Landscape Quality Assessment of South Australia

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Dissertation for Doctorate of Philosophy

Department of Geographical & Environmental Studies
University of Adelaide
2000

I lift my eyes to the hills - where does my help come from?
My help comes from the Lord, the Maker of heaven and earth

Psalm 121:1-2
New International Version

CONTENTS

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Andrew Lothian

14 September 2000

ACKNOWLEDGEMENTS

I acknowledge with sincere appreciation the assistance and encouragement given to me by many individuals over the eight years of preparing this dissertation.

In particular I thank the following:

My family, Cynthia my wife, and Nicholas, Clare and Joy who grew up during the course of the thesis

My supervisors, Associate Professor Nick Harvey, Department of Geographical and Environmental Studies, Dr John Brebner, Associate Professor, Department of Psychology, and Professor Anthony Radford, School of Architecture, University of Adelaide

Bob Willson and Mark Brown of the Computer Complex, Department of Psychology for assistance with SPSS

The librarians of the Barr Smith Library, University of Adelaide, the best library in Adelaide

Dr Ray Correll and Mary Barnes, Division of Mathematics and Information Sciences, CSIRO for statistical assistance

Dr Kym Nicolson, Jason Phillips and Linda Vears, GIS Applications Branch, Planning South Australia for mapping assistance

Jenny Deans, Graham Blair, Colin Harris, Dr Tony Robinson, Brendan Lay, Peter Copley for the loan of slides and photographs

Paul Edstein for editorial assistance

All individuals who participated in the slide rating and scoring sessions

ABSTRACT

The object of this thesis is to provide, through a thorough analysis of human perception and interaction with aesthetics and landscape quality, a comprehensive basis on which to develop a credible methodology for the large-scale assessment of perceived landscape quality.

The analysis of human perception and interaction with aesthetics and landscape quality is gained by inquiring in depth into a range of theoretical constructs from key disciplines, cultural aspects, and empirical studies covering:

- the contribution of philosophers to aesthetics
- the psychology of perception and colour
- the contribution of Gestalt psychology to aesthetics
- the psychoanalytical construct of human responses to aesthetics
- the influence of culture on landscape preferences, tracing the changing perceptions of mountains, the portrayal of landscapes in art, and the design of parks and gardens
- a review of over 200 surveys of landscape quality in the late 20th century, including typologies and theories of landscape quality

Based on the analysis of these and the knowledge gained, an empirical study is formulated and conducted, comprising a study of landscape quality of South Australia, an area of nearly 1 million km^{-1}.

This involves, firstly, the acquisition of data covering the delineation of landscape character regions for the State, photography of these landscapes, derivation of a set of representative slides, and rating of these by groups of participants.

Secondly, these preference ratings are comprehensively analysed on the basis of the attributes of the scenes covering land form, land cover, land use, water bodies, naturalism, diversity and colour.

Thirdly, the results are applied as follows:

- a map of landscape quality of South Australia is derived
- the results are used to predict the effect that changes in land use (e.g. clearance of trees) will have on landscape quality
- the theoretical constructs of landscape quality are evaluated on the basis of the preference ratings
- a protocol is detailed to guide the undertaking of large-scale landscape quality assessment

The thesis thus fulfils the objective of conducting a thorough analysis of human perception and interaction with, aesthetics and landscape quality, to provide a basis for developing a credible methodology for the large-scale assessment of perceived landscape quality.

PREFACE

This thesis represents the fulfilment of a personnal quest, a search for understanding why we humans like beautiful landscapes, indeed, why we can regard landscapes as beautiful.

Originating in bushwalking trips to natural areas in Australia in the 1960s this quest was stimulated by travel in Europe, North America, Israel and New Zealand over the ensuing decades. The following quote from personal notes on a visit to the Lake District in England in 1984 indicates the state of my interest at the time:

> "The lakes are simply superb, delightful and beautiful. I kept asking myself, what is it that makes them so lovely? Is it the variety of colours - the lush green, the mottled hues of trees, the blue lakes, the bright red and purple of the rhododendrons, the yellow buttercups; is it the land form - ever changing, contorted, full of surprises around every corner, different everywhere you look, new and exciting, grassy fields which sometimes look as though they are green felt draped over a skeleton of rocks; or is the hand of man - apparent in the herds of straggly woolly sheep crying out to be shorn, the grey flat stone walls across fields, the delightful little villages surrounded by enclosed fields, and the stands of woods.
>
> "Each one of these elements - land form, land use, and land cover are the elements of landscape and, in the case of the lakes, each on their own would be sufficient to be a beautiful place. Put all three together and you have an outstanding area.
>
> Why is it that we humans seem to like particular scenes though puzzles me. Yet there was no doubt in my mind that the scree slopes, forested with planted softwoods above Thirlmere, just didn't compare with the variety of colour and form, of 'bumpy' fields, of farm animals, of a lakeshore, of Esthwaite or Windermere or Grassmere."

The quest for answers reached a threshold point in the early 1990s in a realisation that, if explanation was to be obtained to achieve personal satisfaction, it would only be fulfilled through a process of rigorous study and inquiry. Hence the PhD.

The personal motivations for the quest are relatively straightforward to discern. In the late 1960s environment management, my real interest, did not exist as a tertiary course. So I trained in urban and regional planning followed by post graduate studies [MSc Environment Resources] in the UK [University of Salford, 1973]. Returning to Australia, I commenced working in the newly formed South Australian Department of Environment and Conservation, the agency responsible for environment management in the mid 1970s.

Working across environmental impact assessment, environmental planning, environment policy development, environmental economics, state of environment reporting, mapping of vegetation clearance, and working across state as well as national issues, I became familiar with, and in many ways contributed to, this process of explanation and management of environmental components.

In the early 1980s I supervised a master's thesis on wilderness conservation in South Australia [Lesslie, 1981] and this triggered a realisation that landscape, like wilderness, was a qualitative aspect of the environment deserving of explanation. If this could be achieved with wilderness in a program of work which later [1995] culminated in mapping of wilderness quality across Australia, I reasoned why could not a similar outcome be achieved for landscape?

Yet attempts at landscape quality assessment were patchy, highly individualistic, statistically unsound in methodology and lacking comparability of technique, let alone reproducible results. Personal involvement included engaging consultants to undertake several landscape studies [Dallwitz, 1977; Sanderson, 1979], examining several theses of landscape surveys [eg Dare, 1978], and reviewing landscape studies in South Australia [Lothian, 1984].

With so much known about the environment compared with the state of knowledge 20 - 30 years previously, yet with landscape quality the one area that defied explanation, the challenge presented itself to resolve. Being able to measure landscape quality; map it and to apply a method at a State-level and then nationally were key goals.

The quest of explanation has taken a somewhat unusual path, to the exasperation initially of my supervisors, but gradually with their understanding and forbearance that this was a personal odyssey to be enjoyed for the journey it provided, rather than for the destination that may or may not be attained. As a mature age student, the interest was definitely in the journey, the explorations of various possible explanatory pathways and alleys that sometimes were blind but worth pursuing nonetheless. The study comprised three distinct parts, reflecting a process of increasing specificity of purpose and these are the parts contained in the thesis.

The first part, the most discursive, tracks across a range of possible explanatory models. Philosophy, it was reasoned, should reveal why humans like landscapes, because beauty has been a subject of philosophers literally for millennia. Psychoanalysis with its understanding of the unconscious should have an explanation of why beauty is appreciated. Theories of perception and Gestalt psychology could surely offer understanding for the perplexed. The influence of culture on human appreciation of landscape was examined for an understanding of whether beauty is merely a cultural contrivance determined by one's cultural upbringing or something more innate. Each of these issues is subject of the exploratory papers in Part One.

Part of this exploration has resulted in the publication of a paper [Lothian, 1999] that synthesised aspects of philosophy and psychoanalysis. More papers are intended to make the fruits of this quest more widely available. By the end of the first part, one is more informed and perhaps wiser about a range of possible explanations of the central question - why humans like landscapes and some pointers for future directions of inquiry emerge.

The second part focuses on what landscape studies can say about human landscape preferences. It covers the underlying constructs or theories on which studies are based, the methodologies that have been developed to measure these preferences, and the findings of the studies. This part is exhaustive in covering over 200 surveys and provides much detailed understanding of the dimensions and characteristics of human landscape preferences.

The third and final part, the application phase, culminates the analysis of the first and second parts, an assessment of landscape quality at a State-wide level. South Australia as a whole was the subject, selected on the basis that if a methodology could work at this scale, then its application nationally would be largely a question of adequate resources, not of some fundamental inadequacy.

The methodology essentially sought to relate human preferences, the dependent variable, with the characteristics of the landscape, the independent variable, and to use this as the basis for mapping landscape quality at a State-wide level. It has involved deriving a map of landscape character for South Australia, photographing the South Australia landscape travelling nearly 20,000km throughout the State, selecting 160 slides for rating purposes and having over 300 respondents rate these in landscape quality terms. Based on this, a detailed analysis of the results was undertaken and relationships between the dependent and independent variables derived; relationships between human preferences and the physical landscape.

The result is a thesis that is believed to go a long way towards fulfilling the original quest. It is not claimed to have fulfilled this in its entirety, inevitably through the long and detailed process involved one is all too aware of shortcomings, of areas where more work is needed, of frustration in not gaining the complete understanding sought. But also the result is a sense of accomplishment, of fulfilment in what has been done. At the end the achievement has been of being more able to answer the question, why humans like landscape?, and to have applied this knowledge to its identification and measurement that can form the basis for its management and protection.

DETAILED CONTENTS

TABLES

FIGURES

ATTACHED CD

The following are located in the CD enclosed with the thesis

Summary
An extensive 23 page summary of the thesis.

Appendixes
Chapter 7

References
The references used in the preparation of the thesis are shown under their relevant chapter headings.

Reference set of scenes

The 160 scenes used in the thesis are shown in a Powerpoint file on the CD. This also displays the distribution graph of preferences for each scene, their means and SDs, locational information and descriptions of the scenes.

Overview

This Powerpoint presentation summarises the methodology and findings of the survey of landscape quality of South Australia.

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Landscape. The very word conjures up images in our mind of past scenes enjoyed, of encounters with the physical world, of sunsets admired, of childhood memories of idealised and romantic scenes of storybook castles on high rocky pinnacles, dark forests and placid streams meandering amidst grassy meadows.

Landscape quality is the subject of this thesis. Its central theme is of inquiry: why is it that certain landscapes appeal to us? What is it about landscapes that convey attraction, beauty, interest, even love of a scene? It examines the question, is there something inherent in the landscape that appeals or is it something in us which responds to the landscape? Educationists speak of nature or nurture, the role of genetics vs environment in determining human behaviour. In the context of landscape, does the locus of its appeal lie before or behind our eyes?

In this chapter a foundation is laid. The term *landscape* is defined and differentiated from other terms such as scenery and aesthetics. A taxonomy of aesthetics is described and a model of human interaction with landscapes is introduced. A plan for the thesis is outlined.

One writer on aesthetics, a psychoanalyst, remarked on the motivations of those who seek to understand beauty:

> "It seems that the problem of beauty is one of those [experiences] which are apt to become more obscure by explanations. The countless theories which have been created around it are mountains of bootless endeavor, monuments of the unrewarded toil of centuries. This, instead of working as a deterrent, has added a strong fascination to the quest, it stimulates the undying wish-fantasy of being the hero to whom it is reserved by a special favor of fate to succeed where all predecessors have failed, to penetrate the labyrinth of tangled logic and rescue the pure virginal truth from the monster which has held it in durance. The present attempt, although it tries to find shelter behind the traditional forms of scholarly modesty, is in this respect no better than it should be." [Sachs, 1951, 148].

Sachs' comment lays bare the hidden motives which can induce one to initiate this research however, as outlined in the preface, my motives derive from an environmental ethic.

1.2 DEFINITIONS

Consultation with dictionaries suggest two broad meanings of the term "landscape"; firstly, *a view or a prospect of inland scenery that can be comprehended from a single viewpoint***,** and secondly, *a picture or sketch of the same*. Interestingly, the definition excludes the sea but dictionaries are silent on whether it excludes rivers and lakes as well on the basis that these features are not *land*scape but waterscape.

Significantly the definition combines both the physical scene and the viewer who sees it, the viewer defining from their viewpoint that portion of the entire scene that comprises the landscape. The viewer may also render an interpretation of what they see in the form of a picture, thereby providing a record of the landscape from that position. The second definition does not include photographs which can be used to interpret the landscape. The definition thus includes both the perception and interpretation of the landscape.

The term *landscape* in this thesis has the above meaning but with the inclusion of water, whether in the form of a river, lake or the sea. The only proviso being that the land should provide the visible context for the water; i.e. a scene of the sea or a lake without land being visible would not be considered to be a landscape. The inclusion of land, however, regardless of its extent in the scene, will be sufficient for it to be considered landscape.

1.3 ORIGINS OF *LANDSCAPE*

The etymology of the term *landscape* has been researched extensively in the literature. It is believed by some that the terms *landskift, landscip*e or *landscaef* entered Britain some time after the 5th century [Calder, 1981, 6; Jackson, 1986, 65; Mikesell, 1968, 576; James 1934, 78]. These terms referred to a system of human-made spaces in the land - spaces such as fields with boundaries though not necessarily defined by fences or walls. It also referred to a natural unit, a region or tract of land such as a river valley or range of hills as occupied by a tribe or later, ruled by a feudal lord. The term is similar in meaning to the German *landschaft* referring to a small administrative unit or region. The term fell into disuse and by the time of the Doomsday Book in the 11th century the word did not appear in any translation from the Latin.

The modern form of the word with its connotations of scenery appeared in the late 16th century when the term *landschap* was introduced by Dutch painters when referring to paintings of inland natural or rural scenery. According to Jackson: "From 1577 with Harrison's *Description of Britain* onwards, a new awareness of the aesthetic nature of landscape emerged as a new kind of topographical writing flourished..." [1986, 80]. Originally the term was translated *landskip* which the Oxford English Dictionary (OED) refers to as the corrupt form of the word, gradually to be replaced by *landscape*.

Following a lengthy analysis concentrating on the German term *landschaft*, Hartshorne [1939, ix] defined landscape as referring to "the external, visible, (or touchable) surface of the earth. This surface is formed by the outer surfaces, those in immediate contact with the atmosphere, of vegetation, bare earth, snow, ice, or water bodies or the features made by man."

Hartshorne differentiated the term from *region* which he considers is larger and more flexible in size. He eliminated sky on the basis that the atmosphere is simply the medium through which the earth's surface is viewed and also excludes underground mine workings, the soil beneath vegetation and rainfall. However he includes moveable objects noting that a view of Broadway without traffic would be incomplete. He ignored the inclusion of oceans in landscape. He opposed perception of landscapes by other than sight, e.g. sounds and odours, on the grounds that these do not contribute to a unified concept. In regard to the concept of natural and cultural landscapes that Sauer among others differentiated, he stated "the natural landscape ceased to exist when man appeared on the scene" [Ibid, 171]. While admitting the term *primeval landscape* could refer to pre-human landscapes he considered the present *natural landscape* is "a theoretical concept which never did exist" [Ibid, 173].

During the 1920s and 1930s, attempts were made to construct methodologies that made landscape the essential if not exclusive task of geography [Mikesell, 1968, 576]. This stemmed from Carl Sauer's view that the role of geography was to systematically examine the "phenomenology of landscape". Sauer viewed landscapes broadly as areas comprising distinct associations of forms, both physical and natural, and regarded landscape study as tracing the development of natural landscapes into cultural landscapes.

By the 1940s, this emphasis had passed as geographers found that the difficulties associated with reconstructing the past were forbidding and at odds with their primary concern with the present world. The concept of a *natural* landscape became increasingly questioned with knowledge of human impact on the environment. More recent geographers have addressed the subjective attributes of a place within humanistic geography [Tuan, 1976] thus crossing the bridge between the objective and the subjective assessment of an area.

The popular conception of the *landscape* that is reflected in dictionaries conveys a particular and a general meaning; the particular referring to an area of the earth's surface and the general meaning being that which can be seen by an observer.
With greater attention to the environmental perception by psychologists over recent

decades, landscape is regarded as the raw material with which to study human perceptions and the human processing of information. Thus Daniels & Cosgrove [1988, 1] defined *landscape*, not in physical terms but as an outward expression of human perception: "a landscape is a cultural image, a pictorial way of representing, structuring or symbolising surroundings." Meinig combined the physical and the psychological: "any landscape is composed not only of what lies before our eyes but what lies within our heads." [1976, 47].

In recent decades the term *environment* has gained wide usage. Appleton distinguished *environment* from *landscape* by referring to the latter as "the environment perceived". An advantage which the term environment has over landscape is, as Bourassa noted [1991, 9], that *environment* can refer more readily to urban scenes although the term *urban landscape* is also in common usage. As the term *environment* embraces the total physical, biological, cultural and aesthetic components of an area, it is generally regarded as too broad and encompassing a term for landscape.

The terms *scene*, *scenic* and *scenery* are inadequate descriptions of landscape. With its roots in the theatre where a scene describes a portion of a play, so a scene can describe a portion of a landscape. *Scenery*, which describes the decorative backdrops used on a stage, also refers to the general appearance of a place, particularly a picturesque view. While it can be used interchangeably with *landscape* it does not convey the same depth of meaning.

The term *landscape aesthetics* or just *aesthetics* is frequently used in the literature. Aesthetics has a more controversial origin than landscape. It derived from the Greek *aisthesis* meaning "sense perception". The term was used as the title of the book *Aesthetica* [1750-58] by Alexander Baumgarten [1714 - 62], a minor German philosopher who incorrectly applied the Greek term to a critique of the beautiful or the theory of taste. Thus the term which originally applied to the broad field of sense perception was restricted to the area of taste. Immanuel Kant in 1781 criticised this use and applied it in accordance with its classical meaning "the philosophy of sensuous perception" [ODEE, 1966, 16]. However, the corrupted term *aesthetics* gained popular acceptance entering England after 1830 and, according to the OED, within a century of the coining of the meaning by Baumgarten, it was in use widely throughout Europe.

The dictionary definition of *aesthetic* perpetuates Baumgarten's error and defines it as "things perceptible by the senses as opposed to things thinkable or immaterial" [Shorter Oxford, 1973], "pertaining to the sense of the beautiful or the science of aesthetics" [Macquarie, 1981], or "of, relating to, or dealing with aesthetics or the beautiful" [Websters, 1973]. *Aesthetics* is regarded as a branch of philosophy, that which "deduces from nature and taste the rules and principles of art, the theory of the fine arts; the science of the beautiful..." [Macquarie] or "[that] dealing with the nature of the beautiful and with judgements concerning beauty" [Websters].

Thus landscapes have often been the subject of inquiry within the broad framework of aesthetics in the quest for understanding of beauty.

1.4 WHY EVALUATE LANDSCAPE QUALITY?

While the concept of landscape quality emerged over many centuries, there can be no doubting that it resonates with human appreciation of beauty as expressed in art, sculpture, architecture, dance and other forms. These are human created forms of beauty while landscape beauty derives from the natural and human elements the landscape contains.

Evaluation of landscape quality is therefore motivated by a desire to understand, firstly to understand <u>what</u> humans appreciate in landscapes, and secondly, to understand <u>why</u> they have this reaction to a physical scene. This thesis focuses primarily on what humans appreciate, though passing some comments on why this is so.

But there are more utilitarian reasons for evaluating landscape quality. Some authors [eg Buhyoff, Wellman, Harvey and

Fraser, 1978, 255] have identified legal requirements, particularly the US National Environment Protection Act 1969 which requires Federal agencies to “identify and develop methods and procedures that presently unquantified environmental amenities and values may be given appropriate consideration in decision making …” (Sec 102b).

Change to the English landscape has provoked considerable concern [eg Leonard, P.L. & Cobham, R.O., 1977 The farming landscapes of England and Wales: a changing scene. *Landscape Planning*, 4:205-236] and evaluating landscape quality may provide the ammunition to combat further change.

A comprehensive set of reasons and needs to evaluate landscape has been defined by Kane [1981, 78]:

1. to help establish priority lists of sites and regions that should be preserved as part of our natural [national?] heritage;
2. to provide a means of aesthetically comparing sites and regions so that, if desired, human impact can be used to advantage or guided into the least attractive areas;
3. to help monitor deterioration of landscape quality for specific places, by means of periodic evaluations;
4. to provide a means of carrying out ‘before and after’ studies in order to gauge the impact of particular kinds of human activities and alterations;
5. to define and isolate the perceptual factors and physical-landscape components that are important in environmental perception and, if desirable or necessary, to be able to itemize *why* a particular landscape is or is not aesthetically pleasing;
6. to collect data on landscape preferences from different cultures and from diverse subpopulations (eg male/female, young/old, travelled/untravelled) so as to better understand technique theory, the working of our senses, the differences between various societal groups, and the biases of our cultures;
7. to satisfy a growing body of environmental law in many countries [cites the US NEPA 1969]

Kane’s first reason underlay a decision by the Australian Council of National Trusts in 1975 to encourage State Trusts to undertake landscape classification so that areas could be included on the Trust’s lists of significant landscapes [McBriar, 1977, 4].

1.5 CLASSIFICATION OF AESTHETICS

The literature of aesthetics covers a wide range of objects that are the subject of an aesthetic experience. Figure 1.1 proposes a taxonomy of aesthetics that differentiates natural and human objects. The taxonomy provides a context for landscape aesthetics.

Natural objects cover the natural environment, human forms (and animal forms) and landscapes. However while each of these are natural in origin (i.e. the basis of their aesthetic attractiveness is not human created), each has been modified by human influence - e.g. the emphasis on beauty aids by many womens’ magazines. The aesthetics of human creation covers tangible objects and conceptual phenomena such as music and literature. Objects include landscaped gardens, such as those created by Capability Brown in England in the 18th century. These gardens are often regarded, through human inguenity, as of a natural appearance, thus providing a bridge between the two main categories of nature and human creation. It is as if the highest form of artificial creation is to appear natural.

1.6 MODEL OF HUMAN-LANDSCAPE INTERACTION

A model of the interactions between humans and landscapes is proposed which identifies five key components [Figure 1.2]:

1. <u>theory</u> - theoretical constructs which can provide a rationale for the research
2. <u>techniques</u> - methodologies which assist in researching human perception of landscape
3. <u>observer</u> - the characteristics of the human observer
4. <u>mode of presentation</u> - the manner by which the landscape is observed, whether in the field or by surrogates [e.g. photographs]

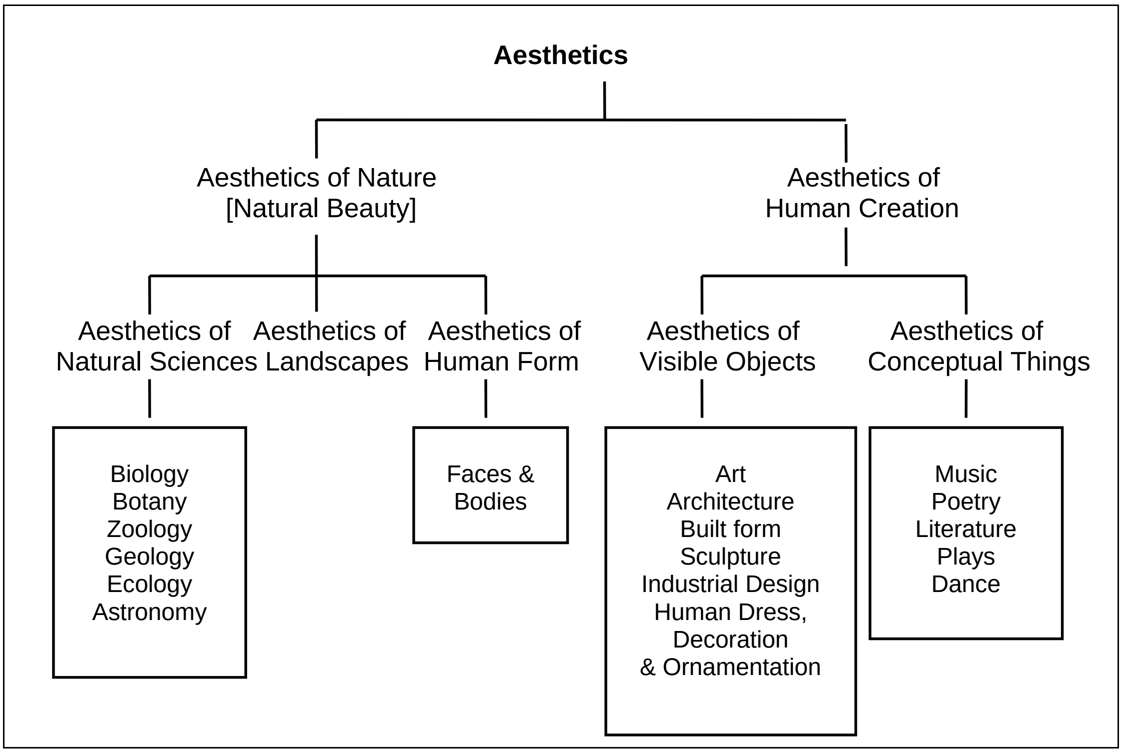


Figure 1.1 A Taxonomy of Aesthetics

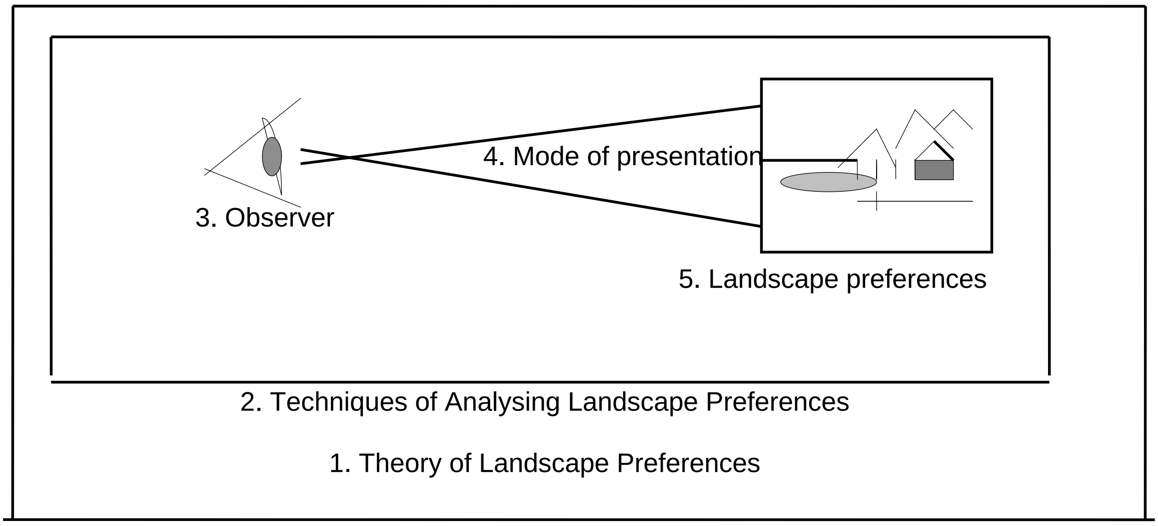


Figure 1.2 Model of Human – Landscape Interaction

5. landscape preferences - the preferences for different components of the landscape [e.g. trees, water, mountains]

Each of these is examined in the thesis:

1. theory – Sections 7.3, 8.2
2. techniques - 7.4, 9.4
3. observer characteristics – 7,4, 8.3
4. presentation mode – 7.4, 8.4, 9.3
5. landscape preferences –7.4, 8.4

In addition, Chapter 10 covers many of these aspects in the empirical study.

1.7 HYPOTHESIS FOR THESIS

Building on the taxonomy of aesthetics, this thesis aims to derive insights from a range of relevant disciplines of how people perceive and interact with aesthetics and landscape quality. The knowledge gained will then be used in framing and conducting an assessment of landscape quality.

The hypothesis formulated to guide the thesis is:

> *To provide, through a thorough analysis of human perception and interaction with aesthetics and landscape quality, a comprehensive basis on which to develop a credible methodology for the large-scale assessment of perceived landscape quality.*

The study of aesthetics and landscape quality needs to appreciate fully the philosophical, psychological and cultural roots of the subject and draw from these in formulating surveys of landscape quality. This thesis will therefore approach the subject holistically through analysing the contribution of the disciplines of philosophy and psychology, and through the cultural paradigm.

It involves analysing:

- how philosophers have sought to understand beauty in general and aesthetics in particular
- the findings of psychologists of human perception, and the formulation of theoretical models to explain perception
- digging deeper under the surface of the human psyche to gain from the insights of psychoanalysts of their understanding of the underlying motivations and influences on human aesthetic preferences

It also involves drawing on a wider canvas, the interaction of culture and landscape, focusing on Western culture in particular.

Analysing human interaction with landscape quality extends to the studies of landscape quality that have been undertaken over recent decades and of the theoretical frameworks that have been developed to comprehend the perception of landscape quality.

These components will provide understanding of human perception of, and interaction with, aesthetics and landscape to provide the logical foundation for developing the method.

The object of the hypothesis involves the development of a credible methodology to assess landscape quality at a large-scale. This is a tangible undertaking and needs to be guided by explicit criteria. The following six criteria are established which need to be fulfilled in order for this part of the hypothesis to be accomplished:

1) be replicable, statistically rigorous and defensible
2) reflect the preferences of the community
3) identify the relative importance of components of landscapes for preferences
4) enable mapping of landscape quality at a State level
5) provide the basis for a methodology which could be applied nationally
6) be practicable

The first criterion addresses the need to ensure that the methodology of landscape quality assessment is scientific in the sense of being replicable, is credible in its statistical design and execution, and its results can be defended in a court if necessary. The second criterion derives from the premise that as landscape quality is a subjective quality it is assessable only through involvement of the community; it is not possible to assess landscape quality based on a formula of the physical characteristics of the landscape without reflecting community preferences.

The third criterion aims to achieve a comprehensive understanding of the influences on landscape preferences and of their relative importance. The fourth criterion involves a practical output of the study, to derive a map of landscape quality at a state-wide level. This leads to the fifth criterion of ensuring that the methodology can be applied to assess landscape quality at a national level across Australia. Finally the methodology needs to be practicable in the sense of being readily achievable, not necessitating a large expense, and being able to be accomplished with a minimum of resources.

It is taken as axiomatic, but nevertheless needs to stated explicitly, that references to landscape quality throughout this thesis is a short-hand reference to landscape quality as perceived.

1.8 PLAN OF THESIS

The thesis comprises three distinct parts: Part One provides a theoretical context; Part Two examines landscape studies over the past century; and Part Three presents the development of large scale landscape quality assessment using South Australia as the test area [Figure 1.3]. The analyses in Parts One and Two provide the basis for Part Three.
Part One contains five chapters that analyse the contributions of various disciplines on understanding aesthetics. It commences with the philosophy of aesthetics examining the contribution of philosophers over millennia. This is followed by chapters on Gestalt psychology of aesthetics, an early psychology of perception, and then a broader chapter on perception which examines various models of perception. This chapter also examines the perception of colour. The following chapter analyses the contribution of psychoanalysis to aesthetics. The final chapter of this part moves from disciplines to culture, and traces the interaction of culture and landscape. This is examined through three case studies of mountains and landscape, art and landscape, and garden design and landscape.

Part Two comprises two chapters tracing the research into landscape aesthetics during the twentieth century and summarising the findings of these studies. The analyses contained in Parts One and Two provide the understanding to formulate the survey contained in Part Three.

Part Three presents a study undertaken of the landscape quality of South Australia directed to the development of a methodology for large -scale landscape quality assessment. A chapter describes how the data was acquired and the following very extensive chapter analyses the data. The application of the results is discussed in the final chapter. Discussion and conclusions complete the thesis.

	Chapter
	1. Introduction
	2. Philosophy of Aesthetics
Part One	3. Gestalt Psychology
	4. Perception and Colour
	5. Psychoanalysis and Aesthetics
	6. Culture and Landscape
Part Two	7. 20th Century Landscape Studies
	8. Findings of Studies
	9. Acquiring the Data
	10. Analysis of Preferences
	11. Applying the Results
Part Three	12. Discussion and Conclusions

Figure 1.3 Outline of Thesis Structure

CHAPTER TWO

PHILOSOPHY OF AESTHETICS

2.1 INTRODUCTION

Humans have long asked the questions like "what is beauty?", " why is a scene beautiful?", "what is the nature of the aesthetic experience?". Questions of aesthetics have occupied many philosophers, although less so today than in the past.

Philosophy is a search for ultimate reality. It aims to identify and describe; it does not seek to explain which is the purpose of science. Philosophy undertakes conceptual investigat-ions [*a priori*], in contrast again with science, it does this independent of experience. An *a priori* concept may be validated through experience. Philosophy has three main areas of enquiry: methodology, - which covers the theory of knowledge and logic; metaphysics, which is the theory of the nature and structure of reality; and the theory of value. The theory of value addresses three ultimate values: truth, goodness and beauty.

Aesthetics has been a subject of philosophy since at least the time of Socrates. Up to the 18th century the focus was beauty but following Baumgarten's invention of the term 'aesthetics' in about 1750, philosophy then broadened its inquiry to encompass this more inclusive term.

Philosophers distinguish between the *aesthetic object, the aesthetic experience* and *the aesthetic recipient*. The object stimulates an experience in the recipient. This is identical with the human-landscape interaction model [Chapter 1].

Landscape is but one of many aesthetic objects.These include music, art, sculpture, human faces, architecture, poetry and natural objects. Philosophers seek to identify the common principles operating on and determining the nature of the aesthetic experience.

A judgement is made about the scene, that *it* is a beautiful scene. The observer attaches a quality to the scene that, in the objective sense, it does not possess. It may comprise soil, rocks, hills, valleys, rivers, fences, houses, trees and animals but no-where does it possess a feature called 'beauty'. Beauty is expressed as if it is a tangible quality of the scene. The judgement made is represented as being objectively valid. This judgement is not based on any rational part of our consciousness, no assessment or analysis of the scene is made against some standards of beauty. The judgement is immediate and complete. It is solely a subjective statement. This paradox between subjectivity and aesthetic judgement is one of the issues with which philosophers have grappled.

The philosophy of aesthetics reflects the contributions of individual philosophers, building on that which has preceded them and developing new concepts and ideas. A characteristic of their writings is their tortuous complexity. Philosophers deal with ideas that generally take considerable space to develop in their own jargon.

Philosophers have often spent lifetimes thinking and discussing issues, analysing cases and postulates, reviewing the contributions of other philosophers. The summary of the life's work of many individuals which is presented here scarcely scratches the surface of the depth of analysis and comprehension of the issues they addressed. It is akin to flying across a range of high mountains and viewing only the top few metres of each, ignoring the thousands of metres providing their foundation and enabling them to project that far. This review cannot do justice to the work of these individuals, nor is it intended to provide any more than an overview of the points most salient to the aesthetics of landscape.

2.2 CLASSICAL PHILOSOPHY OF AESTHETICS

About 200 years before Plato, a possible reference to beauty occurred in Homer's Illiad [XVIII, 548] where the shield of Achilles was described as "a marvellous piece of work !", which suggests an aesthetic judgement.

There are few records of philosophers prior to the era of Plato [427 - 347 BC]. Socrates [469 - 399 BC] believed it desirable for youth to dwell amongst beauty and thereby be influenced for the better, thus linking beauty and morality.

Plato was more concerned with the organisation of the state than with aesthetics and, as a result, approached the subject from the viewpoint of its role in relation to the citizenry. Plato regarded art as the imitation of reality, thus laying the foundation for later philosophers who view art as expression, the key being that poets and artists alike aim to capture the form or essence of the object.

Plato, like Socrates, viewed beauty as having a moral influence. However, while Socrates argued that whatever is useful and efficient is beautiful, to Plato beauty indicated eternal values. He postulated a progression of beauty - beauty of the human body, of the mind, of institutions and laws [his ideal state], of the sciences [i.e. philosophy], culminating in absolute beauty itself, which is outside of time and space - transcending the visible world. Order and proportion were essential elements of beauty.

Plato considered that beauty is either contained by certain properties of an object [the definist theory] or it is indefinable but makes itself evident in the internal unity of the object [the nondefinist theory]. Such internal unity produces beauty only if unity in variety is present together in an object. While aware of the likelihood of disputation over what is beautiful, Plato considered objects to be beautiful intrinsically because they are "always beautiful in their very nature". Objects cannot be "fair in one point of view and foul in another, or at one time or in one relation or at one place fair and at another ...foul"; in other words beauty is absolute, not relative.

Aristotle [384 - 322 BC] further developed Plato's theory of imitation in three senses: for moral education, for catharsis [i.e. purgation] and for character formation. He believed that Plato's idealised forms of beauty were immanent in tangible objects. According to Aristotle, beautiful objects, had to be of a certain size, neither minute nor vast, in order that their unity and wholeness could be appreciated by the observer.

2.3 EARLY CHRISTIAN ERA

Plotinus [204 - 269 AD], a neoPlatonist Roman born in Egypt, rejected the Stoic view that beauty was based on a formalism derived from symmetry. Plotinus argued that both a live face and a dead face may be equally symmetrical, but only the live face would be considered beautiful. Rather, he saw beauty as "that which irradiates symmetry rather than symmetry itself". Beauty does not derive from any single aspect of the object but from the total object. He used the term "ideal-form" (e.g. a block of stone is transformed by a sculptor into an ideal-form). In experiencing beauty, the individual finds an "affinity" with the object, thereby participating in the ideal-form and its divinity. Thus the observer becomes beautiful and divine. This idea laid the basis for mysticism and romanticism in aesthetics.

Plato's idea of idealised beauty was regarded by Augustine [354 - 430 AD] as existing in the mind of God and given to the observer by Divine illumination, thus relating beauty to religion. On this basis, beauty is not relative but a constant. The concepts of unity, number, equality, proportion and order were central to Augustine's aesthetics. He considered that the unity of an object derived from its order and proportion. He distinguished between the beauty of an object that forms a whole and beauty that derives from being part of a whole.

Thomas Aquinas [1224-74] considered beauty to be a subset of goodness. Beauty derived from three factors: "integrity or perfection", "due proportion or harmony" and "brightness or clarity", the latter interpreted as symbolising, through light, divine beauty. During the Middle Ages, theologians came to believe that, as God had created the world *ex nihilo*, therefore the visible world displayed signs of its Maker: "For since the creation of the world God's invisible qualities - his eternal power and divine nature - have been clearly seen..." [Romans 1:20]. Bonaventure [c1217 - 74] regarded nature as the "mirror of God", displaying His perfection to varying extents. The origins of the 18th century natural theology school may be traced to these views [See Chapter 6].

2.4 RENAISSANCE

With the Renaissance's interest in the classics of Greek and Rome, many Academies reduced their ideas about beauty to "rules" based on the eminent authorities of antiquity. Marsilio Ficini, the founder of the new Academy in 1462 developed the theory of contemplation based on Plato. He believed that, while contemplating the various stages of Platonic forms, the soul withdraws somewhat from the body and only in this state can beauty be experienced. Alberti [1404 – 1472] the architect, considered beauty to derive from an order and arrangement such that nothing could be changed except for the worse, a relativist viewpoint.

2.5 MODERN PHILOSOPHY OF AESTHETICS

Cartesian rationalism, derived from the works of Rene Descartes [1596 - 1650], and was influential in aesthetics, although he wrote nothing about the arts. Instead, he argued for the role of reason - "clear and distinct ideas" in establishing truth, and that knowledge advanced through building on one truth to reach another. Intuition and deduction are sources of truth, intuition being "the undoubting conception of an unclouded and attentive mind ...[that] springs from the light of reason alone" [Beardsley, 1966, 141] and deduction being a logical chain of intuitions. Descartes' method had universal application, being highly influential in aesthetics as well as in other areas of philosophy.

Modern aesthetics developed after the end of the 17th century in two centres, Britain and Germany - British empiricism contrasting with German aesthetic idealism. Francis Bacon in England in the early 17 th century had provided the empirical foundations in his work on beauty and deformity in the human figure. The 18 th century saw aesthetics established into an autonomous area of philosophy. The issue of taste in aesthetics and the search for the underlying explanations of beauty were the focus of the British empiricists.

2.6 BRITISH AESTHETICIANS

During the 17 th and 18 th centuries, the British empiricists, John Locke [1632 - 1704], Bishop George Berkeley [1685 - 1783] and David Hume [1711 - 1776] addressed aesthetics as a key question in philosophical inquiry. Called 'empiricists', because they sought to demonstrate that human knowledge derived from experience rather than deduction, they argued that "the mind at birth is a blank slate, a *tabula rasa*, upon which experience 'writes' through the sensations received." [Rock, 1984, 9]. In 1651, Thomas Hobbes wrote "There is no conception in man's mind which hath not at first, totally or by parts, been begotten upon the organs of sense." [Rock, 1975, 13].

The empiricists addressed issues such as the mind-body problem, the nature of external reality, the general issue of how knowledge is gained, and how do we see forms, questions in which visual processes are central and which occupied the philosophers then as they do today [Uttal, 1983, 27]. There were three basic ideas in British empiricist philosophy [O'Neil, 1977, 3]:

- phenomenalism: a relation exists between the stimuli of the physical world and the sensory experience
- elementarism: complex sensory experience could be analysed into basic elements - i.e. not further decomposable
- associationism: elementary experiences were combined through a learning process of association.

John Locke [1632 - 1704] laid a foundation for British philosophy with his work on knowledge, ideas, language and government. He made the distinction between primary and secondary qualities, the former including solidity, extension, motion and number and being "utterly inseparable from every particle of matter" the latter including colours, smells, tastes and sounds "which in truth are nothing in the objects themselves but powers to produce various sensations in us by their primary qualities" [Hamlyn, 1987, 172]. Locke asserted the difference was based on science, which had been able to deal with primary qualities but not the secondary. Beauty can reside objectively in an object insofar as beauty comprises the object's primary qualities but, insofar as beauty is evident in the object's secondary qualities, beauty is a subjective quality. Although rather confused, the distinction Locke makes between beauty residing in the object or in the eyes of the beholder became a key question for philosophers over the coming centuries.

Anthony Ashley Cooper [1671 - 1713], the Third Earl of Shaftesbury, envisioned a harmonious world created by God. Believing that human taste favoured things which are both pleasing and for our good, Shaftesbury [as he was known] linked aesthetics with a moral sense and was thus influential in establishing aesthetics and ethics as key issues for philosophy -

> "..the most natural beauty in the world is honesty and moral truth. For all beauty is truth. True features make the beauty of a face; and true proportions the beauty of architecture; as true measures that of harmony and music ... A painter...understands the truth and unity of design; and knows he is even then unnatural when he follows Nature too close, and strictly copies Life." [Shaftesbury, in Hofstadter & Kuhns, 1976, 240-1]

Shaftesbury regarded the association of ideas as critical in the aesthetic experience and also emphasised the immediacy of the human perception of beauty. His identification of the aesthetic attitude of disinterestedness laid the basis for Kant's later development of this key concept. And, with his love of wild nature, Shaftesbury preceded the 18th century's interest in the sublime as an aesthetic concept distinct from beauty.

The Scottish philosophers, Frances Hutcheson [1694 - 1746] and Joseph Addison [1672 - 1719] built on Shaftesbury's work. Both regarded beauty as residing in the object. In 1725, Hutcheson published *Inquiry Concerning Beauty, Order, Harmony and Design*, the first modern treatise on aesthetics. Beauty, he argued, results when certain qualities are present in objects, these qualities being "a compound ratio of uniformity and variety: so that where the uniformity of bodys [sic] is equal, the beauty is as the variety; and where the variety is equal, the beauty is as the uniformity" [Beardsley, 1966, 186], thus providing an absolute basis for aesthetics. Addison regarded aesthetic taste as a function of three qualities: sublimity, novelty and beauty.

William Hogarth, a painter, published *The Analysis of Beauty* in 1753, one of many such books of the time that attempted to provide a definitive system to define beauty. He believed linear beauty is produced by six qualities: fitness, variety, uniformity, simplicity, intricacy, and quantity or size. He produced a wavy line that is "the line of beauty" and a three-dimensional serpentine equivalent, the "line of grace", by which, according to Beardsley, grace is added to beauty [Ibid, 192]. Although Hogarth's proposals were ridiculed, they had an influence on later writers. Hogarth introduced the term "serpentine line" which he believed explained beauty in objects.

David Hume [1711 - 76], rejected the objectivist view of aesthetics of Shaftesbury, Hutcheson and Addison. For Hume, beauty resided not in the objects but in the mind.

> "Beauty is no quality in things themselves. It exists merely in the mind which contemplates them, and each mind perceives a different beauty." [Beardsley, 1966, 190]

Rather than look for beauty in the nature of the objects, Hume looked to "the constitution of our nature, by custom, or by caprice"; thus beauty was a function of the characteristics and preferences of the human observer and of the customs of their culture. Hume's major contribution was in arguing for a standard of taste developed through experience, education and sensitivity to aesthetic qualities.

The final significant British aesthetician of the 18th century, Edmund Burke [1729 - 97] was possibly the most important. In 1757 he published *A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful*, a work that influenced aesthetic thought well into the next century and beyond. Burke’s book has been described as signalling the point at which English aesthetic taste changed from classical formalism to romanticism [Cranston, 1967, 429].

Burke differentiated the aesthetic judgement concerning beauty and the sublime; beauty originates with our emotions, particularly in our feelings towards the opposite gender, while the sublime originates in nature and our feelings towards it. He defined beauty as "love without desire" which derives from objects that are small, smooth, gently varying, delicate - all attributes of female beauty, indicative of Hogarth’s influence. Beauty was not defined by the properties of harmony, proportion, utility etc, rather these properties resulted in the human experience of beauty.

Sublimity involves emotions of great intensity - "astonishment without actual danger". Qualities which can be sublime include darkness, privation and emptiness, uncertainty, confusion, obscurity, vastness approaching infinity, qualities which contrasted traditional aesthetic standards of harmony, proportion, clarity, and so on. A degree of terror, controlled as when looking over the edge of a high cliff or inside a dark cave and filling the mind with what is before it, epitomise the sublime. Even ugly objects could be a source of aesthetic interest, thus paving the way for the 19th and 20th century expressionist movements in art which seek to provoke emotional reaction, not necessarily beauty in the classical sense. Beauty contrasts with sublimity but they are not opposites in the sense that the sublime is ugly. Rather it is an aesthetic experience of a different kind, indeed Burke suggested that the ugly can be the subject of aesthetic appreciation. Burke regarded sublimity as more important than beauty.

Burke and Hume therefore viewed beauty as the observer’s response to certain properties in the object; yet these do not define beauty, they only provide the conditions for its perception by an observer. It was demonstrated that many of the properties thought to engender beauty in an object, properties such as unity, proportion, uniformity and variety, utility or fitness - were present in many objects, not all of them considered beautiful [Stolnitz, 1961, 197]. Moreover Burke and Hume showed that the "unity in variety" formula lacked content and applied to many objects. Alison examined the various "principles" and found none acceptable. He wrote "These principles are true to a certain extent, though I believe also, that they have arisen from a partial view of the subject." [A. Alison, 1790. *Essays on the Nature and Principles of Taste*, quoted by Stolniz, 1961, 200] By the end of the 18th century it was concluded that it was altogether impossible to find properties which were common and peculiar to beauty.

2.7 GERMAN PHILOSOPHERS

The British aestheticians were essentially amateurs - "gentlemen of leisure addressing amateurs" but the German philosophers "were university professors, addressing learned audiences" [Russell, 1961, 677].

(1) Kant

Immanuel Kant [1724 - 1804], the first of the great German philosophers, "is the great giant of 18th-century philosophy, and arguably the great giant of philosophy in general." [Hamlyn, 1987, 217] "Kant, like all the very greatest figures in human culture, sums up a past age and inaugurates a new one." [Hofstadter & Kuhns, 1976, 277]. Bertrand Russell was a little more circumspect: "Kant is generally considered the greatest of modern philosophers. I cannot myself agree with this estimate, but it would be foolish not to recognise his great importance." [Russell, 1961, 677].

With eulogies such as these it is evident that Kant's influence was great indeed. He was born and lived all his life in Konigsberg then in Prussia [now Kalingrad in Poland] on the border with Lithuania. He remained a bachelor and by all accounts lived an eventless life as professor of logic and metaphysics in the university.

In 1764 Kant published *Observations on the Feeling of the Beautiful and the Sublime* about which Russell wrote:

> "Like everybody else at that time, he wrote a treatise on the sublime and the

beautiful. Night is sublime, day is beautiful; the sea is sublime, the land is beautiful; man is sublime, woman is beautiful; and so on." [op cit, 679]

Kant acknowledged that the sublime involves an experience with some infinite or boundless greatness that overwhelms the observer. He considered, however, that nature does not contain anything that is boundless but does involve formlessness. The importance of the sublime to Kant is that it incites the mind "with ideas that involve higher purposiveness" beyond the normal senses [Hamlyn, 1987, 241]. To Kant "the sublime *moves*, the beautiful *charms*" [McCloskey, 1987, 19].

In 1781 Kant published his major work, *Critique of Pure Reason*. He revised this in 1787 and followed it in 1788 with *Critique of Practical Reason* and, in 1790, with *Critique of Judgement*. The latter contained his ideas on aesthetics. Kant regarded humans as having three modes of consciousness - knowledge, desire and feeling. The first book dealt with knowledge, the second with desire and the third with feeling. His third critique contributed fundamentally to aesthetics, indeed its opening part is considered to be *the* classic work in aesthetics [Hamlyn, 1987, 241].

Focusing on philosophical aesthetics, Kant's contribution was in going forward, from the empirical analysis of previous philosophers, to the recognition of the aesthetic as a "domain of human experience equal in dignity to the theoretical and the practical (i.e. the cognitive and the moral)." [Hofstadter & Kuhns, 1976, 278]

Kant argued his case regarding aesthetics by a series of four "moments" or theses, each of which develops sets of arguments. He summarised the findings of each:

- First Moment *Taste* is the faculty of judging of an object or a method of representing it by an *entirely disinterested* satisfaction or dissatisfaction. The object of such satisfaction is called *beautiful.*

- Second Moment The *beautiful* is that which pleases universally without requiring a concept [i.e. reason].

- Third Moment Beauty is the form of the *finality* [or *purposiveness*] of an object, so far as this is perceived in it *without any representation of a purpose*.

- Fourth Moment The *beautiful* is that which without any concept is cognized as the object of a *necessary* [i.e. universal] satisfaction [or delight].

The four moments may be summarised as relation, quantity, quality and modality (i.e. necessity) [Beardsley, 1967, 27].

The First Moment

The first moment contains two important ideas: the notion of the mind's <u>representation</u> of the object and the principle of <u>disinterestness</u>. The aesthetic experience involves the reception by the mind [the noumenal world] of an imaginative representation of the phenomenal world. The mind is not concerned with the object *per se* but with the mind's representation of the object. "It is the object *as experienced* which exhibits beauty" [Zimmerman, 1968, 386] - thus addressing the debate of the earlier aestheticians of whether beauty rests in the object or in our mind. "Kant shows that beauty, which at first sight seems to be an objective property of a beautiful object, is in reality a human valuation of it." [Goldman, 1967, 184].

Because it is a judgement of taste and not of cognition, i.e. aesthetical rather than logical, it is inherently subjective. Thus the aesthetic qualities of objects exist only subjectively. It follows that the existence of the object is of no consequence - if it were mere illusion the aesthetic experience would remain the same. Its existence may of course be a practical and moral issue, but these considerations are not aesthetic in nature.

This leads to the principle of disinterest. The presence of interest in an object is of practical or moral significance, but not of aesthetic significance. Disinterest means an absence of desire for the representation of the real existence of the object, and that it does not engender a want in relation to the object. Only by disinterest, is it possible to have a free, pure aesthetic experience, uncorrupted by existential concerns.

The role of the imagination in the mind's representation of an object is vital. Imagination is free and without interest. Aesthetic judgement is distinguished from other judgements by the "free interplay of the imagination and the understanding" [Hamlyn, 1987, 240]. Aesthetic pleasure is the result of harmony between the imaginative representation and understanding.

The Second Moment

The second moment is based on Kant's classification of pleasures and the objects giving rise to them:

Kinds of Pleasure	Object
Pleasure in the matter of sensation [the <u>Agreeable</u>]	Sensation
Pleasure in the <u>Beautiful</u>	Perceptual form
Pleasure in the <u>Good</u>	Concepts

The first of these is concerned with agreeable pleasures, sometimes termed “animal pleasures”, the second, which concerns aesthetics, is pleasure in things perceived, and the third with abstract, intellectual pleasures. Kant regarded this classification as both universal and mutually exclusive, i.e. it covers all possibilities but an object can generate only one pleasure. While this causes some problems, it is important to his aesthetic philosophy. Aesthetic pleasure lies between fulfilling “animal” needs (e.g. appetite, and intellectual pleasures, including the rational and the moral). Aesthetic pleasure has elements of both but is pure experience for, as has been established by Kant's first moment, it is unrelated to the existence of the object. Clearly, sensual pleasure requires an object and a moral imperative requires action. Neither can claim universality. Uniquely, the aesthetic experience gives pleasure universally and is unrelated to understanding.

The definitions distinguish the Beautiful from the Agreeable or from the Good [Kant's categories of pleasure]. The structure that emerges from Kant's classification of pleasures and from his moments is [McCloskey, 1987, 28]:

- Pleasure in the Agreeable and in the Good are interested; only pleasure in the Beautiful is disinterested.

- Pleasure in the Agreeable is private whereas pleasure in both the Beautiful and in the Good are both universal and necessary pleasures. These are also 'Communicable' pleasures; pleasure in the Good is communicable by concept whereas pleasure in the Beautiful is communicable by means of the form of finality [see third moment].

- Pleasure in the Agreeable and in the Beautiful are both immediate while pleasure in the Good may be either mediated or unmediated.

The Third Moment

Kant's third moment builds on the second moment's distinction of the aesthetic experience and asserts that an aesthetic judgement is not a conceptual judgement, i.e. it does not "involve or presuppose the concept-producing power of the understanding" [Zimmerman, 1968, 391]. As the aesthetic experience is pure and subjective, it follows that it is exclusive of understanding.

The central idea is summed up by Kant's famous phrase *purposiveness without purpose*, which appears to be contradictory but serves to differentiate the aesthetic experience from the practical and the moral. It denotes an object that is purposive in its form though has no purpose or function - e.g. the beauty of a rose. Beardsley describes it thus:

> "the judgement of taste is intimately connected, Kant thinks, with purposiveness, but it is not, of course concerned at all with particular purposes, for then it would be conceptual and it would not be disinterested" [1966, 216].

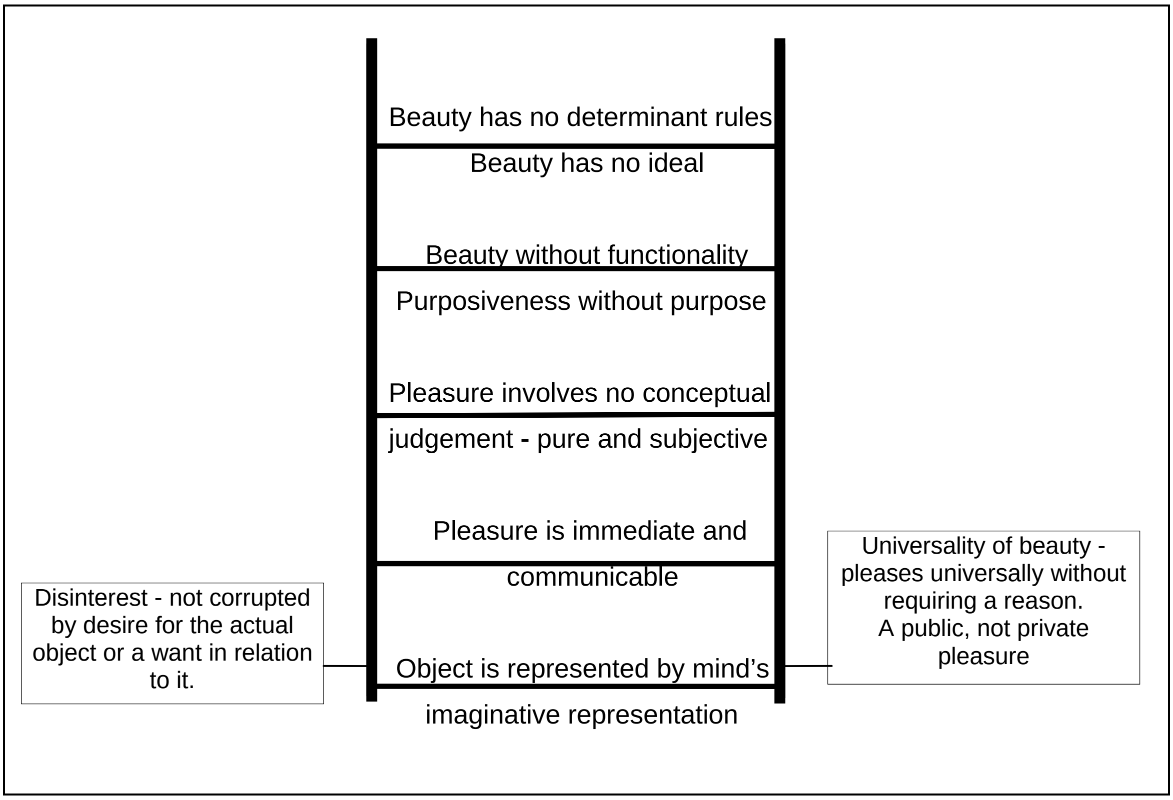


Figure 2.1 Kant's Aesthetic Theory - A Framework

Purposiveness without purpose, alternatively described as *form of finality*, refers to a special type of formal quality dependent upon an object's perceptual properties, i.e. those which can be sensed about an object rather than any abstract properties. It is this property of beauty that Kant considers is pleasing. A beautiful flower has beauty, which is free, whereas a beautiful building has a purpose, and therefore, functionality, which is not free. Such utility implies what a building ought to be - i.e. comprised of walls, roof and so on, whereas beauty which is free contains "no concept of what the object ought to be" [Kant].

Being free, Kant does not attempt to provide rules for determining whether a particular object is beautiful - "no objective rules of taste can be given which would determine what is beautiful through concepts" and that it would be a "fruitless endeavour to seek a principle of taste which would provide a universal criterion of the beautiful through determinate concepts." [Kant, in Guyer, 1979, 208]. However he does seek for more general or rules. These include the design and composition of objects rather than their colour and tone, the form of objects rather than what they might represent, and the possible application of such rules to natural objects rather than works of art which embody purpose. Some have criticised Kant for abandoning disinterest in defining such rules, suggesting the attempt is "seriously flawed" [Ibid, 209].

The Fourth Moment

Kant's fourth moment builds of the preceding moments: that aesthetic pleasure derives from the pure experience of an object without cognitive determination and that such pleasure is universal. The term 'necessary' means that if an object is judged beautiful by universal agreement [the second moment], then all others ought to also agree to its beauty although we cannot guarantee it:

> "one is asserting that every human subject would experience an immediately felt aesthetic satisfaction if they experienced the object freely." [Zimmerman, 1968, 392].

Because everyone feels the pleasure, it is not a private but a public experience.

Figure 2.1 summarises Kant's theory as a ladder, the principles of disinterest and universality depicted as legs, principles that influence the outcomes shown as the rungs.

Kant's contribution to aesthetics is fundamental and profound. His work has endured and shaped our view of beauty to this day. An example is in the area of art where the "aesthetic movement" recognised that the "aesthetic quality of art is not dependent on its practical usefulness or even its congruence with conventional morality" [Saw & Osborne, 1968, 20], a position which derived from Kant's distinctions of the aesthetic from the useful, the pleasant and the good.

The following are summaries by several authors of his findings:

> "Shorn of its many elaborations, Kant's analysis of our use of the expression 'This is beautiful' is that it expresses disinterested pleasure which we believe we are entitled to demand of any and everyone because the object judged is discerned to have a certain kind of perceptual form which is called by Kant the Form of Finality." [McCloskey, 1987, 24]

> "...aesthetic experience, i.e. the experience of natural beauty, is experience of the noumenal [i.e. of the mind] world as it filters through the phenomenal [i.e. the physical] world, and, that in order to secure the experience of natural beauty, the human mind must act passively in receiving its contents and not actively in organizing them." [Zimmerman, 1968, 385]

> "the aesthetic object is something utterly different from all utilitarian objects, for its purposiveness is without purpose; the motive that leads to its creation is distinct, and independent of all others (that is, the free play of imagination under the understanding's general conditions of lawlessness); and the enjoyment of beauty and of the sublime brings to man a value that nothing else can provide, since it has nothing to do with cognition or with morality." [Beardsley, 1966, 286]

Dewey [1934, 252-3] who argues for the experience as the basis of aesthetics takes a more sardonic view of Kant's aesthetics:

> "having disposed of Truth[1] and the Good, it remained to find a niche for Beauty, the remaining term in the classic trio. Pure feeling remained, being "pure" in the sense of being isolated and self-enclosed; feeling free from any taint of desire; feeling that strictly speaking is non-empirical. So he bethought himself of a faculty of Judgement which is not reflective but intuitive and yet not concerned with objects of Pure reason. This faculty is exercised in Contemplation, and the distinctively esthetic element is the pleasure which attends such Contemplation. Thus the psychological road was opened leading to the ivory tower of "beauty" remote from all desire, action, and stir of emotion."

Kant has achieved in careful detail a philosophical analysis of beauty. He finds that the aesthetic experience is our mind's representation of the object and, experienced with disinterest, is pure and is wholly subjective. The state of harmony between an object's imaginative representation and our understanding yields aesthetic pleasure. Such pleasure is neither sensual nor intellectual; it does not involve fulfilling animal appetites and neither does it involve rationality or reason. It does not involve conceptual judgement. Objects that we consider beautiful have a special kind of formal quality dependent on their perceptual properties, a purposiveness of form but not of function - purposiveness without purpose. Aesthetic pleasure being free and without cognitive determination, is common to all who experience it.

Critics of Kant have questioned the issue of disinterest and his universality argument. As Dewey noted [1934, 253], the 18th century was a century of reason

1. Dewey notes that the effect upon German thought of capitalization has hardly received proper attention. He also criticizes aesthetic theorists who erect "adjectives into nouns substantive" [Ibid, 223].

rather than passion, "objective order and regularity ... the source of aesthetic satisfaction". Viewed in this setting, disinterest fits. In the contemporary period with expressionism in art, community concern about amenity issues and influencing policy outcomes, disinterest may seem quaint and irrelevant. But this is to misunderstand it. To Kant, disinterest reflected the freedom to enjoy the aesthetics untainted by existential concerns, which he saw could impart other influences on our appreciation. Conversely, the universality argument has rightly been criticised as untenable, given that culture plays a major role in determining aesthetic preferences [see later sections]

(2) Schiller and Hegel

Other German philosophers who addressed questions of aesthetics and beauty iincluded Schiller and Hegel.

Friedrich Schiller [1759 - 1805], a poet of the first rank, was dismayed with Kant's assignment of the judgement of taste as being essentially subjective. Whereas Kant found freedom as being located in reason, Schiller found that "beauty is freedom in appearance", the mediation between the sensible[2] and the rational. He compared two states of man: originally natural and sensuous advancing to a state of reason or morality. Schiller proposed the civilising role of art and beauty, viewing them "as the medium through which humanity ...advances from a sensuous to a rational, and therefore fully human, stage of existence." [Beardsley, 1967, 28] Whereas Kant argued uniformity of human response to the environment, Schiller saw that different types of poets "quite simply see the world differently ... wherever any form of interpretation or explanation is involved." [Elias, 1967, 314] He thus found that cognitive and moral judgements, far from being objective, are as subjective as aesthetic judgements.

Georg Hegel [1770 - 1831] countered Kant's view that natural objects provided the basis of beauty with the idea that art represents the highest embodiment of the "Idea", higher even than natural beauty. "Natural beauties bear an imprint of the Idea, but a dimmer and lower one than is borne by the works that directly proceed from the human spirit." [Beardsley, 1966, 238] To Hegel, beauty is "the rational rendered sensible, the sensible appearance being the form in which the rational content is made manifest." [Acton, 1967, 447]. Hegel graded art into the symbolic, classical and romantic and the products of art into architecture, sculpture, painting, music and poetry.

He graded nature, animals and plants as being more beautiful than inanimate objects although the souls of animals are concealed by features, hair, scales etc. Such grading biases aesthetic appreciation (e.g. a rock will be inferior to a statue regardless of their relative qualities). [Crawford, 1993, 192]. Hegel ranked natural beauty very low in comparison with human art.

2.8 ROMANTICISM

Schiller and Hegel represented the new spirit of Romanticism that came to replace the 18^{th} century's rationalism and classicism. Romanticism dominated European art, literature, philosophy and even politics through to the early 20^{th} century and its influence is still with us. It commenced about 1770 in Germany and about 1800 in England and came to dominate the Victorian era.

According the Russell, "in its most essential form [Romanticism was] a revolt against received ethical and aesthetic standards" and was "characterised as a whole by the substitution of aesthetic for utilitarian standards" [Ibid, 651, 653]. Emphasising emotion in place of classical order, the typical Romantic was "sensitive, emotional, preferring colour to form, the exotic to the familiar, eager for novelty, for adventure, above all for the vicarious adventure of fantasy, revelling in disorder and uncertainty, insistent on the uniqueness of the individual to the point of making a virtue of eccentricity." [Brinton, 1967, 206]. "Romantic poetry embodies a striving for the infinite; it stems from Christianity, and is marked by inner division of spirit, a sense of a gap between actual and ideal, hence an unsatisfied longing." [Beardsley, 1966, 245]

Poetry was the art form that best reflected Romanticism. While previously poetry was

2. i.e. perceptible by the senses.

regarded as imitation, the Romantics viewed poetry as an expression of feeling. The three Lakeland poets - Wordsworth, Coleridge and Southey - were Romantics, but Byron was the poet who best epitomised the Romantic ideal - the Romantic hero, hypersensitive and alienated from his society.

Wordsworth initiated a new form of lyric poetry in which the visible landscape symbolised human attributes - the blending of the natural object and human feeling into "a single symbolic unity, in which the heart dances with the daffodils, the impetuous West Wind trumpets a prophecy, and the nightingale sings of magic casements opening on the foam of perilous seas." [Beardsley, 1966, 264]

Jean-Jacques Rousseau [1712 - 1778], a Romantic philosopher, believed that the golden age of humanity was the early communities, based on the family, where humans lived in small groups, satisfying their basic needs from the products of the forest.

The Romantics loved wild scenery, "wild torrents, fearful precipices, pathless forests, thunderstorms, tempests at sea, and generally what is useless, destructive, and violent." [Russell, 1961, 654] Russell comments that this continues to influence today - "almost everybody, nowadays, prefers Niagara and the Grand Canyon to lush meadows and fields of waving corn. Tourist hotels afford statistical evidence of taste in scenery."

2.9 CONTEMPORARY PHILOSOPHY OF AESTHETICS

Aesthetics, and the issue of beauty and natural beauty in particular, fell somewhat out of favour as an issue of enquiry in the 19th and early 20th centuries.

George Santayana's [1863 - 1952] rejected Kant's disinterested aesthetics, in *The Sense of Beauty* [1896] arguing that the central quality of aesthetics is pleasure. He defined beauty as "pleasure regarded as the quality of a thing" or "pleasure objectified". Santayana denied that beauty is an objective property of objects, but rather is the pleasure experienced through the perception of an object - it is a value that can only exist in perception. The pleasure derived is objectified in (i.e. projected into) the perceived object and this is beauty. The pleasure is "objectified" in the sense "of being experienced as a quality of a thing and not as an affection of the organ which apprehends it." [Olafson, 1967, 284] Santayana thus argued that aesthetic pleasure involves a fusion between the response to an object and the object itself. Reflecting Darwin's influence, Santayana regarded aesthetic judgements as "phenomena of mind and products of mental evolution".

Benedetto Croce [1866 - 1952] in his *Aesthetic as Science of Expression and General Linguistics* [1902] provided a philosophical basis for the expressionism in 19th century art, particularly Impressionism, by regarding art firstly as expression and secondly as intuition. His central formula was "intuition=expression". Croce regarded aesthetic experience as a primitive form of knowledge in which aesthetics is intuitive knowledge, as distinct from logical knowledge (as in science). He considered that something does not exist unless it is known, i.e. "that it is not separable from the knowing spirit." Natural beauty is thus not an issue of perception "but of an intuition that knows objects as, themselves, states of mind." [Dewey, 1934, 294] Beauty is "successful expression" [Beardsley, 1966, 324]. Croce considered there are no degrees of beauty but through inadequate expression there are degrees of ugliness.

John Dewey [1859 - 1952] focussed on experience being "a single, dynamic, unified whole in which everything is ultimately interrelated." [Bernstein, 1967, 381]. Dewey viewed life as comprising "overlapping and interpenetrating experiences" [Ibid] through which the individual develops knowledge and knowing in a nonreflective way. An aesthetic experience to Dewey is a consummate, enjoyable and complete experience, part of the experiences of everyday life.

In contrast to Kant, Dewey's requires involve-ment, engagement, and entering into an experience:

> "the distinguishing feature of esthetic experience is exactly that no ... distinction of self and object exists in it,

> since it is esthetic in the degree in which organism and environment cooperate to institute an experience in which the two are so fully integrated that each disappears." [Dewey, 1934, 249]

To Dewey, the aesthetic experience was the product of the interaction of the subjective and the objective [Bourassa, 1991, 46].

Dewey, consistent with his overall approach to the role of experience, in *Art as Experience* [1934], regarded the aesthetic experience as defined by its immediacy and pervasiveness, qualities connecting the various aspects of the experience into a unique whole. Dewey's book has had an "incalculable influence on contemporary aesthetic thinking" [Beardsley, 1967, 31].

To Dewey, beauty is "the response to that which to reflection is the consummated movement of matter integrated through its inner relations into a single qualitative whole." [Dewey, 1934, 130], i.e., beauty involves the experience of responding to something which is complete in itself. He cited demonstrations in mathematics and operations in surgery as examples of beauty, and the human form as containing "sensuous charm and manifest-ation of a harmonious proportion of parts" [Ibid, 130]. Aesthetics and beauty are con-summatory and engaged as experience.

Ernst Cassirer [1874 - 1945], a neo-Kantian philosopher, developed a general theory of human culture and the role played by symbols - myth, language, art, religion and science, symbols by which humans represented the world to themselves. "Symbolic represent-ation ...is the essential function of human consciousness and is cardinal to our understanding not only of the structure of science, but also of myth and religion, of language, of art, and of history. Man is a symbolizing animal." [Korner, 1967, 45]. To Cassirer, these symbolic forms are not modelled on reality but model it - they are expressions of the spirit or mind itself. And so the study of these is the study of human power [Beardsley, 1966, 349].

Symbolism in art preceded Cassirer, with roots in the Romantics and the symbolizing of Deity in medieval art. Semiotics, in which one thing functions as a sign of something else, sparks interest in the meaning of all kinds of forms of symbolism (e.g. the interpretation of dreams and neuroses, cultural mythology, religious symbolism, linguistics). Semiotics is considered by Beardsley to represent a new level of consciousness by Western culture not previously achieved by any other age [1966, 263, 343]. Semiotics has been applied to the analysis of poetry, myth, literature and art. Carl Jung's concept of "archetypes" or "primordial images" deriving from the collective unconsciousness is an application of semiotics.

Cassirer's philosophy influenced the philosopher, Susanne Langer, who developed the concept of art as "presentational symbol" or "semblance". Langer was opposed to Dewey's experiential model because she saw it as being based on an assumption that "all human interests are ... manifestations of "drives" motivated by animal needs." [Langer, 1953, 35]. Aesthetics, Langer argued, involves more than meeting everyday biological needs or providing pleasure, it is "as important as science or even religion, [and] sets it apart as an autonomous, creative function of a typically human mind." [Ibid, 36].

Langer uses the term 'semblance' to represent the way a thing *appears* to a person. An object such as a rainbow consists entirely in its semblance, it has no cohesion and unity. Similarly, a painting of a scene is mere semblance: "if we stretched out our hand to it we would touch a surface smeared with paint." [Ibid, 49]. *Semblance* is the aesthetic quality of an object. Langer regarded works of art as:

> "single, indivisible symbols, language as a system of symbols. We find art beautiful when we grasp its expressiveness - beauty is expressive form" [Ibid, 396].

On the basis that natural objects cannot be symbolic, others have held that Cassirer and Langer's symbolic language applies only to art [Saw & Osborne, 1960, 16]. Our responsiveness to art derives from intuition - it is not learnt.

The latter 20th century also saw phenomenology and existentialism established as philosophical movements. Beardsley describes the task of the phenomenologist as being to grasp as fully as possible, what is actually experienced and to describe it faithfully, apart from all pre-conceptions and theoretical constructs [1966, 368]. The suspension of intellectual consideration is similar to Kant's disinterest and enables the qualitative richness of the experience to be fully encountered in its completeness.

Existentialism views each human as alone in a world without meaning, save that which the individual imparts out of personal freedom. Martin Heidegger has examined aesthetics from an existentialist viewpoint. He uses the concepts of world and earth in the notion of "the setting up of a world and the setting forth the earth" when considering aesthetic objects. Using the example of the Greek temple, Heidegger describes "setting up a world" as it is the temple's religious role, housing a god, providing a focus of the Greek people, and symbolising meanings through physical things. The "setting forth the earth" is the temple's physical appearance, the materials of which it is constructed, its setting and in regard to each of these, the way in which the temple highlights and glorifies its earthen roots.

2.10 PHILOSOPHY OF AESTHETICS - A SUMMARY

Aesthetics has been a subject of philosophical enquiry probably since the beginning of human thought. Philosophers, as individuals with strong analytical and conceptual skills, are perhaps among the best placed to develop a framework for understanding aesthetics, a framework that would be widely comprehended and applied. Aesthetics as a subject of inquiry has been considered by some of the best minds in history. To what extent have philosophers produced a comprehensive framework for the consideration of aesthetics? What has been the sum influence of their work? Are they able to provide a single answer to the simple question, "what is beauty?".

It is curious that the answers to these questions are in the negative. Table 2.1 summarises the approach taken by the various philosophers of aesthetics. It is evident that each has erected their own framework, to varying degrees, building on that which has preceeded them.

Kant was the only philosopher who established a comprehensive and credible conceptual base on the issue of aesthetics. While the contribution of each philosopher reflected the influence of the culture and times in which they lived, his approach comes closest to being a framework with application in any time and place. Its difficulty lies in its complexity and hence, communication in ordinary language.

The net influence of the work of philosophers, in terms of impact on society and community thinking, has not been as great as might be expected. There are exceptions such as Burke and Kant, but overall the writings of the philosophers appear to have been relatively unheeded by the society within which they live. Even among those with an interest in the subject, such as contemporary geographers and psychologists, it is noteworthy that their knowledge of the work of philosophers is scant indeed, which results in these later individuals revisiting issues that have been addressed in much greater depth centuries before. A further example is the oft quoted "unity with variety" formula of beauty which Burke and Hume had shown to be inadequate in the 18th century.

As an example, much research persists into the intrinsic factors of landscapes giving rise to beauty, and surveys seek to define the aesthetic quality of an area according to assumptions about what is beautiful. Yet the issue of whether beauty lies objectively in the physical features or subjectively in the observer, had been largely resolved to the satisfaction of philosophers by the end of the 18th century in favour of subjectivity.

The reason for the lack of impact of philosophy may be associated with its protracted nature, its excessive verbosity and specialist language - the jargon that develops in any discipline - understanding of which is a pre-requisite for entry and which excludes others who look to

Table 2.1 Summary of Philosophers of Aesthetics

Philosopher	Era	Philosophy of Aesthetics	Concept of Beauty	O/S
Classical				
Socrates	5th c BC		Moral influence	O
Plato	4-3rd c BC	Imitation of reality	Progression of beauty	O
Aristotle	4th c BC	Catharsis, character, morality		O
Early Christian Era				
Plotinus	3rd c AD	Ideal form	Irradiates symmetry	O
Augustine	4-5th c		Divine source - idealised	O
Aquinas	13th c		Expression of Goodness	O
Bonaventure	13th c		Mirror of God	O
Renaissance				
Ficini	15th c		Classical rules	O
Alberti	15th		Order & arrangement	O
British Aestheticians				
Locke	17th c	Primary & secondary qualities	O/S	
Shaftesbury	17th c	Moral influence/Disinterestedness	Truth	O
Hutcheson	18th c		Uniformity & variety	O
Hogarth	18th c	Serpentine line	Six qualities	O
Hume	18th c	Our nature, by custom or caprice		S
Burke	18th c	Emotional basis	Love without desire	S
German Philosophers				
Kant	18th c	Subjective disinterested pleasure	Purposiveness without purpose	S
Schiller	18th c	Civilising role	Freedom in appearance	O
Hegel	18-19th c	Art is highest embodiment	Rational rendered sensible	O
Romantics	19th c	Emotional aesthetics	Wildness	O
Contemporary Philosophers				
Santayana	19-20th c	Pleasure	Pleasure objectified [quality of thing]	S
Croce	19-20th c	Intuition = expression	Intuition that knows objects as states of mind	S
Dewey	19-20th c	Experience	Experience of responding to a complete object	S
Cassirer	19-20th c	Symbols		S
Langer	20th c	Presentational symbols/semblance	Expressive form	S

Note: O = Objectivist, S = Subjectivist

philosophers for answers. If one perseveres with philosophy and reaches at least a modicum of comprehension of the arguments presented, then it is evident that in terms of the depth of analysis of the issues, the precision of the logic presented, and the comprehensiveness of its coverage, the work of the philosophers surpasses the level of discussion of aesthetics by most other disciplines.

The simple question, "what is beauty ?" has gained as many answers as there are philosophers. The major change that has occurred, however, is the shift from regarding beauty as inherent in the object [objectivist] to considering it as "in the eyes of the beholder" [subjectivist]. From the Greeks through the early Christian era and the Renaissance, beauty was considered to be an objective physical characteristic. It was the British empiricist, John Locke who, in the 17th century, was the first to regard beauty as having both objective and subjective qualities. In the 18th century, Hume and Burke established beauty as the observer's subjective response to an object, but it was Kant who established the philosophical rationale for understanding aesthetics as a wholly subjective phenomenon. Kant marked the break between the old and new schools of thought, the former believing beauty to be an inherent, non-relational quality of an object, while the latter regarded beauty as a quality able to evoke an aesthetic response or experience in the observer.

2.11 INTEGRATION OF KANT'S AESTHETICS WITH LANDSCAPE THEORY

Kant's approach to aesthetics is very relevant to landscape quality. Landscape quality fulfils all of Kant's prerequisites of beauty - landscape quality is without function and there is no ideal or limit; no conceptual judgement is made - the response is immediate and the pleasure is often shared, the pleasure is gained without desire or want for it, the pleasure is a universal and a common response, and the pleasure is public, not private.

Kant's approach to aesthetics parallels contemporary evolutionary perspectives of aesthetics, as described by the habitat theory of Orians (1980, 1986, Orians & Heerwagen, 1992, Balling and Falk, 1982), the prospect-refuge theory of Appleton (1975, 1988), Urlich's affective theory (1983, 1986, Urlich, *et al,* 1991) and the Kaplans' information processing theory (Kaplan, S. and R. 1982, 1989, Kaplan, S. 1987, Kaplan, S. & R. and Brown, 1989)[3].

The fundamental tenet of these theories is that human perception of scenic quality is rooted in survival; to put it simply, that the landscapes humans prefer are survival enhancing. The Kaplans define it thus:

> "The central assumption of an evolutionary perspective on preference is that preference plays an adaptive role; that is, it is an aid to the survival of the individual." (Kaplan, S. and R. 1982, 186).

Although when viewed through contemporary eyes it is sometimes difficult to see what is survival enhancing about, say, Orians' savannah landscape or the Kaplans' mystery component, the utility of these needs to be examined over the timescale of human development to understand their role.

Kant's principle of disinterest can be interpreted as similar to the non-cognitive response to landscape beauty, not being a response derived from evaluation and thought. In a widely quoted paper, Zajonc (1980) argued against the prevailing doctrine that affect is postcognitive and instead suggested that discriminations [i.e. like-dislike] can be made in the complete absence of recognition memory. Disinterest can be defined as "unbiased by personal interests" (Shorter Oxford English Dictionary) and the non-cognitive response to aesthetic objects carries no such opportunity for bias - at least in the immediate sense, although in evolutionary terms it can be argued that it is survival enhancing and hence, biased.

Kant's second principle, the universality of beauty, can be seen to closely parallel the evolutionary perspective - if beauty is indeed survival enhancing, then all humans must respond to it. Nor does it appear to be a learned or acquired skill. Rather, appreciation of beauty is innate, although what is appreciated may be influenced by culture.

The rungs in the model (Figure 2.1) summarise Kant's moments or theses and each of these can be explained through an evolutionary perspective. His recognition that it is the mind's representation of the environment rather than the environment *per se* places him squarely in the province of perception. It is the ability to accurately perceive surroundings and to understand and to interpret any threats and opportunities, that has been fundamental to human survival.

The immediacy of the aesthetic response is supported by Zajonc's thesis and has been commented on by many writers. Urlich *et al* (1991, 207-8) proposed that "immediate, unconsciously triggered and initiated emotion-al responses - not 'controlled' cognitive responses - play a central role in the initial level of responding to nature, and have major influences on attention, subsequent conscious processing, physiological responding and behavior." Herzog (1984, 1985) compared the responses of viewers of scenes given 15 seconds, 200 milliseconds (i.e. 1/5 sec) and 20 milliseconds (i.e. 1/50 sec). Though not identical, the responses were surprisingly similar supporting Kant's thesis that the pleasure is immediate, although it is unlikely that he envisaged periods as short as 20 ms.

Kant's thesis, that pleasure involves no conceptual judgement can be viewed in the

3. These are discussed in Chapters 7 and 8.

light of Zajonc's assertion that "preferences need no inferences". Zajonc is supported by Urlich 1986, Urlich *et al* (1991), and Ruddell *et al* (1989). Kant's thesis that beauty is without functionality, "purposiveness without purpose", reflects the non-cognitive perception of aesthetics, the functionality of which is rooted in evolutionary past. Its function is survival-enhancing but this does not enter our conscious awareness and is only now being illuminated through the theories of the Kaplans and of Orians, Appleton and Urlich.

Finally, the lack of determinant rules for beauty can also be seen as survival-enhancing, because rules reduce flexibility of response when faced with new circumstances and therefore do not enhance survival.

Accordingly, Kant's philosophy of aesthetics has close parallels with contemporary theories of aesthetics based on an evolutionary perspective. Kant was unwittingly identifying, nearly a century before Darwin, principles which can make sense through their survival-enhancing qualities. The universality of Kant's aesthetics is reinforced by its parallels with contemporary theories of landscape aesthetics.

It is worth noting that the survival enhancing aspects of landscape quality are a perceived quality of the landscape, not an inherent quality. It is the interpretation humans place upon what is viewed in the landscape that ensures their survival - if they perceive wrongly, their survival may be threatened. Survival require the operation of the subjectivist paradigm.

2.12 OBJECTIVIST VS SUBJECTIVIST PARADIGMS

(1) Relevance to Research of Landscape Quality

Whether the objectivist or subjectivist paradigm applies to landscape quality is a critical difference - if it is an objective quality it can be measured and evaluated from surveys of the physical landscape. But if it is subjective, such surveys will not suffice - rather it must be based on an assessment of the community's landscape preferences.

It is important that landscape researchers understand the advantages and disadvantages of the two approaches. The subjectivist approach is replicable, its findings can be taken to reflect the community, can be defended politically and its findings applied with confidence. The results are likely to provide a reasonably permanent assessment of the landscape quality. Moreover, the results are defensible if used in courts where landscape quality is an issue. The subjectivist results can be used to predict the effect on landscape quality of change (e.g. Daniel and Schroder, 1979; Hull and Buhyoff, 1986).

Conversely, the subjectivist method may however be more expensive and it requires more specialist skills to apply - skills covering the selection of participants, photography of scenes, management of sessions to rate photographs and their content, and statistical analysis. It may take longer and be more difficult than the objectivist approach.

The fundamental failing of the objectivist approach lies, paradoxically in its inherent subjectivity. The assumption it makes that quality is an inherent characteristic of the landscape means that this is assessed using a subjective approach. In turn, this means that the results lack replicability, are unlikely to be defensible in a judicial context, and will not necessarily reflect the preferences of the general community. The "objective" criteria used are often devised and applied by an individual and perhaps a few others, scarcely a statistically or scientifically valid method. The credibility of the method typically relies on the reputed expertise of the individual applying it. Yet the eminence of the author is of no benefit if the method is fundamentally flawed.

The objectivist approach could be made somewhat more rigorous and statistically valid by:

- ensuring the criteria used to measure landscape quality reflect community preferences as determined through surveys. However, the authors of expert methods may regard the inclusion of community views as reducing aesthetic assessments to the lowest common denominator.

- utilising a larger number (minimum 30) of participants to carry out the assessment - these should be representative members of the community, not specialists such as landscape architects

Even so, the adoption of these measures will take away the sole advantage of this method over the subjectivist method, namely the ease and low cost it involves. These measures would in fact transform it into the subjectivist method.

(2) Combining the Two Paradigms

At the outset of this paper the contrasting surveys of landscape were described, those which surveyed the physical attributes of the landscape in an attempt to define quality, and those which surveyed observer's preferences for the landscape. The assumptions that underlying the surveys of a landscape in fact reflect the prevailing subjectivist paradigm. Thus, in Linton's (1968) survey of the Scottish landscape, his high scoring of mountains reflected the subjectivist paradigm that applied. Similarly, Fines' (1968) scale of landscape quality placed the mountains at the highest level and flat land towards the bottom of the scale. The point is that, although these surveys assume the landscape quality to be intrinsic in the landscape, the assumptions they made in rating this quality derive from the subjectivist view of landscapes.

The two paradigms can be combined into a model of landscape perception that provides a means for reconciling both and providing a role for each.

Earlier it was noted that although the Romantic poets saw landscape qualities as contained in the landscape (i.e. objectivist), their writings influenced the wider society to view landscapes through eyes imbued with Romanticism, a subjectivist mindset.

Figure 2.2 illustrates this, the ellipse representing, in Dearden's (1989) terms, the pyramid of influences - innate (i.e. evolutionary), culture, familiarity and socio-economic and demographic variables - on the individual. This creates the subjectivist context, which determines how one views a landscape. Within this context, the individual will almost inevitably view the landscape in objectivist terms, but in actuality, their preferences are determined by the subjectivist context. To the individual, the beauty is perceived to be in the landscape but viewing this generates pleasure in the viewer, a pleasure determined by the above variables.

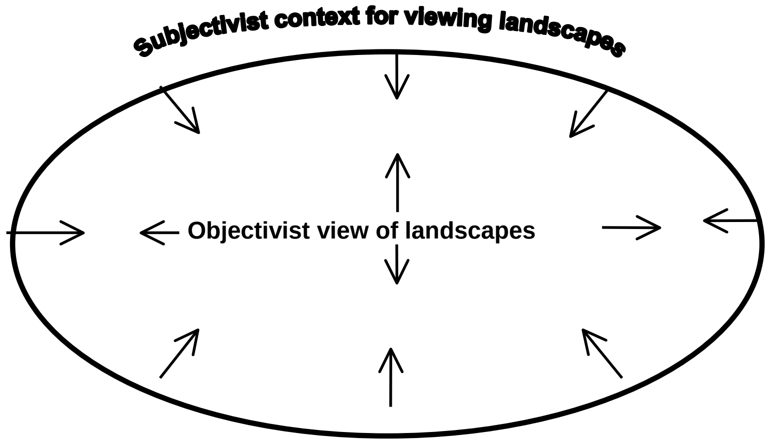


Figure 2.2 Relationship of the Objectivist and Subjectivist Paradigms

2.13 CONCLUSION

Typologies of landscape studies have identified a variety of ways in which landscapes can be classified (e.g. Figure 2.2) and the objectivist and subjectivist paradigms presented in this paper are a further construct which may be used to classify the studies at a fundamental level. Basically, these paradigms contrast treating landscape quality as an inherent physical attribute (objectivist) versus the perception of the physical landscape by the human brain (subjectivist).

Both paradigms have long histories, having their roots in the contribution of philosophers over many centuries. Until the 18th century, philosophers viewed beauty in objectivist terms. Philosophers lead by Locke, Hume, Burke and particularly Kant then asserted that beauty is a construct of the mind viewing the object, the subjectivist paradigm.

The Cartesian revolution, which separated “what is out there” from “what is in here” (i.e. nature and mind), undoubtedly had a major influence in the shift from the objectivist to the subjectivist. Kant’s comprehensive theory of aesthetics has close parallels with, and support from, the contemporary theories of landscape quality based on Darwin’s evolutionary perspective, which Kant pre-dated by nearly a century. The influence of the psychological perspective in the latter half of the 19th century further consolidated the subjectivist paradigm as the dominant philosophical paradigm of aesthetics today.

What is the future of these paradigms? The future lies in the use of the subjectivist paradigm. Use of the objectivist paradigm should be abandoned. The method lacks scientific rigour, is non-replicable, lacks statistical validity, is largely subjective in its construction and is often based on an assessment by a sole assessor. By contrast, the subjectivist paradigm offers a method that is: scientifically and statistically rigorous; is replicable and objective, and reflects the preferences of the community. Moreover this method offers predictive capability and can be used to assess the effect on landscape quality of land management actions such as clearance of trees, routing of major power lines or construction of a water body.

Further development of the subjectivist paradigm and its application to assess the landscape quality of regions, and even nations, will serve to establish landscape quality as an environmental attribute that can be measured, managed, and predicted.

CHAPTER THREE

GESTALT PSYCHOLOGY AND AESTHETICS

3.1 INTRODUCTION

Gestalt theory covers the psychology of perception and was developed mainly in Germany in the early 20th century. It builds on the concept that the whole is more than the sum of the parts; Gestalt postulates that the whole is *different* than the sum of the parts. It is a highly relevant concept for landscape quality where aesthetic delight derives from the whole landscape.

In this chapter the origins of the Gestalt theory are described briefly and the Gestalt tools of analysis are reviewed. It examines the interaction of Gestalt psychologists with aesthetics. The contemporary perspective of the Gestalt contribution is then examined. Finally, the relevance of the Gestalt approach to landscape is addressed. Attachment 1 provides a Gestalt analysis of landscape photographs and attachment 2 provides a glossary of terms.

3.2 ORIGINS OF GESTALT

(1) Pre-Gestalt Psychology

Gestalt psychology developed from the realisation in the late 19th century that the atomistic [or structuralist] approach to psychology and perception that reduced phenomena to their smallest possible quanta failed to explain characteristics that could derive from the individual parts[4]. This approach assumed that sense data comprised pointillist mosaic of bits and pieces that were then aggregated into larger entities [Ehrenzweig, 1967, 18].

Structuralist psychology taught that:

> "all psychological facts (not only those in perception) consist of unrelated inert atoms and that almost the only factors that combine these atoms and thus introduce action are associations formed under the influence of mere contiguity." [Kohler, 1959, 4]

This approach used analytic introspection to relate the association of experience with the stimulus energies they provoked.

The structuralist approach could not explain depth and shape, neither could it explain significant changes to a scene that can result from changes in its parts.

In the 19th century, psychology sought to pattern itself on the physical sciences and believed that there was a one-to-one correlation between experience of the external world and the stimulation of the mind. This was the constancy hypothesis - that "given a particular stimulus, the same response will occur independent of other conditions." [Wolman [a], 1973, 76] It parallels the principle of uniformitarianism in the earth sciences – which holds that the physical processes occurring today are identical to those that occurred in past ages. The psychology of the day failed to account for the attributes of form, sense and value in cognitive processes.

A chink in the traditional approach originated with research by Christian von Ehrenfels who, in 1890, identified the form quality[5], or Gestaltqualitat as a key aspect of features. A square is more than the sum total of four equal lines and four right angles; its most important characteristic is its squareness. A melody is not just a collection of notes but a set of certain notes in a particular order and style. If

[4]. A similar atomistic approach characterises most landscape analyses, e.g. Shafer *et al* 1969, Daniel and Boster 1976, Dearden 1980. Typically these divide a landscape into its constituent parts, assess responses to the parts and then recombine them.

[5]. Form qualities are properties of a whole or an entity which does not reside in its constituent parts [Wolman (a), 1973].

the relationship between the notes changes, so to does the tune, but significantly, the melody is retained if it is transposed to another key. Similarly, a square shape retains its essential form regardless of size. An idea can be expressed in different languages but remain identifiable.

Thus the Gestaltqualitat is retained provided the relations among the elements remains unchanged. Transferability does not depend on having common elements, as under the structuralist approach, but rather that they have similar formal or structural properties. Relationship of elements and transposability are key properties of form qualities. Von Ehrenfels argued for the inclusion of form qualities along with sensations to understand the perception of forms, music and movement.

In 1900, Friedrich Schumann demonstrated the subtlety of form qualities; for example, he showed that rotating a square through 45° produces a diamond, still a square but, in contrast to the stable and substantial square, a rather unstable delicate form.

Abandonment of the constancy hypothesis followed research at the University of Frankfurt by Max Wertheimer [1880 - 1943] and later together with Wolfgang Kohler [1887 - 1967] and Kurt Koffka [1886 - 1941]. All three rejected the atomistic or elementalism approach.

(2) Establishment of Gestalt Psychology

In 1912 Wertheimer published the paper that gave birth to the Gestalt movement. It was a paper on the phi phenomenon - the projection of two slightly separated spots of light in succession on a screen to give the impression of a single spot of light moving across the screen. Although the individual images remain stationary, there is an "apparent movement" that does not derive from a series of sensations but is a new outcome from the effect of two stimulus events working in cooperation. The effect is similar to that of motion pictures where the viewer actually sees a series of discrete images. Wertheimer deduced that the apparent movement was the result of a sequence of successive images and that this occurred outside the perceptual field.

"Gestalt" means form or shape. In the German it has two meanings:

- it connotes a shape or form as an attribute of things
- it has the meaning of a concrete entity *per se*, that has, or may have a shape as one of its characteristics [Kohler, 1947, 177 - 8].

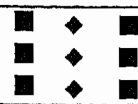
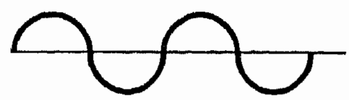
Kohler recognises, however that the use of the term has extended well beyond the content of shape, such as learning, recall, thinking, acting, and biology.

Wertheimer's definition of Gestalt is broader and allows for its wider use:

> "a whole whose characteristics are determined, not by the characteristics of its individual elements, but by the internal nature of the whole." [Katz, 1950, 91].

In contrast to the structuralists, the Gestaltists made organisation the key to their psychology. They examined the organisation of whole objects - music, forms, faces - concentrating on mental processes as being dynamic, structural units rather than bundles of sensations linked by association or imagination. The Gestaltists likened the structuralist model to a telegraph exchange, and their own model as the distribution of stresses on soap bubbles [Hochberg, 1974, 181]; the former containing myriads of operations each operating independently without affecting others, the latter comprising a form dependent totally on the contribution of each element to the whole.

Wertheimer, Kohler, Koffka and other Gestalt psychologists elaborated the approach to other areas of perception, problem solving, learning and thinking. Kurt Lewin applied it to motivation, social psychology and personality, Kohler applied it to animal behaviour, while others applied it to economic behaviour and aesthetics. Rudolf Arnheim was prominent in art and aesthetics. Arnheim considered that the "foundations of our present knowledge of visual perception were laid down in the

Proximity Items close to each other are perceived as whole. Three sets of two lines are seen, not six separate lines	
Similarity Similar items are perceived as units. The vertical columns of squares and diamonds are seen, not horizontal rows of squares and diamonds.	
Symmetry Items that form symmetrical units are grouped together. Three sets of brackets are seen, not six unconnected lines.	
Closure Items are seen as complete units, even if interrupted by gaps. The triangle is completed as a whole, not three sets of unconnected lines.	
Continuation Items with fewest interruptions or fewest separate [i.e. non continuous] contours or edges are seen as units. A curved line and a straight line are seen, not a straight line with semi-circles above and below it.	

Sources: Gleitman, 1981, 214 – 6; Hockberg, 1974, 183 – 6; Lindzey *et al*, 1988, 132 - 3

Figure 3.1 Gestalt Laws of Perceptual Grouping

laboratories of the Gestalt psychologists" [1974, 4].

3.3 GESTALT TOOLS OF ANALYSIS

(1) Gestalt Perceptual Laws

The Gestalt laws of perceptual grouping or unit formation are summarised in Figure 3.1. Some theorists have speculated that there are principles underlying these laws. One that originated in the 19th century is the principle of maximum likelihood, i.e. in Gleitman's words: "we tend to interpret the proximal stimulus[6] pattern as that external (i.e. distal) stimulus object that most probably produced it" [1981, 216].

In an ambiguous scene the observer sees that which from experience or expectation is the most likely explanation. The similarity principle is explained by containing areas that are similar in colour and texture; the proximity principle represents areas close together that are generally of the same object.

(2) Gestalt as Organised Wholes

Regardless of the chaotic appearance of shapes and forms, Gestaltists believe that the brain will project order into them [Ehrenzweig, 1953, 22]. Gestalt laws governing the appearance and behaviour of organised wholes are as follows [Wolman [b], 1973, 422]:

a) Wholes are primary and appear before their so-called parts [Law of Primacy]
b) To perceive and react to wholes is more natural, easier, and occurs earlier than perception of parts.
c) Wholes tend to be as complete, symmetrical, simple, and good as possible under prevailing conditions [Law of Prägnanz].
d) Wholes tend to be governed by internal rather than external factors [Law of Autonomy].
e) Parts derive their properties from their place or function in the whole.

The emphasis of these laws is on the 'whole', rather than the parts. Wertheimer and his colleagues showed that understanding had to occur by viewing organised wholes "from above down", not as the sum of elements "from below up".

> "The whole quality is not just one more added element. The qualities of the whole determine the characteristics of the parts: what a part has to be is determined by its relationship to the whole." [Wertheimer, 1974, 142].

Analysis must be top down rather than bottom up so that the qualities of the whole that determine the parts may be determined. The Gestalt view implies that wholes are prior to

6. The proximal stimulus is the stimulus of the scene on the eyeball.

their parts, and that complexity occurs, not through the aggregation of parts but by the differentiation of a whole.

While Von Ehrenfels had coined the phrase: "the whole is more than the sum of its parts" to describe Gestaltqualitat, the Gestalt psychologists held that the whole is *different* from the sum of its parts [Wertheimer, 1974, 86]. Nevertheless, Von Ehrenfels' formulation is the more common. The concept has entered the land-scape literature: e.g., Aiken [1976, 21] refers to the environment as being greater than the sum of its parts, while Duffield and Coppock [1975, 142] state that the landscape is greater than the sum of the component parts.

The importance of wholes is emphasised by Kohler:

> "Gestalt Psychology claims that it is precisely the original segregation of circumscribed wholes which makes it possible for the sensory world to appear so utterly imbued with meaning to the adult..." [Kohler, 1947, 139].

The Kreitlers state that:

> "a form may have such a high degree of organization that it appears as a self-contained whole, separated from its background and surroundings, [so] that the whole and its parts mutually determine one another's characteristics, ... the qualities of the whole dominate the qualities of the parts." [1972, 82]

They note that any whole can be regarded as a Gestalt: a sentence, an idea, a melody, a painting, a play, an action, as well as colours, movement, and tactile sensations [Ibid, 83]. Wholes can contain sub-gestalts, these being dominated in turn by the qualities of the whole.

Interestingly the Kreitlers note that a powerful Gestalt, whether it be an idea, or a way of thought can be very difficult to change:

> "in the sphere of concepts, this clinging to Gestalts may be responsible for social prejudice stereotypes with all their attendant dangers, and it may sometimes take a genius to destroy a given Gestalt, so that the field is again open for new constructions of solutions." [Ibid, 87]

It could be argued that this may be extending the significance of Gestalts too far, however it is an interesting notion. An example of its possible application relevant to landscape is the ethos that prevailed among farmers in South Australia until fairly recent times that farms had to be free of all weeds or stubble or trees - clean and tidy was the prevailing ethos. Now the value of stubble retention and farm trees is being recognised for land care and soil protection reasons; a powerful ethos or Gestalt is giving way to a new one.

Gestalt psychologists believed that rather than passively receiving sensory information, the mind actively organises the information it receives. A book with pages of text is seen as black type against a white background, not merely black and white shapes competing for attention. A passage of music is more easily identified than a phrase, and a phrase is easier than a note. It explains why individuals can fail to understand a problem until they see the "whole picture" and suddenly gain an insight of understanding, an insight that derives from an holistic approach rather than by logical deduction.

The mind organises and reorganises the parts into a satisfying whole that is different from, not just more than the sum of its parts. The coherent whole has characteristics not apparent in its parts and its parts have properties that they neither possess alone or in another whole.

Notterman notes that by:

> "asserting that the whole possesses its own inherent reality, the Gestaltists made direct contact with the Kantian view that human beings possess an innate tendency to organize events." [Notterman, 1985, 125].

Through their work the Gestalists showed that perception was more than a mechanical process:

> "They held that reality, and perhaps beauty too, are *not* in the eye of the beholder, but merely *begin* there. What we conceive as being "true" depends upon the organization we bring to sensations." [Ibid, 127]

Arguing against the behaviourist's stimulus-response model, Kohler [1947, 165] considered that the correct psychological formula is as follows:

Pattern of Stimulation — Organisation — Responses to the Products of Organisation

Kohler considered that responses are not simply an automatic outcome from stimuli but rather that humans actively interpret and organise the incoming stimuli.

Using a range of examples as illustrations - constellations of stars, ornaments, patches of colour, flies on a table, leaves and stones on the ground - Kohler showed that:

> "organization is a sensory fact when there is no corresponding physical units. Not only groups but also continuous sensory wholes may occur in the absence of corresponding physical units." [Ibid, 157].

According to Arnheim [1970, 30] Gestalt psychologists do not suggest that a Gestalt "shows up with automatic spontaneity" but rather occurs through repeated exposure to the stimuli.

(3) "Good" Gestalt - Prägnanz

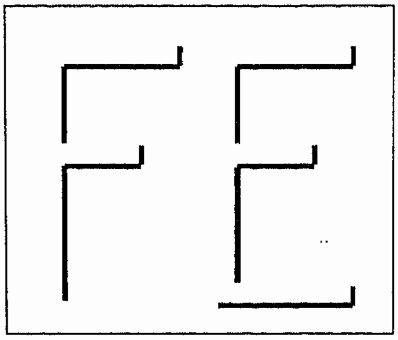
Werthmeimer regarded the Law of Prägnanz or "good" Gestalt as his fundamental thesis and inclusive of all others and of particular importance in perception. "Prägnanz" means the goal directed tendency to restore the balance of the organism. Koffka formulated it thus:

> "psychological organization will always be as 'good' as the prevailing conditions allow; [where] the term "good" is undefined [but] embraces such properties as regularity, symmetry, simplicity and others..." [Koffka, 1935, 110].

To these characteristics, Katz added unity, harmony, inclusiveness, and conciseness [Katz, 1950, 40]. Pickford [1976, 157] regarded 'good' Gestalt as meaning the stronger patterns will dominate psychologically weaker patterns.

The Prägnanz principle is that grouping tends toward maximal simplicity and balance - that we tend to see whole objects or forms rather than parts and that such forms are seen as being as simple or "good" as possible. Prägnanz is the "tendency to see an object as being simple, regular, symmetrical, continuous, closed" [Hamlyn, 1957, 53] and is equated with good form or good Gestalt.

Faced with ambiguous conditions in which the outcome is not fully defined, the Prägnanz principle produces the completion of form and resolution of contradictions so that all parts satisfactorily fit the whole - a 'good' Gestalt. This is the "pressure of the Gestalt" - the feeling of a need to complete the whole by straightening a line, completing a circle, or improving a form. The uncompleted whole creates a tension or psychological disequilibrium [Wolman (a), 1973, 286] that completion of the whole eases.



Prägnanz allows prediction of missing parts. In the figure, few would have trouble completing the letters F and E. The predict-ability inherent in Prägnanz also means that the maximum information can be grasped through a relative minimum of means and effort [Kreitler, 1972, 89]. Painters frequently imply Prägnanz in their art, allowing the viewers to complete the picture for themselves.

> "The overlooking of little gaps and bumps in otherwise coherent and simple shapes corresponds to important functions within the general Gestalt tendency towards a pregnant, coherent, and simple Gestalt. If we ... listen to a

> jumble of nonsensical syllables we will unfailingly project a rhythmical and melodious pattern into them. When we are asked to repeat them we will reproduce them in a better Gestalt. The gap-filling and erasing of bumps recurs: syllables obstructing the easy flow of rhythm are apt to be suppressed; missing feet are readily interpolated to make up the complete rhythm." [Ehrenzweig, 1953, 23]

Thus recollected landscapes are likely to appear better in our memory through the emphasis of factors that make for good Gestalt and the editing out the factors that distract.

Ehrenzweig described Gestalt theory in Prägnanz terms:

> "all perception or creation of form is subject to a tendency towards perceiving or producing as pregnant and simple a structure as possible." [Ehrenzweig, 1953, 22].

Ehrenzweig stated the:

> "incisiveness of form, such as the comparative sharpness of its outline, or its pregnant shape, or the conflict or parallelism between superimposed or juxtaposed forms" are qualities of 'good' Gestalt " [1967, 159].

Arnheim asserted that:

> "the 'law of the good Gestalt' is typical for people - it will be found statistically in a majority of subjects tested by experiment. More essentially, it means that such behavior is typical for perception: When perception is pure and neutral, uninfluenced by the expectations or needs of the person, the simplest possible structure will prevail." [1966, 292]

Kreitler and Kreitler [1972, 90 - 105] reviewed Gestalt research into good forms and their findings are summarised as follows:

a) Asked to draw a beautiful and pleasing line, subjects draw a smooth, continuous and straight line and when asked to introduce change into it they draw rhythmic and repetitive lines, all of these are good Gestalts. When asked to present an ugly line they draw unorganised masses of lines, lacking continuity, mixed angles and curves with intersections and unrelated spaces - a non figure that is bad Gestalt.

b) When asked to change visual patterns to make them good and pleasing, they left unaltered simple good Gestalts such as isosceles triangles, circles, hexagons, rectangles and squares. Open and asymmetrical shapes were changed either into geometrically good Gestalt or into familiar objects.

c) Simple and symmetrical patterns were regarded as beautiful and "strong" whereas highly complex and asymmetrical forms as ugly and weak. Highly complex patterns, [i.e. irregular and asymmetrical], cause heightened arousal as indicated by the usual indicators of desynchronisation of EEG and increased incidence of psychogalvanic skin response.

d) Very simple and regular Gestalts were found to be boring but more complex and less organised Gestalts provided stimulation. The more complex and the inferior Gestalts created more curiosity and more intense and extended visual assessment than simple and good Gestalts.

e) There appears to be a correlation between people with experience with art or visual patterns and a preference for more irregular and complex forms.

f) Primitive art comprises mainly good Gestalts: abundance of planes, straight lines, curves including circles and spirals, symmetry, rhythmic repetition and separate forms. In his book, *Primitive Art*, the anthropologist, F. Boas, admits to astonishment at this finding because such forms "are of rare occurrence in nature, so rare indeed, that they had hardly a chance to impress themselves upon the mind." [Boas, 1955, 31] Kreitler considers that it was the creation of good Gestalts in a context of the relative disorganisation of primal life that constituted their fascination and which gave the artists, who "lured order out of chaos and [who] vanquished the formless by forms" [Ibid, 92], the status of gods or magicians.

g) Patterns of complex parts arranged in a rectangular form are easier to grasp as a unified whole than circular or triangular arrangements - this explains why most paintings are rectangular.[7] However, where the

7. Photographs are also invariably rectangular. The many landscape studies which have used photographs of the area being assessed thus present it to the respondent in a form which facilitates its viewing as a whole, which is entirely unlike its view *in situ* where it lacks a reference frame.

parts are fewer or simpler, they are more easily seen as wholes in triangular or circular forms rather than rectangles.

h) Symmetry or balance is an important Gestalt characteristic. Asked to place various forms in a pleasing manner, subjects arranged lines of greater length or narrowness, figures of greater area, and darker colours nearer to the centre of a square background than shorter or wider lines, smaller figures, or brighter colours respectively. Subjects also tended to favour depth perception in pictures rather than a two-dimensional flat picture, and forms suggesting movement outwards rather than inwards. Bigger and heavier-looking forms tend to be placed in the lower part of an area to compensate for the relative instability of forms in the upper area.

(4) Figure and Ground [Visual Segregation]

In 1915, Edgar Rubin's doctoral dissertation at the University of Copenhagen studied the difference between figure and ground in visual perception - "between the thing-character of the former and the formlessness of the latter." [Asch, 1968, 159].

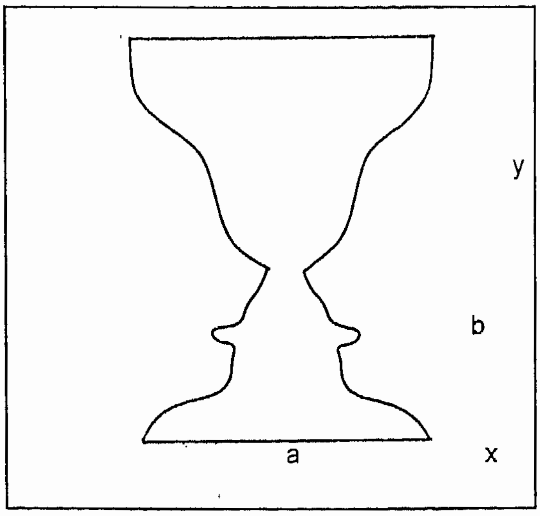


Figure 3.2 A Reversible Figure

Visual segregation involves the separation of an object from its background, e.g. a tree against the sky. A figure has stronger form-properties such as coherence than the ground. The figure-ground phenomena is not confined to visual perception, the well known cocktail effect when one conversation can be heard over competing conversations is an example. It is also asserted to apply to ways of thinking and of personality organisation [Hochberg, 1974, 183].

Reversible figures occur where the figure and the ground can be interchanged, e.g. a goblet, which can also appear as a face in profile. Formerly, psychology asserted that only one figure is noticed and the other goes unnoticed. Gestalt psychology rejects this by asserting that contours "have only a single function, or at any rate one function at a given time" [Katz, 1950, 47].

Examining an example of reversible figures establishes an important principle: that shape belongs to the figure, not to the ground. In the figure, the contour "*b* divides the visual field, giving shape to one side or the other but not both. One sees either a vase or pair of faces. The line marked '*a*' appears to extend to the edge of the contour '*b*', and no further, but the region marked '*x*' has no definite terminus other than the outer frame, '*y*' and seems to extend indefinitely behind the contour '*b*'. However when '*x*' becomes the figure [i.e. faces] the relationship at the edge reverses and now *a* appears indefinite in extent and formless. Thus "shape" belongs only to the region that is figure, not to the ground. [Hochberg, 1974, 182] To see a given object, the perceptual field must be organised so that the object is the figure.

In Gestalt terms, a figure is indivisible and irreducible. The function that each part of the figure plays is "determined by the whole configuration, not by the local characteristics of the part. The part doesn't exist except for the whole that gives it meaning." [Ibid, 183].

According to Kohler:

> "figure and ground behave quite differently in the visual field. Color constancy, for instance, has been shown to be stronger for figure than for ground... After-images are more vivid when observed upon a figure than they are upon mere ground." [Kohler, 1947, 203].

Koffka [1935, 190 - 192] establishes several properties about the figure and ground phenomenon:

- they always involve, in however low a degree, a third dimension of space
- the ground serves as a framework in which the figure is suspended and thereby determines the figure
- the horizontal and the vertical exert an actual influence upon the processes of organisation by making figural organisation easier
- the smaller unit will, *ceteris paribus*, become the figure and the larger, the ground
- if two areas are so segregated that one encloses the other, the enclosing one will be the ground, the enclosed one the figure
- those parts having the greater internal articulation will, *ceteris paribus*, become figures[8], and
- the figure-ground distribution will, *ceteris paribus*, be such that the resulting shapes are as simple as possible; symmetrical figures are simpler than asymmetrical figures

Ehrenzweig noted that:

> "colour interaction between figure and ground stands in inverse proportion to the good Gestalt of the figure. ... the ambiguity of a weak figure on a strong ground immensely increases colour interaction." [1967, 159]

(5) Isomorphism

"Isomorphism" means groups or systems corresponding in form and in relations between their elements. Psychophysical forms as 'seen' by the brain are not essentially different from the physical forms [Katz, 1950, 55]. In Gestalt terms it refers to the brain preserving the functional relations of symmetry, closeness and adjacency, not the exact sizes and angles of patterns [Asch, 1968, 161]. Arnheim describes the principle of isomorphism as processes that take place in different media being similar in their structural organisation [1949, 308].

Isomorphism is significant in two ways [Katz, 1950, 57]:

- the parts of a physical form are sub-ordinated to the whole they constitute; and
- physical forms tend towards precision and maximal simplicity

As an example of isomorphism, Arnheim [1949] described the role of expression in determining the personality or state of mind of an individual. He considers it "indispensable" that expression is also conveyed by inanimate objects such as mountains and clouds. After dispensing with the alternative "theory of association", which contends that expression derives from the associations with past experiences of behaviour, and the "theory of empathy" which extends the associationist theory to placing oneself in the place of the inanimate object and "feeling" what it is subject to, Arnheim described the Gestalist approach:

> "Expressive behaviour reveals its meaning directly in perception" [Ibid, 308], based on the principles of isomorphism. He explains "this means that if the forces which determine bodily behaviour are structurally similar to those which characterize the corresponding mental states, it may be understandable why psychical meaning can be read off directly from a person's appearance and conduct." [Ibid, 308].

Isomorphism involves a correspondence between bodily expression and one's mental state. As a further example, Arnheim suggested that a painter representing Cain and Abel would seek to show the different figures as reflecting good and evil, murderer and victim, acceptance and rejection. Isomorphism is this correspondence in structure between meaning and pattern - a correspondence between form and function [Ibid, 63]. Elsewhere Arnheim defines isomorphism as the "structural kinship between the stimulus pattern and the expression it conveys" [Ibid, 450].

3.4 GESTALT AND AESTHETICS

Sir Herbert Read, the eminent art historian, has noted that modern art does not comply with Gestalt theory because it makes the eye "wander". "Traditional painting excludes eye-wandering by its good Gestalt. The eye is presented with a pregnant pattern, is attracted to it at once and so is given a stable centre of attention." [Ehrenzweig, 1953, 23]. A good

8. Koffka [1935, 194 - 5] noted as an example, sea charts which, contrary to ordinary maps, detail the sea and not the land so that the sea becomes the figure and the land ground.

Gestalt is "always an aesthetically pleasing Gestalt" [Ibid].

Koffka [1935, 347 - 351] touched on aesthetics. He postulated that aesthetic taste is dependent on "class schemas" by which he means categories or classes of objects [e.g. Chinese people, books, houses, or paintings]. The class schema determines the characteristics of the class object. Generally the class schema is unaffected by deviations in class objects. The class schema forms a "sort of framework, or standard, and what does not fit into the framework, or does not conform to the standard, appears as inferior." [Ibid, 349]

Using van Gogh as an example, Koffka noted that art critics during his lifetime refused to take van Gogh seriously and thus kept him from selling any pictures. Yet now his art is appreciated. The art has remained the same; what has changed is the class schema. At van Gogh's time, a class schema was not available to art critics in which to place his work whereas such schema were subsequently established [e.g. by the contribution of the Impressionists] and his work could be assessed. A work of art is not condemned on its own merits but rather, because it does not fit the prevailing schema. Thus class schemas are not immutable in historical terms; whether in painting, architecture, music, poetry and fashion, schemas change and that which was initially rejected can become *de rigueur.*

The parallel with landscapes is the shift in public taste that sees landscapes that the community formerly rejected, or at least showed no interest in, elevated to the position of eminence. Australian's interest in the tropical landscapes of Kakadu and Daintree, or in the arid inland may derive in part from promotion but marks a significant change in public taste. A significant historical example is the changed attitude towards mountain landscapes in Europe that occurred in the early 18th century [see Chapter 6].

Ehrenzweig has addressed aesthetics through combining the Gestalt and the psychoanalytical approaches. In his book, *The Psycho-Analysis of Artistic Vision and Hearing: An introduction to a theory of unconscious perception* [1953] he develops a dynamic theory of beauty. He draws from Nietzsche's book, *"The Origins of the Tragedy from the Spirit of Music"* in which Nietzsche laid down the principles of Apollinian and Dionysian form principles [cf Koffka's class schemas].

Based on Greek art, Nietzsche differentiated the Dionysian art principle, which stands for chaos and destruction [from the Apollinian principle], which moulds chaos into order and beauty. While Greek tragedy originally expressed fear and anguish and acute emotion and pain, over the course of many generations they "have been transfigured into the sublimity and grace of 'classical beauty' " [Ehrenzweig, 1953, 57 - 58]. In Gestalt terms, this is equivalent to the operation of the Prägnanz principle, bringing balance and order. Ehrenzweig notes that Dionysos is equivalent to Freud's Thanatos or death instinct while Apollo represents his Eros or life instinct.

The classical Apollinian order of landscapes has been very influential in public taste from the 18th century onwards when the "picturesque" style was introduced based on Italian art, in particular that of Claude Lorraine who painted elegant pastoral landscapes of the golden classical age [see Chapter 6]. The creation of imagined classical order from what was in all probability, chaos and degradation, reflected the influence of the Prägnanz principle.

The Dionysian influence has the power to excite but after the excitement passes it can become ugly and "old fashioned", much like Victorian clothes and ornate manner of style. However over time, the Prägnanz effect of "bump erasing" removes the unnecessary detail and crystallises a new, simple line and stylistic purity from the old, an example of good Gestalt [Ehrenzweig, 1953, 77- 78]. While Lorraine's exaggerated stylistic detailing of classical landscapes is no longer appreciated, a simplified form that captures the essential elements of his style continues to the present day.

Ehrenzweig regarded aesthetic feelings as the product of the tension and conflict between the Gestalt [i.e. Apollinian] surface elements and the wholly inarticulate form [i.e. Dionysian] elements in which he includes background negative and superimposed masses of light and shade. He argued that the aesthetic feeling of beauty [and ugliness] intervenes in favour of the Apollinian principle of differentiation against the levelling tendency of Dionysian unconscious inarticulate modes of perception [Ibid, 72].

Ehrenzweig also argued that the Dionysian elements are found in the unconscious and that when raised to the surface [i.e. conscious] their lack of good Gestalt causes them to be expressed in half-articulated forms that are unaesthetic, and even ugly. He cited modern Gestalt-free art as an example [Ibid, 79].

3.5 CONTEMPORARY PERSPECTIVE OF THE GESTALT CONTRIBUTION

The Gestaltists roamed far wider than the areas touched on here. Overall they have "had a salutary effect of restraining behavioral scientists ... from oversimplifying their subject matter. By itself, that is a major contribution.... [They] have demonstrated ... holistic phenomena within perception." [Notterman, 1985, 137 - 8].

Similarly, Asch [1968, 173] concluded that Gestalt:

> "was productive of new discoveries and concepts; it generated new questions and proved relevant to basic issues of psychology. Its contributions laid the foundations for the modern study of perception; it broke new ground in the investigation of thinking, memory, and learning; it initiated new steps in social psychology. These achievements deeply affected the outlook of psychology, not least so when they provoked opposition. They spurred a sharpening of issues and the revision of alternative positions; there is little work of consequence in psychology that has been wholly untouched by Gestalt ideas."

Following a detailed review of the Gestalt contribution to organisation, Hochberg [1974, 204] made a somewhat critical conclusion:

> "Although Gestalt theory remains vague in its predictions; although there are important organizational phenomena, such as "invariances," that it really fails to consider; although it does not even explain the phenomena of figural organization that comprise its most visible argument; and although its early speculations about brain processes are clearly näive in terms of our current knowledge of brain structure and function - nevertheless, many of its demonstrations offer what appear to be both the potential foundations of a useful and applicable science of perception, and an insight into the nature of psychological and physiological process. ... The Gestalt explanation of perceptual organization must be regarded as a first stage in an evolving formulation of both problem and solution, neither a closed issue nor a successful theory."

Avant and Helson [1973, 422] considered that "while certain lines of evidence support generalizations regarding the tendency of forms to be as simple, complete, and "good" as possible,... there are others that limit their applicability." The latter comment refers to a finding that different geometric figures were not found to have significantly different absolute thresholds. Overall Avant and Helson consider that Gestalt theory "has been and continues to be a most fruitful and stimulating approach to perception." [Ibid, 423]

3.6 GESTALT AND LANDSCAPE

The frequency with which landscape analysts have referred to the landscape as comprising more than the sum of its parts indicates that the Gestalt concept, whether understood completely or not, has been influential in describing landscape perception. But the relevance of Gestalt goes further than the principle of holism, it also covers Prägnanz (good Gestalt), the influence of Gestalt on recollections, and visual segregation [figure and ground].

The importance of the whole compared with the parts is perhaps more relevant to landscapes than to any other area of perception. It is not disputed, according to the Gestaltist view, that parts are important but rather that the whole is perceptually dominant. Landscape analyses in the literature are often characterised by an over-emphasis on the parts with virtually no focus on the totality, a case of "not seeing the wood for the trees". It is also possible that in some of the analyses undertaken, respondents may actually be responding to the presence of good Gestalts and other Gestalt features within the scenes being assessed. Unfortunately, the scenes used in the analyses are rarely reproduced in the research papers of the so it is difficult to test this hypothesis.

Arising from the foregoing presentation about Gestalt theory there are aspects having relevance to landscapes.

(1) Holism

The qualities of the whole determine the characteristics of the parts (using "qualities" in the sense of the physical qualities of the whole, not necessarily its aesthetic qualities). What a part has to be is determined by its relationship to the whole [Wertheimer, 1974, 142]. A landscape is usually considered to reflect the aggregate impressions of its constituent parts - trees, land forms, land uses, colour, textures and so on. The holism principle turns this on its head and suggests that the parts are a reflection of the whole. The key to understanding this is the Gestalt emphasis on the organisation of the whole.

As an example the outward appearance of a car comprises panels of various forms [e.g.. hood, doors, roof, and boot] which together constitute the external *appearance* of the car. The individual panels are designed by reference to what the designer seeks to achieve overall. Similarly a sculpture or a painting comprises individual elements and segments that lack meaning unless related to the whole. Therefore, for artefacts that are made by humans [including cars, planes, houses, roads, can openers, and works of art], the whole determines the parts. Indeed the parts lack meaning apart from the whole that provides them with purpose and form.

Does the same principle apply to landscapes in which a conscious design is not necessarily evident? If Wertheimer's term "qualities" is taken to mean the character of a landscape, - *not* its aesthetic qualities, but simply the overall physical appearance that enables one to differentiate one landscape from another (such as a desert landscape from an alpine landscape), - then it is clear that the whole will, at least to a significant degree, determine the likely composition of the parts.

One would not expect to find tropical vegetation in outback Australia, or the red sands of the desert in the Mount Lofty Ranges. Similarly human artefacts in a landscape such as dwellings, roads, fences, sheds, signs and livestock constitute an expected and an acceptable range. Beyond these an unexpected artefact may be regarded as alien to the whole and out of keeping with the landscape - e.g. advertising hoardings at Grand Canyon, or a chair lift to Mount Lofty summit.

In localities of recognised outstanding landscapes [where new houses and even commercial developments in towns maintain the character of the area by using traditional materials, colours and forms], a development that disregards these traditions and that introduces new characteristics will be out of character and may be disliked as a consequence. Change within a landscape comprises the introduction of a part that is contrary to the character of the whole, it may differ on account of scale, colour, texture, form or any combination of these and other factors. Drawing on the Prägnanz principle, anomalies in the whole disturb Prägnanz and are disliked in consequence.

However, there can be a place for radical introductions. In Paris, for example, the Pei - designed pyramid outside the Louvre, the inside-outside Georges Pompidou Centre, and even the Eiffel Tower [which was at first despised and later came to be loved by Parisians], are examples of parts which conflict with their contexts [wholes] but are regarded as having sufficient inherent quality to remain. They cease to be regarded as "a part"; they define their own unique whole, a new Gestalt, which differs from the extant.

In general, however, the prevailing landscape character largely determines its constituent parts. This is not total and absolute as it would obliterate diversity. But clearly change must be relatively minor for a landscape to maintain a consistent character.

Landscapes undergo change. For example areas on the borders of cities or in the commuter range of cities often comprise mixtures of two (or more) landscape characters. A rural farming area gradually absorbs the characteristics of an urban area, but for a period comprises neither and will be unattractive as a result of the mixture of characters. In Gestalt terms, there is an admixture of parts but no clear whole.

An aesthetic principle that is often cited in landscape literature is that of unity and variety [or harmony and diversity]. The principle is that aesthetic quality is dependent on an overall unifying character that contains sufficient variety to give it interest. The aesthetic concept of unity and variety and the Gestalt principle of wholes and parts are clearly parallel concepts; they both refer to the same idea. Unity is the Gestalt holism, the prevailing character of the landscape, while variety comprises the parts that provide it with a measure of difference and interest.

We have thus seen how Wertheimer's concept of the whole determining the parts can relate to landscapes through their organisation into typical landscape characters. Generally parts that are out of character with these are disliked, however, there can be instances of outstanding changes that redefine the character by their own qualities. Can Wertheimer's use of the term "qualities of the whole" relate to its aesthetic qualities as well as to character? Before addressing this, the relevance of good Gestalt and visual segregation to landscape are examined.

(2) Good Gestalt

The Prägnanz principle is a key concept of considerable relevance to landscape assessment. The qualities of good Gestalt are summarised as:

- comparative sharpness of outline
- large round forms [Ehrenzweig's pregnant forms] - e.g.. boulders, hills, bushes, and round tree canopies
- conflict or parallelism between superimposed or juxtaposed forms - e.g.. a series of spurs or similar tree forms receding in distance
- isosceles triangles - e.g.. pyramid or peak mountain forms
- circles - e.g.. round trees, boulders, river meanders; and
- symmetrical figures - e.g.. mountains, hills, trees, bushes, boulders.

The Prägnanz principle asserts that simple symmetrical forms possess beauty and strength while the highly complex and asymmetrical are ugly and weak.

Landscapes containing aspects of the above features will generally be preferred over landscapes without them. A landscape need not be unpleasant without them; there can be other redeeming features such as colour, texture or an outstanding feature, to create interest and appeal. *Ceteris paribus* [a rare occurrence in landscapes] a landscape with strong forms, symmetry, roundness of form, and repetition of forms will be the preferred landscape.

The qualities of good Gestalts are not difficult to detect in landscapes. Scenes of rural landscapes, forest and woodland scenes, mountain landscapes, and coastal scenes are often replete in such qualities. However the author knows of no assessment of a given landscape in Gestalt terms. Surprisingly, Gestalt principles are not referred to in the various landscape analyses.

The more significant question is whether the frequency of incidence of Prägnanz correlates with landscape preferences of viewers of a given landscape. If the principle of good Gestalt is to have any bearing, then it would imply that the presence in a landscape of more Prägnanz or the presence of higher quality Gestalt [however judged], would be reflected in the quality attributed to landscapes. Again, no such surveys are known to have addressed this issue.

While Prägnanz can be readily identified, recollections will improve it by diminishing bad Gestalts through filling in and by smoothing gaps and imperfections. Landscape surveys that are based on recollections of areas are likely to display this characteristic, making the results less objective than a field survey.

The lack of Prägnanz can provide one reason why some landscapes are considered to lack appeal, are mediocre, dull and uninteresting. Ugly landscapes may be due to the presence of asymmetrical features, incoherent forms, a cacophony of forms lacking unity of character, and possessed of a blandness or sameness of features.

(3) Visual Segregation

In landscapes, the figure - ground phenomenon is constantly apparent with multiple figures [trees, rocks, mountains, rivers, features attract the eye], and multiple grounds [many trees, mountains, rocks and water bodies]. The figure may also comprise the ground in different views; in one scene a tree is a figure, in another it comprises ground to a view of birds or of clouds. A featureless scene may comprise ground without a strong figure; conversely an interesting scene may comprise multiple features or figures with or without ground.

Koffka's [1935, 190 - 192] properties about figure and ground are applicable to landscapes:

- visual segregation of figure and ground reinforces the depth of landscapes, thereby creating a greater sense of the spatial dimension and adding interest to an otherwise flat landscape;
- the ground serves as a framework in which the figure is suspended and thereby determines the figure; in a painting the main feature is placed to advantage against the ground;
- the horizontal and the vertical exert an actual influence upon the processes of organisation by making figural organisation easier; in landscape photography a vertical element such as a tree is often set in the foreground to provide entry into the scene and assist in its understanding;
- the properties of figures being the smaller and the enclosed relate to the experience of figures in landscapes.

Building on the concept that the meaning of the figure derives from the whole, it can be hypothesised that the significance of the contribution of a feature in landscapes is determined largely by the ground, its setting or its context, rather than by the feature itself. A rock of impressive appearance high on a mountain will be far less impressive if located deep in a ravine or gully. The striking quality of a mountain range that is the culmination of a succession of lower ranges is greater than if the range appears in isolation. The lower ranges, being closer to the viewer, provide a scale against which the distant, higher ranges can be judged. The ground provides a measuring rule for the figure, a basis for comparative judgement.

Unlike the properties of good Gestalt; which correspond to aesthetic qualities, visual segregation appears to be more relevant in understanding the character of a landscape than in contributing to its visual quality, although this possibility cannot be dismissed.

(4) Landscape Aesthetics

Returning to the question of whether Wertheimer's term "qualities of the whole" can relate to aesthetic qualities as well as to character, the concepts of good Gestalt and visual segregation provide a further basis for a response. It was hypothesised that the presence of good Gestalts in a landscape are likely to correlate to visual quality as assessed by viewers. To the extent that good Gestalts contribute to the qualities of the whole, it follows that such properties can relate to aesthetic qualities.

Attachment 1 contains annotated photographs of scenes [mainly New Zealand] analysed for the presence of Gestalt features: holism, good Gestalt and visual segregation. The examples illustrate the ease by which Gestalt features can be identified in landscapes and imply that these readily influence visual perception of landscapes.

ATTACHMENT ONE APPLICATION OF GESTALT PRINCIPLES TO LANDSCAPES

Strong figure/ground form

Series of receding ridges

Trees [Figure] against ground

Fence – receding forms

Ridges receding in distance

Series of spurs – parallelism of form

Large round form [hill]

Sheep [figures] against ground

Mountains comprise series of pyramidal juxtaposed forms

Parallelism of form between trees & mountains

Trees [figure] against mountain [ground]

Trees symmetrical forms

Sharpness of outline

Mountain – isosceles triangle form

Trees round forms

Trees
- symmetrical forms
- juxtaposed forms receding in distance

Fence [figure] against field [ground]

ATTACHMENT TWO
GLOSSARY OF TERMS

Based on Wolman, B.B., 1973, *Dictionary of Behavioral Science*. Van Nostrand Reinhold Co. New York.

Constancy hypothesis
The principle that there is a rigid one to one correspondence between the proximal stimulus and the sensory response so that given a particular stimulus, the same response will occur independent of other conditions.

Form qualities
Properties of a whole or entity that does not reside in its constituent parts.

Isomorphism
The proposition that there exists a one-to-one correlation between a stimulus and the excitory fields in the brain; i.e., if there is a perceived difference of size there will be a corresponding difference in the size of the excitory fields. Isomorphism holds that there is a structural similarity of process in different media, i.e. the same processes can be evident regardless of the means being used to display them.

Perception
The process of obtaining information about the world through the senses. This simple definition obscures a minefield of controversy:

- Descartes and Kant considered it inborn - nativism;
- British associationists considered it is based on previous experience on the association of elements;
- Tichener and Wundt considered it is learning added to raw sensations;
- Gibson considered it the result of physical stimuli impinging on sense receptors - a biological emphasis;
- Gestaltists considered as resulting from an innate organising process; the basic unit is a configuration that, as a whole that is greater than the sum of its parts and which determines the parts; and
- Ames considered that it is a learned act of constructing reality to fit one's assumptions about it.

In sum, perception is dependent upon learning, motivation, social and personality factors.

Perceptual field
All those elements of the external environment that an organism perceives or experiences as it encounters them.

CHAPTER FOUR

PERCEPTION AND COLOUR

4.1 INTRODUCTION

Psychology is the science of behaviour in humans and covers their senses, perceptions, emotions, cognition and actions. Arising out of philosophy in the late 19th century, it focussed initially on the faculties of the mind and sought to understand how the physiological processes of the senses were translated by the brain into sensations and perceptions. During the 19th century, experimental psychology, the study of "how sensory experience is dependent on stimulation of the sense organs" [Boring, 1990, 328] began. This link of physiology and psychology was known as psychophysics, an approach that has been of considerable importance in contemporary studies of aesthetics. Psychology is based on empirical, objectively derived and verifiable evidence derived from observation, testing and evaluation of the human condition.

This chapter examines approaches to the way humans view the world, the basis of perception. It extends from the Gestalt model of perception to other models, principally the information-processing model. Visual perception is a subset of the wider study of perception that is based on all five senses. The history of theories of visual perception is reviewed and the information-processing model is described. Mechanisms and models of visual perception are examined. Finally, the recent contributions of environmental psychology to perception are reviewed.

The second part of the chapter examines the influence of colour on preferences.

4.2 HISTORY OF THEORIES OF VISUAL PERCEPTION

Plato believed that the eye projected a "fiery emanation" outwards to objects in view where this fire "coalesced" with the object and "sensations were thus conveyed to the mind" [Uttal, 1983, 24]. Aristotle roundly rejected Plato's emanation model. Instead, Aristotle argued that vision resulted from an emanation from the object being transmitted to the eye, where it was absorbed. Plato's emanation theory blocked progress in perception until about 1000 AD, when growing understanding of the physics of light shifted the focus to the Aristotelian theory.

The mathematician Euclid established seven postulates that provide the basis of geometrical optics and form perception. One of these is the law of visual angle or retinal size: "The things seen under a larger angle appear larger, those under a smaller angle appear smaller, and those under equal angle appear equal." [Ibid, 25].

Anatomical studies by Arab scholars together with increasing interest in Euclidean geometrical and perception models led to the flourishing of scientific and artistic endeavours during the Renaissance. Perspective in painting was understood for the first time. Kepler [1571 - 1630] solved the problems of optics for the retinal image and permanently laid Plato's emanation theory to rest. Rene Descartes [1596 - 1650] dissected an ox's eye and detected an image on the retina when light was passed through the lens. Rather than simply regarding seeing as the receiving of the physical image by the retina, Descartes saw that it is the result of brain activity, an intellectual leap that parallels contemporary theory. He even proposed that some form of coding of the visual image occurred prior to its interpretation by the brain.

The British empiricist philosophers including Locke, Berkeley and Hume addressed visual perception as a key question of philosophical inquiry. In his famous book *Essay Towards a New Theory of Vision* [1709], Berkeley argued that, as it provides only a two-dimensional image of the world, vision is inadequate for correctly perceiving the world and the process of association is necessary. He differentiated between *mediate* visual stimuli, which included depth perception, and *immediate* or innate stimuli, such as width or colour. Perception of mediate stimuli required indirect evaluation, while immediate stimuli could be perceived directly. Berkeley also believed that mediated precepts involve learning; for example depth perception requires tactual experience.

Both Descartes and Kant disputed the empiricist's view that the mind was a *tabula rasa*, Descartes arguing that it possessed innate ideas about form, size and other properties of objects, while Kant believed the mind imposed its own internal conception of space and time upon the sensory information it receives [Rock, 1984, 11]. The Gestaltists were the direct heirs of this approach. They argued that, although our senses perceive chaotic messages, there is a process of perceptual organization in the mind that brings order out of this chaos so as to "organize them into distinct and segregated units such as objects with specific shapes separated from a background" [Ibid].

During the 18th century, knowledge of the anatomy and physiology of the brain grew. The theory of Johannes Muller [1801 - 1858] - of sensations or signals that encode the shape and quality of stimuli from the retina to the brain - transformed the debate from philosophy to science. He defined ten laws of sensory process that can be summarised as three main generalisations [O'Neil, 1977, 5]:

- Regardless of how a sense-receptor is activated - whether by light, sound, chemical substances, mechanical pressures or electrical stimuli - it will yield, if an experience results, a given type of 'secondary' quality.
- All that we are directly aware of in sensation is the state of the sensory nerve - the neurophysiological effect.
- Although sensations are subjective in that they are received by the senses, they seem objective.

The last of these finds parallels the subjectivist/objectivist model described in Chapter 2 [Figure 2.5] (i.e. although landscape quality is subjectivist, it appears to the individual to be objectivist).

Muller's laws dominated early experimental sensory psychology. Vision was regarded as a process of the brain and in the 19th century was analysed in terms of neural networks.

In the second half of the 19th century, Hermann von Helmholtz undertook extensive research on sensory processes, perception and physiological optics. He believed that past experience provides us with the understanding of objects by which we infer their nature and termed this 'unconscious inference': "The sensations of the senses are tokens for our unconscious, it being left to our intelligence to learn how to comprehend their meaning." [Rock, 1984, 10]

During the 19th century the empirical approach, based on analysis of observable events and processes, dominated and resulted in attempts to understand the components of perception through an introspective method. The development of psychophysical methods by Fechner in 1860 provided a more objective means of studying perception, but the introspective method persisted until the turn of the century.

Haber and Hershenson [1973, chapter 12] distinguished between the empirical and the psychophysical approaches. The empiricists analysed the point of stimulation, the characteristics of the physical image and its projection on the retina and then assessed what other sources of information, derived from memory and learning, were needed for a perceptual experience. Euclidean geometry, comprising lines and angles and parallel lines, was the starting point for empirical analysis. The contemporary inheritors of the empiricist tradition are the “transactionalists” who compare the information received by stimulation in retinal projection with the perceptual outcome; such a comparison shows that the physical process alone is inadequate to account for the perception attained and that the gap is fulfilled by memory, learning or personality.

Psychophysics of space perception is based on seeking correlations between the information received through retinal projection and perception about the environment. This involves exhausting research of the stimulus. James Gibson is the foremost contemporary advocate of this approach. Gibson rejects the approach based on the processing of individual chunks of information and postulates that information is viewed holistically as meaningful entities, paralleling the Gestaltists who worked on the total image.

Early in the 20th century, J. B. Watson developed the behaviourist approach, which replaced introspective terms such as "sensations" and "perceptions" with objectively observable "discriminative responses" [Bruce & Green, 1990, 75]. The behaviourist approach focussed on observation of behaviour rather than understanding internal processes. Contemporary psychology is still dominantly behaviourist in orientation, although verbal explanations of subjects' experiences are regarded as legitimate.

Whilst behaviourism developed in the United States of America, the Gestalt psychologists in Europe developed the phenomenological approach (i.e. that perceptual experience was nativist - innate to the individual). The Gestalt psychologists emphasised that the organization of the form is more important in the perception of forms than the parts from which the forms are constructed.

The Gestalt approach of holistic perceptual processing, as distinct from an elementalistic approach, has gained support over recent decades. Nevertheless, the dominant theories of form perception have tended to be "elementalistic and neuroreductionist in concept and language" [Ibid, 30].

In the mid-20th century, greater recognition of the complexity of human perception saw growth in the "transactional functionalism" approach, which emphasised perceptual experience in interpreting images, and the "new look", which emphasised individual differences in motivation, emotion and personality in influencing what is seen [Bruce & Green, 1990, 77].

In the latter 20th century, the dominant psychological approach to perception has been information processing. Visual information processing refers to the process whereby humans receive visual information about their environment and adjust their behaviour on the basis of that information [Spoehr & Lehmkuhle, 1982, 2]. By the 1960s, the "cognitive psychology" approach, which emphasised perception, attention and memory, came to dominate.

Environmental psychology grew out of the work of E.G. Boring at Chicago in the 1940s and the work at the Midwest Psychological Field Station in Kansas in the 1950s and 1960s, operated by Barker and Wright. These three "legitimised psychological research conducted in real-world settings as well as in the psychological laboratory." [Holahan, 1982, 9] They initiated research into the influence of the behaviour setting on people. They called their work *ecological psychology* and showed that behaviour could not be predicted on the basis of individual differences in background or personality alone and had to take account of the environmental setting.

Various psychologists studied aspects of this and in the 1960s these interests coalesced into the distinct and independent area of environmental psychology. This was applied in architecture, interior design and city planning. However, professionals working in these areas were frustrated by the psychologist's inability to apply their limited research findings to practical issues of design. During the late 1960s increasing numbers of psychologists reflected the growing community concern about the environment and further progressed environmental psychology into new areas of research such as environmental attitudes and perception, urban design, crowding, environmental stress, coping with natural disasters, environmental cognition and mental maps. By the 1970s it had become an accepted field within the social and behavioural sciences [Holahan, 1982,13].

A growing number of psychologists have studied human behaviour and environmental preferences within an outdoor setting, where the complexity of the environment makes it difficult to evaluate the contribution of the various stimuli. An armoury of sophisticated public survey instruments and statistical analysis tools have been developed to apply in such settings.

4.3 INFORMATION-PROCESSING MODEL

The information processing approach to perception arose with the realisation that a perceptual experience does not comprise simply viewing an object or scene - which ends as the viewing ceases - and includes the ongoing human processing of the source of the stimulation. This continuum of experience is a major assumption of the information processing approach. "Neither the perceiver's visual experience nor his overt responses are immediate results of stimulation. They are consequences of processes, or a sequence of processes, each of which takes a finite amount of time." [Haber & Hershenson, 1973, 158] The perceptual task may be considered as comprising a number of stages or processes, each of which represents transformations in our internal representation of the stimulus. Between the time that information is received by the retina and the response by a person, the information is identified, interpreted, and compared with information in memory.

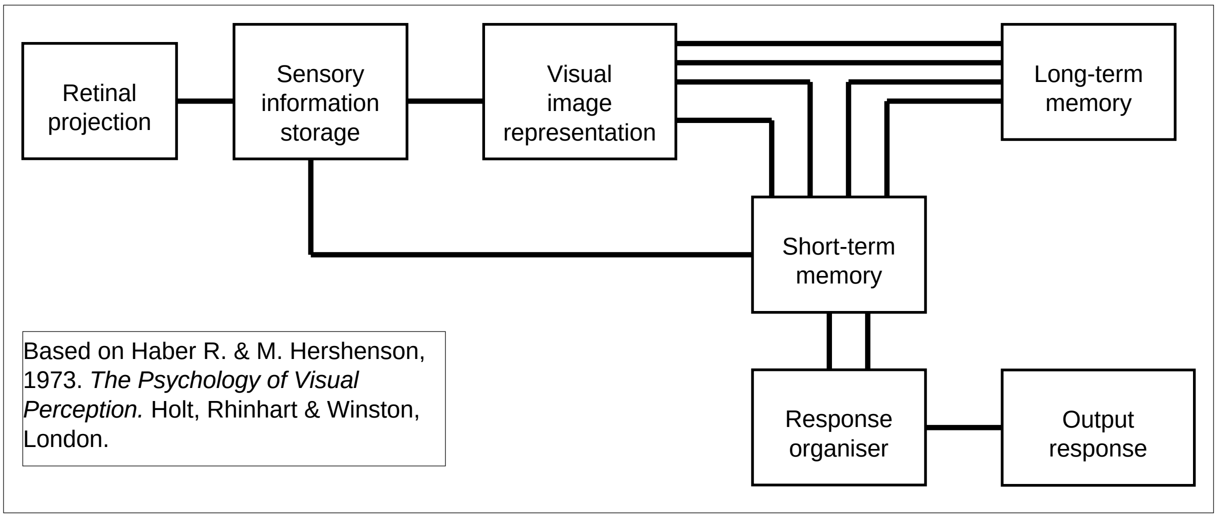


Figure 4.1 An Information Processing Model

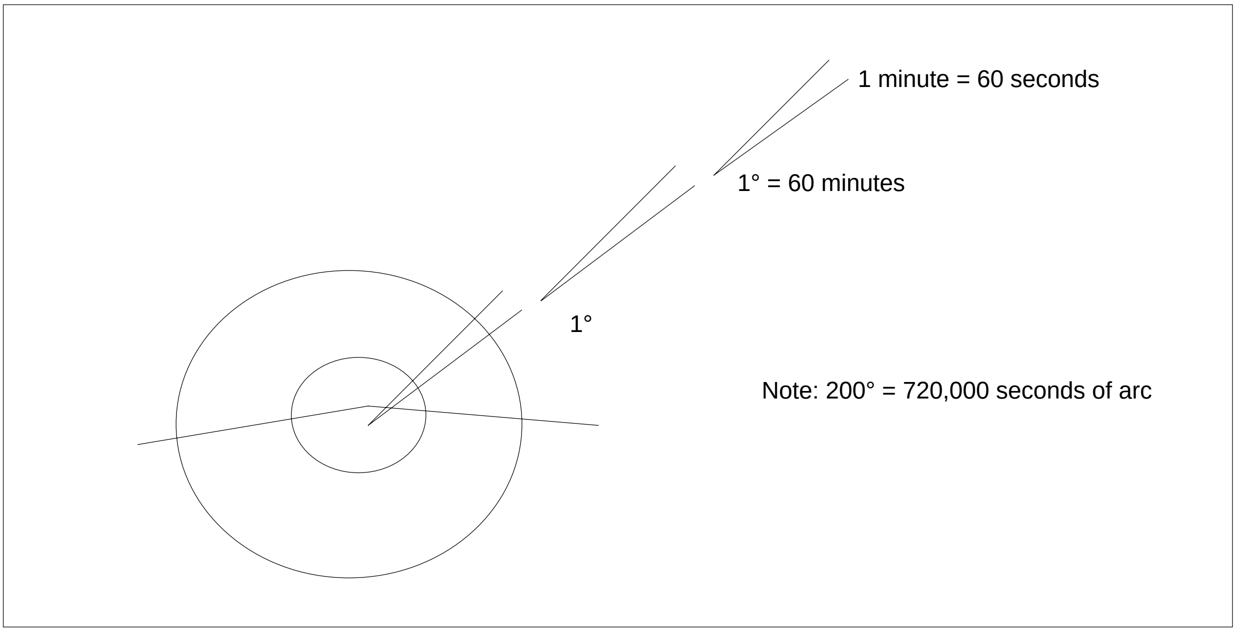


Figure 4.2 Measurement of Arc of Vision

Figure 4.1 illustrates a generalised model of the information-processing approach, based largely on Haber and Hershenson [1973, 162]. Omitted from the figure are auditory and other sources of stimulation. The model comprises three parts: the reception of light by the eye, the overt observable response of the viewer, and the non-observable responses of the viewer (which form the heart of the model). The model differentiates between the reception of the image by the eye and its immediate internal representation[9] it also differentiates between organising the response and the actual response.

Aspects of each of the parts of the model are discussed briefly below.

Retinal Projection. The physical characteristics of the eye together with its neurophysiology

9. Kant also distinquished between the actual scene and the mind's eye representation of it.

are not examined here; there are many references available to provide details[10].

The eye responds to light levels over a range of 10^{13} millilamberts[11] [ml], extending from below the intensity of starlight on white paper [10^{-6} ml], through white paper in moonlight [10^{-2} ml], comfortable reading light [1 ml], white paper in sunlight [10^{4} ml], a tungsten filament [10^{7} ml], to the intensity of light on the surface of the sun [10^{10} ml] [Graham, 1965, 26].

The visual field of the human eye is about 200º, (i.e. extending slightly behind through peripheral vision) [Figure 4.2]. The normal visual acuity of the eye, the ability to resolve small stimuli, is 0.5 seconds of arc,[12] which is equivalent to a line 1mm wide at a distance of one kilometre [Day, 1969, 45]. Under ideal conditions, the eye is able to detect a candle at the distance of 50km [Ibid, 34] and a 20 cent coin can be seen at 10km distance [Haber & Hershenson, 1973, 16].

Eyes are in constant movement, not just following events in one's surrounds but also due to small jiggling movements called *physiological nystagmus*. Several types of movements can be identified: one is very small and fast with the eye moving in angles of 20 seconds of arc, 30-70 times a second; another is a large oscillatory motion; and yet another is a slow drift of a few minutes of arc one way or another. There are also rapid jerks, with an amplitude of 5 minutes of arc, often correcting for the slow drifts [Lindsay-Norman, 1977, 40]. In viewing a scene, the eye moves in a series of discrete jumps called *saccades* from one part of the scene to another. This can occur four or five times per second. Saccadic eye movements take about 200 milliseconds to complete.

<u>Sensory information storage.</u> At this stage, the multiple information outputs from the retina are coded "visually" for internal representation purposes. The nature of this coding and storage is not yet understood. The speed of saccadic movements of the eye gives the viewer about 1/4 second in which to process the information prior to its transference to more permanent storage. The sensory information store is a very short-lived type of memory - perhaps 0.1-0.5 seconds. It enables visual information to be retained after it has disappeared [Spoehr & Lehmkuhle, 1982, 7]. Retention of such information by rehearsal cannot be undertaken as it is in the short-term memory store. More information is stored in the sensory information store than can be extracted, implying some sort of limit by later stages. For example, the memory retains that which is of value [Lindsay & Norman, 1977, 307].

<u>Visual Image Representation.</u> Information about the scene passes to the short-term memory and also to the visual image's representation - the mind's eye of what is seen by the eye. Successive saccades of the scene are integrated with previous ones to construct an integrated image. This is not a photographic image but one that follows the rules of perceptual organization. These include figure-ground segregation and the Gestalt perceptual laws[13].

<u>Short-term Memory.</u> This involves construction of linguistic or conceptual representations from the information received through the eye or from other senses, such as hearing. Construction of words from the letters viewed by the eye involves the short-term memory encoding the individual letters although, with familiarity, not all the letters need to be scanned separately. Short-term memory retains an interpretation of the information received, not the sounds of a sentence but the words. Short-term memory is not permanent but is held a sufficient time for it to be acted on and be stored in long-term memory. Repeating the information, such as rehearsing a telephone number between looking it up and dialling it, appears to be essential for the

10. For example, Brown, Riggs & Hsia in Graham, 1965; Haber & Hershenson, 1973 [chapter 2]; Spoehr & Lehmkuhle, 1982 [chapter 2]; Bruce & Green, 1990 [chapters 2 & 3].

11. The lambert is the luminance of any extended source or surface emitting or reflecting one lumen per square centimetre of its surface. This is equivalent to the luminance of a perfectly reflecting and diffusing surface at a distance of one centimetre from a point source of one candlepower. A millilambert is 0.001 lambert [Graham, 1965, 35].

12. The visual angles of some common objects are: the sun and moon are each 30 minutes of arc, a thumbnail at arm's length is 1.5º to 2º arc, a 4-letter word in a book at 50cm is about 0.7º [Haber & Hershenson, 1973, 16].

13. The Gestalt perceptual laws cover proximity, similarity, symmetry, closure and continuation. These are detailed in Chapter 2.

information to be retained by the short-term memory. The duration of short-term memory may be seconds without rehearsal, or longer when rehearsal is used.

Long-term Memory. Information can be stored in the long-term memory for decades and can comprise images, letters or words. There is no practical limit to the capacity of long term memory, the brain containing approximately 100 billion [10^{11}] neurons each capable of storing a reasonable amount of information. Retrieval of information from long-term memory is rapid, despite the billions of choices available [Lindsay & Norman, 1977, 306 - 7].

Output processes. These can include spoken responses, written or pointing responses, movement, or any other behavioural response based on the information received, processed and interpreted. Many of these will draw on the input of the other senses as well as sight. Responses will also of course derive from cognitive processes, drawing on long-term memory and intellectual thought.

Interconnections. The arrows in Figure 4.1 indicate the direction of action and influence. Arrows in both directions mean that information can flow in both directions and, furthermore, that each process can influence the other. The arrows indicate the probable flows, however not all are proven and research may identify others. The dotted lines between the visual image representation and the long-term memory indicate a link that is uncertain.

Relatively little is known about the cerebral mechanisms involved in processing information at the various stages, although research indicates that many parts of the brain are working conjointly and continuously - not separately and at different times. The process is not necessarily entirely linear as the model may suggest; different stages affect one another [Spoehr & Lehmkuhle, 1982, 6].

4.4 VISUAL PERCEPTION MECHANISMS AND MODELS

One of the consequences of psychophysical research is that its focus on the processes and measurement of perception has been at the expense of research on the content of perception - content free understanding. "An information-processing approach does not in itself demand attention to the perceived qualities of the visual world. ... many of the models ... have no components that are concerned with the way things look." [Haber & Hershenson, 1973, 176]. This qualification is important to the study of landscape; the aim of this review of information processing is to gain under-standing of the processes involved in human perception, processes which are as relevant for looking at landscapes as for reading a book or watching a sporting event.

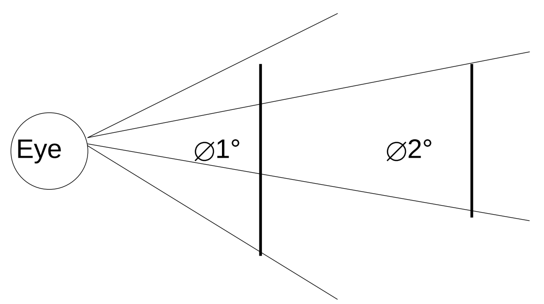
In this section, the laws governing perception are summarised, the concept of visual space and perception of visual form examined, and the principles of perception defined.

(1) Laws

Concept of Visual Angle [Euclid's Law]

Figure 4.3 illustrates the concept of visual angle. The angular size of the object is inversely proportional to the distance of the physical object from the eye - this is Euclid's law of the visual angle. An object of given height will subtend a larger angle when viewed from nearby than when viewed from a more distant location. Foreshortening occurs when an object such as a book is not on a frontal plane (i.e. at right angles to the line of sight) but rather is angled backwards so that the image of the book is smaller and its shape distorted.

This explains the convergence of parallel lines formed by roads, railways and fences, which are not on a frontal plane and also why the individual components in an area of brick paving or leaves on the ground become increasingly compressed with distance. The visual angle subtended by the objects and by the separation of spaces between objects decreases with distance [Rock, 1984, 19].



An object of height ‘h’ subtends angle ∅1° but when moved farther away it subtends a smaller angle ∅2°. Source: Kaufman, 1979, 131.

Figure 4.3 Concept of Visual Angles

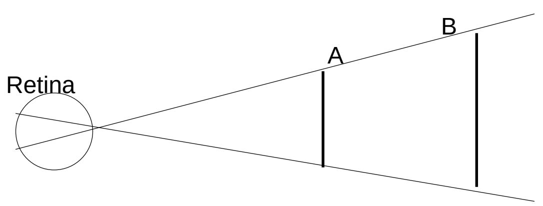
The geometry of Euclid's law is that for the visual angle Ø:

> $\tan Ø/2 = h/2d$
> where h is the size of the object and d is its distance from the eye

Where Ø is small (i.e. so that tan Ø = Ø) then Ø = h/d in radians or Ø = 57.3h/d in degrees. Thus if Ø is 10º, this equation will overestimate it by only 1% [Graham, 1965, 505].

<u>Law of Size Constancy [Emmert's Law]</u>
Size constancy (i.e. an object is about the same size regardless of the size of the image) links with the concept of *shape constancy* (i.e. that an object has the same shape despite changes in the shape of its image) and *orientation constancy* (i.e. that an object is the same despite its orientation).

The law of size constancy is illustrated by Figure 4.4 and indicates that the perceived size of an object of constant angular size is directly proportional to its apparent distance. The term 'apparent distance' means its perceived distance, which is not necessarily the same as its actual distance. Similarly, size is as perceived rather than necessarily its actual size.

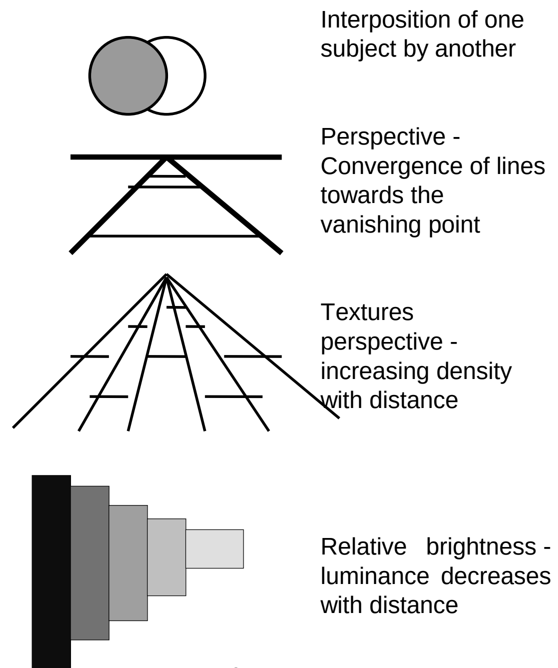


An after-image of constant size on the retina is perceived as being twice as large when perceived at B than at A. Source: Kaufman, 1979, 231

Figure 4.4 Law of Size Constancy [Emmert’s Law]

(2) Visual Space

Perception of visual space is highly relevant to the perception of physical landscapes as it involves the perception of various subtle cues (eg depth and perspective) that give the landscape its characteristic dimensions. Three-dimensional space is considered by some to be paralleled by an internal representation that orients visual objects and even imaginary objects including the viewer’s own body relative to the axes of this internal three-dimensional space [Attneave, 1972, 305]. A similar view is that relations in perceived space determine perception; perceived space being an internal representation of space that provides an internal frame of reference. There has been some experimental evidence in support of the idea of internal representation of three-dimensional space [Kaufman, 1979, 183-46].



Source: Kaufman, L. 1979, 190 - 6

Figure 4.5 Pictorial Cues of Distance

Berkeley [1709] believed that the depth in a scene was not based on anything in the scene itself; rather depth was learnt (e.g. tactually). It is now known that Berkeley was wrong, in that cues in the scene indicate its depth. However, he was right in that cues have to be learnt. Cues to depth in a scene include those shown in Figure 4.5.

The hidden figure in the interposition case in Figure 4.5 is considered to be more distant than the one that hides it. The reason the interposition cue is seen as two circles rather than a circle and a crescent is explained by the Gestalt law of good continuation, which holds that we tend to minimise change or discontinuity. Hochberg established a similar principle – that when a figure allows for alternative descriptions we perceive the simplest one [Kaufman, 1979, 191]. Interposition can also enable one to judge the *relative* distance of an object, as opposed to its absolute or actual distance. How distance is perceived and used to calibrate the representation of space is one of the challenges facing research in perception.

There are additional cues to those illustrated:

- Aerial perspective. Distant objects are tinged with blue colouration, the haze of distance so evident in Australia The cue involves conditions in which the requisite visual contrasts are absent [Graham, 1965, 504].

- Detail perspective. The loss of visible detail of distant objects because of limitations of visual acuity and to the scattering of light by the atmosphere is known as detail perspective. Detail perspective and aerial perspective were cues used by Leonardo da Vinci and other painters of the Renaissance to give the impression of depth in paintings [Rock, 1984, 78].

- Texture gradient. The image of a large number of regular textures receding into the distance creates a gradient of image size [Bruce & Green, 1990, 156].

- Shadows. on the sides of hills and valleys provide an impression of depth; *attached shadows* reflect the depth of within an object itself while *cast shadows* are those that fall on surrounding surfaces. Attached shadows give a strong sense of depth, while cast shadows are somewhat divorced from the object itself and provide little or no cue to depth [Rock, 1984, 75].

- Motion perspective. This is a kinetic cue and involves distant objects appearing to be virtually stationary when one moves past them, while nearby objects move swiftly past. "Objects nearby seem to be moving away from you at a velocity that increases the closer the objects are." [Kaufman, 1979, 199].

- Kinetic cues. Movement provides information about depth and distance that is not evident from a single static view. People with monocular vision estimate depth by movement.

- Familiarity of objects. Familiar objects such as a person, a car, electricity pole or a tree can provide a yardstick against which the distance and size of other nearby objects can be estimated.

The presence of several cues provides the brain with strong evidence of depth, although the means by which cues are interpreted collectively is not understood.

Through working with student air pilots during the Second World War and finding that the tests for cues for depth gave no indication of their success or failure in the air, Gibson realised that the traditional list of cues for depth was inadequate. He came to believe that the whole theory of depth perception was false. In its place, in 1950, he developed a *ground theory* of space perception, to be differentiated from the traditional theory, which he termed *air theory*. He considered that "there is literally no such thing as perception of space without the perception of a continuous background surface" [Gibson, 1979, 148]. Thus, the world did not comprise bodies in empty air [such as aircraft] but rather a basic surface with adjoining surfaces. "The character of the visual world was given not by objects but by the background of the objects." [Ibid] The parallel with the figure/ground principle of Gestalt psychology is obvious.

(3) Perception of visual form

Definition of forms

The dictionary defines form as the visible aspect of a thing [Shorter Oxford Dictionary], but in psychological terms it is difficult to provide a precise, quantifiable definition. Uttal, an authority of perception research, admits that the scientific community has not succeeded in precisely defining what “it is that we mean by the word ‘form.’ We have progressed only modestly beyond the Gestalt notion that form is ‘any segregated whole or unit.’” [Uttal, 1983, 9]. There have been attempts to specify forms statistically as classes of forms. Following a comprehensive review of the literature, Zusne proposed as an interim definition "... form may be considered both a one dimensional emergent of its physical dimensions and a multidimensional variable." [Ibid, 10].

Figure-ground segregation[14]

Homogeneous fields prevent discrimination of objects. However, such fields are relatively rare in nature (e.g. pitch black night, dense fog, snow storm or sand storm). Commonly, objects are seen against a background or on a surface, providing an inhomogeneity in the retinal projection that results in a perceptual

14. Figure and ground are discussed in Chapter 3, *Gestalt Psychology and Aesthetics*, in which the findings of Gestalt psychologists was reviewed. This section concentrates on the findings in relation to perception.

Table 4.1 Figure and Ground Characteristics

Figure	Ground
Has form and shape	Formless
Has solidity and structure	Amorphous and structureless
Thing-like qualities	Uniform
Appears nearer	Extend unbroken behind the figure
Easily identified	Lacks identity
Colour stronger and non-transparent	Colour ill-defined and filmy
Colour localised on surface	Non localised colour
Provides meaning & feeling	Neutral
Provides aesthetic values	Neutral
Preference for vertical or horizontal orientation	Lacks orientation
Symmetrical	Asymmetrical
Memorable	Unmemorable

Based on Haber & Hershensen, 1973, 184; Bruce & Green, 1990, 113; Graham, 1965, 548, 566.

segregation of the visual field into figure and ground. This is the first stage in the organisation and synthesis of form.

Characteristics of the figure compared with the ground are summarised in Table 4.1. The structure of the figure derives from its contour; the strength of its contour will determine the degree by which the figure stands out from the ground.

Ganzfelds

Visual fields that are completely homogeneous are called Ganzfelds (e.g. looking through dense fog without borders, edges or bright areas). Closing the eyelids forms Ganzfelds, reducing stimulation - after a few minutes the neural excitation leaving the retina is reduced to negligible levels. Ganzfelds research has shown the importance of spatial inhomogeneity - variations across the visual field, and temporal changes in the field. Contours or variations are indispensable for form perception.

Earlier reference was made to saccades (small movements of the eye) . Such movements enhance the sensitivity of the visual system [Haber & Hershenson, 1973, 179]. When a procedure is used to stabilise the visual image on the retina, it is found that perception diminishes quickly, but this is reinstated by movement, changing the stimulus over time or by brightening the luminance. The research suggests that variation in stimulation of the retina is necessary for perception to occur [Ibid, 181].

(4) Principles of Perception

Irvin Rock [1975, 559] has defined nine principles of perception. The term 'proximal stimulus' in the definition refers to the retinal image of a particular surface (i.e. that which the eye sees).

1) The proximal stimulus array must be considered to be ambiguous as to what it represents in the world.
2) Perception begins with a process of grouping and figure-ground organization of the proximal stimulus.
3) The organization achieved is based on a selection, decision, or preference on the part of the perceptual system for certain outcomes.
4) The central events that lead to particular perceptions are not themselves subjectively experienced (i.e. they are not conscious).
5) As a rule, what is perceived does not simply correspond directly with the relevant feature of the proximal stimulus (e.g. perceived size with the object's visual angle).
6) The facts of perception cannot be fully explained by the operation of physiological detector mechanisms such as are triggered by a particular stimulus impinging on the retina.
7) What is perceived is generally, although by no means always, verdical[15].
8) Perception generally is not influenced by knowledge, in contrast to sensory information (i.e. what we perceive is not determined by or affected by what is known about the object).
9) Vision is dominant over other sense modalities so that not only does it tend to determine what is perceived when a sensory conflict occurs but it

15. Verdical means truthfully reflecting the objective state of affairs [rather than illusory].

also tends to 'capture' and thereby distort the very experience of the object as given by that other modality.

4.5 ENVIRONMENTAL PSYCHOLOGICAL APPROACHES TO PERCEPTION

The development of environmental perception grew out of the interest of environmental psychologists in the environment in the 1960s and 1970s although one of the earliest, James Gibson, started to develop his theory in the 1940s. The Gestalt theory is also a precursor to the environmental psychology. "The Gestalt emphases on perception as a holistic process and on the dynamic, organizing aspect of perception have influenced much of the later research and theorizing in this area." [Holahan, 1982, 36] Some of the following examples stray into the area of environmental aesthetics.

(1) Gibson's Ecological Theory

James Gibson's *Ecological Theory* proposes that environmental perception is entirely a function of the stimulation received from the environment (i.e. that humans do not interpret and construct meanings from this interaction). In Gibson's terms, humans receive information direct from the environment and view it holistically as meaningful entities rather than in a disaggregated way. An environment's permanent physical properties are termed *affordances*, denoting the functional properties that an object affords (e.g. a sturdy, non-porous object with interior space *affords* shelter; a flat surface raised off the ground *affords* sitting). As we explore and experience an environment we become aware of affordances that help us make use of the environment.

Gibson attributes the origin of the concept of affordances to Koffka, the Gestalt psychologist who described the "demand character" of an object:

> To primitive man each thing says what it is and what he ought to do with it ... a fruit says "Eat me"; water says "Drink me"; thunder says "Fear me"; and woman says "Love me". [Gibson, 1979, 138]

Gibson's concept is that perception is based on the *use* of elements (i.e. their affordances) rather than their form, colour and other attributes. Buildings are not seen as forms but rather as functional spaces in which to work and live. The environment offers affordances to animals or humans. [Gibson, 1979, 127]. Gibson states: "This is a radical hypothesis, for it implies that the 'values' and 'meanings' of things in the environment can be directly perceived." [Ibid]. Affordances are very varied:

> "Surfaces afford posture, locomotion, collision, manipulation, and in general behavior. Special forms of layout afford shelter and concealment. Fires afford warming and burning. Detached objects - tools, utensils, weapons - afford special types of behavior to primates and humans." [Ibid, 137]

Gibson believes that animals, including humans, have evolved ways of detecting invariant information about the environment, which enables them to perceive affordances. These do not derive from memory but from the perceptual system, which has evolved to "resonate" with this information. Gibson leaves vague the notion of resonance [Bruce & Green, 1990, 234].

Gibson's approach is a radical departure from mainstream perceptual psychology.

> "Traditional perceptual theory holds that perception is indirect and mediated by higher cognitive processes. We do not 'just see' the world but actively construct it from fragmentary perceptual data. Gibson is a 'direct realist'. He holds that perception is direct and unmediated by inference and problem solving." [Bruce & Green, 1990, 238]

His theory focuses attention on the environment but has generally been regarded as inadequate to explain human/environment interactions. Appleton's prospects and refuges can be regarded as affordances.

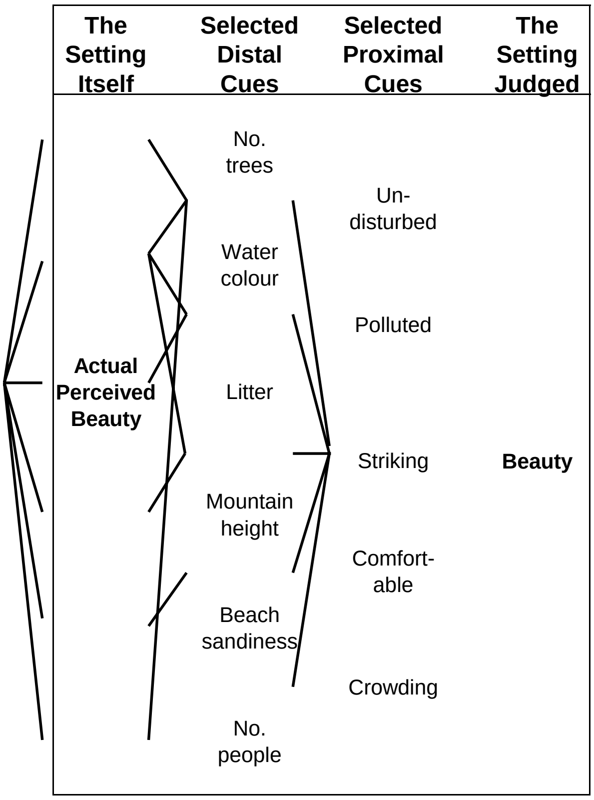
(2) Brunswick's Probabilistic Functional Model

Egon Brunswik's *Probabilistic Functionalism* model of environmental perception emphasises the individual's active interpretation of sensory information received from the environment. Such information is never perfectly correlated with the real environment and complex and some-times misleading cues can be received (e.g. the human eye has to judge how far away an object is based on the size of the object and the setting). We make a probabilistic estimate of the distance that is a 'best bet'. Brunswik described it thus:

> "The best [the individual] can do is to compromise between cues so that his posit approaches the 'best bet' on the basis of all the probabilities or past relative frequencies or relevant interrelationships lumped together." [Ittleson, 1974, 110].

Perception involves extracting useful cues from a scene of many potentially confusing cues. The individual thus plays an active role in interpreting information from the environment based on a repertoire or probabilistic statements from many settings. As there are many possible environments, judgements about any particular environment cannot be absolutely certain - only probabilistic estimates.

Brunswik's model is also known as a *lens* model, which describes the interpretative role the individual plays in perceiving a scene - a process whereby the scattered environmental stimuli (the objectively measurable characteristics of a scene) are recombined by the viewer as a lens focuses light. Figure 4.6 depicts the subjective assessment of the distal environment (proximal cues) and their integration to provide the observer's perception of the scene.



Note: Distal - away from centre of body
Source: Gifford, R. 1987. *Environmental Psychology, Principles and Practice*, 28.

Figure 4.6 Brunswick's Lens Model

The probabilistic model is rather more widely accepted than Gibson's ecological model. Ames' *transactional psychology* takes Brunswik's model further by emphasising the dynamic and creative role of the individual in environmental perception. Each individual builds a unique store of environmental interactions - "the world each of us knows is a world created in large measure from our experience in dealing with the environment" [quoted by Holahan, 1982, 40]. The probabilistic model is a basis for research on organism-environment relationships, in which greater emphasis than is usual is placed on *situation* sampling rather than *subject* sampling so that the environment's influence on behaviour might be better understood.

(3) Berlyne's Collative Stimulus Theory

In contrast to Gibson and Brunswik, Daniel Berlyne has focussed on neither the individual nor the environment in isolation but rather on their interaction. He has found that aesthetic preferences are related to the complexity of a stimulus. Like an inverted U (∩), as complexity of a scene increases so to does its attractiveness up to a point beyond which increased complexity is viewed as less pleasant. Many experiments have been undertaken to investigate the optimum levels of stimulation [Holahan, 1982, 111]. Berlyne identifies an environment's stimulation to derive from its *collative stimulus properties* (i.e. characteristics that cause the observer to compare or investigate further). These properties include:

- complexity - a large variety of elements in the display;
- surprisingness - unexpected elements;
- novelty - newness to the observer; and
- incongruity - something out of place

These properties influence an observer's aesthetic judgements about a scene and also their desire to explore. Berlyne considers that aesthetic judgements and exploration is a combination of two factors:

1. hedonic tone: degree of pleasantness or beauty
2. uncertainty-arousal: the inverted U

As uncertainty increases, hedonic tone (i.e. pleasantness) first increases then decreases [Figure 4.7].

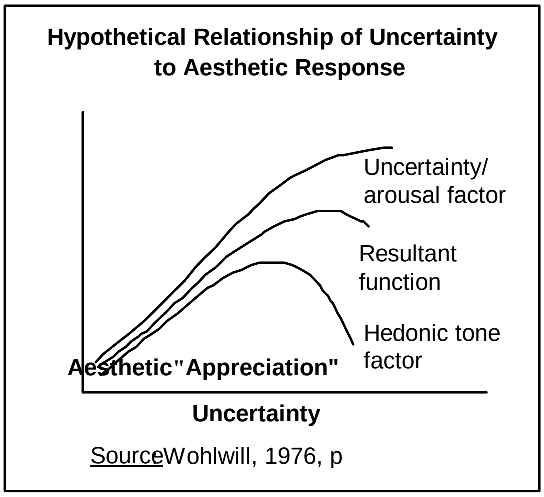


Figure 4.7 Hypothetical Relationship of Uncertainity to Aesthetic Response

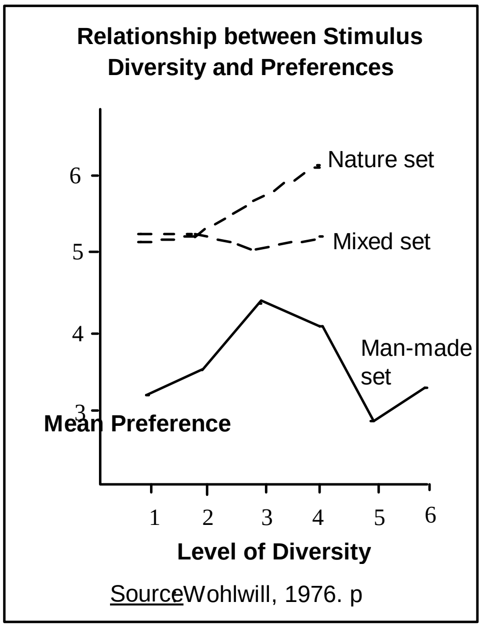


Figure 4.8 Relationship between Stimulus Diversity and Preferences

People appear happiest at intermediate levels of stimulation or uncertainty and do not like excessive stimulation or excessive arousal. Therefore, one might expect that landscapes that are intermediate in complexity, novelty, incongruity, and surprisingness would be judged the most beautiful, whereas landscapes that are low or high in these collative properties will be regarded as less attractive.

While Berlyne's theory is attractive, the evidence with natural landscapes does not support it. Studies have supported the ∩ in relation to non-environ-mental stimuli (e.g. paintings, music) and possibly for urban environments, however, Wohlwill, Kaplan and others contend that in natural environments, preferences increase linearly with complexity [Wohlwill, 1976, 46]. Somewhat surprisingly, the researchers found it impossible to find natural scenes containing the degree of complexity comparable with the human-made environment at the upper end of the scale [Figure 4.8]. In the mixed set, the relationship did not appear to be consistently related to complexity.

The findings support research findings (notably Stephen and Rachel Kaplan) that the significant variable was between natural and human-made, there being a higher preference for natural scenes in preference to human-made scenes. Joachim Wohlwill has considered the environment as a source of affect producing feelings of pleasure or aversion. Stimulus attributes - complexity, incongruity, novelty, familiarity and variety produce these feelings. Wohlwill suggests that *fittingness*, or how well an element (e.g. a house) suits a certain setting (e.g. wilderness) is an additional collative property.

(4) Stephen and Rachel Kaplan's Information Processing

Stephen and Rachel Kaplan employ an information processing approach to explain the interactions between humans and the landscape. The Kaplans hypothesise that "the perceptual process involves extracting information from one's environment." [Kaplan, Kaplan & Brown, 1989, 514] They identify four predictor variables, two of which (coherence and legibility) help in understanding the environment and the other two (complexity and mystery) encourage its exploration. The Kaplans contend that humans seek to *make sense* of the environment and to *be involved* in it. In Table 4.2:

- Coherence is the ease of cognitively organising or comprehending a scene;
- Legibility is the being able to predict and to maintain orientation as one moves more deeply into the scene, the promise of being able to make sense of it in the future;
- Complexity is being involved immediately - a scene's capacity to keep an individual busy (i.e. occupied without being bored or overstimulated);
- Mystery is the promise that more information could be gained by moving deeper into a setting,

(e.g. trail disappearing, bend in a road, brightly lit clearing partially obscured from view by foliage. New information is not present but is inferred from what is in the scene.

Table 4.2 Informational Variables

	Understanding [making sense]	Exploration [involvement]
Immediate	**Coherence** [making sense immediately]	**Complexity** [immediate involvement]
Inferred	**Legibility** [expectation of making sense]	**Mystery** [expectation of future involvement]

Source: Kaplan, Kaplan & Brown, 1989, 516

Coherence and complexity are considered to involve minimal analysis, whereas legibility and mystery require more time and thought.

Underlying the Kaplan's approach is an evolutionary view that human preferences derive from the adaptive value offered by particular settings [Kaplan, S, 1987. 14]. One of the factors cited in support of this is the preference for savannah landscapes over other biomes found among young children [Balling & Falk, 1982]. A further factor is that manipulated landscapes such as ornamental gardens and municipal parks tend to reflect the scattered trees of a savannah landscape A third strand of evidence cited by Kaplan is Appleton's prospect and refuge theory, the notion of seeing without being seen, in which preferences are for those settings which provide advantage for hunting or hiding. In Zube's words [1984, 106]:

> "The Kaplans propose that long term survival of the human species was dependent upon development of cognitive information processing skills which in turn led to preferences for landscapes that made sense to the observer. In other words, landscapes were preferred that could be comprehended, where information could be obtained relatively easily and in a non-threatening manner that provided opportunity for involvement, and that conveyed the prospect of additional information. According to this framework, landscapes that are preferred are coherent, legible, complex, and mysterious."

An evolutionary viewpoint leads Kaplan to conclude [Kaplan, S, 1987, 26] that:

> Aesthetic reactions reflect neither a casual nor a trivial aspect of the human makeup. Aesthetics is not the reflection of a whim that people exercise when they are not otherwise occupied. Rather, such reactions appear to constitute a guide to human behaviour that has far-reaching consequences.

Stephen Kaplan considers that organising workspace, arranging one's home, avoiding certain directions and approaching others may reflect factors such as coherence, legibility, mystery and complexity. He concludes that there is clearly more to aesthetics than optimal complexity and that the "acquisition of new information and its comprehension (are) central themes underlying the preference process." The Kaplans' theory is examined further in Chapters 7 and 8.

4.6 PERCEPTION - CONCLUSION

A somewhat piecemeal picture of the psychology of perception emerges, because perception has not had a single stream of development, growing and becoming more sophisticated in its evolution, but rather is characterised by varying approaches. In more recent decades there has been considerable fundamental research into the neurophysiology of perception, far removed from environmental perception. The abundance of competing theories of perception and environmental perception in particular are indicative of any developing field of enquiry. It is doubtful whether this is likely to change in the near future.

On the contribution of psychology to the study of beauty, Sachs [1951, 149] remarks with prescience:

> "The great bulk of investigation about the nature of beauty has been piled up by metaphysical speculations or elaborated as part of some system of philosophy. As everyone knows, the approach by observation of facts and by experiment is a comparatively modern innovation, and this is especially true in matters concerning the mind; anything so obviously connected with a man's soul was considered the exclusive domain of philosophy, metaphysics and theology. Psychology, the latest of the late, was welcomed not too warmly when it tried to squeeze itself into an already overcrowded space. The bias of this present attempt (i.e. Sachs' book) is clearly on the side of psychology, trying to get elbow-room for it, even at the cost of some older occupants."

Despite being a relative newcomer compared with philosophy, psychology has contributed profound insights and knowledge of aesthetics.

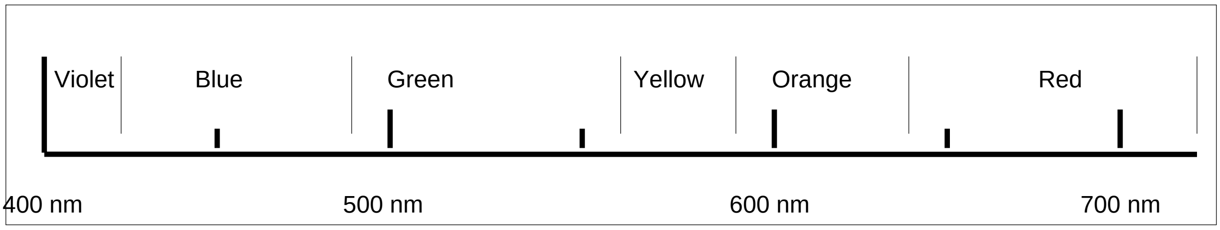


Figure 4.9 Wavelengths of Visible Light Spectrum

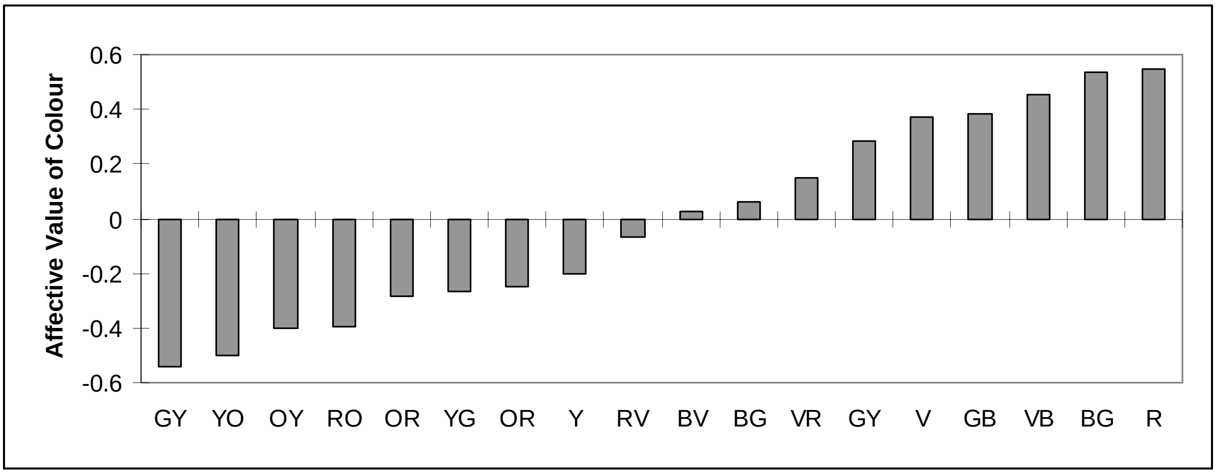
4.7 PERCEPTION OF COLOUR

Colour plays an important role in human perception and the enjoyment of landscapes. Without colour the appreciation of sunsets, of autumn colours, of azure blue sea, of flowers and blossoms would be diminished substantially. But in addition, colour provides survival enhancing information about the environment (e.g. by distinguishing between ripe and unripe fruit) [Padgham & Saunders, 1975, 171]. But given that many species of animal lack colour vision yet survive it is curious what purpose colour plays other than aesthetic.

Isaac Newton (1642 - 1727) first observed the colour spectrum when he held a prism up to light from the sun. Rainbows provide a natural alternative where the raindrops serve as tiny prisms and split the light. The colour spectrum: red, orange, yellow, green, blue, indigo and violet, comprise differing wavelengths of visible light, each bent slightly differently by the prism [Figure 4.9]. Black, white and grey have no hue and are neutral or achromatic colours while colours with hue are called chromatic colours. Colour has three psychological attributes: hue, saturation and brightness.

- *Hue* is the normal meaning of colour – (e.g. a red rose, a blue sea).
- *Brightness* or *value* is the lightness of a colour or its light intensity. Achromatic colours vary only in brightness, (e.g. ranging from black [minimum brightness] through to white [maximum brightness]).
- *Saturation* or *chroma* is the strength, richness or vividness of the hue ranging from highly saturated and intense through to hues of low saturation and weak. It is also the purity of colour - the extent to which it is pure chromatic colour without the addition of any achromatic colours. The addition of achromatic reduces saturation. It is determined by the extent to which the colour differs from a neutral colour of the same value (e.g. starting with grey and adding a hue will gradually increase the chroma and its vividness). A view with sunlit and shaded areas contains both rich saturated hues (i.e. sunlit areas) and subdued hues of low saturation (i.e. shaded areas).

However others, such as Walton, Guilford and Guilford, disagreed suggesting that they had found “a common basis of feeling for different colours” [Figure 4.10].



Source: Walton, Guilford & Guilford, 1933

Figure 4.10 Affective Preference for Colours - in Ascending Order

Their work was based on data on colour preferences collected from successive university students over 14 years. The highest preferences were for red and blue. Yellow hues were at the bottom of the rankings.

The influence of colour on preferences has been researched by psychologists since before the last century[16]. The earliest definitive study was by a German researcher, J. Cohn in 1894 who could find no general colour preference. Later researchers, Dorcus, 1926 and von Allesch, 1924, supported Cohn, von Allesch despairing of finding any consistent reaction to colours.

Cohn also reported a general preference for saturated colours, a finding supported by many other researchers, although Titchener, 1901, believed that some observers preferred saturated colours while others preferred unsaturated colours. Of the characteristics, hue, tint (brightness) and chroma, Guildford, 1933 found hue to be the most important and the others of secondary importance. Some researchers have found differences in colour preference according to gender (e.g. women prefer red to blue, men prefer blue to red). After examining several thousand cases, Garth, 1931, concluded that the “color sequences between the two sexes are about the same.”

In view of the conflicting evidence from previous research, Eysenck, 1941, conducted further experiments and critically reviewed the previous research. He found that the agreement between rankings of colours is as high as agreement between tests of intelligence, that some prefer saturated colours and others unsaturated colours, and that there were no gender differences (although women appear to slightly prefer yellow over orange). Given that von Allesch had concluded from his work that the results were too variable to say that there was any clear colour preference, Eysenck subjected von Allesch’s results to statistical analysis. He concluded that in fact von Allesch’s results were “essentially identical with my own, both as regards the amount of agreement between the Ss, and as regards the nature of the factors determining the judgement of the Ss.” [Ibid, 390].

[16]. This resumé of historical research is based on the reviews by Eysenck, 1941, and Ball, 1965.

Based on the findings of various experiments from other researchers, Eysenck derived the rankings shown in Table 4.3. This was based on a total of 21,060 subjects.

Table 4.3 Average Rankings of Colour Preferences

Colour	Rank
Blue	1.42
Red	2.20
Green	3.18
Violet	3.92
Orange	5.07
Yellow	5.21

Source: Eysenck, 1941

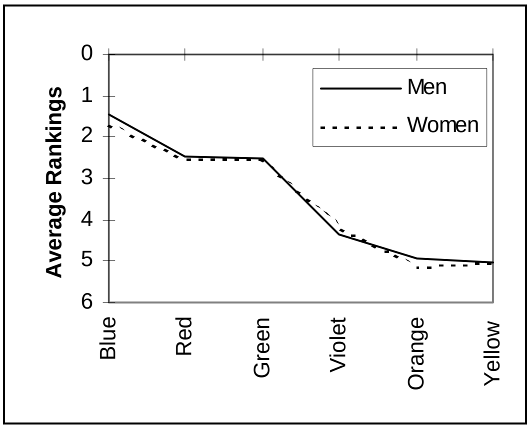


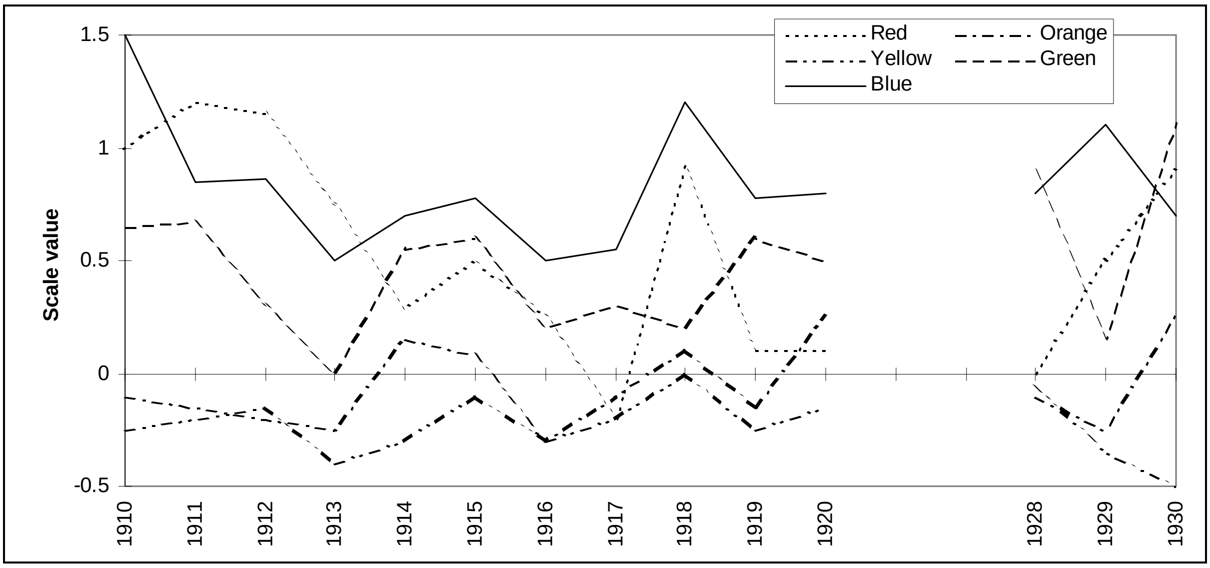
Figure 4.11 revised. Incorrect graph used in print edition.

Source: Eysenck, 1941

Figure 4.11 Colour Rankings by Gender

Figure 4.11 compares the colour rankings of men and women and shows that there is very little difference, Eysenck reporting a correlation of 0.95. Yellow is slightly preferred over orange by women and orange over yellow by men.

Walton, Guilford and Guilford, 1933 reviewed data on colour preferences that had been collected annually, except for the gap 1920-28, over the period 1910 to 1930 at the University of Nebraska. Ratings from 1279 university students were involved. The findings indicate considerable variation over time [Figure 4.12]. A similar chart was prepared by the authors and indicated slightly greater fluctuations over time for females than for males. The results indicate for example that preferences for red decreased continuously from 1910 to 1918 and then rose again in the late 1920s to its former level. The fluctuations for blue, green and orange almost parallel each other until the late 1920s. Yellow, the lowest ranked colour, had the smallest annual variations.



Source: Walton, Guilford and Guilford, 1933
Note: No tests were conducted between 1920 and 1928.

Figure 4.12 Variations in Colour Preferences, 1910 - 30, Males, University of Nebraska

Guilford and Smith, 1959, used a large colour range [over 300], held constant brightness and saturation, and used equal numbers of males and females. They found consistent rating from day to day. Males rated the colours slightly higher than females. Preferences were highest in the green-blue area and lowest in the yellow and yellow-green. They found that affective values were positively related to brightness and saturation.

The study of children's colour preferences has shown that the earliest top preference is yellow. For example, Staples, 1932 found that below 6 months of age, infants preferred chromatic colours to achromatic. The hues in order of preference were: yellow, blue, red and green. By the time the child is two years old, red becomes the favoured colour and by school age this has again changed to blue.

In summary, this brief review of colour preferences has found that the highest preferences are for red, blue and green, with saturated hues scoring higher than hues of low saturation. Differences between genders are slight but differences between races may be larger.

4.8 APPLICATION OF PERCEPTION AND COLOUR

The information processing framework includes the influence of short and long term memory on interpreting the information received. Familiarity of the scene, which relies on memory, can be an important influence on preferences [see Chapter 8] and should be included in the survey of landscape quality.

The various theoretical constructs including the Kaplans' information processing, Berlyne's collative stimulus and Brunswick's probabilistic functional model offer interpretations of perception and their relevance to preferences could be assessed in the survey.

Colour is an attribute of landscapes which differs from the physical components such as land form and land cover but which is considered likely, on the basis of past studies of the influence of colour, to influence landscape preferences. It should therefore be tested in the survey.

CHAPTER FIVE

PSYCHOANALYSIS AND AESTHETICS

5.1 INTRODUCTION

Psychoanalysis developed from the work of one man, Sigmund Freud [1856 - 1939], as a method for treating psychoneurotic abnormalities. Psychoanalysis focuses on the influence of the unconscious on one's mind and behaviour. In this chapter the contribution of Freud is examined and psychoanalytical models of aesthetics are described. Attachment 1, provides a glossary of some of the main psychoanalytical terms.

5.2 BASIC CONCEPTS OF PSYCHOANALYSIS

The basic tenet of Freud's psychoanalysis has been summarised thus:

> "...human behaviour is a product of unconscious needs and drives and of superego restraints and norms, all elaborated, compromised, and channelled into overt behavior by the ego." [Kreitler & Kreitler, 1972, 6].

Freud's psychoanalysis has two fundamental systems: firstly, the id, ego and super-ego and secondly, the unconscious, pre-conscious and conscious. These provide, as it were, the skeleton on which all Freud's other concepts hang [e.g. sublimation, repression, introjection].

(1) Id, Ego and Super-Ego

Freud differentiated between the id, ego and super-ego:

- Id one's unconscious instincts, the most primitive and elemental drives or urges which are uncompromising and dictatorial and which are partly inherited and partly acquired.
- Ego relates the individual to the real world and seeks to protect it and enable it to cope.
- Superego which is the conscience or part of a person concerned with moral ideals, both conscious and unconscious, and contain the person's earliest and most intense emotional links with their parents.

While the ego seeks compromise, the superego is satisfied with nothing less than perfection. Freud found that in many of his patients, the demands of the id conflicted with the absolute prohibitions of the superego, resulting in weakened egos to the point of mental collapse. Defence mechanisms are employed to cope with this include repression, negation, sublimation and, most commonly, displacement. Freud emphasised the influence on later life of the conflicts and experiences of one's early years. While Freud examined infants from age 2 onwards, Klein and others have researched the first 2 years of life.

Freud saw the development of personality as largely determined in childhood, but later psychologists such as Erikson regarded social factors as more important enabling the person's ego to develop throughout their life based their responses to life's challenges.

(2) Unconscious, Pre-Conscious and Conscious

The unconscious was Freud's great discovery and was based on his analysis of dreams. Dreams are Freud’s "royal road" to the unconscious. The unconscious comprises the repressed contents and instincts that have been denied access to the preconscious or conscious states. Much in the unconscious content derives from events early in life of which we have no recollection and includes desires, fears, and socially unacceptable feelings and wishes, many of which are sexual in nature. Although located in the unconscious, they powerfully affect our conscious thoughts and behaviour. Psychoanalysis aims at the gradual uncovering of these repressed memories to free the patient from their influence. The unconscious was regarded by Freud as the source of symbolism on which creative imagination is based.

The second area of the mind, the preconscious, comprises the knowledge and memories wthat are not presently conscious but which can be drawn on by the conscious mind. The contents of the unconscious are censored from being passed into the preconscious without transformation. The Freud linked the conscious mind, the third area, directly with perception; it covers both the awareness of the external world and of internal perceptions.

(3) Pleasure Principle & Reality Principle

As a biological being, humans seek to attain pleasure and avoid pain. Freud's *pleasure principle* drives humans to seek that which results in pleasure such as food and to avoid things that can give unpleasure. It is the id seeking release. Along with the pleasure principle, the *reality principle*, governs mental functioning. The reality principle is the awareness of the external world of which a child gradually becomes aware and understand. The pleasure principle is instinctive but the reality principle is learnt and in time comes to dominate as a regulatory principle. The pleasure principle operates instinctively and directly, (e.g. as a baby or young child demands food). The reality principle results in the pleasure principle being satisfied less directly, through the detours and postponements imposed by the external world. The pleasure principle is central to Freud's aesthetics.

Delight in attractive landscapes is an example of the pleasure principle operating, resulting in spontaneous, wholly subjective pleasure. The reality principle may influence what we like through cultural and other factors on our preferences. During the 20th century in particular, however, artists have rejected the emphasis on pleasure and contemporary paintings, music, plays and other art forms may provoke other emotions such as shock, horror, amusement and puzzlement.

While humans can recognise a wide range of qualities in the external world, Freud found that internal reality is expressed solely "in terms of an increase or decrease in tension as expressed on a single qualitative axis - namely, the pleasure-unpleasure scale" [LaPlanche & Pontalis, 1967, 323]. Freud found it to be far more complex than simply a direct relationship between pleasure and a consequential reduction in tension, or its inverse. He found that "pleasurable tensions" exist in situations that, though producing tension, can be pleasurable[17]. Freud thought that this might be related to changes in the level of the cathexis within a given space of time.

(4) Symbolism

Symbolism is a central concept in psychoanalysis. Freud regarded humans as symbolic animals. Symbolism is not regarded as strongly now as in Freud's time. Symbolism involves an object having more than one meaning and representing ideas and fantasies of which the viewer is barely, if at all, aware. Sexual symbolism dominates, but it may also extent to all aspects of life - birth, love and death. Based on his clinical work on dreams, Freud described the following as symbols [Spector, 1972, 95]:

- drawings by dreamers of landscapes in their dreams that when looked at closely, represent the human body, genitals etc
- pillars and columns as legs
- gateways as a body orifice
- water pipes as urinary apparatus
- kings and queens of fairy stories representing one's parents while princes or princesses represent the dreamer
- all elongated objects such as sticks and tree trunks representing the phallus while boxes, cases, chests, cupboards, ovens and ships represent the uterus
- rooms representing women, especially if the means of access are represented while the key to the lock signifies the penis
- steps, ladders, staircases and climbing or descending them representing intercourse
- a woman's hat or an overcoat represents a genital organ while a tie represents the penis which is also represented by ploughs, weapons, snakes, umbrellas and even airships - the list is endless

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17. This is the basis of the pleasure in the sublime [see Chapter 6] in the 18th century - potentially dangerous situations enjoyed in safety.

The phallus plays a prominent role in psychoanalysis and refers not to its actual representation but to its symbolic function. Historically its representation has been used in initiation and has symbolised sovereign power and transcendent virility. The phallic symbol should not be taken to mean:

> "a specific allegorical meaning ... however broad that might be (fecundity, potency, authority etc), [it] cannot be reduced to the male organ ... itself in its anatomical reality ... The phallus turns out to be the meaning - i.e. what is *symbolised* - behind the most diverse ideas just as often as (and perhaps more often than) it appears as a symbol in its own right.." [LaPlanche & Pontalis, 1967, 313, their emphasis].

Freud regarded the phallic symbol as one of the universal objects of symbolism.

Freud emphasised that the sexual aspects of dreams should not be exaggerated by "attributing exclusive importance to them" [Spector, 1972, 96] and did not assert that all dreams require a sexual interpretation. Symbolism is a route by which artists tap their unconscious; the means by which the instinct, (the unconscious), may be liberated [Dalbiez, 1941, 380]. Many of Freud's analyses of art made no reference to their sexual content.

The works of art that Freud and other psychoanalysts examined did not contain explicit sexual content; their sexual allusions needed to be drawn from their works. The point has relevance to landscape where mammary hills or phallic rock outcrops are sometimes suggested as evidence of seeing sexual aspects in landscapes. The psychoanalytical frame suggests that it is the far more subtle features which are probably not even apparent to the conscious mind which are important in sexual terms, rather than those which are obvious.

Freud also discovered the Oedipus Complex, which involves jealous hatred of the parent of the opposite sex and love for the parent of the same sex, or vice versa, or both in varying degrees. The complex is most apparent in young childhood [age 3 - 5], diminishes until puberty and is then conquered by varying degrees. It plays a major role in personality structure and in the orientation of human desire [Laplance & Pontalis, 1967, 283].

(5) Introjection and Projection

Introjection was first coined by the early Hungarian psychoanalyst, Sandor Ferenczi, in a paper "Introjection and Transference", published in 1909. Freud further developed the concept which he saw as providing a key to understanding melancholia [*Mourning and Melancholia*, 1917] as well as the general structure of the mind [*The Ego and the Id*, 1923].

Introjection involves the absorption by the ego of external objects that provide pleasure, including ideas, impressions and influences [Isaacs, 1952, 86,98]. This contrasts with *projection* that, in psychoanalytical terms refers to the ego thrusting "forth upon the external world whatever within itself gives rise to pain." [Ibid, 87]. The ego allows stimuli that give pleasure but prevents entry of those that are dangerous.

The first object introjected is the mother's breast. Aspects of parents are introjected and throughout life a person both introjects and projects to obtain pleasure and avoid pain. However, with growth that which constitutes pleasure and pain change [Heimann, 1952, 130]. Introjection and projection are among the earliest mental mechanisms. Introjection helps the ego cope with losing an object. Freud found that in the extreme case of melancholia, the loss of a loved object such as by death or change of heart, causes the ego to establish the object inside itself, (i.e. it introjects the lost love object while outwardly abandoning it) [Ibid, 133].

Projection is a primitive defence mechanism, the action of which the subjects may be unaware. This is because the subjects may refuse to recognise certain qualities, feelings, wishes or even 'objects' within them that they project onto another person or thing. An example used by Freud is a person who says of another, "I love him" but is contradicted by delusions of persecution. The unconscious statement then is “I hate him”. This is transformed by projection into “He hates [persecutes] me”. "Projection … is the attribution of one's own unacceptable impulses and ideas on to others" [Kline, 1972, 153].

Projection is also used in general psychology to refer to the displacement and relocation of a psychological element in an external position. This is similar to the psychoanalytical term "transference". Used in this sense it may describe, for example, the projection onto a pastoral scene of maternal thoughts of warmth and fecundity.

The mechanisms of projection and introjection are among the earliest of mental mechanisms and are fundamental to our relationship with and our perception of the external world.

> "Perception and its component operations (attention, taking notice of, storing in memory, judging, etc) are bound up with introjection and projection ... To appreciate the role which introjection and projection play in early development in the function of perception leads us to realize that perception cannot be divorced from object-relation." [Heimann, 1952, 126]

Introjection begins in infancy with the breast and thereon the infant introjects all pleasurable objects. Objects that yield pleasure, including people, food, smiles and laughter, pets, and the wider environment, are taken into the infant's inner world. Both introjection and projection continue throughout life but what constitutes pleasure and pain changes with personal growth. Introjection initiates processes that affect all aspects of life, both psychic and physical [Ibid, 155].

(6) Phantasy

In contrast with the word "fantasies" which are *conscious* mental images, psychoanalysts use the term 'phantasy' to refer to *unconscious* mental content that may or may not become conscious. Freud found that everything conscious has a preliminary unconscious stage - all mental processes originate from the unconscious and only under certain conditions becomes conscious [Isaacs, 1952, 82]. Phantasy is the psychic representative of instinct and Isaacs believed that:

> "there is no impulse, no instinctual urge or response which is not experienced as unconscious phantasy" [Ibid, 83].

This internal psychic reality is just as real to the person as external reality. Only under certain circumstances do they become conscious (e.g. via dreams). Phantasy is thus important in understanding perception.

> [There is] "a wealth of evidence to show that phantasies are active in the mind long before language has developed, and that even in the adult they continue to operate alongside and independently of words. Meanings, like feelings, are far older than speech ... In childhood and in adult life, we live and feel, we phantasise and act beyond our verbal meanings ... Words are a means of referring to experience, actual or phantasied, but are not identical with it, not a substitute for it." [Isaacs, 1952, 89].

Words cannot convey the full richness of our experiences.

Phantasies are based initially on taste, smell and touch and other somatic sensations particularly with the mouth and lips which are the main means of perception. Such sensations provide the basis for early phantasies. In infancy the visual element is relatively small and there is no distinguishing between inner and outer reality. Later, about the age of 3 - 4 years, visual images play an increasing role but are closely associated with somatic responses and with emotions.

The visual element in perception gradually increases, at first intertwined intimately with somatic responses and emotions, then differentiated from the somatic and distinguishing between the inner and outer worlds. As this occurs, the somatic undergoes repression and the visual elements in phantasy become stripped of emotion, separated from bodily ties:

> "They become 'images' in the narrower sense, representations 'in the mind' ... of external objects recognized to be such. It is 'realized' that the objects are outside the mind, but their images are 'in the mind'." [Isaacs, 1952, 105]

Freud's findings revolutionised psychiatry and broadened the understanding of the human psyche. Comparing his findings to that of Harvey, who discovered the circulation of blood and who showed the body as a functioning and organised organism, one writer noted that Freud:

> "observed the operations of the unconscious mind and demonstrated that they could be understood as a dynamic system of which conscious awareness and overt behaviour are only facets. The unconscious operations of the mind, ... were as little open to direct inspection as the circulation of the blood." [MacAlpine, 1956, 136]

5.3 PSYCHOANALYTICAL APPROACHES TO AESTHETICS

In examining the psychoanalytical approach to landscape, one is immediately beset with a problem - little has been written on the subject. Given that the focus of the psychoanalyst is the human psyche and in seeking understanding as to why humans think, feel, and act in the way they do, it is surprising that human interaction with the external environment, in an aesthetic sense, has not attracted more extensive inquiry by analysts. The sole exception to this statement, to the author's knowledge, is a brief section in a paper by Hanns Sachs [1951].

(1) A Psychoanalyst's View of Landscape History

Sachs provides a psychoanalytical analysis of the changing taste of beauty since the Renaissance. Prior to this, he considered that nature was regarded as gentle, kind, smiling - the "motherliness of nature." The image of the shepherd fitted this image - as in the Bible and through Greek and later poets. This image of nature derived from the pre-pleasure[18] furnished by the promise of fecundity and plenty and on the paternal kindness of the nourishing earth and a benevolent God." [Ibid, 226].

With the growth of scientific understanding of nature towards the second half of the 18th century, the naive dependence on nature's bounty gave way to "compelling it to deliver the goods that had hitherto been accepted as voluntary gifts." [Ibid, 226]. Mechanisation of farming on a scientific basis replaced the pastoral shepherd.

The high mountains, the cliffs and rocks were not regarded as beautiful because they were not productive, but more profoundly because they aroused anxiety and where anxiety was present, beauty could not dwell. [Ibid, 161]. With scientific understanding anxiety gradually waned and these landscapes acquired a unique aesthetic value, termed by writers of the time as "sublime" [see Chapter 6].

> "Men had been taught beauty by fields and flowers, by hills and woods, by clear brooks and sunny lakes. They applied what they had learned to the new wide world and admired the formation and outline of cliffs and crags, the colours of the deep sea and the tints of the sunset." [Ibid, 227-8].

The new beauty differed from the old; this was not based on pleasantness, it was raw, intense, and "more deeply emotional". Their awe-inspiring appearance, far from being repulsive, was their main attraction.

Sachs distinguishes between the old form in which beauty was in small, diluted, and pleasant doses, and the new beauty where it is pure and undiluted. The former pleasant scenes offered a gratuitous pre-pleasure, - the "mind is left free for the 'pursuit of happiness' for its own pleasure-seeking Id activity." [Ibid, 229]. In the modern form, however, pre-pleasure mechanisms are almost absent and sublimation is at work "with as much zeal that the original sources are often hardly recognizable." [Ibid, 230]. Beauty and anxiety are absolutely irreconcilable according to Sachs [Ibid, 171] and sublimation of beauty occurs.

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18. Pre-pleasure is the conscious pleasure afforded which serves as the facade to a deeper pleasure in the unconscious. The transition to the hidden occurs only where the link between the facade and the unconscious is seamless. Aesthetic pleasure is a function of the quality of the transition from facade to interior [see Sachs, 1951, 46].

The purpose of the following analysis is to search for models and keys that are relevant and potentially applicable to understanding human aesthetic responses to landscapes. The section begins with a general review of the psychoanalytical approach to artistic creativity and then examines a range of psychoanalytical models that have been developed to assist in understanding aesthetics. These are synthesised and a psychoanalytical model of landscape aesthetic response is presented.

(2) A Psychoanalytical View of Artistic Creativity

Psychoanalysts have been interested in art as an expression of the unconscious mind whether in the fine arts of music, poetry, painting, sculpture and dance or in the range of other artistic pursuits. Many psychoanalysts have examined artistic impulses - the factors underlying creativity [Schneider, 1950].

In 1908, Freud asked the question:

> "We laymen have always wondered greatly ... how that strange being, the poet, comes by his material. What makes him able to carry us with him in a way and to arouse emotions in us of which we thought ourselves perhaps not even capable ?" [Segal, 1955, 384].

Freud was interested in art and the artist and wrote several psychoanalyses of works including Michelangelo's statue of Moses, the Medusa Head, and Leonardo da Vinci's Mona Lisa and The Virgin and St Anne. His interest lay more in the subject matter of the artist than in the art itself. While he did not write systematically about aesthetics, nevertheless his writings provide insights.
With reference to art, Isaacs wrote:

> "We know from drawing, painting and sculpture and the whole world of art, what a wealth of implicit meaning can reside even in a shape, a colour, or of melody and harmony in music" [Isaacs, 1952, 89].

It has been suggested that:

> "psychoanalysis provides our only really complete theory of art, telling us how it originates in the mind, why it takes the form it does, what function it has in society, and how it relates to our great myths and social institutions." [Kernan, 1979, 213].

Essentially, psychoanalysis sees art as wish-fulfilment or as an expression of unresolved psychic conflict.

> "The power of art comes ... from the strength of [the artist's] psychic energies which are powerful enough to surge through barriers erected by consciousness and by society. His craft lies only in his largely unconscious ability to find symbolic expression for his desires ..." [Ibid, 214].

In 1911, Freud explained the artistic impulse in terms of phantasy; the artist turns from reality because of an inability to renounce instinctual satisfactions and gives full rein to erotic and ambitious desires through phantasy. Using his artistic gifts, he returns to reality through "moulding his phantasies into *a new kind of reality*" [Read, 1951, 76, writer's emphasis] which is then acclaimed. The artist thus becomes the hero, the king, and the favourite through art, not reality. Art, according to Freud is the path from phantasy back to reality - wish fulfilment. The artist is able to modify his phantasies so that their unacceptable origins are undetectable. According to Freud, the results are able to "awaken in us the same emotional attitude, the same mental constellation as that which in him produced the impetus to create" [Ibid, 77].

Stokes considered art to be therapeutic to both the artist and the viewer [1965, 55]. Freud recognised that art provided catharsis to repressed sexual desires. Freud's theory of both wit and artistic appeal is that its pleasure "derives from the free expression of repressed feelings otherwise unacceptable to the conscious personality" [Alexander, 1948, 186]. In addition, as Stokes' noted, the process of artistic creation integrates the ego and its objects.

Hanna Segal considered that each artist creates a world of their own; even two artists or writers describing the same scene will produce totally different results. Drawing on Klein's work, Segal believes that artists seek to recreate a world that has died:

> "It is when the world within us is destroyed, when it is dead and loveless, when our loved ones are in fragments, and we ourselves in helpless despair - it is then that we must re-create our world anew, reassemble the pieces, infuse life into dead fragments, re-create life." [Segal, 1955, 390].

This is a process of sublimation in a wider sense than that of Freud.

Recognising that ugly and beautiful are two aspects of aesthetic experience Segal believed that both must be present for the full experience. Ugliness is the fragmented destroyed past, beauty is the object restored [Likierman, 1989, 137]. Psychoanalysts regard the main elements of beauty as the whole, the complete and the rhythmical [such as rhythmical sucking, breathing and heartbeats].

Based on various clinical cases involving artists and depression, Segal asserts that artists are able to withdraw into a life of phantasy and communicate this through their art. They embody some deep experience of their own in their art and, she suggests, this is the drive to overcome unusually strong depression.

According to Segal, aesthetic pleasure for the viewer derives from:

> "an identification of ourselves with the work of art as a whole and with the whole internal world of the artist as represented by his work. In my view all aesthetic pleasure includes an unconscious re-living of the artist's experience of creation." [Segal, 1955, 399].

Kris [1953, 59] distinguishes between the inspiration phase and the elaboration phase of artistic creation and notes that wherever such creation takes place, the idea of a public exists (i.e. a public who will see and respond to the work).

Kris [1948, 357] noted that psychoanalysis cannot answer why some people have natural gifts for art and can only partly answer why some individuals turn to art. However, it can explain the functions that art fulfils in the individual artist. He considered that the function of art is "an invitation to common experience in the mind" [Ibid, 360]. Considering the viewer, he cited the evidence from observations that the viewer enters unconscious identification with the artist and, as it is dealing with re-creation, experiences the psychic process in reverse. It enters the consciousness and is elaborated by the pre-conscious and by the id. The flow of mental energy [(athexis) between the ego, id and super-ego is experienced as pleasurable:

> "On a first level, the flow of emotions in the safety of the 'aesthetic illusions' is pleasurable; on a second level, the change of cathexis itself, accompanied by a sense of control, is experienced as delight" [Ibid, 369].

This is similar to Freud's words in 1908:

> "I am of the opinion that all the aesthetic pleasure we gain from the works of imaginative writers [or art - author] is of the same type as ... fore-pleasure, and that the true enjoyment of literature proceeds from the release of tensions in our minds" [Read, 1951, 76].

This is the carthexis approach - art offering relief to the unconscious.

Herbert Read, an art historian with an interest in psychoanalysis, suggested that identification in aesthetics is not limited to some other person, "but can be a plastic object, the essential aesthetic feeling being provoked, however, only when the object is a significant object" [1951, 79]. His formulation provides a means whereby landscapes may provide a basis for identification.

In summary, the artist turns from reality and, through giving full rein to phantasies, gives symbolic expression to repressed unsocial feelings and thoughts. Gaining unconscious cathexis or relief, and seeking to overcome depression and re-create a lost object, the artist creates works of art that give vent to his or her phantasies in an acceptable way. Through this the artist becomes a significant figure, a hero; through their art they mould a new kind of reality and thus gain the freedom they previously lacked.

The viewer of art, through unconscious identification with and re-living the same psychic pressures experienced by the artist, gains cathexis relief from unconscious tensions which is pleasurable. Read's observation that aesthetic identification can be with a significant plastic object may open the way for the consideration of landscapes.

Having introduced the psychoanalytical approach to aesthetics, various models are now examined for their psychoanalytical explanations of the aesthetic phenomenon. These models which I have called:

- Freud's sublimation model
- Sachs' co-ordinated psychic model
- Klein's depressive integration model,
- Likierman's psychic growth model, and
- Spitz's transactional model.

examine the outline presented above in greater depth.

(3) Freud’s Sublimation Model (or Instinct Model)

Based on the psychoanalytical approach, Freud considered that "artists express unconscious desires in a sublimated symbolic form, curbed and inhibited by the superego" [Kreitler & Kreitler, 1972, 6]. Sublimation is the outward expression, in socially acceptable ways, of unconscious thoughts and drives that are socially unacceptable - exchanging an "originally sexual aim for another one which is no longer sexual but which is psychically related to the first" [Laplance & Pontalis, 1967, 432].

Freud regarded the origin of beauty as being sexual excitement, stating that he considered it certain that beauty derived from sublimated sexual feeling [Spector, 1972, 100]. Some authors have suggested that some of the higher primates can similarly derive sexual stimulus from aesthetic activity such as painting [Simenauer, 1964, 434]. Freud regarded the appreciation of beauty and aesthetic pleasure as the indirect satisfaction of vital needs (i.e. a sensualist approach to aesthetics in contrast to an intellectual approach) [Dalbiez, 1941, 383]. The idea that beauty derives from sexuality was not new and many books covering the theme were available to Freud.[19] He broadened sexuality, however to include cultural activity and beauty as being derived from sexual feeling.

Sublimation of the sexual aspect is the key to Freud's conception of art. Sublimation is a process argued by Freud to account for human activities that have no apparent connection with sexuality but which are assumed to be motivated by the force of sexual instinct [LaPlanche & Pontalis, 1967, 431]. Freud defined sublimation as "the capacity to substitute for the sexual aim of another, non-sexual aim which is genetically related to the first." [Dalbiez, 1941, 369].

Freud considered the repression of early childhood sexuality resulted in its diversion from direct release and its displacement elsewhere, including artistically. Since Freud, sublimation has been widened to cover a general mental process resulting in "the transformation of any primitive trends into 'higher' civilized expression" [Likierman, 1989, 137]. Freud's original sexual formulation of sublimation has broadened to encompass the process of civilising psychic processes.

Kris considered sublimation as the most frequently misused of Freudian terms. He describes it as:

> "the social aspect of the process of discharge of energy: an instinctual drive, which tends to a goal disapproved by society and by the individual's super-ego may be redirected towards an approved goal" [1948, 356].

Kris noted that artistic pursuits offer opportunities for sublimation of impulses of various kinds.

Sublimation produces objects that are socially valued such as art. Freud considered that artists sublimate their most personal wishes and phantasies, expressing them in an art form that "softens the offensive aspects of these wishes" [Spector, 1972, 101], a kind of

19. For example, George Santayana, 1896. *The Sense of Beauty,* New York & London; Yrjo Hirn, 1900. *Origins of Art*, London; as well as many German and French publications. See Spector, 1972, 216, note 30.

sugarcoating of content to make the art presentable. The deflection of libido from its original sexual or aggressive aims provides the energy for artistic creativity [Bychowski, 1951, 599].

Viewing art (or any object in aesthetic terms) also involves sublimation on the part of the viewer:

> "The perception of ... art affords vicarious fantasy gratification for these unsatisfied wishes [i.e. infantile or primitive drives and wishes] in a sublimated, i.e. socially accepted form. ... The latent content of works of art - disguised by symbolization, displacements, conversions into opposites, and other dreamlike distortions - activates the repressed wishes and thus lets them be gratified in fantasy. The perceiver can identify with this content and project his unconscious strivings onto it with impunity, shielded as he is from the superego by the socially accepted manifest content of the work of art." [Kreitler & Kreitler, 1972, 7]

Freud showed that the work of an artist is the product of sublimation from their unconscious phantasy life. For a period, Freudian analyses were made of the unconscious foundations of an artist's work but this is rarely practiced now. In the 1920s, art critics such as Roger Fry and Clive Bell rejected Freud's notion of art as sublimation and wish fulfilment substituting aesthetic creation in its place.[20]

Klein [1930, 237] considered symbolism to the foundation of all sublimation, symbolism being a more primitive instinct in which external objects represent internal thoughts, feelings and ideas. Symbolism is the indirect and figurative representation of an unconscious idea, conflict of wish. It is a widely used concept in psychoanalysis and many other disciplines. While the forms of symbols are very numerous, they generally refer to a small group of objects: the body, parents and blood relations, birth, death, nudity and above all sexuality. Freud considered that the unconscious comparisons underlying symbolism "are not freshly made on each occasion; they lie ready to hand and are complete, once and for all" [LaPlanche & Pontalis, 1973, 445]

According to Ernest Jones, Freud's contemporary and biographer, perceptual memories are converted into visual forms. On this basis, Spector considers that the process of symbolism "causes the mind to revert to more primitive mental processes, especially those costing the least effort, such as the concrete and sensorial - usually visual" [Spector, 1972, 100-1].

Read considered that symbolism has become the central principle of aesthetics - "art is art as symbol" [1951, 73]. By symbolism, Read referred to it is a symbol for certain feelings, "a pattern of sentience" [Ibid, 75].

Freud did not simply look in art for signs of the artist's sexual or neurotic motives but recognised the ability of the good artist to "synthesize his experience with his neurotic wishes and fantasies..." [Spector, 1972, 77], that he is able to achieved insights into the mind approaching those of a psychoanalyst. He regarded great works of art as

> "unfolding dramas of the mind, ... psychodramas [which we] might term ...psychic realism: the landscape and details of the environment are reduced to a minimum. [Ibid, 93].

While Freud's greatest emphasis is on the sexual instinct in aesthetics, he does not deny the influence of other instincts [Dalbiez, 1941, 381]. He never examined the nature of aesthetic pleasure itself, preferring to concentrate on the process of artistic creation.

(4) Sachs' Coordinated Psychic Model

> "The creative mind, in reacting to beauty, in producing beauty, represents the highest form of psychic life, in which all its parts - the id, the ego, and the super-ego are co-ordinated." [Sachs, 1951, 239].

So Hanns Sachs concludes his exploration of how it is that these normally separate entities combine in the presence of beauty. Sachs identifies the play element - the make believe that psychic processes easily distinguish

20. Bell, C., 1925. Dr Freud on Art, *The Dial*, April, 280-81; Fry, R. 1924. *The Artist and Psychoanalysis*, London.

from reality as the means through which things that would otherwise be forbidden [and hence repressed] are accepted. Through what is experienced, whether artistic creation such as paintings, plays or poems, or nature, an id content that is otherwise inaccessible "reveals itself in these moments with a clarity beyond words and intellectual conception." [Ibid, 231].

In revealing the hidden id content through its transference on the ego, Sachs is not offering any more than Freud in referring to sublimated drives and desires which are brought to the surface, i.e. the ego. Elsewhere Sachs describes the role of the creative artist in translating his inner experience into lines, colours, sounds or words, to which the recipient acquires the same emotional experience through re-translating them in their own mind. This provides the basis for the understanding of art [Ibid, 196].

In the context of play, make-believe and illusion makes the super ego "a bit more indulgent", less inclined to focus on anxiety and guilt, so that it actually participates in the activity that results in the linking of id and ego as it "cherishes the narcissistic ideal of a complete fully organised and freely functioning personality." [Ibid, 235]. Similarly close alliances between the ego and super ego are apparent also in religious ecstasy. The active participation of the super ego results from "bribing" it with the narcissistic satisfaction that the ego offers to it. Attenuation of the super ego's destructive, critical attitude against the ego provides the basis on which beauty is built.

But Sachs develops his theory further, drawing on Freud's concept of the death instinct in beauty. Normally the aggressive drive is part of this instinct that, through sublimation, is turned inwards against the ego and in also strengthening the severity of the super ego. But with the super ego co-operating with the ego about objects of beauty, the death instinct cannot be converted into aggression since it has no object, either inside or outside on which to focus. The death instinct therefore continues its normal form with varying intensity of influence. In situations of diluted or weak beauty, it provides stability through an infusion of death instinct character into the play of ego and id tendencies [Ibid, 238]. Functioning fully, the death instinct provides:

> " a feeling of restfulness and bliss, ... a haven of peace where the eternal necessity to choose between sensual gratification and peace of mind is abolished. This is the reason why some little bit of beauty is such an indispensable help in carrying the burden of life." [Ibid, 239].

Sachs equates motionlessness with death, not actual morbidity, hence a feeling of peace paradoxically resembles death, not life.

Faced with great, pure beauty, life and death are present intensely and are indissolubly linked. Death strives for permanence, stability, and immobility; life seeks movement, dynamism and motion. Sachs concludes: "Beauty is a quest which leads to motion as well as to immobility. Beauty is life dancing - but dancing to the tune of death." [Ibid, 240]. Motion is life, immobility is death, therefore while beauty brings life, the peace it offers is death.

Contemporary psychoanalysts regard Freud's notion of the death instinct as controversial and the analysis by Sach's is not now regarded as useful. However Sachs' theory of beauty, based on the unique co-ordination of the id, ego and super ego offers a further psychoanalytical approach to the issue of aesthetic experience. Sachs makes it clear that he is referring not only to artistic creations but also to nature so his model has relevance to landscape aesthetics.

(5) Klein’s Depressive Integration Model (or Object Relation Model)

Melanie Klein, a psychoanalyst who specialised in children, attributes fundamental importance to an infant's first object relation (i.e. the relation to the mother's breast and to the mother) [Klein, 1957, 3]. Introjection of this primal object in a secure environment lays the basis for individual development.

The *good breast* is instinctively felt to be the source of nourishment and therefore, of life itself, and provides unity with the mother, restoring to some extent the lost prenatal unity and, even when food is not sought, providing constant reassurance of the mother's love. The good breast is internalised, it is:

> "taken in and becomes part of the ego, and the infant who was first inside the mother now has the mother inside himself" [Ibid, 3].

Freud regarded the infant's pleasure at the breast as the prototype of sexual gratification and Klein extends this to cover "all later happiness and ... the feeling of unity with another person." [Ibid, 18].

However, the infant also experiences anxieties, possibly associated with the longing for the prenatal state in the womb, or to difficulties the mother experiences in feeding and caring for her child or to physical inadequacies. Klein calls the results of this the "bad breast". The good and bad breasts represent the infant's feelings of love and hate, of pain and pleasure, even of life and death instincts. The child loves the good breast and hates the bad, but then comes to realise that they are the same. Attacks on the bad breast are actually on the good breast. The infant works through this every day, loving and hating the same thing; a treadmill broken by love, which repairs and restores. The infant has thus a sense of losing and regaining the good object.

Through psychoanalysis of patients, Klein found the good breast represents maternal goodness, patience, generosity and creativity. She writes:

> "It is these phantasies and instinctual needs that so enrich the primal object that it remains the foundation for hope, trust, and belief in goodness." [Ibid, 6].

Following birth, and for the first three or four months of life, the infant develops the paranoid-schizoid position; anxieties tend to be paranoid and the defences to them involve the ego fragmenting itself and its object. Normality of the individual is determined, according to Klein, by the internalisation of the breast and the "dispersal of the destructive impulses and of internal persecutory anxieties." [Ibid, 23].
During the first three to six months of life the infant is subject to fears of the loss of loved objects - Klein's depressive position. In phantasy these objects, external and internal, are destroyed resulting in persecution and guilt for their loss and a wish to restore and recreate the lost objects outside and within the ego. This wish is the basis of later sublimation and creativity. With growth comes a capacity to restore, a relinquishment of the depressive anxieties, and an integration and enrichment of the ego by assimilation of the loved objects. The guilt gives rise to a need to restore and recreate and this provides the roots of creativity.

Although at face value the idea of depression as being the font of creativity may seem contradictory, it is well known that many artists, writers and composers have produced some of their best work while in such a state. Regarding Mozart, for example:

> "some of his gayest, brightest, most beautiful and cheerful music during periods of his life that were, to say the least, trying. The depression Mozart tells of having suffered during these periods was accompanied by outbursts of creative activity, in which he sought unconsciously to restore the infantile situation of complete bliss at the mother's breast..." [Esman, 1951, 610].

Roger Money-Kyrle believes that the beginnings of a non-utilitarian Kantian attitude to things to be admired and loved, but not consumed derives from the conflict between desiring to possess and consume the object and the desire to protect it forever from these pressures [1961, 114]. Concurrently with these conflicts, the infant feels a oneness with the object - the mother, yet also their separateness as a distinct individual. This feeling of oneness and otherness, Money-Kyrle suggests, may be recaptured in later aesthetic experiences - the feeling of closeness, empathy and identification with a landscape for example and the objective recognition of one's separateness.

(6) Likierman's Psychic Growth Model

Meira Likierman considers that aesthetic experience is primary and present from birth and that, rather than deriving from psychic growth, it is a precondition of growth [1989, 133]. Her model of individual development in infancy derives from Klein. In contrast to Klein, however, she regards aesthetic experience as not only preceding the depressive position but is the critical enabling factor of it.

The aesthetic experience commences with life and derives from the earliest 'good' experiences. From a psychoanalytic viewpoint, she considers that "appreciation of beauty is ... a fundamental human capacity present within everyone." [Ibid, 133] This capacity is a primitive precursor to the later development of taste and ability to judge and appreciate beauty. Our aesthetic knowledge is critical in representing the world to ourselves, providing the basis for fantasies for imagination and thought.

Likierman postulates that the aesthetic experience exists in a primitive form from the inception of life and that its characteristics are defined by Klein's paranoid/schizoid position which antedates it and serves as the basis for the development of the depressive position. Rather than seeking the reparation of a lost and destroyed object, the individual's healthy development depends on transferring their early aesthetic experience into the depressive perception of an integrated object and of viewing the whole good/bad world in terms of aesthetic principles [Ibid, 138].

The paranoid/ schizoid position has a lasting influence on artistic creativity and on how reality is viewed as an adult. This is because 'good' is first experienced aesthetically as an infant and forever after aesthetics is "known other than through the thinking mind" [Ibid, 138].

Klein's concept of the paranoid/schizoid position involves a polarity in infantile experiences, good and bad which are separated from each other and only experienced separately and singly. Psychoanalysis has focussed on the bad aspects of the paranoid/schizoid position and has not given the good aspects the same attention. The good is symbolised by the ideal object which Likierman considers is "an aspect of reality which is integral to any experiencing of goodness. The ideal comprises the very essence and core of goodness, and so remains an inevitable dimension of all good experiences. " [Ibid, 139]. An ideal can be so intense as to inspire awe for a good that is greater than self, a sublime experience - thus perhaps providing insight into our reaction to an outstanding landscape which can represent a good in its most ideal or sublime form.

The sublime experience (a perfect good), experienced in infancy and resulting in our comprehension of goodness reveals itself in the dreams and fantasies of individuals and in human cultural heritage. Likierman cites 'light' as an example, mentioning its use in Biblical themes, religious iconography in which the sun motif appears as a halo, and its use by painters such as Van Gogh. These are inferences of common early intensely aesthetic experiences.

With growth the child enters Klein's depressive phase of life discovering the good and bad parts of experience and bringing these together as two aspects of a 'whole'. Never again will good be a fixed and absolute certainty. The phase is marked by recognition of the loss of an omnipotently 'owned' part object (i.e. the mother), the loss of ignorance and the process of integration into a 'whole' person.

In a world of loss and pain, the initial sublime experience continues to succour and is preserved as whole as possible. The infant "imposes an aesthetic pattern over his view of his life" and attributes an aesthetic value to the whole good/bad world and begins to experience life from the point of view of order and meaning. From thereon, "the 'good' is never conceptualised without accompanying unconscious aesthetic phantasies" [Ibid, 148]. The whole good/bad object provides us with the ability to value beauty otherwise it would be wholly utilitarian.

Drawing on Kant's formulation of beauty as being an aspect of form not related to purpose (i.e. independent of its usefulness to us), Likierman notes that beauty indicates to us the "existence of an objective world" [Ibid, 135]. In psychoanalytical terms she states, "any value which the individual places on a non-functional, non need-fulfilling quality of the object is necessarily aesthetic." Beauty is a quality which is not given, consumed or possessed, it is the quality the object "keeps to itself and represents its "essential 'otherness', ... its unique identity" [Ibid, 135].

Aesthetic knowledge also contributes to the development of our phantasy life and imagination, for example as adults we can perceive a horse but our aesthetic sensibilities help us distinguish between a racing horse and a broken down hack. Such knowledge provides the raw material for symbol formation. Freud showed how the details of external reality are condensed by the mind and blended in new forms which comprise our unique individual symbols. The richness of detail of such objects in our dreams and unconscious thinking is astonishing, it "is as if man can create in phantasy the complexity which God has created in nature." [Ibid, 135].

The process of absorbing what we see and transforming it into symbols involves a process of personalising external reality - "impregnating sensory 'data' with meaning that is personal" [Ibid, 136], a concept applicable to viewing and appreciating landscapes. She considers that the way in which the aesthetic "gets locked into our complete life experience, fusing with both intellectual and emotional processes within the medium of the developing personality" [Ibid, 136] to be fundamental to our appreciation of art and to our desire to create, value and preserve art. Our aesthetic experiences which help shape us, we in turn express through artistic creations. Our mood affects our aesthetic response - Likierman considers that happiness can increase our sensitivity to beauty.

Likierman argues that the aesthetic content of an object lies in its form, not its content. Citing Hamlet's "to be or not to be" soliloquy, she notes that an alternative phrase: "I have a conflict ..." would not convey the same truth. She goes on to examine how Hamlet's words turn facts into art, expressing a truth about his state of mind in a form that captures its close-to-suicide essence.

Likierman's model of psychic growth overturns the classic model which views aesthetics as developing with growth, instead viewing aesthetics as developing from the beginning of life and, through its representation of the world, of being crucial to growth and integration of the individual as a whole being. Her linking of aesthetics with the good/bad object provides a pre-cognitive means of assessing the value of an objective wholly subjectively and without considerations of purpose or utility, thus linking it with Kant's aesthetics.

(7) Spitz’s Transactional Model

Ellen Spitz developed a rather radical view of art from a psychoanalytical viewpoint. She considered that psychoanalysis "locates aesthetic pleasure in the subject [and] also in a dynamic in which the spectator-subject may become object to the aesthetic subject *qua* subject." [Spitz, 1991, 4]. By this she meant that the art object itself gazes at the viewer as though to desire him or her. There is a hint of this in the statement by Cezanne: "The great classical landscapes, our Provence, Greece and Italy as I imagine them, are those where clarity becomes spiritual, where the landscape *is a hovering smile of acute intelligence*..." [Prodo, 1990, 403, my emphasis].

Based on Freud's major texts relevant to aesthetics,[21] Spitz defined three major precepts [Ibid, 5]:

(a) An object found is an object refound, and the refinding rather than the

21. viz: *Interpretation of Dreams*, 1900; *Three Essays on the Theory of Sexuality*, 1905; *Jokes and their Relation to the Unconscious*, 1905; and *Beyond the Pleasure Principle*, 1920.

intrinsic properties of the found or chose object is of prime significance.

(b) The relations of joke/teller/listener (work of art/artist/spectator) imply a dynamic characterised by subtle reversals, complex alignments, and shifts of position.

(c) Subjectivity, born of loss, stages the replicative recovery of its object through links with an unconscious symbolic system that radically determines this very subjectivity.

Spitz's approach signals an interaction between viewer and subject, an aesthetic experience involving an object intensely engaging a subject; the:

> "object's presence figures an absence, induces a lack (desire) in the subject which it (the object) in an imaginary way, fulfils. The dynamic can be both reversed and replayed. Thus the subject experiences fulfilment and want - a *pleasure in desiring* - which constitutes the special quality of aesthetic experience." [Ibid, 5].

Adrian Stokes has a similar view. He considered art to invite empathic identification - the "envelopment factor in art" which he called the incantatory process a term suggesting absorption to some extent in the subject matter [1965, 17 - 18].

> "...all art describes processes by which we find ourselves to some extent carried away, and that our identification with them will have been essential to the subsequent contemplation of the work of art as an image not only of an independent and completed object but of the ego's integration" [Ibid, 19].

5.4 RELEVANCE OF PSYCHO-ANALYTICAL APPROACH TO LANDSCAPE

(1) Summary of Psychoanalytical Models of Aesthetics

The overview of psychoanalytical approaches to aesthetics together with the description of the various models that have been developed on aesthetics indicates the rich insights and radical contributions that psychoanalysis provides for understanding aesthetics. Psychoanalysis focuses on understanding the underlying human motivations and processes that produce certain actions, not in the outcomes. Psychoanalysis helps understand human psychic processes in selecting one landscape over another or to explain the content of landscapes in terms of symbolism, but the use of psychoanalysis to rank landscapes is thus unlikely to be productive.

While the psychoanalytical approach can assist in understanding landscape aesthetics, it would be difficult to derive a universal predictive model because it can produce not one interpretation, but a range of differing interpretations of the object viewed (e.g. art, landscape) and its effects on the viewer. Nor does psychoanalysis provide for verification in an objective way and account for the formal aspects of the object or explain its cognitive content [Kreitler & Kreitler, 1972, 7 - 8].

Others consider that because psychoanalysis does not follow the principles of scientific method[22] that it is invalid. Kline considers it as a "huge collection of empirical hypotheses and propositions some of which may be true." [1972, 4]. Nevertheless, based on careful examination of the evidence of studies which have sought to evaluate the veracity of psychoanalysis, he concludes that the majority of Freudian concepts are confirmed [Ibid, 359]. Yet he cautions against some of Klein's concepts even though he considers her use of introjection and projection to be supportable [Ibid, 332].

Having regard to these qualifications, the psychoanalytical model is considered relevant to understanding landscape aesthetics. At the most fundamental level it reinforces the significance of individual differences in psychological constituencies which derive from widely varying drives and desires. It also identifies a range of experiences (e.g. mothering, growth) and psychic mechanisms (e.g. introjection, projection, phantasy, symbolism and sublimation) which are

22. Scientific method is based on: *observations* under controlled conditions; *constructs* which must be operational [i.e. having clearly specified and identifable empirical referents] ; and *hypotheses* which must be testable [Marx, 1963].

common to virtually all humans from infancy and which influence people throughout their lives.

It is apparent that the various approaches described above are variations on a theme, the basic theme being the psychoanalytical model established by Freud, on which the later practitioners have developed their particular emphases and explanations of the mechanisms involved.
It is useful, therefore, to again summarise Freud's basic model of the individual psychic. This comprises the *id*, one's unconscious instincts; the *ego*, which relates the individual to the real world; and the *superego*, which is that part of a person concerned with moral ideals; together with the *unconscious* and its importance as the container of hidden contents and instincts.

Various mechanisms connect the inner and outer worlds: *introjection*, the taking into the ego of things which give pleasure; *projection*, the displacement externally of a psychological element, including the expelling from the ego of things that cause pain; *symbolism* in which external objects are accorded internal meaning; *phantasy* in the unconscious about external objects; and *sublimation* by which socially unacceptable thoughts and drives are given socially acceptable expression.

Some psychoanalysts have addressed the question of aesthetics from a psychoanalytical viewpoint. Most psychoanalytical discussion of aesthetics uses artistic creation as their subject and few, apart from Sachs, mention the natural beauty of the world. As discussed, there are significant differences between art and landscape, the most important in psychoanalytical terms being that, whereas a viewer can identify with the artist's unconscious desires expressed through sublimation, this is not possible with landscape - although it is possible with the paintings and even photographs of landscapes in which a human creative element in involved.

Based on these fundamental concepts, a variety of models in relation to aesthetics have been developed. These are summarised in Table 5.1 together with the role of the viewer. and the viewer's relationship with the landscape.

Key outcomes identified by these models and psychoanalytical concepts are:

- development of unconscious phantasies, based on introjection of objects and things which give pleasure
- symbolism of external objects in terms of an individual's unconscious sense of meaning
- projection of unconscious feelings and phantasies onto external objects as representative of these
- sublimation of socially unacceptable unconscious feelings and drives in socially acceptable ways such as through art, recreation and other pursuits
- creation of art which presents unconscious phantasies, desires and thoughts in socially acceptable ways - creating a new form of reality not previously present, through which the artist becomes a significant figure and socially esteemed
- softening of the superego's censorial role in the presence of aesthetic pleasure, and the unique combination of the id, ego and superego to enjoy it
- carthexis or relief in artistic creation
- overcoming depression through the rediscovery and recreation of the lost good object
- the aesthetic equated with the good or ideal object
- pleasure from an aesthetic object gained without its consumption
- the viewer identifies with the artist and relives the same psychic experiences experienced in the art's creation, gaining relief from unconscious tensions in a manner that provides pleasure

(2) A Psychoanalytical Model of Landscape Aesthetics

Having examined the contribution that psychoanalysis provides in understanding artists and art, what triggers an aesthetic response to natural beauty? Psychoanalysis suggests that the starting point of such a response derives in large measure from the infant's image and relationship with its mother.

Qualities such as softness, warmth, roundness, closeness, love, nurture, envelopment, safety, security, fecundity and satiation describe the aesthetic

Table 5.1 Summary of Psychoanalytical Models of Aesthetics

Model	Description
Freud Sublimation/ Instinct Model	The outward expression of unconscious sexual or other socially unacceptable thoughts and drives, expressed through art forms, recreations and other pursuits that are socially acceptable. Symbolism of external objects is a primitive basis for sublimation. The viewer identifies with art, 'sees' symbols in it - it expresses their own phantasies through sublimation. Landscape viewer - aesthetic beauty expresses sublimated desires and drives.
Sachs Co-ordinated Psychic Model	The make-believe character of play enables otherwise forbidden [or repressed] objects to be acceptable, softening the super ego's censorial role and enabling the id, ego and super ego to co-operate in enjoying beauty. This is essentially sublimation at work [see Freud].
Klein Depressive Integration/ Object Relation Model	An infant's experience of the good and bad breast results in a sense of losing and then regaining the good object. Sublimation of this is the basis of artistic creativity, a desire to restore and recreate. The viewer can gain aesthetic pleasure for an object without consuming it, the basis of non-utilitarian [Kant] aesthetics. The viewer can gain a sense of empathy, closeness and identification with a landscape reminiscent of an infant's feeling of oneness with their mother. The beauty of a landscape can trigger sadness at the memory of loss of an ideal object and its rediscovery.
Likierman Psychic Growth Model [cf Klein]	Development of Klein's model, based on aesthetic experience from birth being essential for growth and fundamental to judging good and bad experiences; the good or ideal object equates with perfection and is known intuitively rather than cognitively. Integration of the good and bad results in a sense of loss of the owned object [mother]. The earlier experience provides nourishment and an aesthetic value to the world - good and bad. This enables the viewer to value beauty in a non-utilitarian way. Landscapes trigger unconscious phantasies that equate them with the lost perfect object.
Spitz Transactional Model	Aesthetic pleasure located in the subject and in the subject/observer dynamic. Aesthetics based on refinding the lost object; the relationship of the object, creator, observer; and asubjectivity derived from loss which recreates the lost object through unconscious symbolism. This is close to the Klein/Likierman model.
Segal [cf Klein]	Recreating a lost, dead world in our minds; identify ourselves in the art and reliving the creative experience. cf Klein.

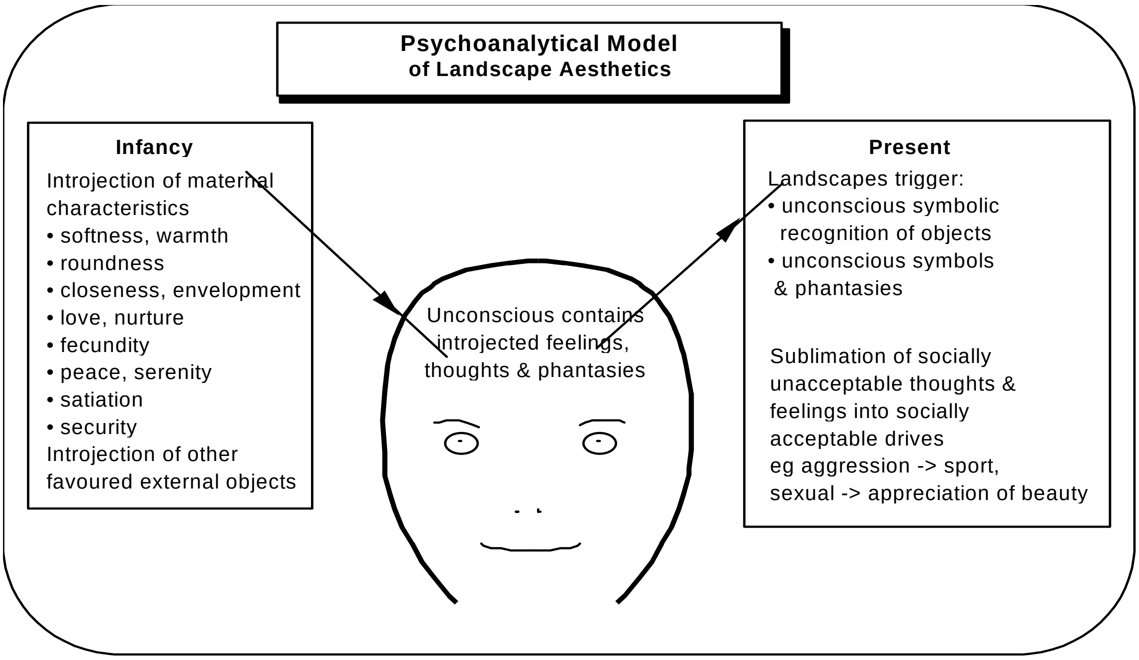

Figure 5.1 Psychoanalytical Model of Landscape Aesthetic Response

feelings experienced as infants from mothering. As noted earlier [Isaacs, 1952], words cannot convey the full richness of experiences. These describe in approximate terms the qualities that could generally be associated with one's mother by an infant.

This early association with one's mother provides the earliest aesthetic experiences and, as Likierman [1989] suggests, establishes the precondition for growth.

The qualities which are associated with the early pleasurable experiences are introjected into the ego. As well, ideas and feelings which one realises are socially unacceptable are introjected into the unconscious. Fed by these and by further ongoing introjected inputs from the external world, phantasies develop which reinforce the strength and influence of these inputs in the unconscious mind [Figure 5.1].

The introjected inputs, together with resultant phantasies form the reservoir of unconscious experiences which the conscious mind, in viewing external objects such as landscapes, draw from in projecting onto these objects. External objects trigger symbolic associations with the contents of the unconscious. Objects which unconsciously remind one, for example, of maternal characteristics such as envelopment, roundness, serenity and fecundity, are viewed positively. Similarly, objects which trigger images of the phallus or other sexual images, repressed in the unconscious, are unconsciously recognised.

Features of the external world are continually being introjected into the unconscious, adding to the reservoir of experience by which future interactions are influenced. The feedback mechanism serves to reinforce the significance and influence of preferred objects, such as landscapes, leading to the desire for more similar experiences.

In summary, this psychoanalytical model of landscape aesthetic responses postulates the infant development of a reservoir of unconscious experiences based on introjected feelings and thoughts which provide the raw material for phantasy. This unconscious content influences our perception when viewing aesthetic objects such as landscapes, projecting the content of our unconscious onto these objects and recognising their symbolic content. These preferred objects add to the unconscious via the mechanism of introjection.

(3) Links with Kant's Philosophy of Aesthetics

Kant considered that the aesthetic experience is the mind's representation of the object and, experienced with disinterest, is pure and wholly subjective. Such pleasure is neither sensual nor intellectual, it does not involve conceptual judgements, rationality, reason or fulfilling animal appetites. Objects that we consider beautiful have a special kind of formal quality dependent on their perceptual properties, a purpose of form but not of function - purposiveness without purpose.

How does Kant's view correspond with the findings and models of psychoanalysis?

Firstly, it supports Kant in asserting that the aesthetic content of a landscape is not an objective quality of the scene but rather derives subjectively from the viewer, based, in part on processes of introjection, sublimation and phantasy.

Secondly, the introjected and sublimated feelings and thoughts, particularly of a maternal origin, postulated as the basis of the unconscious experiences that the conscious mind draws on when viewing external objects such as landscapes may correspond with Kant's concept of formal qualities that relate to beauty. Kant suggested that beautiful objects have a special kind of formal quality. He suggested some general or indeterminate "rules" covering this quality although in doing so he was criticised for abandoning disinterest.

Kant's rules covered the design and composition of objects rather than their colour and tone, the form of objects rather than what they might represent, and the possible application of the rules to natural objects rather than works of art that embody purpose. These rules, particularly that which refers to form rather than what the object represents, may be suggestive of symbolism, in turn providing a basis for sublimation and introjection.

Thirdly, Kant's concept of beauty being purposiveness without purpose (i.e. independent of utility), is supported by Likierman's view that the aesthetic experience commences from earliest infancy and is fundamental to understanding the good/bad world in terms of aesthetic principles. As quoted earlier, because "the 'good' is first experienced aesthetically as an infant forever after aesthetics is "known other than through the thinking mind" [1989, 138]. She states, "any value which the individual places on a non-functional, non need-fulfilling quality of the object is necessarily aesthetic." Beauty is a quality not given, consumed or possessed, it is the quality the object "keeps to itself and represents its "essential 'otherness', ... its unique identity" [Ibid, 135].

Similarly, Money-Kyrle believes that the beginnings of a non-utilitarian Kantian attitude to things to be admired and loved but not consumed can be explained psychoanalytically. He believes that such an attitude derives from the conflict between desiring to possess and consume the object (i.e. the mother), and the desire to protect it forever from these pressures [1961, 114]. The infant feels a oneness with the mother, yet also their separateness as a distinct individual. This feeling of oneness and otherness, Money-Kyrle suggests, may be recaptured in later aesthetic experiences - the feeling of closeness, empathy and identification with a landscape for example and the objective recognition of one's separateness.

Finally, Melanie Klein's concept of the good/bad breast may explain the changing tastes in landscape. While historically mountain scenery was not regarded as beautiful, perhaps, as Sachs [1951, 161] suggests, because they aroused anxiety in the presence of which beauty could not dwell, with scientific understanding anxiety waned and the landscapes acquired a beauty known as sublime. The change represents the bad breast being made good; what was once abhorred has now become accepted and admired.

5.5 CONCLUSION

The psychoanalytical approach provides rich insights into human motivations and underlying drives and desires. While possibly difficult to apply in a predictive or even explanatory sense, it does provide valuable understanding which can inform research and analysis.

Significantly, the psychoanalytical approach reinforces the subjectivist paradigm but its special contribution is its emphasis on the unconscious as having a very significant influence on preferences. This may help explain the immediacy of interpretation of scenes and their evaluation in qualitative terms. This is not likely to be an aspect which the landscape quality survey would cover.

Attachment One
Glossary of Psychoanalytical Terms

The following definitions and notes are based on Laplance & Pontalis's *The Language of Psycho-Analysis*, originally published in French in 1967 and translated in 1973. Of the hundreds of definitions cited, only words used in this chapter are included here. Generally only a summary of the definition is provided for reasons of space although in some cases a verbatim definition is used.

Cathexis The concept that a certain amount of psychical energy is attached to an idea, to a group of ideas, to a part of a body, an object etc.

Consciousness A transient property that distinguishes external and internal perceptions from psychical phenomena as a whole. It receives information both from the outside world and from internal sources. This information comprises sensations, which impress themselves at some point on the pleasure-unpleasure scale, and of revived memories.

Death Instincts Instincts that are opposed to the life instincts and strive towards the reduction of tensions to zero-point - in other words they aim to bring the living being back to an inorganic state. Turned inwards at first, they subsequently turn against the outside world in aggression. The notion was among Freud's later works and is not widely accepted.

Depressive Position A form of object-relations that is established after the paranoid position about the fourth month of and gradually overcome during the first year though it can be reactivated in later life. (Its formation is described under Klein.)

Ego, Id and Superego These are discussed in the text.

Identification A process whereby the subject assimilates an aspect, property or attribute of another and is transformed, wholly or partially, after the model the other provides. Identification is fundamental to the development of personality. Identification in psychoanalytical terms means *identification of oneself with*. In a wider common use, identification overlaps with psychological concepts such as imitation, empathy, sympathy and projection. Introjection is a prototype of identification.

Instinct (or Drive) Traditionally, a hereditary behaviour pattern that varies little from one member of an animal species to another. In psychoanalysis it describes a dynamic process comprising a pressure (or energy) that directs the organism towards an aim.

Introjection In phantasy, the subject transposes objects and their inherent qualities from the 'outside' to the 'inside' of self. Discussed further in text [Introjection and Projection].

Object-relation A relatively contemporary term describing the subject's mode of relation to his world. O-r's exist of specific subjects and also types of o-r such as oral o-r. Objects include people as well as projected and introjected, and the 'good' and 'bad' objects of Klein. Relationship means *inter*-relationship involving not only the way the subject constitutes his objects but also the way these objects shape his actions.

Phallus Classically the figurative representation of the male organ but in psychoanalysis the symbolic function taken on by the penis in the intra- and inter-subjective dialectic.

Phantasy [or fantasy] Imaginary scene where the subject is a protagonist, representing the fulfilment of an [unconscious] wish in a manner distorted by defensive processes. While phantasy has been suggested as referring to unconscious fantasies, few American writers use it in this sense. Phantasies have different modes: conscious (day dreams), unconscious, and primal.

Pleasure Principle A key principle that governs mental functioning - psychical activity is directed at avoiding unpleasure and procuring pleasure.

Preconscious A system of psychical apparatus that is distinct from the unconscious and the conscious; its contents are not currently present in the field of consciousness but, in contrast to the unconscious, are still accessible to the conscious (e.g. knowledge and memories). Unconscious contents and processes cannot pass into the preconscious without transformations.

Projection A term used in general psychology to refer to the displacement and relocation of a psychological element in an external position. This is similar to the psychoanalytical term "transference". In a psychoanalytical sense projection is an operation whereby qualities, feelings, wishes and even 'objects' that the subject refuses to recognise or rejects in himself, are expelled from the self and located in another person or thing. This is a primitive defense mechanism (e.g. in paranoia and superstition).

Subconscious Used in Freud's early writings as a synonym for 'unconscious' but discarded because of the confusion it created. It referred to that which was scarcely conscious.

Sublimation Human activities that have no apparent connection with sexuality but are assumed to be motivated by the force of the sexual instinct. Artistic creation and intellectual inquiry are described by Freud as principal sublimated activities. The instinct is said to be sublimated insofar as it is diverted towards a new, non-sexual aim and to the degree that its objects are socially valued ones.

Symbolism Indirect and figurative representation of an unconscious idea, conflict or wish. In psychoanalytical terms, symbolism gives expression in a way that is indirect, figurative and difficult to decipher. Symbolism can cover all forms of indirect representation. Freud saw that symbolisms generally escape censorship by the ego. While the symbols discovered are very numerous, the range of things they symbolise is very narrow: the body, parents and blood relations, birth, death, nudity and above all sexuality [sexual organs, the sexual act]. Freud considered that the unconscious comparisons underlying symbolism "are not freshly made on each occasion, they lie ready to hand and are complete, once and for all".

Transference A process of actualisation of unconscious wishes (e.g. of infantile prototypes that re-emerge and are experienced as if they were actually happening). Derives largely from analytic situation and provides basis for the cure. Transference involves an unconscious idea, which cannot enter the preconscious, linking with an idea already in the preconscious and transferring its intensity on to it. An example is the patient unconsciously making the doctor play the role of the loved or feared parental figure.

Unconscious The repressed contents that have been denied access to the preconscious-conscious system. Its contents are representatives of the instincts and are governed by the mechanisms of condensation and displacement. The contents seek to re-enter consciousness but cannot do so without transformation through compromise and censorship. Freud regarded dreams as providing the 'royal road' to the unconscious.

CHAPTER SIX

CULTURE AND LANDSCAPE

6.1 INTRODUCTION

The purpose of this chapter is to examine the influence of culture upon the perception of landscape quality. Previous chapters have examined individual influences on landscape perception - the psychoanalytical approach [Chapter 5], the operation of human visual perception [Chapter 4] and the Gestaltist view of perception [Chapter 3]. Philosophy, the subject of Chapter 2, spans both the individual and the culture, although philosophers would argue that it is dependent on neither [i.e. it is *a priori* and value free].

This chapter moves firmly beyond the individual's perception of landscape to that of culture. Culture is the glue that cements an individual into a community. A given culture’s norms in turn help to shape individual attitudes, beliefs and preferences. This is not the place to examine in depth the influence of culture on the individual, rather it is accepted as axiomatic that individual aesthetic preferences are influenced by the culture in which they live. In this chapter the focus will be mainly on Western culture, particularly that of England.

The subject of the influence of culture is vast so a thematic approach is adopted to provide structure. The chapter commences with a brief review of the concept of culture before examining the two dominant influences on Western culture’s attitude to landscape, classicism and teleology. While the unifying thread is the influence of culture on landscape perception, this is examined through three specific areas: the community's changing attitudes towards mountains, the portraying of landscape in paintings and the development of gardens which can represent idealised landscapes..

6.2 CONCEPT OF CULTURE

The concept of culture has many dimensions. The *Shorter Oxford Dictionary* views it as involving improvement or refinement by education and training and, more relevantly for the purposes of this study, the “intellectual side of civilisation.” Burnett provided the classic definition of culture in *Primitive Culture* [1871]: “Culture - is that complex whole which includes knowledge, belief, morals, law, custom and any other capabilities and habits acquired by man as a member of a society.” To Burnett's list can also be added language, ideas, sentiments, values, objects, actions, tendencies and accumulations, since these also contribute to culture in its various manifestations. A key characteristic of culture is that of an *integrated* pattern of knowledge, belief and behaviour that distinguishes one society from another.

Culture is a more general term than either “society” or “civilisation”, society referring to an organised group of people interacting in a structural system at a given point in time, while civilisation is the culmination of culture spanning time [e.g. the Egyptian, Incan or Chinese civilisations], and incorporating a sophisticated development of the arts, sciences and philosophies together with well developed practical abilities such as in architecture and metallurgy.

Culture is entirely learnt and is a means by which ideas are transmitted down through the generations. The economic and material aspects of human existence appear to develop through progressive stages as a given culture gradually achieves dominance over the basics of survival, transforming the environment to provide wealth and leisure. In contrast, the artistic, literary and philosophical aspects of culture appear less related to its developmental stage, perhaps being more dependent on key individuals such as have appeared in European culture [e.g. Shakespeare, Newton, Dante, Michelangelo, Kant, Marx, Darwin].

Cultures comprise at least two dimensions of variability, they vary in a spatial sense across the face of the globe and even within a given country, and they vary temporally across time. Although the Australian culture may seem relatively homogeneous across the nation, its characteristics have changed vastly over its 200 years. Even within the space of a lifetime, transitions are apparent in many attributes, changing from the predominantly Anglo-Saxon culture of pre-war to the multicultural society of today. Within a given country there are subtle cultural differences such as are apparent in Australia from north to south and from urban to rural. Thus a culture is a heterogeneous dynamic amalgam at any point in time, difficult to describe in homogeneous terms, its dynamism difficult to pin down.

In contrast, traditional cultures such as in feudal Europe or especially tribal societies such as Papua-New Guinea may continue largely unchanged in their essential characteristics over many generations to another. However such constancy is rare now under the pervading influence of travel and other forms of communication. Anthropologists believe that cultural variability was probably greatest in the 14th – 15th centuries, before European culture became a dominant force through the global colonising activities by many of its constituent nations.

Through the accumulation of ideas and the means of transmitting them, a culture develops in depth and influence, both geographically within a given timeframe and across time. Cultures change through a variety of factors:

- economic and ecological change
- traits may be absorbed from external sources
- subjugation
- evolution

One tends to view other cultures through the lens of one's own culture[23]

Western culture can be defined as comprising those nations in Europe, North America, Australasia and some other countries which broadly reflect common cultural traits - the rule of law, democratic government institutions, the freedom of the individual, capitalist economies, advanced use and development of technology, widely available educational, health and social services, as well as a common heritage of Christian religion, art, music, literature, and other pursuits.

While Western culture may be thought of as a dominant paradigm in the world today, past centuries have seen other cultures [e.g. Chinese, Arabian, Assyrian, Roman] being dominant. Today's Western culture represents a merging of certain key characteristics amongst a number of countries that share a common heritage. It derived essentially from Europe - "Modern civilisation, irrespective of geography, has been formed by the expansion of ideas and institutions that originated in Europe." [Deak, 1985, 686]. While this assessment perhaps ignores the influence of the United States on democratic processes, the role of cities or of the influence of both the United States and Japan on economic structures, nevertheless in the broad sense Europe provided the seedbed of ideas and pressures which gave rise to many of the characteristics of Western culture, in particular the development of its philosophy, laws, governments and institutions, mathematics, sciences, the arts, and technologies.

With origins from Greece and Rome, Europe fused together the best of diverse cultures of the Mediterranean, central and northern European countries. The concept of beauty, later embraced in the broader term of aesthetics, has been of interest to Western culture since the Greeks and Romans. In the following sections, the development of this concept is explored through a cultural perspective.

6.3 DEVELOPMENT OF WESTERN CULTURAL ATTITUDES TOWARDS LANDSCAPE

The Western approach to the aesthetic qualities of landscape has been fashioned by various strands of influence. Classical Hellenistic and Roman influences emerged again during the Renaissance and later periods. From Christian theology developed the teleological view or natural theology of nature and landscape that together with classical influence, dominated until the 17th and 18th centuries. The 18th century saw immense speculation about aesthetics in Europe, with major changes in cultural attitudes to aesthetic objects resulting. The 19th century was the great age of aesthetic theory, when

23. Ethnocentrism is the tendency to view other cultures through the eyes of one's own culture, while cultural relativism is a comparative approach which seeks to understand and appreciate the diversity of cultural differences.

German philosophy dominated in England and the Continent. Darwinian evolutionary theory created a new perspective of nature and landscape, diminishing the teleological influence and leading to a greater searching of the physical reasons for their characteristics. And finally, the 20th century has seen many of these strands combining in a synthesis of influences, added to by various strands of its own [e.g. the appreciation of wilderness and of the environment in a non-utilitarian sense].

Addressing cultural attitudes from late 20th century perspective, it is difficult to comprehend the total revolution that has occurred over the past 100 years, in a post-Darwinian era, from that which previously dominated. In terms of landscape, prior to the 20th century, the two great strands were:

- classical ideals of design, reflected in part by the idea of a past Golden Age of antiquity which man sought to recreate in his country gardens and parks and which were reflected in attitudes to mountainous scenery

- in the Christian era, the powerful influence of the teleological view of nature and landscape

During contemporary times, these strands have tended to be "demoted to the level of myths, explained away as symbolic analogies or treated simply as fairy-tales" [Hunter, 1985, 5] yet until the last century they largely shaped Western cultural image of nature and landscape.

Contemporary attitudes towards landscapes are no longer informed by a classical or teleological view. On the one hand this releases a freedom from the fetters that these created but, on the other hand, their absence has created a vacuum of an underlying value system on which the aesthetics of landscapes could be based.

These two strands, the classical view and the teleological view of nature, are traced in this section.

(1) The Classical Influence

Arcadia - the Golden Age

The Golden Age refers to a legendary time prior to the world of classical Greece and Rome which was inhabited by creatures who were half human and half animal and by men who lived happily off the fruits of a bountiful earth in a pre-agricultural existence. Life was simple with no human effort required to gain food, a period of "happy shepherding and innate soil fertility" [Glacken, 1967, 132]. People of the Golden Age possessed "physical and moral superiority" and soil fertility was so great that agriculture was unnecessary [Ibid, 131]. Clark refers to the myth of the Golden Age, as a period “in which man lived on the fruits of the earth, peacefully, piously and with primitive simplicity.” [Clark, 1976, 169].

The Greek poet Hesiod in the 8th century BC defined five stages in man's history starting with the Golden Age followed by the silver and bronze ages, then an age of demigods, and finally the then current iron age. The idea that initial perfection had been replaced by hardship and human degeneration contributed to the veneration of the Golden Age. Hesiod's poem described the era thus:

> "for the fruitful earth unforced bare them fruit abundantly and without stint. They dwelt in ease and peace upon their lands with many good things, rich in flocks and loved by the blessed gods." [Quoted by Glacken, 1967, 132]

Hesiod's theme was perpetuated by later writers, including Seneca, Ovid, Varro and Virgil. For Ovid, the Golden Age was a period before man had changed the environment:

> "Not yet had the pine-tree, felled on its native mountains, descended thence into the watery plain to visit other lands... Anon, the earth untilled, brought forth her stores of grain, and the fields, though unfallowed, grew white with the heavy, bearded wheat. Streams of milk and streams of sweet nectar flowed, and yellow honey was distilled from the verdant oak." [Quoted by Glacken, 1967, 133]

The Greeks esteemed beauty, they valued the beauty of youth, of beauty in a person or a god, as beauty was a sign of perfection [Lister, 1973, 5].

Arcadia, located in the central Peloponnese, is a wild and mountainous region that, according to legend "was peopled by nymphs and satyrs, shepherds and herdsmen, living and loving in a life of innocent simplicity." [Hunter, 1985, 7] Contrary to contemporary usage in which Arcadia conveys an idealised rural environment - the *Shorter Oxford* defines it as "the ideal region of rural felicity; ideally rural or rustic" - the real Arcadia was a difficult area from which to wrest a living. With mountains rising above 2000 metres, the climate was cool and because of the hardness of life, music was introduced out of necessity to "tame and soften the hardness of the soul through education" [Polybius, Quoted by Glacken, 1967, 95]. Pan, the patron saint of pastoral poets and the god of idealised wild nature, had his abode in Arcadia.

The Grecian Golden Age and Arcadia have parallels in the Judeo-Christian doctrine of paradise and also relates closely to the creation of gardens and parks. During the first Christian millennium, theologians reconciled the Christian Eden with the Arcadian Golden Age [Shepard, 1967, 76]. The Garden of Eden, from which God banished Adam and Eve, can be seen as a picture of a former Golden Age:

> “Now the Lord God had planted a garden in the east, in Eden; and there he put the man he had formed. And the Lord God made all kinds of trees grow out of the ground - trees that were pleasing to the eye and good for food. In the middle of the garden were the tree of life and the tree of the knowledge of good and evil. A river watering the garden flowed from Eden, and from there it divided; it had four headstreams.” [Genesis, 2: 8 - 10]

The term *paradise*, which became synonymous with the Garden of Eden, derives from the Persian word *pairidaeza* that means an enclosed park. Similarly, the word Eden derives from the Babylonian *edina*, meaning a field or park [Hunter, 1985, 10]. The Judeo-Christian account of the early origins of humans closely parallels that of the Grecian Golden Age. Both are centred in garden-like environments and involve people in mostly play and little work, both are harmonious places in which people can feel completely at home, and both are places to which, in subsequent ages, people have longed to return.

In the Biblical account, Adam was commanded by God to till and keep the Garden of Eden but, as with life in the Golden Age, this does not appear to have been an onerous task. However following his disobedience of God’s command not to eat of the fruit of the tree of knowledge of good and evil, God cast Adam and Eve from the garden with these words:

> “Cursed is the ground because of you; through painful toil you will eat of it all the days of your life.
> It will produce thorns and thistles for you, and you will eat the plants of the field.
> By the sweat of your brow you will eat your food until you return to the ground,
> Since from it you were taken; for dust you are and to dust you will return.” [Genesis 3: 17 - 19]

Thus while the Golden Age was followed by progressive degeneration to lesser levels of contentment, Eden was followed by immediate banishment to a harsh world from which one had to seek a living by the "sweat of the brow".

As well as providing attractive and pleasant environments, particularly from the harshness of the Middle Eastern sun, gardens and parks recall paradise, a former Golden Age, a time before the necessity of work.

Describing the site that would later be Rome, Virgil pictured it in terms of the Golden Age:

> "These woods were once the home of indigenous fauns and nymphs,
> And of men who has sprung from hardwood oaks, who had no settled
> Way of life, no civilisation; ploughing, the forming of
> Communal reserves, and economy were unknown they lived on the produce of trees and the hard-won fare of the hunter."
> [Virgil, *The Eclogues, Georgics and Aeneid*, quoted by Hunter, 1985, 5]

Virgil has been called “a great master of landscape” [by Gilpin, quoted by Gilbert, 1885]. Virgil’s sensitivity and obvious knowledge of rural areas made his books valuable sources of advice on farm management. A description of his own estate indicates this sensitivity:

> “... from where yon hills
> Begin to rise, and gently slope again
> down to the stream, where the old beech-trees throw
> Their ragged time-worn tops against the sky”
> [From Virgil’s *Georgics*; Gilbert, 1885, 18]

The fertility of the soil was considered greatest when it was least interfered with by man; with interference through ploughing and cropping came loss of soil and loss of fertility thus requiring greater exertion and effort to gain a living. The necessity of hard work and a longing for the ease of the idealised Golden Age continues its influence to the present day.

Gilbert [1885, 50] considered that the Greeks preferred a landscape, "tamed and utilised, made useful and made agreeable", only later developing the freer pastoral form. The Roman appreciation of landscapes widened and deepened somewhat from the Greek.

In time, certainly by the Renaissance, Arcadia and the Golden Age had fused into a single concept of a peaceful pastoral setting with large trees, contented livestock and demigods playing in the glades. The creation of the English country estates in the 17th and 18th century derived much of their imagery from Arcadia [see Section 6.6].

Classicism

The classical influence derived both from the image of the former Golden Age, the Arcadia of antiquity, and also from the ancient writers and poets. From the Renaissance through to the end of the 19th century, the classical influence exerted a very significant effect upon Western culture, including its attitudes to landscape. The classical influence is also termed *classicism*.

Classicism derived its inspiration from the cultures of ancient Greece and Rome and continually looks back to the classical Golden Age. The word "classicism" derived from *classici*, which was the name given in Rome to citizens of the first rank.

The attributes of classicism cover:

> "an aesthetic tendency characterized by a sense of proportion, by a balanced and stable composition, by a search for formal harmony and by understatement; imitation of ancient writers; aversion to the exceptional; well-nigh exclusive interest in psychological and moral analysis; control of sensitivity and imagination ..." [Secretan, 1973, viii]

Classicism is characterised by "serene beauty, taste, restraint, order and clarity." [Ibid, 2], a concern with the ideal in form and content, a clarity of subject matter and style, simplicity and understatement [Greenhalgh, 1978, 11]. Horace pronounced the famous aphorism *ut pictura poesis*, "as is painting, so is poetry", thereby linking the two disciplines and justifying art [Ibid]. The close links between poetry and painting were apparent in England from the 17th to 19th centuries [see Section 6.5].

Goodness, Truth and Beauty, the ancient triad, were invisible ideals that influenced all humankind. In its temples, statues and poetry, ancient Greece was regarded as the pinnacle of perfection, of perfect proportion and balance and of goodness, truth and beauty. This sense of ideal beauty, perfect equilibrium and harmony, infused classicism's influence upon Western cultural attitudes to landscapes. This will become apparent in the later sections on attitudes towards mountains and the development of landscape art.

The Roman Emperor Augustus [63 BC - 14 AD] came to epitomise the classical ideal, his name applied to the Augustan Age and the Augustan Idea meaning the ideal of classicism in the 16th to 18th centuries. His emperorship was characterised by relative peace, order, security, a republican form of government with Augustus as emperor but refusing the dictatorship [Erskine-Hill, 1983, 11]. Though certainly not without his faults, Augustus ended the civil wars and strengthened the power of Rome. An early historian described him as: "the man the world needed, and may claim to have been one of the greatest servants of the human race" [Quoted by Erskine-Hill, 1983, 25].

Being the man who ordered the census at the time of Christ's birth permanently linked Augustus to Christian literature including the patristic writers of the early church, Dante in the 14th century and in Christian plays such as the *Chester Cycle*, [one of the English Mystery plays]. During the period of the 16th to the 18th centuries, various English monarchs were likened to Augustus [Erskine-Hill, 1983, 213]. The preface to the 1616 *King James Bible* compared King James with Augustus. The comparison stemmed from the "passionate desire to see, within the framework of a

Christian monarchy, a better life and a higher level of civilization in Britain." [Ibid, 133] The refusal by Cromwell, later in the 17th century, to accept the crown also led to him being compared with Augustus.

The secular position of Augustus was established by Petrarch's reference in his epic poem, *Africa*, and by several of Shakespeare's plays including *Anthony and Cleopatra* (Augustus defeated Anthony at the battle of Actium), *Julius Caesar* (Augustus was his adopted son) and *Cymbeline*.

Platonism, the key philosophy that permeated through to the modern world, delighted in the variety and beauty of the visible and temporal world but yearned for the invisible and eternal world beyond.

Platonism vanished from influence following the closure of the Athenian schools in 529 by the emperor Justinian until its rediscovery in the Renaissance in the 15th century. The Middle Ages, or the Dark Ages as they were called during the Renaissance, saw Europe "permeated by the influence of the antique" [Greenhalgh, 1978, 13] which combined with the newer Christian symbols. Classicism was of relevance both to the secular and Church powers. The monasteries founded in Italy and Switzerland in the 7th century became centres of classical learning and repositories of Latin manuscript.

The Renaissance saw a rediscovery of the classical origins of European culture, a searching for the ancient texts and their translation and preparation of commentaries. During the Renaissance in Florence, the Platonic Academy was established. By the latter 15th century it had made Plato's personality a cult object. Marsilio Ficino played a leading role in translating Plato's works and by the time he died in 1499, most of the important literary works of antiquity had been made available in Latin translations to Italy and Europe [Secretan, 1973, 10]. During the 16th and 17th centuries, the classicism that had been birthed in the Renaissance in Italy had spread across Europe in the form of neo-classicism [i.e. new or revived classicism]. This took with it an educational system based on Latin and Greek, together with the "common cultural heritage of ancient history, mythology and wisdom." [Ibid, 11]

Classicism peaked in France between 1660 and 1680 [Ibid, 47]. In Germany, classicism emerged in the second half of the 17th century as a reaction against the baroque and drew its inspiration more from Greece, resulting in a "tempering of Germany's harder self by the luminous humanity of Hellas." [Ibid, 73] From about 1690, the name *Augustan Age*, the period of classicism, was applied to English culture [Erskine-Hill, 1983, 223]. Throughout the period from 1690 to the early 1800s, the term "Augustan", a synonym for classicism, was used positively [Ibid, 265].

The imperative, *Follow Nature*, was one of the "battle cries' of classicism [Secretan, 1973, 36] and the imitation of nature was one of its hallmarks, imitation in the sense of typifying or drawing characters based on nature.

Classical writers such as John Dryden had a preference for order, a love of the ancients, a large stock of mythological and pagan relics, rationality and much elegance [Ibid, 50]. Other classical writers included the poet, Alexander Pope, "the supreme Augustan classic" [Ibid, 52] and Samuel Johnson, another Augustan who wrote about the "role of fantasy, the function of repression, the desire to forget, the wish to avoid reality" [Ibid, 55] predated Freudian psychoanalytical concepts by several centuries. Important to the classical mode were reason, judgement and wit, the idea that nature, truth and beauty are "indissolubly linked" [Ibid, 62], and a connection between good taste and good morals.

The far reaching influence of a classical education in 17-18th century England was apparent in the comment by a clergyman viewing blazing iron-works on the banks of the River Wye: "We saw Virgil's description realized, and the interior of Etna, the forges of the Cyclops, and their fearful employment, immediately occurred to us" [Quoted by Andrews, 1989, 3].

Until the end of the 18th century, England's focus was on Rome, but with growing translations of the Greek classics and growing interest in Greek philosophy and architecture, the focus of classicism then shifted sharply from Rome to Greece. This has been described as a romantic, even Byronic gesture [Crook, in Clarke, 1989, 44]. The 18th century has been described as the Homer's century [Turner, in Clarke, 1989, 63] and Hellenism had a profound influence during the 19th century Victorian era. Greek religion, mythology and philosophy were widely studied.

"Public schools" existed in England for many centuries and the classics - Greek and Latin, dominated their syllabus. Public education is of more recent origin, having commenced in England in the mid 19th century, To the modern mind the emphasis given in that education to the classics seems incredible. Greek and Latin dominated the syllabus: not only were students required to learn these languages but also to study the classical literature in its original language. During the 19th century this spread classicism to the wider middle classes, empowered through the industrial revolution to gain an education.

While mathematics and science were also regarded as of growing importance, a wide ranging report on education in 1875 found that out of a 35 hour teaching week, 6 hours each were given over to science and mathematics and the remaining 23 hours devoted to Greek and Latin [Bowen, in Clarke, 1989, 173]! A further illustration is that to join the Indian Civil Service, a knowledge of Greek and Latin was worth twice as many points in the competitive examination as French, German or the local Sanskrit [Ibid, 176]. Even as late as the 1950s, entry to masters degrees in some English and Scottish universities required first year Latin [J. Brebner, *pers comm*].

By the end of the 19th century, forces in society were moving education in the opposite direction to classicism. Education was based more fully on the three "R's", whilst commerce and industrialisation resulted in changed priorities in which the classics had little relevance and foreign languages assumed greater importance than Greek and Latin [Kandel, 1967, 602]. The expanding British empire made society more aware of other cultures. The First World War saw romanticism and classicism die "on the battlefields of Flanders" [Bowen, in Clarke, 1989, 183] although the Third Reich "brewed up a crazy mixture of classicism and German folk-art." [Greenhalgh, 1978, 200]

Nevertheless traces of classicism live on. For example in the far off Antipodes, Deborah Edwards traced its influence in the work of Australian artists such as Lionel Lindsay, Norman Lindsay, Rupert Bunny, and Mervyn Napier Waller [whose painting *The Pastoral Pursuits of Australia*, in the Art Gallery of South Australia is strongly classical]. The classical influence continues to be strong in architecture and recent years have seen strong classical lines in modern buildings [e.g. see Stern, 1988].

(2) The Teleological View of Nature and Landscape

The second great theme that influenced Western attitudes to nature in general and landscape in particular was its Judeo-Christian roots, especially the concept of creation being designed by God, being an expression of God and a proof of His existence. The Genesis account of creation underlay the teleological view of nature and landscape.

Teleology is the doctrine of final causes[24], particularly as related to the evidences for design or purpose in nature [Shorter Oxford] and is used interchangeably with the terms 'natural theology' and 'physico-theology'. The latter terms are theologies founded upon the facts of nature and the evidences of design there found [Ibid]. The unity and harmony that is apparent in the world led inexorably to the idea of a purposefulness of creation.

The following section draws largely from Clarence Glacken's monumental study *Traces on the Rhodian Shore - Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century* [1967]. Among his themes, Glacken examined the idea of the earth as a purposefully made creation.

Grecian Gods and Nature

Cultures other than Judaic and Christian have viewed nature not only as created by gods, but inhabited by them as well. The

24. Teleology: the doctrine or study of ends or final causes especially as related to the evidences of design or purpose in nature. Physico-theology: a theology founded upon the facts of nature and the evidence of design there found. Final causes: having regard to end or purpose. (*Shorter Oxford*).

Judeo-Christian view was strict on this point, God created the earth and heavens but God is not in it; the Creator but not the creation is to be worshipped. Many other cultures by contrast worshipped nature, which is known as pantheism, and in which the creator and the creation are indistinguishable.

While many cultures could be examined in this regard, the Greeks are particularly relevant given their importance to Western culture and that the Greek's pagan beliefs gave way to Christianity. Xenophon [427 - 355 BC] in his *Memorabilia* advocated the existence of a god on the basis of the proof of physiology, the cosmic order and of the earth as a fit environment [Glacken, 1967, 42]. Socrates [469 - 399 BC] spoke of a variety of natural phenomena such as the sun, stars, seasons and animals and their suitability for man, ending with the statement:

> "... you will realise the truth of what I say if, instead of waiting for the gods to appear to you in bodily presence, you are content to praise and worship them because you see their works." [Glacken, 1967, 43].

Plato's [427 - 347 BC] concept of the artisan deity accorded closely with the Greek's admiration for artisans of metal and gems and their ability to produce something of beauty and utility from raw materials. Aristotle [384 - 322 BC] believed that, just as artisans have an end purpose in mind for their work, so a "final cause, or the Good, is more fully present in the works of Nature than in the works of Art." [Ibid, 47] Applying this to animals, Aristotle advocated the study of all animals because:

> "in not one of them is Nature or Beauty lacking. I add 'Beauty', because in the works of Nature purpose and not accident is predominant; and the purpose or end for the sake of which those works have been contracted or formed has its place among what is beautiful." [Glacken, 1967, 47]

Aristotle, along with many other thinkers since, did not define the purpose of nature, arguing that it "is not a conscious agent; it is the vital force present in all living things" [Ibid, 49]. The purpose is thus an unconscious one to nature but Aristotle was content with this. Later, Christian thinkers were to see the Christian God as supplying the purpose and design lacking in Aristotle's argument.

Stoic writers saw the beauty of the earth around them and believed that it could not have been created for animals and plants but rather for man "who partakes of the divine and the gods themselves." [Glacken, 1967, 708] Panaetius [born 185 BC] built on the Stoic belief that a creative primeval force is responsible for the world's beauty and purposefulness. He saw in the Greek landscape; "with its alternation of land and sea, its innumerable islands, its contrasts between the lovely shores and the steep mountains and the rough cliffs, and the variety of plant and animal life existing in this landscape" [Ibid, 52], joy in the beauty of the earth, a parallel for the splendour of the cosmos, a perfection which derived from the work of a purposefully creative nature.

The Lucretian-Epicurean view was less flattering - it was that given the wickedness and stupidity of man and the imperfections apparent in the world, how is it possible to conceive that the earth was made for man? Without the notion of a benevolent Mother Nature, they believed that man established his place in the world through dint of effort and by imitating natural processes - "Men by their struggles add to what is already provided by nature." [Ibid, 138].

It is clear that to the Greeks, nature was god-designed to provide man with a suitable environment; there was both wonderment at the beauties of nature and a utilitarian purpose contained within it.

Cicero did not believe that "this most beautiful and adorn'd World" could have been produced simply by the fortuitous arrangement of atoms [Nicolson, 1959, 255].

Biblical Basis of Judeo-Christian View

The Biblical basis for the Judeo-Christian view is found in the following passages[25]:

> Then God said, "Let us make man in our image, in our likeness, and let them rule over the fish of the sea and the birds of the air, over the livestock, over all the earth, and over all the creatures that move along the ground."
> So God created man in his own image...

25. The *New International Version Bible* [Hodder & Stoughton], 1978, is used for scriptural references.

> God blessed them and said to them, "Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish of the sea and the birds of the air and over every living creature that moves on the ground."
> Then God said, "I give you every seed-bearing plant on the face of the whole earth and every tree that has fruit with seed in it. They will be yours for food." [Genesis 1:26-29]

> You made him ruler over the works of your hands; you put everything under his feet.
> All flocks and herds, and the beasts of the field,
> the birds of the air, and the fish of the sea, all that swim the paths of the seas. [Psalm 8:6-8]

> The heavens declare the glory of God, the skies proclaim the work of his hands. [Psalm 19:1]

> You crown the year with your bounty, and your carts overflow with abundance.
> The grasslands of the desert overflow; the hills are clothed with gladness.
> The meadows are covered with flocks and the valleys are mantled with grain; they shout for joy and sing. [Psalm 65: 11-13]

> How many are your works, O Lord! In wisdom you made them all; the earth is full of your creatures. [Psalm 65: 11-13]]

> ...since the creation of the world God's invisible qualities - his eternal power and divine nature - have been clearly seen, being understood from what has been made, so that men are without any excuse. [Romans 1:20]

The Western attitude to nature and landscape can be directly attributed in large measure to these and related passages. They establish:

- the design of creation by God: particularly the Genesis account, Psalm 104:24 and Romans 1:20
- creation as God's handiwork - the artisan deity concept, as expressed in Psalm 19:1
- the discovery of wisdom in God's creation [Psalm 104:24] provided a bridge between faith and science, "in this way one obtains knowledge of nature and a deeper understanding of the works of God" [Glacken, 1967, 157]
- creation as an expression of God - his "invisible qualities" - Romans 1:20
- God's bounteous provision for man and the beauties of creation: Psalm 65:11-13. The Psalms particularly dwell on the beauty of creation
- the rulership of man over creation: the Genesis account and Psalm 8:6. Glacken refers to man's power as "vice-regent of God on earth" [Ibid, 166]. Man did not earn his rulership, it was thrust upon him.
- God the creator is to be worshipped, not the creation. There are many such Biblical injunctions that marked a contrast to the pagan religions.

The brevity of the Genesis account of creation, together with the references to nature in the Psalms and elsewhere, led to the development of the hexameral literature, i.e. that concerned with the six days of creation. This started with the early Church Fathers, Philo, St Basil and St Ambrose, was magnificently expressed in Milton's *Paradise Lost*, and was a major focus of the physico-theology writers of the 17th to 19th centuries as they sought to explain the characteristics of nature and to understand God through linking biology, geology and geography with the Biblical account of creation. Glacken refers to this literature as "a vast curiosity and irrelevancy" [Ibid, 164] and there is much in it that is spurious and pseudo-science.

The influence of the Biblical account on Western culture was summarised by Glacken thus:

> "The Judeo-Christian conceptions of God and of the order of nature were often combined by the early Church Fathers with both the classical argument of design and the idea of an artisan-deity or demiurge, creating a conception of the habitable world of such force, persuasiveness, and resiliency that it could endure as an acceptable interpretation of life, nature, and the earth to the vast majority of peoples in the Western world until the sixth decade of the nineteenth century." [Glacken, 1967, 168]

Darwin's *The Origin of Species* was published in 1859 and marked the demise of the telelogical influence.

Nicolson makes an important point by noting that it:

> "is difficult today, in an age when social, economic, and international problems are paramount, to think ourselves back to a time when these were of far less importance than theological issues. We are so much more intent upon what man has made of man than upon what God originally made of him, so much more concerned with what man may make of Nature than with the Nature originally created by God, that once-burning issues seem trivial." [Nicolson, 1959, 77].

Patristic Period to End of Middle Ages

The Patristic Period [literally the Church Fathers] from the 1st to the 6th centuries through to the end of the Middle Ages in about 1500 was the formative period for Western culture. This was a period of development of technology, of major cathedral building over a 300 year span, of powerful monasteries, of clearing the forests for farming and, of relevance to landscape, of a growing appreciation of and love for the beauties of nature and landscape [Ibid, 173]. It was a period of substantial environmental change, resulting in widescale forest clearance [and some planted, e.g. New Forest], land drainage and the development of cultivation and farming across areas of Europe. It saw north-western Europe grow in population and power, balancing the Mediterranean.

During the Patristic period the physico-theological arguments of the Greeks and Romans were adopted and absorbed by Christian theology. They wrote of God as an artisan deity who not only made things according to his plan but who, unlike a human artisan, created the materials as well, and, as St Augustine noted, "working invisibly, effect(ing) visible results" [Ibid, 177].

The Patristic period through to the end of the Middle Ages put into effect the Biblical injunction and mandate to "fill the earth and subdue it."

While God created the materials, humans fashioned them to their purposes - a tree may provide shade and shelter, timber for a house and its furniture, wood for a fire, and limbs for bows and other weaponry. "The earth is more beautiful than it was at creation: it is a nature, improved by the art of man with divine approval and intention." [Ibid, 181]. St Basil of Caesarea [331 - 379] compared the unfinished with the finished earth:

> "for the proper and natural adornment of the earth is its completion: corn waving in the valleys - meadows green with grass and rich with many coloured flowers - fertile glades and hilltops shaded by forests" [Glacken, 1967, 192].

Basil saw the "landscapes of his own day ... [as] adornments and completions, like God's furnishings." [Ibid, 298]

The early Church Fathers added little to the knowledge of nature, they simply utilised existing pagan knowledge and interpreted it afresh through the eyes of scripture.

Ambrose [340 - 397] drew heavily on Basil's work and also classical writings particularly Virgil. On natural beauty he wrote that just as embroidery follows the weaving, God created first and adorned later. God was responsible for both. In 384, Ambrose wrote that the world was much more beautiful now than when it was created:

> "Formerly, the earth did not know how to be worked for her fruits. Later when the careful farmer began to rule the fields and to clothe the shapeless soil with vines, she put away her wild dispositions, being softened by domestic cultivation." [Glacken, 1967, 299]

Augustine [354 - 430] contributed an immense wealth of ideas and originality of thought. His basic approach was summarised by Glacken thus:

> "The earth and earthly things are to be spurned when we compare them with the greater glories of the City of God, but neither are life on earth and the beauties of nature to be despised because they are on a lower order in the scale of being or because they represent an order inferior to the Divine Order. The earth, life on earth, the beauties of nature, are also creations of God." [Glacken, 1967, 196]

Augustine, in extolling the beauty, grace and utility of the creation, extolled the Creator:

> "Ask the loveliness of the earth, ask the loveliness of the sea, ask the loveliness of the wide airy spaces, ask the loveliness of the sky, ask the order of the stars, ... ask the living things which move in the waters, which tarry on the land, which fly in the air...ask all these things, and they will all answer thee, Lo, see we are lovely. Their loveliness is their confession. And these lovely but mutable things, who has made them, save Beauty immutable ?" [Ibid, 200]

Augustine wrote: "beauty is a proportion of parts, together with an agreeableness of colour" [Ibid], thus paraphrasing what Cicero and other classical sources had said. Beauty was also associated with utility - that which did the work well. It was associated mainly with living things such as women, flowers and birds rather than scenery. Beauty also tended to be small scale rather than large. Both classical and Christian writers saw aesthetics as subordinate to ethics [Nicolson, 1959, 71].

Reason underlay Augustine's sense of beauty. In *Divine Providence and the Problem of Evil*, he wrote "From this stage, reason advanced to the province of the eyes. And scanning the earth and the heavens, it realised that nothing pleased it but beauty; and in beauty, design; and in design, dimensions; and in dimensions, number." [Nicolson, 1959, 123] Symmetry "pleases because it is beautiful, and it is beautiful because the parts are like and are brought by a certain bond to a single harmony." [Ibid, 123-4] The classical influence is apparent in these comments.

During the following centuries, monasteries became established in Europe and played a significant role in transforming the landscape. Mark, a monk at Monte Cassino in Italy about 560 described the transformation of the nearby hillsides:

> "Lest men should tire who seek thy high abode
> Winds round its sides a gently-sloping road.
> Yet justly does the mountain honour thee,
> For thou hast made it rich and fair to see.
> Its barren sides by thee are gardens made,
> Its naked rocks with fruitful vineyards laid,
> The crags admire a crop and fruit not theirs,
> The wild wood now a bounteous harvest bears..." [Glacken, 1967, 304]

Many other monasteries throughout Europe repeated the changes achieved here, transforming extensive tracts of land to agriculture through clearing the forests, draining the marshes, even diverting rivers.

The Church Fathers regarded nature as a book to provide further substantiation of the revealed word. And unlike the printed word which only the rich could afford, nature was a book that all could read. The Church Fathers also strove to link nature with scriptural texts and for symbolism such as the selection of a monastery cloister site in the shape of the Greek letter delta [Δ], which symbolised the Trinity. Paradise was regarded as an ideal landscape.

The idea of God being revealed in creation was developed by Erigena John Scotus or John the Scot [born 810]:

> "for whatever He knows He creates, and what He creates derives from Himself. Accordingly, the whole creation is a process of divine revelation, with each being an aspect, finite and limited, of God's own nature." [Glacken, 1967, 211]

Thus every aspect reveals the character of God but is not god itself which would be pantheistic.

St Bernard of Clairvaux [1091 - 1153] wrote that natural beauty is acceptable providing it is associated with God and his works. He believed that "trees and stones will teach you what no teacher permits you to hear" [Ibid, 213] The development of the abbey at Clairvaux changed the landscape from a wilderness to one which was more useful, more charming and more beautiful. The abbey was situated in a valley, grain and vines growing nearby -"each of them offers to the eye a beautiful sight, and supplies a needful support for the inmates." [Ibid, 213]

Bernard wrote of the charm of the area:

> "The smiling countenance of the earth is painted with varying colours, the blooming verdure [i.e. fresh green] of spring satisfies the eyes, and its sweet odour salutes the nostrils. ... In this way, while I am charmed without by the sweet influence of the beauty of the country, I have not less delight within in reflecting on the mysteries which are hidden beneath it." [Glacken, 1967, 214]

The delight with which St Francis of Assisi [1182 - 1226] communed with nature is well known, perhaps less well known is that he "followed rapturously and most literally the exhortation of Romans 1:20" [Ibid, 215] - i.e. of understanding God's invisible power and divine nature from the creation. In St Francis, "living nature attains a dignity and holiness far removed from the crude utilitarian conceptions of the believers in design." [Ibid, 216].

About this time, St Vincent of Beauvais wrote:

> "I am moved with spiritual sweetness towards the creator and ruler of this world

> when I behold the magnitude and beauty and performance of his creation." [Hunter, 1985, 53]

Source: Clark, 1976

Forest Imagery in a Gothic cathedral

This was the era of cathedral building. There are close parallels between the form of the northern deciduous forests and the nave of the Gothic cathedral [Shepard, 1967, 172]. The tall cathedral columns symbolised the trunks, their spreading arms the branches, and the giant windows filtering light like leaves in a tall forest. The carvings of leaves on structural members and walls furthered the imagery. Thus "a Gothic cathedral can be seen as a metamorphosis of the broad-leaved forest into stone." [Hunter, 1985, 54].

One who walked throughout the length and breadth of Europe was Albert the Great [1193 - 1280], a Dominican monk. The beauties of the earth to Albert were more than symbols, "its apparent order more than a simple illustration of design." The designed earth is holy as it is God's creation. [Glacken, 1967, 228] Albert observed that human effort improved on nature - domesticated plants gave better fruit, grains and vegetables were larger, softer and better tasting under cultivation.

In about 1259, St Thomas Aquinas [1226 - 1274] wrote *Summa Contra Gentiles*, which Glacken considered to be the most important and cogent discussion of natural theology to emerge in the Middle Ages. Aquinas brought together the order, planning, design and beauty of nature in a more rigorous form.

Aquinas saw that God had provided for orderly processes of nature; "leaves, for example, were so arranged that they protect the fruit of the plant." [Ibid, 235] Therefore, Aquinas argued, "the natural agent tends toward what is better, and it is much more evident that the intelligent agent does so. Hence, every agent intends the good when it acts." Glacken added, "The synthesis now expresses the goodness, the order, and the beauty of nature."

The major preoccupation of theologists in the Middle Ages was creation:

> "the continuously visible creation on earth, as one constantly sees in the naturalistic, symbolic, and allegorical writings... This long discussion of creation and its meaning in the formative period of Western civilization intensified interest in unity and harmony in nature, in physical and moral evil, in intermediate agencies between God and the world of daily life, be they secondary causes or … nature personifications..." [Glacken, 1967, 253].

While theological issues were important, so to were practical issues associated with establishing agriculture - issues such as sowing, grafting, plant breeding and animal husbandry [Ibid, 313]. Glacken considers that the period saw a shift from one in which "theological ideas of man as a modifier of nature dominated to one in which these ideas are the result of experience, by ecclesiastic and lay alike, in the exploitation of natural resources." [Ibid, 314]

Renaissance to the Late 17th Century

With its intense interest in classical sources, the Renaissance combined a love of scenery with its historical associations, "seeing in the fusion the beauties of landscape altered and unaltered by man." [Ibid, 356].

In 1485, Leon Battista Alberti [1404 - 1472] argued for care in selecting sites for buildings or cities; a building should not be placed in a valley between two hills because:

> "an Edifice so placed has no Manner of Dignity, lying quite hid; and its Prospect being interrupted can have neither Pleasure nor Beauty." [Glacken, 1967, 431]

Perhaps Alberti had not studied the siting of monasteries that were frequently in such a position for good practical reasons.

John Barclay, in *Icon Animorum* [1614], described the natural and man-made beauty of the scene along the River Thames from Greenwich Hill, asserting it to be most beautiful in England and possibly all Europe. It was "soe faire a variety, and the industry (as it were) of Nature, displaying her riches." Barclay believed that variety of beauty and monotony was needed as any beauty would "glut and weary" the viewer unless it was "beautified with contrarieties, and change of endowments, to refresh continually the wearied beholder with unexpected novelties." [Ibid, 452].

The discovery of the New World together with the immense scientific discoveries by Galileo, Kepler, Newton, Boyle and others during the 15th and 16th centuries increased interest in the designed earth, the findings being interpreted as providing further evidence of God's providence. Many scientists wrote about final causes: Newton's was grounded on the order, beauty and motion of the heavens rather than the order of nature on earth and Robert Boyle wrote of design both in the whole of creation and in the detailed aspects of plants and animals.

The writings of this period indicated a conflict, according to Glacken [Ibid, 378], between a mechanical and an organic view of nature. The former saw the individual parts acting according to known laws, the whole being the sum of the parts and their interaction. The organic approach saw the whole as existing, perhaps in the mind of an artisan before the parts - the design of the whole explains the actions of the parts. The organic approach is based on teleology - the idea of God as the divine artisan fashioning nature according to His will permeated much of the writings of the time.

The mechanical view emphasises secondary causes and eliminates final causes. The mechanical view gained credence with the prestige of mathematics; the earth was seen as a great machine and the harmonies of nature could only be understood by studying this underlying mechanical order. However the appreciation of the beauties of nature and of its interrelationships would not have derived from a mechanical approach [Ibid, 391-2].

In his seminal work: *Discourse on Method for Properly Guiding the Reason and Finding Truth in the Sciences* [1637], the French philosopher, Rene Descartes [1596 - 1650] argued for reason to be the basis of truth. While acknowledging God to be the First Cause, from there on he ignored God in explaining physical phenomenon. He advocated a goal of attaining control over nature through his scientific method and the application of science. Descartes established four rules for rational thinking:

1. Never accept anything as true until it is patently so [rule of evidence].
2. Divide the subject matter into as many components as possible [rule of analysis].
3. Proceed from the simple to the complex [rule of synthesis].
4. Revise thoroughly, lest anything be omitted [rule of control] [Secretan, 1973, 30].

The influence of Descartes was “subtle and ubiquitous” [Secretan, 1973, 30] and grew over the following centuries. The "Cartesian shears" which separated "what is out there" from "what is in here" [i.e. nature from mind], resulted ultimately in the emergence of the subjectivist view of aesthetic quality. Instead of seeing aesthetic quality as an inherent quality of a physical object such as a landscape, the distinction of mind and nature paved the way for people to appreciate the role of their own subjective feelings in determining aesthetic preferences.

Baruch Spinoza [1632 - 1677] opposed teleology on the basis that it was pure speculation and assumed that all of nature served man. He did not attribute to nature either beauty or ugliness, arguing that these were simply products of human imagination [Ibid, 378], an early subjectivist approach to aesthetics.

The 17th and early 18th centuries saw enormous growth of scientific knowledge, against which physico-theology assumed a lesser standing. It drew on the findings of geographical exploration in providing new examples and it gained a greater appreciation of interrelationships in nature. This prepared society for Darwin's understanding of the 'web of life' and of ecological relationships.

An eminent lawyer and Chief Justice, Sir Matthew Hale, in *The Primitive Origination of Mankind* [1677], wrote a masterly exposition of Christian belief regarding man's dominion over nature based on the Genesis account, including:

> "And hereby Man was invested with power, authority, right, dominion, trust and care ...to preserve the face of the Earth in beauty, usefulness, and fruitfulness. And surely, … it was not below the Wisdom and Goodness or God to create the very Vegetable Nature, and to render the Earth more beautiful and useful by it …." [Glacken, 1967, 481]

Hale saw man's role as to control nature for the earth's sake and for his own.

Baron Gottfried von Leibniz [1646 - 1716] saw creation as increasing one's admiration for the beauty of divine works - "the general beauty and perfection of the works of God" [Ibid, 377, 477]. An ardent supporter of final causes, Leibniz saw man as finishing the work of God.

In 1692, Richard Bentley [1662 - 1742], the most eminent English classical scholar of the age delivered eight sermons, *A Confutation of Atheism.* Bentley considered that the "order and beauty of the systematic parts of the world, their discernible ends and final causes, ... [a] 'meliority [i.e. superiority] above what was necessary to be,' show, he says, an intelligent benign agent." [Ibid, 396] More than most, Bentley emphasised the beauty of nature and the asymmetry of nature. He did not find an irregular feature such as a landform less beautiful than a regular or symmetrical one:

> "All pulchritude[26] is relative; and all bodies are truly and physically beautiful under all possible shapes and proportions, that are good in their kind, that are fit for their proper uses and ends of their natures." [Glacken, 1967, 397]

Glacken believed that physico-theology was always more successful and persisted longer in the life sciences because of the abundance of opportunities for finding evidence of final causes:

> "in the observation of organic growth, in the relationship of plant and animal life to one another and to their habitats, in plant and animal communities, in the pattern of distribution of organic life throughout the earth." [Ibid]

The scientific discoveries of the late 17th century saw tremendous growth in human understanding of the cosmos, and with this, "God had grown with his universe: the Deity of the later seventeenth century was grander, vaster, more majestic than before, expressing Himself in unnumbered worlds." [Nicolson, 1959, 186]. Isaac Newton's, *Philosophie Naturalis Principia Mathematica* [1687], was able to not only explain physical phenomenon but, with mathematics, could predict their behaviour under differing influences. It was one of the most influential books of all time and established order, proportion and regularity as universal principles.

This late 17th century period saw a tremendous burgeoning of physico-theology through publication of four "remarkable" books in England [Glacken, 1967, 406]:

- Burnet's *Telluris Theoria Sacra* [1681, translated in 1684 as the *Sacred Theory of Earth*]
- Woodward's *An Essay Towards a Natural History of the Earth, and Terrestrial Bodies, especially Minerals ...* [1695]
- Whiston's *New Theory of the Earth* [1696]
- Keill's *Examination of Dr Burnet's Theory* [1698]

These were very widely read at the time, several being translated into other languages.
Thomas Burnet's book together with Milton's *Paradise Lost*, were the two most widely read theodicies[27] of the early 18th century [Nicolson, 1959, 273], some ranking it on a plane with Plato, Cicero and Milton [Ibid, 191, 193].

Burnet argued, "Science and Scripture are not enemies but friends, one complementing the other." [Ibid, 196] Burnet divided the earth's history into three periods, the past [antediluvian[, present [postdiluvian[, and a future period similar to the first. His former antediluvian period was contemporary with the classical Golden Age, a paradise with a perpetual equinox [because he said, the earth did not tilt on its axis[28]]. This period ended with

26. A Middle English term for beauty

27. i.e. works which seek vindication of divine attributes - Shorter Oxford

28. The issue of the earth tilting on its axis provided much fare for the physico-theologians as it created the seasons and variations in climate across the earth, a diversity of conditions that favoured humans. Newton, though a teleologist, did not believe the inclination of the earth on its axis proved the existence of God.

the Flood. The postdiluvian world was unpleasant, unfruitful and nature was hard and niggardly. The future earth would occur after fire destroyed the postdiluvian earth.

Burnet [and many others of his time] believed that there were no mountains at the time of the earth's creation, in the antediluvian period, but that they appeared with the Fall of Man and reflected the fallen state of the world. He had much to say about mountains [see section 6.4].

Woodward used fossil evidence to show that the relief of the present postdiluvian world was similar to the antediluvian world. He also disputed Burnet's claim that "the earth is a pile of 'Ruines and Rubbish' whose mountains have not the 'least foot steps of Art or Counsel,' a globe which is a 'rude *Lump*,' a *'little dirty Planet,'* that he would grant it neither order or beauty" [Glacken, 1967, 411]. Woodward considered that the earth contains many areas that are "indeed extremely charming and agreeable". The aesthetic quality of natural beauty was seen as another proof of the wisdom of God.

Glacken regarded John Ray's *The Wisdom of God Manifested in the Works of Creation* [1691], which went through twelve editions, as the best natural theology ever written [Ibid, 379].

Drawing from Psalm 104:24[29], Ray presented the most comprehensive pre-evolutionary vision of the earth and its plants and animals, together with their interrelationships and extolled their diversity and variety. His view was positive and optimistic: the earth was a "place of beauty and usefulness whose powers do not decline with age as do the plants and animals it supports" [Ibid, 421] and whose climate and relief are not evidences of ruin but rather of beauty and order.

In reaction to Burnet's dismal view, Ray wrote of the beauty of nature:

> "How variously is the Surface of this Earth distinguish'd into Hills, and Valleys, and Plains, and high Mountains, affording pleasant Prospects? How curiously cloath'd and adorn'd with the grateful Verdure of Herbs and stately Trees, either dispers'd and scatter'd singly, or as it were assembled in Woods and Groves, and all these beautified and illustrated with elegant Flowers and Fruits..." [Glacken, 1967, 418]

Ray's ideal saw man improving on nature - the beautiful village resting in well-tilled fields [Ibid, 665]. Ray believed that God enjoyed the aesthetics of the earth:

> "[God] delights in the Beauty of his Creation, and is well pleased with the Industry of Man, in adorning the Earth with beautiful Cities and Castles; with pleasant Villages and Country-Houses; with regular Gardens and Orchards, and Plantations of all Sorts of Shrubs and Herbs … with Shady Woods and Groves, and walks set Rows of elegant Trees, with Pastures cloathed with Flocks, and Valleys cover'd with Corn, and Meadows burthened with Grass..." [Glacken, 1967, 484]

Reverend William Derham, a friend of Ray, was the author of *Physico-Theology: or, A Demonstration of the Being and Attributes of God, from His Works of Creation* [1713]. Derham book became the most influential work in this field of the early 18th century. Like Ray he emphasised the earth's utility and beauty. The earth was orderly and well-planned with "nothing wanting, nothing redundant or frivolous, nothing botching or ill-made..." [Glacken, 1967, 422].

Both Ray and Derham wrote of the significance of organic interrelationships evident on the earth and in this they preceded modern writers on the balance of nature and the web of life.

Throughout the 17th and 18th centuries modern ideas of humans as a controller of nature become more prominent building on Descartes' thesis. While the teleological arguments of design continued there was "more penetrating criticism of final causes" from philosophers, especially Hume and Kant [Ibid, 502], and the teleological view of nature transformed into philosophical and theological support for the natural histories of the 18th century [Ibid, 508].

While science advanced, lending support to the mechanical view of nature which could be described mathematically, teleology continued to exert a significant influence on the earth and life sciences and in geography from the 17th through to the 19th centuries [Ibid, 505]. The

29. *How many are your works, O Lord! In wisdom you made them all; the earth is full of your creatures*

development of the microscope and telescope revealed an order and purpose in nature not previously seen and provided further support for physico-theology.

“Consult the genius of the place”, wrote the poet Alexander Pope. *Genius Loci* was quickly recognised to be Divine, reinforcing the natural theological view, and poems and literature followed, referring to the Divine presence in the place [Hussey, 1927, 31]. In *The Moralists* [1709], Shaftesbury wrote “your *Genius*, the *Genius* of the Place, and the GREAT GENIUS have at last prevail’d.” [Thacker, 1979, 181]. Shaftesbury considered aesthetics to involve “ ‘Nature’s genuine Order’, the ideal form and harmony of things existing ‘before the Fall’ .” [Hussey, 1927, 53 - 54]

Linnaeus's celebrated lecture *Oeconomy of Nature* in 1749 recognised design and emphasised environmental influences in the distribution of living organisms including humans. Interestingly he justified the earth's relief on aesthetic as well as utilitarian grounds; that it is pleasing to the eye and it increases the surface area of the earth [Glacken, 1967, 510].

Count Buffon, whom Glacken placed in the front rank of 18th century naturalists, rejected final causes in the study of nature, believing that nature should be studied for itself. Influenced by Descartes, Buffon’s *De la nature, Premier Vue* [1764] defined nature in terms of a system of laws established by God for the existence of things [Ibid, 519].

Aesthetic improvement, according to Buffon, came from the hand of man: "Wild nature is hideous and dying; it is I, I alone, who can make it agreeable and living." [Ibid, 663] He went on to advocate drying out the marshes to make their stagnant waters flow in brooks and canals, clearing out the thickets and the old forests and, in their place, making pastures and arable fields so that a "new nature can come forth from our hands." Buffon's ideal nature is one that is "well cared for, ordered, a little too well raked, embellished with decorations." [Ibid, 665]

Voltaire was sympathetic with final causes and wrote on the subject in the *Dictionnaire Philosophique* [1768]. He saw nature as a work of art, both revealing a sense of purpose, with beauty in nature suggestive of final causes. He made particular mention of the beauty and utility of the mountains-rivers-plains triad [Ibid, 523].

Opponents of Teleology

Hume and Kant led the arguments against the teleological school. David Hume [1711 - 1776], the Scottish philosopher, presented his arguments via dialogues between Cleanthes and Philo, enabling him to argue a point back and forth. Cleanthes was the conventional, Philo the innovator. Cleanthes described the world as a machine "whose intricately adjusted and accurately fitted parts work well together" [Ibid, 525]. Philo argued that the analogy of a machine is remote:

> "The further we push our researches of this kind [i.e. microscopy] we are still led to infer the universal cause of all to be vastly different from mankind, or from any object of human experience and observation." [Glacken, 1967, 526]

Rebutting the artisan concept, Hume argued that any artisan becomes skilled through trial and error, through countless mistakes, corrections and changes. Are we to suggest, Hume asked, that God learnt how to construct a world through such methods, - that many worlds "might have been botched and bungled, throughout an eternity, in the art of world-making" [Ibid, 526].

The Prussian philosopher, Immanuel Kant [1724 - 1804], addressed teleology in his *Critique of Pure Reason* [1781] and more particularly in the "Critique of Teleological Judgement" in part II of *Critique of Judgement*. [1790]. Kant built on and synthesised aesthetic ideas that had developed during the 18th century and is generally acknowledge to have “welded their fragments together so as to create a truly philosophical system”, bringing order out of the chaos which then existed [Monk, 1935, 4-5]. Central to Kant’s philosophy of aesthetics was his finding that an object’s character lay in the judging mind rather than in the object judged [Ibid, 4]. His was a subjectivist rather than objectivist approach.

Kant tore away the examples of final causes and, almost regretfully, found that the teleological proofs must be rejected.

Addressing the commonly used analogy of nature as a machine, such as a watch, Kant pointed out that the maker of the watch lies outside it, a cog of the watch cannot produce another or repair itself. However, nature organises itself, "the organization of nature has nothing analogous to any causality known to us." [quoted by Glacken, 1967, 532] thus disposing of the artisan analogy.

Interestingly, Kant took an objectivist position when addressing beauty in nature, that is contrary to the subjectivist position he developed elsewhere in *Critique of Judgement*:

> "We may regard it as a favour that nature has extended to us, that besides giving us what is useful *it has dispensed beauty and charms in such abundance*, and for this we may love it, just as we view it with respect because of its immensity, and feel ourselves ennobled by such contemplation - just as if nature had erected and decorated its splendid stage with this precise purpose in its mind." [Glacken, 1967, 533-4, emphasis added]

Kant argued that the earth's relief, far from being evidence of design, is merely the result of its geological history. Glacken summarised Kant's contribution as a "harvesting of thoughts spanning more than two thousand years" [Ibid, 535].

Nature Lovers

As well as the arguments of philosophers, opposition to physico-theology came from another source, the development of an almost pantheistic love of nature. This movement, led by Jean-Jacques Rousseau [1712 - 1778] has had a profound effect on Western attitudes to nature, providing among other things, one of the foundations of the conservation movement.

Biese suggested that Rousseau's influence was so revolutionary and original that in a sense, the world's history began again with him [Biese, 1905, 260]. Born in Switzerland, Rousseau grew up on Lake Geneva and loved to roam the countryside. On such a ramble in 1728, he wrote of how the "high mountains unfolded themselves majestically before my eyes" [Ibid, 267]. In 1765 he lived for two months on Peter Island on the Lake of Bienne, a relatively insignificant Swiss lake, north west of Berne. According to Clark, on the island, Rousseau "had an experience so intense that one can almost say it caused a revolution in human feeling." [Clark, 1969, 190]

> "I often sat down to dream at leisure in sunny, lonely nooks ... to gaze at the superb ravishing panorama of the lake and its shores ... When evening fell, I came down from the higher parts of the mountains and sat by the shore in some hidden spot, and there the sound of the waves and the movements of the water, making me oblivious of all other distraction, would plunge me into delicious reverie. The ebb and flow of the water, and the sound of it ... came to the aid of those inner movements of the mind which reverie destroys and sufficed me pleasantly conscious of existence without the trouble of thinking ..." [Biese, 1905, 269-70]

Filled with the reverie of the flopping waves, Rousseau "became completely at one with nature, lost all consciousness of an independent self, all painful memories of the past or anxieties about the future." [Clark, 1969, 190]. In 1761 Rousseau published *La Nouvelle Héloise* which "overflow[ed] with Rousseau's raptures about the Lake of Geneva" [Biese, 1905, 274]. The book made three points: firstly that the purpose of one's inner consciousness was to allow feelings in the heart, secondly the worth of solitude - "all noble passions are formed in solitude", and thirdly, the love of romantic landscapes, described for the first time in glowing terms.

Rousseau's feeling for nature had a profound effect on European thought, and was expressed tangibly by the upsurge in tourism to places such as Chamounix, by climbers ascending Mont Blanc and other peaks, by a delight in Robinson Crusoe type solitude, in the more sensitive descriptions of other cultures in both scientific and artistic terms, and the appreciation of foreign landscapes found during world explorations. The love for nature was, however, imbued with a heavy sentimentality that cast a melancholy shadow over it. It was the genius of Goethe who freed and purified the love for nature from this morbidity.

> "Goethe focussed all the rays of feeling for Nature which had found lyrical expression before him, and purged taste, beginning

> with his own, of its unnatural and sickly elements.” [Biese, 1905, 296]

While other poets wrote of nature almost in the third person, as one remote and insincere in expression, Goethe wrote from an inner sensibility. It was said of him that “Nature wished to know what she looked like, and so she created Goethe” [Ibid]. Unlike Rousseau, who saw nature as a painter, Goethe saw nature as a poet. While Rousseau remained a deist, Goethe ultimately became more of a pantheist. An example of the quality of his writing is from *Werther*, a book of his youth:

> “When the lovely valley teems with vapour around me, and the meridian sun strikes the upper surface of the impenetrable foliage of my trees, and but a few stray gleams steal into the inner sanctuary, then I throw myself down in the tall grass by the trickling stream; and as I lie close to the earth, a thousand unknown plants discover themselves in me. When I hear the buzz of the little world among the stalks, and grow familiar with the countless indescribable forms of the insects and flies, then I feel the presence of the Almighty who formed us in His own image, ...” [quoted by Biese, 1905, 304]

Later in life, Goethe’s scientific objectivity took over, “the student of Nature supplanted the lover” [Ibid, 324]. Yet his feelings for nature became pantheistic and this linked his scientific and poetic impulses. As expressed by Biese:

> “This pantheism marked an epoch in the history of feeling. For Goethe not only transformed the unreal feeling of his day into real, described scenery, and inspired it with human feeling, and deciphered the beauty of the Alps, as no one else had done, Rousseau not excepted; but he also brought knowledge of Nature into harmony with feeling for her, and with his wonderfully receptive and constructive mind so studied the earlier centuries, that he gathered out all that was valuable in their feeling.” [Biese, 1905, 325]

Goethe objected to the teleological view of nature because it relied on analogy, which, in scientific terms, is unsatisfactory [Glacken, 1967, 535].

William Wordsworth [1770 - 1850] was brought up around the Lakes in Cumberland, and like Rousseau and Goethe, developed a deep sensitivity to and delight in nature. As a poet of the first rank, Wordsworth sought to write on the complexity of what happens when eye and object meet: “The delicate interplay between perception and imagination could nowhere be more intricate than in the representation of a natural scene, transmuted and recollected in the ordering form of Wordsworth’s poetic language.” [de Man, 1984, 126] A deeply religious man, he sought in nature a closeness to the Reality, although Biese considered his theism contained an “undeniable, though hidden, pantheism” [Biese, 1905, 326].

In the poem, Tintern Abbey, Wordsworth confessed in a characteristic way:

> “Nature then
> (The coarser pleasures of my boyish days
> And their glad animal movements all gone by)
> To me was all in all. I cannot paint
> What then I was. The sounding cataract
> Haunted me like a passion; the tall rock.,
> The mountain, and the deep and gloomy wood,
> The colours and their forms, were then to me
> An appetite, a feeling and a love...” [Biese, 1905, 327]

Wordsworth sought nature’s aesthetic pleasures because they provided him with a basis for a religious interpretation of nature.

Rousseau, Goethe, Wordsworth and other nature poets and writers such as Byron, Scott and Shelley transformed the way in which Europeans viewed nature. Coming with the enlightenment their pantheism, “universal love, sympathy with Nature in all her forms, was the base of feeling” [Biese, 1905, 339].

Post Darwinian Period

With the decline of physico-theology at the end of the 18th century, the definition and influence of laws influencing nature took precedence.

The criticisms of the teleological argument in the 18th century, particularly by Hume questioning the artisan analogy and by Kant postulating that the way nature is organised does not imply causality, paved the way for the revolution in thought which occurred in the 19th century, particularly as a result of Darwin's *Origin of Species*. Hume and Kant showed that concepts of nature are constructs of the human mind - the modern day equivalent is that of the ecosystem. Far from being the bountiful mother of design which had conventionally be held to be true, Hume had shown nature to be niggardly - a term which came into common parlance in the 19th century under Darwin and Malthus. The 18th century, the century of Kant, Rousseau, Voltaire, was the age of enlightenment and of Revolution. It was a period that broke with the conventions of the classics and of the Bible.

The end of the 18th century also established humans as a significant modifier of nature, the dimensions of which would await George Marsh's *Man and Nature, or Physical Geography as Modified by Human Actions* [1864] and others in the 19th century. Glacken noted in conclusion:

> “the idea of a designed earth, whether created for man or for all life with man at the apex of a chain of being, has been one of the great attempts in Western civilisation, before the theory of evolution and modern ecological theories emerging from it, to create a holistic concept of nature, to bring within its scope as many phenomena as possible in order to demonstrate a unity which was the achievement of an artisan-creator." [Ibid, 707]

Beauty in nature, Glacken asserted, brings man closer to the "heartbeats of the creation" [Ibid, 707].

Glacken also noted that, over 2300 years of Western civilisation, virtually every great thinker has had something to say about teleology. Over this span, he identified five main periods of history during which the teleological ideas took on shape and life[Ibid, 712 -3]:

- The Hellenistic period and the Hellenised Roman period that followed; favoured by a common language [Greek] and understanding the unity of nature, the contributions of the Greek philosophers were immense

- The early Christian period with the writings of Basil and Ambrose, culminating in Augustine who integrated Classical and Christian ideas of design

- The 12 - 13th centuries through the contributions of Albert the Great and of Thomas Aquinas and associated with the construction of the cathedrals

- The late 17th - early 18th centuries, drawing from the immense scientific discoveries of the time and reinterpreting the scriptural basis afresh through the eyes of Burnet, Ray and Derham

- The remainder of the 18th century with the work by Buffon, Linnaeus and Voltaire and the contrary arguments of Hume and Kant.

The following centuries have been characterised, as far as Western culture is concerned, with industrialisation of economies, specialisation of talents, and secularisation of beliefs. An urban-based rather than rural society, and increasingly technological in orientation, its roots with nature have until recent decades been seen as irrelevant. Knowledge of physico-theology, the debates that have raged in the past and the hair-splitting of philosophers have been largely forgotten, consigned to the irrelevancy of history. Yet these comprise part of the foundations of Western culture, they explain not only who we are but also how we became thus.

The specialisation of science and the arts that has occurred over the past 100 years has contributed to the lack of awareness of the history of landscape perceptions. For example, in 1920 geographers were exhorted by Sir Francis Younghusband, then President of the Royal Geographical Society, to undertake a systematic study of the beauty of landscape [Younghusband, 1920]. Although Vaughan Cornish produced a number of books on this theme[30], geographers largely ignored his call until recent decades [Fuller, 1988, 12].

Having examined the classical and teleological foundations of Western culture, the remainder of this chapter focuses on three areas in which the development of cultural attitudes towards landscape is traced. These are the development of the Western attitudes towards mountain landscapes, the depiction of landscape in Western art and the development of gardens. These three areas - mountains, landscape art, and gardens - provide a basis for examining how the present day perception of landscape in general has emerged from a cultural perspective.

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30. Vaughan Cornish’s books included *The Poetic Impression of Natural Scenery* [1931], *Scenery and the Sense of Sight* [1935], *The Beauties of Scenery: A Geographical Survey* [1943].

6.4 THEME ONE: ATTITUDES TO MOUNTAINS

In 1657 mountains were described with epithets such as "Warts, Wens, Blisters, Tumours, Imposthumes"[31] [Nicolson, 1959, 2, 41] yet a century later, in 1769, Thomas Gray wrote of the Scottish highlands: " the mountains are ecstatic" [Ibid, 358]. These were not isolated descriptions, they epitomise a sea change in attitudes towards mountain landscapes that occurred in as little as fifty years during the early 18th century. The reasons for this change illustrate the influence of culture on a society's attitudes towards nature, and landscapes in particular.

An English writer, S.P.B. Mais, in 1938 asserted that “Certain canons of beauty are unalterable ... Taken generally you and I, plain men, admire very much what plain men admired in Chaucer’s day, Shakespeare’s day, and Wordsworth’s day.” He went on to cite as examples the English downs, the fells and the jagged mountains of the north [quoted by Lowenthal, 1978, 387]. However as this section will demonstrate, the writer was wrong; human preferences for landscape have changed significantly, none more so than in regard to mountain scenery.

In *Mountain Gloom and Mountain Glory: The Development of the Aesthetics of the Infinite* [1959], Marjorie Hope Nicolson traced the reasons for this shift, focusing on the literature and poetry of the period. She considered that the change was the result of "one of the most profound revolutions in thought that has ever occurred." [Ibid, 3] The reasons relate directly to the teleological and classical influences traced in the previous section.

(1) Classical Attitudes to Mountains

Up to the mid 17th century, mountains did not figure in paintings, literature or poetry except along classical lines. The standard mountains were Greek - Olympus, Pelion, Parnassus, Ossa, and Helicon and these were described as they were imagined, not as they were seen or experienced because few writers had actually seen mountains. English mountain poetry rarely mentioned local mountains in the British Isles. Travellers' accounts mentioned the dangers and difficulties of travelling in mountainous areas but virtually never described them as beautiful.

Greek poets used terms that are similar to contemporary sublime descriptions:

> "Aeschylus felt the mingled majesty and terror of earthquake and storm, of 'sky-piercing rocks' and 'star-neighboured peaks,' of the distant Caucausus. Alcman's 'mountain summits ... glens, cliffs and caves,' like his 'dark ocean's waves,' were both beautiful and dangerous, associated with 'black earth's reptile brood' and the 'wild beasts of the mountain wood.' " [Ibid, 39]

Aristophanes was more sympathetic:

> “... the wood-crowned summits of the hills;
> Thence shall our glance command
> The beetling [literally - far seen look-out places] crags which sentinel the land”
> [Quoted by Gilbert, 1885, 13]

The Romans' attitudes were little different although Biese considered that the Roman feeling for nature was more developed overall than was the Greek [Biese, 1905, 18]. The Romans regarded mountains as aloof, inhospitable, desolate and hostile and described them in terms of difficult, sharp, horrid, inaccessible and frozen. Writers who lived near mountains, such as Catullus, Virgil or Horace scarcely ever mentioned them. Virgil spoke of “Father Apennine, when through his glistening holm oaks he murmurs low, and, lifting himself with snowy peak to the winds of heaven, rejoices.” [*Æneid*, Quoted by Gilbert, 1885]

Only Lucretius seemed to admire mountains, and even climbed them although as a philosopher he described them as waste places occupying areas better occupied by green meadows. Like Constable and the Dutch painters centuries later, he loved clouds: “... the storm-wind, wild, comes carrying clouds like mountains through the air... may you mark ... huge caves built of hanging rocks of cloud” [quoted by Gilbert, 1885, 16]

(2) Biblical Basis of Attitudes

31. Wens are an Old English term for a lump, protuberance or wart. Imposthumes or impostumes is a Middle English term for a purulent swelling, a cyst, an abscess. Clearly neither terms were used as endearments.

A major determinant of the attitudes towards mountains was interpretation of the Bible that, in contemporary eyes, seem quite amazing. The key passage is in Genesis 1:9 and 10 describing the third day of creation:

> And God said, "Let the water under the sky be gathered to one place, and let dry ground appear.' And it was so.
> God called the dry ground 'land', and the gathered waters he called 'seas'. And God saw that it was good."

God called the world he created "good" so it should have been the paragon of beauty.

The question arose whether God created the mountains when he created the earth. In this there were two opposing views, one that mountains were created on the third day, and a counter and stronger view that they developed at some later time. Influenced by classical notions of aesthetics in which symmetry, proportion and restraint determined beauty, many believed that God would not create something irregular, therefore what God created was regular and perfect, i.e. without mountains. Later, at the Fall, or at the Flood[32], when sin and judgement entered the world, mountains emerged symbolising the state of imperfection of man.

Somewhat incredibly to modern conceptions, it was widely believed that the earth was like an egg, which accounted for there being no mountains. The idea of the earth as a smooth round egg occurred in ancient Persian, Egyptian and Oriental legends and also in Jewish and early Christian theology. The Roman poet Ovid [43 BC-17 AD] describing the creation of the earth by a god: "his first care was to shape the earth into a great ball, so that it might be the same in all directions." [Ibid, 78] The passage "the Spirit of God was *hovering* over the waters." [Genesis 1:2, emphasis added] suggested to early Christian expositors a Heavenly Dove. It was a short step from there to suggest that a bird hovering over or sitting on eggs [i.e. that the earth was an egg]. Basil was one of the Patristic writers who suggested this although it was meant in an allegorical sense. Later writers, however, extended the logic and sought to explain the structure of the egg. Abelard [1079 - 1142] suggested that the yolk is the earth, the white is the water, the membrane is the air, and the shell is fire [Ibid, 81]. This model also helped explain the origin of the waters in the Flood. It certainly explained the smoothness of the earth without mountains to disfigure its beauty.[33]

It was widely agreed that the mountains came after creation with both Jewish and Christian expositors arguing that these "blemishes" on creation were due to human depravity [Ibid, 82]. Many believed that mountains resulted from the sin of Adam and Eve and associated mountains with the idea of the earth growing old. From this, the parallel with man was apparent: the blemishes, deteriorations and excrescences which pockmark a human face and body occur also on the earth in the form of mountains - hence the expressions of the 17th century of mountains as warts, wens, blisters, tumours and imposthumes.

The fact that Adam and Eve and the serpent were guilty but that the earth was also being punished vexed many commentators - as Rabbi Nathan taught: "three entered for judgement, yet four came out guilty." [Ibid, 83] The critical passage is in Genesis 3:17, which is now translated "Cursed is the *ground* because of you" [emphasis added] was originally translated by Jerome in the Vulgate as "earth". Jerome's translation can imply the entire world rather than the soil, which the rest of the passage makes clear, is meant [by its reference to it bringing forth thorns and thistles]. Resulting from God's curse,

32. Mountains are not mentioned in the Genesis account until the flood. Genesis 7:19: "[The waters] rose greatly on the earth, and all the high mountains under the entire heaven were covered."

33. The notion that the earth is flat rather than round may have derived from a misunderstanding of ancient texts. According to Nicolson "classical and patristic philosophers, with only a few exceptions, accepted the idea that the earth was round." [Ibid, 92] The egg analogy could scarcely produce any other conclusion. Ancient writers argued extensively about the flatness of the earth and this may have been misinterpreted to refer to whether the earth was round or flat, rather than whether the earth was flat or mountainous. In the middle ages it was widely believed that the earth was flat.

the earth was defaced and was in a state of decay.

While there was disagreement concerning whether the mountains arose at the time of Adam and Eve's sin or when Cain killed Abel, it was almost universally agreed among Bible commentators that the Flood or Deluge caused major changes to the earth and that, if the mountains were not present prior to this, they were certainly there after the flood as the Ark came to rest on Ararat [Ibid, 87]. Augustine's position was that the flood made the mountains higher and the valleys and ocean depths deeper; this became the generally accepted position.

(3) Pre Mid 17th Century Attitudes

Up to the middle of the 17th century, whenever writers, poets and travellers mentioned mountains [which was rare], they repeated the epithets of the classics. Augustine used descriptions of mountains and valleys to moralise about humanity [Ibid, 47-8], while Dante made clear his dislike of mountains describing the unappealing masses of broken stones and crags fit only to guard the entrance to hell [Rees, 1975b, 306]. Milton's "mountains on whose barren breast the labouring clouds do often rest", was based on classical conventions and, following anatomical use, described "huge-bellied mountains". Similarly Shakespeare, who probably never saw a mountain, described them in classical terms; for example Hamlet's description of his father is based on Virgil's description of Mercury on Mount Atlas:

> "Hyperion's curls, the front of Jove himself,
> An eye like Mars, to threaten or command,
> A station like the herald Mercury
> New-lighted on a heaven-kissing hill"

To writers like Bunyan, mountains were allegories of life - he spoke of hills as symbols of the ups and downs of life, mountains were 'proud' and valleys 'humble' [Nicolson, 1959, 44].

There were exceptions. In the 4th century Basil placed his hut on a mountain from where he could gain an extensive view. Dante [1265-1321], who had seen many lands, appeared to delight in the mountains, describing the ascent through charming upland, flowery glade, crag, rocky path and narrow cornice ledge, leading to the Paradise on the summit, for the abode of spirits on their upward way:

> "that so made pure and light.,
> They may spring upward to the starry spheres" [Gilbert, 1885, 36]

In the 13th century, John of Salisbury ascended to Grand St Bernard and described it thus:

> "I have been on the mount of Jove; on the one hand looking up to the heaven of the mountain; on the other shuddering at the hell of the valleys; feeling myself so much nearer to heaven that I was more sure that my prayer would be heard."
> [Nicolson, 1959, 49]

In 1335, Petrarch [1304-1374] climbed Mount Ventoux [less than 2000 m high] and was delighted by its grandeur and majesty until he read in his copy of Augustine's *Confessions*: "And men go forth, and admire lofty mountains and broad seas … and forget their own selves while doing so" [Shepard, 1967, 161]. He was angry with himself for admiring a mountain more than the human soul and dignity of man and scurried down guiltily.

In 1401, Adam of Usk had himself blindfolded and carried across the St Gothard Pass [Shepard, 1967, 131]. In 1480 Felix Fabri, a monk from Ulm, journeyed through the Alps and wrote of the dreadful peaks, "rigid from the cold of the snow or the heat of the sun" but of the pleasantness of the valleys [Biese, 1905, 262]. Again, there were exceptions. The naturalist, Konrad von Gesner wrote in *De Admiratione Montium* in 1541 of his delight in climbing mountains to study the plants and for exercises - "I say then that he is no lover of nature who does not esteem high mountains very worthy of profound contemplation" [Ibid, 264; Shepard, 1967, 161]. Gesner was atypical - a more typical example was a guidebook to Italy which included nothing of significance about the mountains of that country.

Mountains were often regarded as the haunts of evil spirits. Mount Pilatus near Lucerne for example, contains near its summit a lake that was thought to be haunted by the spirit of Pontius Pilate. The Lucerne council prohibited visits to the lake until the law was repealed in the early 16th century. However the legend was only demolished when a brave person threw stones into the lake without retaliation by Pilate [Rees, 1975a, 42].

In 1621, Joshua Poole described his journeying over the Alps and Pyrenees:

> "I am now got over the Alps …; I had crossed … the Pyreneans to Spain before; they are not so high and hideous as the Alps; but for our mountains in Wales ... they are but Molehills in comparison to these; they are but Pigmies compar'd to Giants, but Blisters to Imposthumes, or Pimples to Warts." [Nicolson, 1959, 61]

Similarly, Dr Johnson described the Pyrenes as "uncouth, huge, monstrous excrescences of Nature, being nothing but craggy stones." Recoiling from the Scottish mountains he penned: "An eye accustomed to flowery pastures and waving harvest is astonished and repelled by this wide extent of hopeless sterility." [Shepard, 1967, 131]

George Hakewill, in *Apologie of the Power and Providence of God* [1627], believed that the mountains were the "immoveable markes of the great deluge" [Ibid, 109] but, contrary to most of this age, he argued for their usefulness. He spoke of the "pleasing variety of mountaines and vallies" [Ibid, 110]. He considered variety to be one of God's principles of the universe. In a delightful conclusion to his book, Hakewill wrote:

> " I thinke that all things considered, wee have no less reason to blesse God for the less fruitfull mountaines, than for the fat and fruitfull vallies." [Nicolson, 1959, 110]

Galileo's *Sidereus nuncius,* [1610] described his findings that the moon's irregularities and mountains were like the earth. Together with his discovery of the four moons around Jupiter and that Venus had crescent phases, these discoveries had an electrifying impact across Europe. Coupled with his discovery in 1613 of spots on the sun, Galileo's findings were believed to indicate decay in the cosmos as well as on earth. Decay was thus thought to be universal, not only confined to the earth.

In *Somnium*, an influential work of fiction, Kepler described the lunar hills and valleys as [in Nicolson's words], " a vivid if forbidding spectacle of vast towering mountains, profound chasms and abysses into which crept for protection the strange denizens of the moon world." [Ibid, 132], scarcely a description of beauty and delight but rather of grandeur and terror which later formed the basis of the 'sublime'. Hard on the heels of these stellar discoveries, the poet John Donne described mountains as "warts and pock-holes on the face of the earth":

> "But keepes the earth her round proportion still?
> Does not a Tenarif, or higher Hill
> Rise so high like a Rocke ... confesse, in this
> The worlds proportion disfigured is." [Lowenthal, 1978, 384]

John Milton [1608 - 74] crossed the Alps in 1638 en route to Italy but left no record of his impressions.

In 1642, Sir John Denham's poem "Coopers Hill" was published. The poem was of the topographical poetry genre and described the prospect from Coopers Hill, situated at Runnymeade Island [where the Magna Carta was signed] on the Thames with Windsor nearby and London in the distance. The view included Windsor Castle, Runnymeade Island, an abbey ruined in the Dissolution and the Thames - a landscape of "English political and religious history" [Andrews, 1989, 14]. Denham's description of the Thames Valley reflected experience of the Italian landscape - magnifying its attributes to the point of exaggeration [Hussey, 1927, 23-4]:

> "... the steepe horrid Roughness of the Wood
> Strives with the gentle Calmness of the Flood.
> Such huge Extremes, when Nature doth unite,
> Wonder from thence results and thence Delight ...."

The poem was unusual in not adopting the traditional classical model of Mount Parnassus as the basis for inspiration, but rather taking the, then, radical step of using a familiar English location. The poem was reprinted many times and stimulated an outpouring of similar topographical poetry over the next two centuries. Between 1650 and 1841, more than 200 poems either referred to Coopers Hill or borrowed from it [Aubin, 1936, 36].

The topographical poem was an important feature of 17th and 18th century English literature, having its roots in the classics and providing practical and moral instruction. Myra Reynolds identified ten characteristic attitudes towards nature of the classical period including:

- dislike of the grand, terrible or mysterious in nature [such as mountains, storms, and atmospheric phenomena]
- delight in gentle, pleasant nature [such as rural England]
- symmetrical forms in formal gardens
- cold and lifeless imitation of classical models
- an underlying conception of nature as being entirely apart from man and therefore to be treated either as servant or foe [Reynolds, 1909, 57].

By Denham's time, the Italian landscape picturesque was just beginning to be evident in English poetry, and the pictorial contrasts were developed in words more fully over the following two centuries[34]. Many poets adopted images of the paintings of Claude Lorraine and Salvatore Rosa, seeking to portray in words the sweet serenity of Claude and the melancholy wildness of Rosa [see Section 6.5].

In 1644, John Evelyn partly climbed Mounte Pientio and spoke conventionally of the "heapes of Rocks so strangely congested and broaken ... as would affright one with their horror and menacing postures." [Nicolson, 1959, 61-2]. Evelyn regarded the Alps as an unpleasant barrier between the “sweet and delicious” gardens of France and Italy. [Rees, 1975a, 40]. As the translator of Lucretius who described mountains as waste places, when Evelyn reached Lake Maggiore at the foot of the Alps he exceeded Lucretius in his description of the Alps:

> "which now rise as it were suddainly ... as if nature had here swept up the rubbish of the Earth in the Alps, to forme and cleare the Plaines of Lombardy." [Nicolson, 1959, 62]

A common view was that the 'ugliness' of the mountains could enhance the beauty of man's accomplishments. The Earl of Devon-shire's magnificent home, Chatsworth in Derbyshire, was often contrasted with the crags and wild rocks of the grotesque nearby Peak which was even referred to as the "Devil's arse"! [Ibid, 63-4, see also Hussey, 1927, 25]

Henry More's *An Antidote against Atheism* [1652], advocated that all nature is designed by God and is therefore good. He argued that mountains are useful for many reasons and reiterated reasons cited from Pliny through to Hakewill [Nicolson, 1959, 116]. More's argument that "You may deem them [i.e. mountains] *ornaments* as well as *useful*" [Ibid, 121] was little more than a repeat of long held views. Nicolson comments: "Intellectually he was persuaded of the value of mountains, but emotionally he was unmoved by them." [Ibid, 122] More considered variety and diversity to be about ethical matters rather than aesthetic. He also regarded mountains as contributing to the diversity of the world metaphysically, ethically and aesthetically. Without them, the world would be a "languid flat thing." [Ibid, 139] Following Augustine, More was unenthusiastic about irregularity in nature as found in clouds or mountains.

More's statement reflected the prevailing classical view that beauty was based on reason, not emotion. The architect, Sir Christopher Wren, summed it up thus:

> "Beauty is a Harmony of Objects, begetting Pleasure by the Eye.... Geometrical Figures are naturally more beautiful than any other irregular; in this all consent, as to a Law of Nature." [Nicolson, 1959, 124-5]

Up to the 17th century, objective knowledge about mountains was limited. "Genesis governed geology" [Ibid, 159]. For example, the heights of mountains were greatly exaggerated, fossils found on mountains were believed to have been deposited by the receding Flood, the water

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34. Many authors have examined the treatment of nature in poetry. Some which have examined the themes of landscape in England from the 16th to 19th centuries include the following:
Myra Reynolds, 1909*. The Treatment of Nature in English Poetry Between Pope and Wordsworth*. University of Chicago Press, Chicago, 388 pp.
J.R. Watson, 1970. *Picturesque Landscape and English Romantic Poetry*. Hutchinson Educational, London, 210 pp.
J.R. Watson, 1985. *English Poetry of the Romantic Period, 1789 - 1830*. Longman, London, 360 pp.
Each of these have extensive bibliographies of further works.

in rivers was thought to ooze out of the mountains, and the analogy of the human body was used to suggest that the mountains comprise the bones of the earth and the rivers its arteries.

In the 1690s, the intrepid Celia Fiennes rode about England on horseback; her comments reflected the prevailing standards of taste. Travelling through the Lake District, an area idolised by later generations, she appeared to have no sense of an aesthetic experience:

> “Looking upward I was as farre from the top which was all Rocks, and something more barren, tho’ there was some trees and woods growing in ye Rocks and hanging over all down ye Brow of some of the hills. From these great ffells there area several springs out of ye Rocks in the way, when something obstructs their passage and so they come with more violence, that gives a pleaseing (sic) sound and murmuring noise.” [Hussey, 1927, 91]

Her description gave no sense of the sublime, picturesque or romantic qualities that latter writers would extol.

About 20 years later, Daniel Defoe made a similar tour of the country. Like Fiennes, he clearly “preferred scenes of activity and evidence of man’s endeavor than wild uncultivated stretches of country. The natural landscape left them unmoved; at most it made them thankful when they reached civilization once again.” [Clark, 1968, 19]. Defoe wrote of the “Barren Mountains of Wales”, contrasting them against the “pleasant and fruitful” areas nearby. Of the Lake District, Defoe complained of “seeing nothing round me in any places, but unpassable Hills, whose tops, covered with snow, seemed to tell us all the pleasant part of England was at an end.” [Ibid, 20]

Burnet's *A Sacred Theory of the Earth* [1681], viewed the present world as inferior to the original - "its gross irregularities and lack of symmetry offended his sense of proportion" [Nicolson, 1959, 196]. Burnet saw that the "first Model ... was drawn in Measure and Proportion by the Line and by the Plummet..." whereas the modern world "...'tis a broken and confus'd Heap of Bodies, plac'd in no Order to one another..." [Ibid, 196-7]. Mountains were one of the major "irregularities" which offended Burnet's sense of decorum: "Upon the ... Globe stand great Heaps of Earth or Stone, which we call Mountains" [Ibid, 197].
Burnet contrasted the original pristine earth with the present scarred world in these words:

> "The Face of the Earth before the Deluge was smooth, regular, and uniform; without Mountains, and without a Sea...
>
> ".. this smooth Earth … had the Beauty of Youth and blooming Nature, fresh and fruitful, and not a Wrinkle, Scar or Fracture in all its Body; no Rocks nor Mountains, no hollow Caves, nor gaping Channels, even and uniform all over. ... 'Twas suited to a golden Age, and to the first innocency of Nature." [Nicolson, 1959, 198]

All this was changed with the Deluge. When Noah alighted from the Ark, according to Burnet, he viewed a ruined world, which "Time's comforting hand gradually overlays with healing scars the 'raw and ghastly' wounds of nature" [Ibid, 200] Where previously there had lain "a wide and endless Plain, smooth as the calm sea" now there were "wild, vast and indigested Heaps of Stone and Earth." The mountains stood as the spectacular "Ruins of a broken World" [Ibid, 200], a dismal prospect indeed.

Burnet resurrected the idea of the earth as an egg, but unlike the egg of the ancients, Burnet's was informed by science and based on natural principles. He believed that the heavier parts of the Earth sunk towards the centre and the lighter water and air floated above this. There were two kinds of waters, one "fat, oily and light" and other "more earthy like common Water", the two like "Cream, and thin Milk, Oil and Water" [Ibid, 202]. His egg comprised several "Orbs", a world which was not spherical but ovoid, with a solid centre, the yolk where burned the "central Fire", a "Membrane" above, with the earth's surface being the shell and an "Abyss" underneath it. Burnet's egg model provided the answer to the question of the source of the Flood - it was the liquid within which had poured forth.

Interestingly Newton, in considering Burnet's theory of mountain formation suggested an alternative. He wrote "Milk is a uniform a liquor as the chaos was. If beer be poured into it, and the mixture let stand till it be dry, the surface of the curdled surface will appear as rugged and mountainous as the earth in any place." [Ibid, 235] Perhaps the great scientist had visions of God mixing beer and milk in a gigantic vat to form the mountains!

There were other theories about the formation of mountains:

- John Ray - they were "elevated by subterraneous Wild-fire, Flatus [i.e. blowing], or Earthquakes"
- Edmund Halley of comet fame - they were formed by the "Choc" [i.e. collision] of a comet
- John Beaumont - fermentation "after the manner of leaven in dough"
- Richard Jago - formed on the third day of creation when under the influence of the sun's heat, vapours rose within the earth's crust and with these also rose "rugosities" which hardened in the heat. [Nicolson, 1959, 242 - 5]

(4) Change in Attitudes towards Mountains

Burnet's visit to the Alps in 1671 shattered his long cherished notions of proportion, symmetry and order. From a distance the Alps appeared to meet classical expectations but when among them and climbing them he found the "incredible Confusion" appalling:

> "These Mountains are plac'd in no Order one with another, that can either respect Use or Beauty;... There is nothing in Nature more shapeless and ill-figur'd than an old Rock or Mountain ... if you look upon an Heap of them together, or a mountainous Country, they are the greatest Examples of Confusion that we know in Nature." [Nicolson, 1959, 210]

Burnet had commenced writing his Latin version of *A Sacred Theory of the Earth* while in the Alps. He stubbornly refused to accept that the Alps were created by God but they were a "secondary Work, and the best that could be made of broken Materials." [Ibid, 212] Grouping mountains with clouds and stars, Burnet considered that none of them displayed order or proportion. He often wrote that it would have "cost no more" to put these things in "better Order"! [Ibid, 214]

Yet despite his horror at what he saw in the mountains, he also experienced awe and attraction of their vastness, the beginnings of a love/hate response. Together with the cosmos and the oceans, he cited mountains as objects that gave him pleasure because of their sheer immensity: "The greatest Objects of Nature are, methinks, the most pleasing to behold" [Ibid, 214]. He acknowledged their majesty that drew one's mind to the infinite:

> "...as all Things have that are too big for our Comprehension, they fill and overbear the Mind with their Excess, and cast it into a pleasing kind of Stupor and Admiration." [Nicolson, 1959, 214]

Burnet sought to rationalise his feelings by distinguishing responses to beauty from responses to vastness, the former to be based on order, symmetry, decorum, reason and restraint; the latter based on grandeur, leading to contemplation of God and infinity. Vastness however carried with it a certain repulsion: "*Vastness* signifies an excessive Greatness" [Ibid, 216].

Describing this as the "Aesthetics of the Infinite", Nicolson postulated the model:

God
|
Cosmos
|
Mountains and Oceans
|
Cosmos
|
God

From thoughts of God, humans think of the infinitude of the cosmos and then transfer such thoughts to mountains and oceans of the earth. In reverse the mountains and oceans raise one's thoughts to the cosmos and thence to God. Nicolson believes the 17th century discovered what she termed, the "Aesthetics of the Infinite": "Awe, compounded by mingled terror and exultation, once reserved for God, passed over in the seventeenth century first to an expanded cosmos, then from the macrocosm to the greatest objects in the geocosm - mountains, ocean, desert." [Nicolson, 1959, 143] The pleasure derived from nature "lay in the enlargement of the soul to experience more completely the powers, desires, and aspirations given by its great Original, the true Infinite. [Ibid, 321] Shepard [1967, 159] noted a similar transfer of awe from sky spirits to stars and planets and then to earth.

Burnet faced an internal conflict between reason and emotion. On the one hand his training was based on reason:

> "He was taught that the external world reflects some shadow of the first Beauty, that all things in Nature exhibit design and plan, that proportion, relation, correspondence, symmetry are repeated in macrocosm, geocosm, microcosm, that Beauty is consonant with Reason, to be apprehended by the rational faculty." [Nicolson, 1959, 219-220].

On the Alps, Burnett came face to face with what he termed "Phansy", an early term for "fantasy". The emotions he felt were: "enthusiastic, primitive and violent and as such repellent to a disciple of Reason." [Ibid, 220] He was "both shocked and enthralled" at what he saw. The feelings and words that came to him were those that had legitimately been applied to God and the vastness of space. Now he found himself applying them to mountains.

Burnet’s dilemma was a conflict between cognition - his reason and learning, and emotions - what he liked and disliked. As there was no place in his philosophy for beauty to derive from emotional response - he had to rationalise it - he linked it with the response to the Divine.

In his *Sacred Theory*, Burnet was the first to distinguish between the emotional effects of the beautiful and of the sublime in nature. In his lifetime, mountains did not become beautiful but they did become sublime. Importantly his book is one of the first to find that beauty exists, not in external objects [objectivist approach] but in our subjective response to them, in Burnet's terms, in the "soul" of the man perceiving the object.
Burnet's book raised the proverbial hornet's nest with protagonists and supporters attacking and defending it, respectively. Burnet was regarded on the continent as one of the most important thinkers of his generation [Ibid, 233]. He was quoted by numerous writers, some ranking him with Newton and Descartes. Many books and pamphlets were written supporting, opposing or amplifying Burnet. He made his generation "mountain conscious" [Ibid, 253] and led to a new interest in geology [Ibid, 269]. English hills were described as "Burnet mountains"- poets dwelt on the theme of Burnet's mountains as heaps of ruins:

> "Hills pil'd on hills, and rocks together hurl'd;
> Sure, Burnet, these the ruins of thy world." [*The Prospect*, quoted by Nicolson, 1959, 231]

Burnet's book led to a new aesthetic - the sublime. Nicolson wrote of "an era that went mad over sublimity." [Ibid, 231] Regularity vs. irregularity became a major area of debate with the former being regarded as classical, the latter English. It led to questions of absolute and relative standards of beauty and whether beauty was inherent in the object or in the mind of the viewer.

John Ray's *The Wisdom of God Manifested in the Works of Creation* [1691] resorted to the conventional utilitarian argument and provided an impressive list of twenty "uses" of mountains, including their role in transforming evaporated salt water from the sea into the fresh water of rain and for the provision of minerals. Ray also expressed his delight in the beauty of mountains, responding directly to Burnet's concept of them as a "Heap of Rubbish and Ruins":

> "I answer, That the present Face of the Earth, with all its Mountains and Hill's, its Promontories and Rockes, so rude and deformed as they appear, seem to me a beautiful and pleasant Object, and with all that Variety of Hills, and Valleys, and Inequalities, far more grateful to behold, than a perfectly level Country without any Rising or Protuberancy to terminate the Sight." [quoted by Nicolson, 1959, 261]

On 5 December, 1692, Richard Bentley’s Boyle Lecture opposed Burnet's thesis. Speaking of mountains, he used the classical and scriptural arguments and was one of the last to describe mountains in such disparaging terms as "Warts and superfluous Excrescences". Steeped in book knowledge, he failed to share Burnet's actual experiences of mountains. However, he did question the classical notion that irregularity equals deformity, arguing that:

> "There is no Universal Reason that a Figure be called Regular, which hath equal Sides and Angles, is absolutely more beautiful than any irregular one." [quoted by Nicolson, 1959, 262]

A mountain that appears perfectly formed from a distance can become a formless mass when viewed nearby [Monk, 1935, 2]. Bentley said that the supposed "deformity" was not in Nature but rather was read into Nature: "This objected Deformity is in our Imaginations only, and not really in the things themselves". With these words he, together with Burnet, recognised the subjectivist element in the appreciation of beauty. The very act of recognising that beauty may be subjectively based, instead of being inherent in the object presupposes a separation of mind and nature that was unlikely to have occurred prior to Descartes. With Burnet and Bentley we see the glimmerings of a new approach which grew to their full flowering in the 18th and 19th centuries, culminating in the works of Hume and Kant.

The trickle that Burnet launched in the late 17th century turned into a flood during the following century as more and more travellers to the Alps experienced the dilemma Burnet faced when attempting to reconcile their cultural upbringing in the classics, the Bible and the Church Fathers with their experiences on the ground.

John Dennis set off to see the Alps in 1688 and experienced what Burnet had experienced. He too returned to write about his experiences [*Miscellanies in Prose and Verse*, 1692], developing "an aesthetic that had been only embryonic when he went abroad, to seek for new criteria against which to test literature, and to make the first important distinction in English literary criticism between the Sublime and the Beautiful." [Nicolson, 1959, 279] Although dubbed by "Sir Tremendous Longinus" by Pope and Gray, as though he had assumed the mantle of Longinus[35] in regard to the sublime, Dennis actually went far beyond the Greek rhetorician. Unlike Longinus who focused on the effects of the sublime, Dennis had experienced first hand the source of the sublime.

Writing to a friend of his journey across the Alps, Dennis used phrases such as "wonders", "astounding prospects", "horrid, hideous ghastly Ruins", "monstrous heaps", "horrour" [sic] joined with harmony", "a view [that] was altogether new and amazing", "a delightful Horrour", "a terrible Joy" [Thorpe, 1935, 465-8]. Dennis's words indicate a mixture of horror and joy, feelings that he considered were inconsistent with reason.

Dennis identified three causes for feelings of the sublime: 1. God, 2. the cosmos, and 3. earthly elements - wind, meteors, the sea, rivers and mountains. These aroused "Enthusiastick Passions" of admiration, terror, horror, joy, sadness and desire [Nicolson, 1959, 282]. In his frequent use of the word "soul" to describe the seat of emotions about the sublime, Dennis was articulating the result of the "Cartesian shears that had separated 'the world out there' from the 'mind in here' (and) had laid upon thoughtful men a burden of discovering how nature affected the mind and how mind knew nature." [Ibid, 285]

Dennis distinguished beauty from the sublime, the former being based on reason, order, regularity, symmetry while the later was the emotional response to objects that create a sense of awe and horror. Dennis regarded the sublime as something quite the opposite of beauty.

Anthony Ashley Cooper [1671 - 1713, born the year of Burnet's revelatory visit to the Alps], was the third Earl of Shaftesbury and a noted philosopher, visited the Alps in 1686 and wrote that the sublime derived from God and, in Nicolson's words, "in the manifestations of Deity in the superabundance and diversity of His cosmic and terrestrial works." [Ibid, 295] Shaftesbury regarded the sublime as the higher, more majestic beauty; it was a power:

> "which naturally captivates the heart, and raises the imagination to an opinion or conceit of something majestic and divine... We cannot help being transported with the thought of it. It inspires us with something more than ordinary, and raises us above ourselves." [quoted by Nicolson, 1959, 300]

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35. Cassius Longinus [AD 213 - 273] was a Greek philosopher who is purported to have written the book, *On the Sublime*. However the book is first century AD and may have been written by Dionysius.

While beauty drew admiration, the sublime evoked a deeper emotion, drawing one closer to God.

Joseph Addison [1672 - 1719] took his tour of the Alps in 1699 and, writing about his observations, quoted from Latin poets but could find few poems of the mountainous areas [Ibid, 304]. Like Burnet he described the mountains as "vast heaps of mountains ... thrown together with such irregularity and confusion." On arrival in Geneva he wrote to a friend:

> "My head is still Giddy with mountains and precipices, and you can't Imagine how much I am pleas'd with the sight of a Plain ..." [quoted by Nicolson, 1959, 305]

While the vastness of the mountains did not affect Addison as it had affected Dennis, he nevertheless felt "an agreeable kind of horror" [Ibid, 307]. In describing the "great", Addison focused not on the object but on the "largeness of a whole view":

> "Our imagination loves to be filled with an object, or to grasp any thing that is too big for its capacity. We are flung into a pleasing astonishment at such unbounded views, and feel a delightful stillness and amazement in the soul at the apprehension of them." [quoted by Nicolson, 1959, 314]

In describing beauty, Addison conventionally followed the practices of his time - it was characterised by elegancy, decorum, symmetry, proportion and smallness rather than vastness. He wrote:

> "A beautiful prospect delights the soul, as much as a demonstration. We are struck, we know not how, with the symmetry of anything we see, and immediately assent to the beauty of an object…
>
> "There is nothing that makes its way more directly to the soul than beauty, which immediately diffuses a secret satisfaction and complacency through the imagination." [quoted by Nicolson, 1959, 312]

There are inklings of the subjectivist view in these words. Addison's differentiation of the beautiful and the great were the basis of the important distinction between the sublime and the beautiful that developed in England during the 18th century [Ibid, 313].

Dennis, Shaftesbury and Addison all viewed the sublime as deriving from vast objects in nature - mountains and oceans, stars and the cosmos - reflecting the glory of Deity. Three distinctive characteristics of the sublime had been defined: firstly the distinction between the sublime and beautiful, secondly that the sublime is a higher beauty, and thirdly an emphasis on the vastness of objects that God or man have made. On these concepts were based future developments of the sublime.

About 1699, William Nicholls proposed that, though travelling in mountainous areas was dangerous, it could offer aesthetic satisfaction:

> "Those Spectacles which you suppose give *Horror*, strike us rather with an *awful* Reverence; appear, methinks, like *stately Monuments* of the *Magnificence and Grandour* [sic] of their *Author*, and the *weary Traveller* himself at once *pants* and *admires*." [quoted by Aubin, 1936, 71]

With the new century, mountains were increasingly experienced first hand as growing numbers of wealthy English made the Grand Tour of Europe, particularly after the Treaties of Utrecht established peace between various European powers in 1713. Experiential knowledge gradually replaced, or at least supplemented, book knowledge. Irregularity in nature, which in the classical sense was detested, came to be appreciated as travellers acknowledged the beauty of mountains and clouds. Natural caves and grottoes had been abhorred but were now of interest, resulting in the proliferation of grottoes in English gardens. A greater tolerance of the different and the unclassical was apparent although the classical influence was still strong.

A curiosity of the era was the significance of colour following the discoveries of Newton's prism. Combined with the growing interest in geology and gemstones, beauty was seen in the colours of the gems and other objects of nature, while light which was regarded as the "effluence of Deity" was considered sublime [Nicolson, 1959, 345]. Thus in the early 18th century, colour equalled beauty; light equalled sublime.

Poems about hills became far more common in the 18th century than in the preceding century, although this was due in large measure to the popularity of Denham's poem, "Coopers Hill".

Mountains were no longer the 'warts and wens' and monstrosities of the previous century, but were emerging as significant aesthetic objects and essential parts of a diverse world. This was not fully achieved in the early part of the 18th century and reversals to the old classical position continued. But a major shift in Western attitudes towards mountains had began and there would be no turning back. Poets writing of the Alps recorded their impressions, not in the “shock/horror” phrases of the 17th century writers but rather in a more objective fashion. James Thomson, a prominent mountain poet, drew on classical images but also wrote of the beauty, the romance, and the terror of mountains.

Bishop Berkeley’s descriptions of Italy in 1714 illustrated the love of that land by the English and a more moderate attitude towards mountains: “wonderful variety of hills, vales, ragged rocks, fruitful plains, and barren mountains, all thrown together in a most romantic confusion...” [quoted by Manwaring, 1925, 12]

In 1739 the youthful Horace Walpole and Thomas Gray struck out on their Grand Tour, Gray later to be recognised as England's best classical scholar. Visiting Grand Chartreuse, in a passage that many regard as a hallmark of the Romantic Movement, Gray described its psychological effect on him:

> “I do not remember to have gone ten paces without an exclamation that there was no restraining: not a precipice, not a torrent, not a cliff, but is pregnant with religion and poetry. There are certain scenes that would awe an atheist into belief ...You have death perpetually before your eyes, only so far removed, as to compose the mind without frightening it. One need not have a fantastic imagination to see spirits here at noonday.” [quoted by Hussey, 1927, 94]

Walpole said of Italy "our memory sees more than our eyes in this country", reflecting his classical education [Ogden & Ogden, 1955, 354] and the influence of their 'memories' was also apparent in their journey through the Alps. A thorough grounding in the classics was usual in England at the time. The influence of the sublime, of the picturesque, Italian landscape painting, and of the admiration of the vast, the grand and the wild, were all prominent [Ibid, 355]. The experience of the Alps was to remain with Gray throughout his life. He found the mountains "astonished me beyond expression" and the vast, wild, and irregular enthralled him [Ibid, 357]. The influence was apparent in his description of a visit to Scotland in 1765:

> "I am returned from Scotland, charmed with my expedition; it is of the Highlands, I speak; the Lowlands are worth seeing once, but the mountains are ecstatic, and ought to be visited in pilgrimage once a year. None but those monstrous creatures of God know how to join so much beauty with so much horror." [quoted by Ogden & Ogden, 1955, 357-8]

During the 18th century, the prominence given to the vast objects of nature - mountains, oceans, the cosmos - overshadowed the works of man as subjects of poetry. More fundamental changes had also occurred. Geology had replaced Genesis as the explanation of nature, the six days of creation were replaced by "long and leisurely earth processes" [Ibid, 368], and classical and Biblical descriptions of mountains in allegorical terms had made way for descriptions from observation. The horror and abhorrence formerly associated with mountains had disappeared, giving way gradually to a delight and love of mountains.

Travel burgeoned during the 18th century, not only to the Continent on Grand Tours but also throughout Britain. Many books were written of tours undertaken. The gradual establishment of railways and of steamboats on rivers and lakes, particularly in the early 19th century, made travel more popular and common.

Enthusiasm for the picturesque led to a growing appreciation of the Lake District in England in the later quarter of the 18th century by painters, poets and tourists [Manwaring, 1925, 215]. “There is a *Rage for the Lakes*, we travel to them, we row upon them, we write about them, and about them” wrote Hester Piozzi in 1789 [Andrews, 1989, 153]. “Picturesque travel” was aided by guidebooks, such as Thomas West’s *Guide to the Lakes* in 1778, and the identification in these books of stations from which to view picturesque scenes. At Station III, West described the view over Derwentwater is described:

> "Here is all that is great and pleasing on the lake, all that is grand and sublime in the environs, lie before you in a beautiful order, and natural disposition." [quoted by Watson, 1970, 13]

West's guidebook went through seven editions over the next 20 years. It conducted tourists:

> "from the delicate touches of *Claude*, verified on *Coniston* Lake, to the noble scenes of *Poussin*, exhibited on *Windermere*-water, and from there to the stupendous romantic ideas of *Salvatore Rosa*, realized in the Lake of *Derwent*." [quoted by Hussey, 1927, 126].

Celia Fiennes recommended visiting the Lakes to cure "the evil itch of over-valuing fforeign [sic] parts" [Hussey, 1927, 97]. Dr Brown published a letter about a visit to the Lakes in 1768:

> "On the opposite shore [from Keswick], you will find rocks and cliffs of stupendous height, hanging over the lake in horrible grandeur, the woods climbing up their steep and shaggy sides, where mortal foot never yet approached; on those dreadful heights the eagles built their nests; a variety of waterfalls are seen pouring from their summits, and tumbling in vast sheets from rock to rock in rude and terrible magnificence: while on all sides of this immense amphitheatre the lofty mountains rise round, piercing the clouds in shapes as spiry and fantastic as the rocks of Dovedale. " [quoted by Hussey, 1927, 99-100].

Brown's letter was a factor in causing Thomas Gray and Arthur Young to visit the Lakes and with the improvement of roads in the area it became a popular place to visit. Young, a farmer, wrote in romantic terms of the Lakes similarly to Brown: "the towering rocks, many of them of terrible size" [Ibid, 104], while Gray viewed them in picturesque terms, with "a certain intimacy of comprehension, a depth of tone which makes his descriptions seem like nineteenth-century work" [Ibid, 105]. Gray viewed the scene as a painter rather than a poet; to him a landscape was more than a picture, it "had sentiment, character, meaning, almost personality" [Ibid, 106]. His descriptions of the Lakes helped make it a fashionable place to visit:

> "...the most delicious view, that my eyes ever beheld. Behind you are the magnificent heights of *Walla-crag*; opposite lie the thick hanging woods of Ld [sic] Egremont, and Newland Valley, with green & smiling fields embosom'd in the dark cliffs ... to the left the turbulent chaos of mountain behind mountain roll'd in confusion; beneath you ... the shining purity of the *Lake*, just ruffled by the breeze enough to shew it alive, reflecting rocks, woods, fields, & inverted tops of mountains ..." [quoted by Manwaring, 1925, 182]

During the 1760s and 1770s Thomas Gray also visited the Wye Valley and parts of the West Country, the Peak District and the Scottish highlands, the principal regions of Britain most visited by enthusiasts of the picturesque. His descriptions had a powerful effect in shaping aesthetic taste and ensuring the popularity of all of these areas - except the Peak which he found ugly, "black, tedious, barren, and not mountainous enough to please one with its horrors" [Ibid, 183].

Rousseau's influence on European attitudes towards mountainous landscapes was also felt. In the 1760s he wrote to a friend about climbing:

> "Upon the top of mountains, the air being subtle and pure, we respire with greater freedom, our bodies are more active, our minds more serene, our pleasures less ardent, and our passions much more moderate. Our meditations acquire a degree of sublimity from the grandeur of the objects around us. It seems as if, being lifted above all human society, we had left every low terrestrial sentiment behind." [quoted by Biese, 1905, 276]

Goethe made his first visit to the Swiss Alps in 1775 but did not come to appreciate them until a later visit in 1779, when he was "the first German poet to fall under the spell of the mountains" [quoted by Biese, 1905, 314]. He wrote "These sublime, incomparable scenes will remain for ever in my mind" and described the mountains across Lake Geneva "The view was so great, man's eyes could not grasp it" [Ibid]. He described the effect the mountains had on him:

> "The passage through this defile roused in me a grand but calm emotion. The sublime produces a beautiful calmness in the soul, which, entirely possessed by it, feels as great as it ever can feel. How glorious is such a pure feeling, when it rises to the very highest without overflowing. .... When we see such objects as these for the first time, the unaccustomed soul has to expand itself, and this gives rise to a sort of painful joy, an overflowing of emotion which agitates the

> mind and draws from us the most delicious tears ...” [quoted by sBiese, 1905, 316]

Increasingly during the 18th century, travellers experienced the European Alps with attitudes "diametrically opposed to those of Burnet and Dennis" [Nicolson, 1959, 372]. By the 1760s, Rousseau had “the ear of Europe and [was telling them] of the beauties and subtlities of Alpine scenery” [Monk, 1935, 127]. Armed with guidebooks travellers sought the experiences of sublimity. In 1785 a *Guide to Travelling in the Harz* was published and in 1806, a *Guide to Switzerland* appeared. Pinkerton’s *Catalogue of Voyages and Travels* in 1814 identified 360 guidebooks, 276 being for travel on the Continent [Reynolds, 1909, 223].

Writers and poets of the 19th century were interested in the geology of the mountains and features such as caves and chasms which were "symbols of the secret places in the soul of man" [Nicholson, 1959, 379]. They delighted in natural extreme events such as storms, avalanches, earthquakes and volcanic eruptions. While 17th century poets were self conscious about space and 18th century poets self conscious about time, the Romantic poets of the 19th century were comfortable with notions of both infinity and eternity [Ibid, 381]. Writers of Burnet, Dennis and Addison's time distinguished clearly the sublime and the beautiful but by the time of the Romantics this distinction was no longer apparent [Ibid, 384]. Shelley had a vastly different impression of Mont Blanc from his predecessors:

> “Far, far above, piercing the infinite sky,
> Mont Blanc appears, - still, snowy and serene.” [quoted by Nicolson, 1959, 387]

William Wordsworth expressed himself across the range of emotions about mountains. The Alps he found overwhelming and unstable, the mountains of the English Lake District he found stable and permanent, a "tranquil sublimity":

> "... the brook itself,
> Old as the hills that feed it from afar,
> Doth rather deepen than disturb the calm
> Where all things else are still and motionless." [quoted by Nicolson, 1959, 391]

Wordsworth’s subjectivity, focusing on the influences of an object on the mind, has been likened to the philosopher, Kant. Kant’s *Critique of Judgement* has a similar point of view to Wordsworth’s *Prelude* [Monk, 1935, 5].

In the 20th century, a review of English landscape tastes in the post-war period failed to include mountainous landscapes among the categories identified[36] [Lowenthal & Prince, 1965; see also Lowenthal, 1978, 388].

(5) Mountains - Conclusions

Western cultural attitudes to mountains derived originally from classical and scriptural origins, the former defining what was acceptable and which, from a scriptural view, established what was “good” and hence of Divine origin, it being axiomatic that God would not create anything that was not good. Because mountains did not fit into the classical definition of beauty, being irregular, asymmetric and without due restraint, it followed that they were loathsome and to be despised. Based on human analogy, mountains were regarded as excrescences and blisters, marring the earth’s beauty. To cap it off they were also regarded as largely useless, unproductive and barren. Many accounts of mountains by travellers over the centuries spoke of them as monstrosities and terror-filled places.

Then through first hand experience of mountains, a change occurred in the late 18th century as travellers experienced both the terror of mountains and a sense of awe and attraction to their vastness. Feelings that had been reserved for God were applied to earthly elements such as mountains. These feelings aroused by vast objects were called sublime and were distinguished from the classical notions that defined beauty in terms of regularity, proportion, symmetry and restraint. Experiential learning displaced book learning.

During the 18th and 19th centuries, many English experienced mountains for themselves, initially experiencing them first hand as “a delightful Horrour” and “a

36. Lowenthal and Prince [1965] identified the following categories: the bucolic, the picturesque, the deciduous [trees], the tidy [nothing out of place], façadism, antiquarianism, rejection of the present and the sensuous and the functional, historical associations, and genius loci.

terrible Joy" but, as technology overcame the terrors of travelling, began to enjoy them as beautiful and delightful in their own right. Mountains became a favourite subject of writers and poets and with the understanding provided by geology and other natural sciences the mythologies attached to mountains evaporated.

The history of Western culture's perception of mountains is testimony to a revolutionary shift in perception - in Marjorie Hope Nicolson's words "one of the most profound revolutions in thought that has ever occurred." While she focussed on the change from viewing mountains as excrescences and warts that marred the beauty of the earth to viewing them as places of sublimity, the revolutionary shift is more than this. It also marked the shift from an objectivist to a subjectivist approach to aesthetics.

For centuries it was taken as self-evident that mountains were monstrous "horrours" and while such descriptions were merely the adjectives applied by the mind, they were regarded as objective descriptions of mountains. The Cartesian shears separated what was out there from what was in here. With Burke, Kant and other philosophers came the realisation, brought into stark clarity by concept of the sublime that these descriptions were essentially subjective, and did not exist outside the mind. While humans thought they were objectively describing the mountains as excrescences, these descriptions were merely subjective tags.

The example of mountain aesthetics also provides a case study into the influence of cultural norms and expectations in shaping individual perceptions. Throughout history, up to the time of Burnett and with very few exceptions, the ruling cultural paradigm that had been derived from classicism and Scripture, defined the individual's view of mountains. The cultural paradigm created a womb-like enclosure, cutting off the individual from other influences and ensuring conformity of the individual to this paradigm. The individual's view of mountains is thus based, not on objective fact, but on the image provided by one's cultural blinkers. It takes a courageous individual to break out of this mould, to re-define what this paradigm should be.
The ruling cultural paradigm today, at least in the West, is that mountains are spectacular, beautiful, awesome places. The abundance of picture books, calendars, paintings and articles and stories of them and the many tourists, walkers and climbers who visit them attests to this. It would be almost incomprehensible for someone to describe such areas in the terms used 350 years ago. The cultural paradigm shapes the individual perceptions and can provide either a negative or a positive context for individual perceptions.

The lesson of mountain aesthetics therefore is this: while the reality may be constant, culture and other influences influence its perception and interpretation.

6.5 THEME TWO: LANDSCAPE AND ART

As an expressive medium, paintings and drawings often reflect the idealised essence of that form of physical environment that is regarded by the prevailing cultural norms as beautiful.

The very concept of capturing in a small picture an image of the wider world is itself a staggering advance. It is noteworthy that no Palaeolithic cave paintings contained scenes of nature other than animals and some human forms, not even the ground was depicted. Certainly landscape scenes were never included. An analysis of 2188 figures in 66 caves in Europe painted between 3,000 - 8,000 BC found they were all animals.[37]
Clearly, these paintings were motivated by something other than an aesthetic desire, possibly they were totemic, religious, a charm to ward off spirits, or representative of possession of a locality.

The ancient Egyptians appeared disinterested in aesthetics - their fine sculptures and paintings were located in tombs and temples rather than being for general view. As well, the many inscriptions praising the work of architects and builders were in terms of the durability and strength of the work, never its beauty [Beardsley, 1966, 22].

37. See A. Leroi-Gouram, 1982. *The Dawn of European Art - An Introduction to Palaeolithic Cave Painting.* Cambridge University Press; M. Ruspoli, 1987. *The Caves of Lascaux, The Final Photographic Record.* Thames & Hudson.

Paintings by Australian Aborigines are maps of Dreamtime stories representing relationships between elements that symbolise features such as streams, billabongs, rocks and snakes. They are painted as a plan view from above and require interpretation. The Western concept of a view or a scene as a way of conceptualising landscape was unknown to the Aborigines [Taylor, 1994, 42].

The art historian Otto Pacht wrote, "The discovery of the aesthetic value of landscape was the final outcome of a complex ripening process in which every form of imagination was involved and which concerned the entire attitude of man towards his physical environment." [Shepard, 1967, 119]

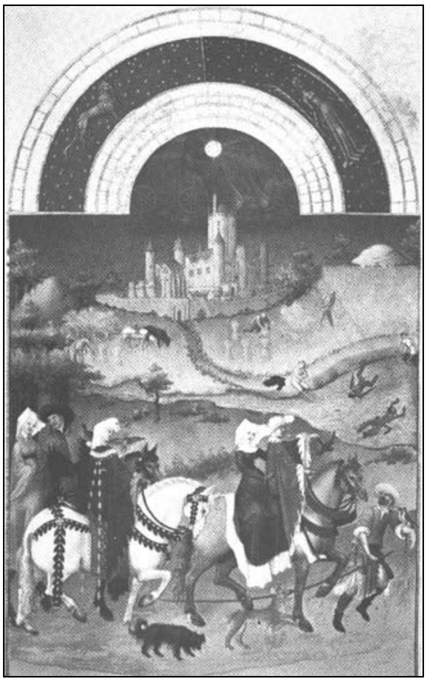
(1) Landscape in Pre 17th Century Art

In the Western culture, the first glimpse of landscapes appeared as backgrounds to scenes of the Virgin or the nativity or other religious subjects as early as the 13th century. Giotto's frescoes of the life of St Francis, painted at the Basilica in Assisi between 1296 and 1304, included trees painted as symbols and overall, the frescoes lacked Francis's empathy for the natural world. Fra Angelico [1387-1455] painted *Noli me Tangere* with flowers and trees but they lacked any sense of reality.

The brothers de Limbourg, achieved a more realistic depiction of landscapes in France in 1416 with the paintings, *Très Riches Heure,* on the theme of the months in the countryside. Clark considered them significant because they lay between symbol and fact [Clark, 1976, 22].

The Flemish paintings of the Van Eyck brothers of this time portrayed realistic landscapes. A 1432 altarpiece at Ghent, by the Van Eycks, accurately represented plants in a luxuriant valley with rocky vegetated walls [Biese, 1905, 191].

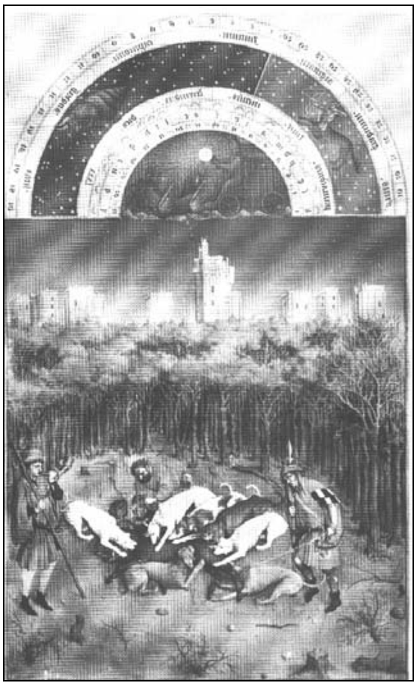
Other artists of the Low Countries followed the lead of the Van Eycks including Dierick Bouts, Roger van der Weyden, Joachim de Patenir, Simon Bennick, Hieronymus Bosch and Pieter Brueghel. The seasons in the countryside were a popular theme; the works of Bruegel [born around 1520] are perhaps the best known and depicted plump peasants disporting themselves in various rural and household activities, with houses and trees depicted accurately and a pleasing unity created from the various elements of the paintings [Hunter, 1985, 61 - 70].



Source: Clark, 1976

de Limbourg brothers, Tres Riches Heure du Duc de Berry, 1416

[the very rich hours (i.e. time) of the Duke of Berry]



Source: Clark, 1976

de Limbourg brothers

Source: Clark, 1976

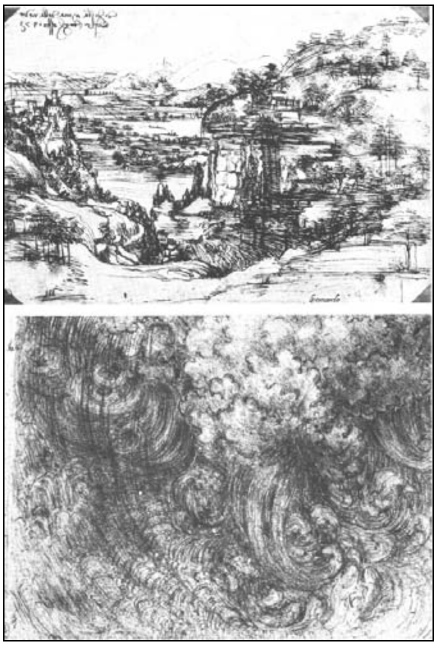
Albreht Durer, View of the Arco, 1490s

The Flemish influence reached south to Italy and influenced Renaissance artists. Sandro Botticelli [1447-1515] included glimpses of landscapes of northern Europe rather than of Italy in some paintings such as *Adoration of the Magi* [1481]. While some Italian artists painted realistic scenes, in most the landscapes were merely a “decorative and romantic” image [Hunter, 1985, 73]. An early topographical painting was the Swiss Konrad Witz’s *The Miraculous Draught of Fishes* [1444] which detailed Lake Geneva [Clark, 1976, 39].

Albrecht Durer [1471 - 1528], an outstanding draughtsman and water-colourist, painted scenes of Innsbruck in 1494 and later, scenes of lakes that are not unlike Turner’s of the 19th century.

The paintings of Leonardo da Vinci clearly reflected observations of real landscapes captured in his notebooks and used in the backgrounds of paintings such as the *Virgin and Child*, *Mona Lisa* and *Madonna of the Rocks*. His careful scientific observations of rock formations are evident in his paintings.

The 15th century saw the development of perspective by the architect Alberti. Early artists painted the foreground and the background in perspective but had problems linking through the middle ground. Sometimes they constructed paintings so as to avoid the problem, such as from a high viewpoint, at other times making rather botched attempts to paint the middle ground in perspective. Gradually however they mastered it.



Source: Clark, 1976

Leonardo da Vinci, Landscape Drawing [top] and Deluge drawing [bottom]

Renaissance artists were inspired by the classics, particularly the poems of Ovid and Virgil. The latter’s sensitive understanding of the countryside combined with the dream of the Golden Age. Virgilian landscapes, an “evocation of the antique world” [Clark, 1976, 113], became a staple of artists from the Renaissance through Claude Lorraine and the Italianate artists of the 18th century to the Romantics of the 19th century.

Steeped in classicism, Michelangelo regarded the value of art as deriving from the moral or historical importance of the subject; realism whether of landscapes or portraits was inferior. He rebuked the Flemish landscape painters for not dignifying their paintings with “reason or art... symmetry or proportion” [Rees, 1978, 52-4] and his distaste of such painting influenced his contemporaries.

The Venetians created a new approach to the ancient concept of the Golden Age. Giovanni Bellini [1430-1516] of Venice predated Brueghel but painted similar landscapes. His *Madonna of the Meadows* and *St Francis in the Wilderness* are striking for the realism of their landscapes, inclusive of symbolic objects such as the ass in the latter painting. Near the end of his life, Bellini painted *The Feast of the Gods* [1514] with figures of gods, goddesses and satyrs feasting in the foreground amid tall trees and rocky outcrops, all imbued with a golden light. The painting, harking back to Arcadia and the Golden Age, is not unlike a Claude Lorraine or Nicolas Poussin of the next century [Hunter, 1985, 74 - 77].

From his earliest age, the Venetian Giorgione had astonishing skill in painting and rendered the perspectives of lands-capes expertly. His park-like scenes were suffused with a golden light and his “flowing rhythm” made a natural lyricism [Clark, 1976, 114]. The structure of his paintings, looking through dark masses of trees or rock on the sides to a distant scene provided the model for Claude [Ibid, 115].

Another Venetian, Titian was one of the first to paint nature as he saw it: “the broad masses of sward and foliage, the light glinting through leaves and catching the tree trunks” [Hussey, 1927, 9]. He developed the theme of Bacchanal, a favourite classical theme, with nymphs and satyrs rollicking amidst Arcadian scenes. Another artist who painted broadleaved deep forest scenes was the German, Altdorfer [1480 - 1538] whose inspiration was the high northern forests. His painting of *St George* [1511], though small, is packed solid with leaves of trees, not light and airy but “menacing, organic growth, ready to smother and strangle any intruder” [Clark, 1976, 75].

Source: Clark, 1976

Altdorfer, St George, 1511

In the early 17th century landscape painting was described as "an Art soe new in England, and soe lately come a shore, as all the Language within our fower (four?) Seas cannot find it a Name, but a borrowed one, and that from ... the Duch" [Norgate, c1621, Quoted by Whinney & Millar, 1957, 260; spelling is Norgate's] He was referring to the Dutch term "landskip" from whence the English "landscape" was derived.

Norgate was correct in his assessment of the newness of landscape art to England. The 16th century had seen virtually no interest in landscape painting until the latter decades when several books that covered it in part were published or translated. By 1600, however, landscape painting was only nascent, occasionally used as a backdrop to a portrait or a tapestry, but was not an identifiable genre of art. This was to emerge in England over the following century.

(2) Landscape in 17th Century Art

Henry and Margaret Ogden comprehensively assessed the emergence of landscape in art in *English Taste in Landscape in the Seventeenth Century* [1955]. The growing role of landscape in art was expressed mainly in paintings but also in tapestries, book illustrations and masque scenery (i.e. backdrops for plays). Using catalogues of art collections taken during this period, the Ogdens established quantitative indicators of the proportion of landscapes in collections and analysed the subjects of landscapes and the changing taste of landscape.

Landscapes drew heavily from Continental influences, the major schools being the Italianate (Roman and Venetian), Dutch and Flemish, and French. Italianate artists included Paul Brill [1554 - 1626], Nicolas Poussin [1593 - 1665], Gaspar Doughet [1613 - 1675] who was Poussin’s brother-in-law and also known as Gaspard Poussin, Claude Lorraine [1600 - 1682], and Salvatore Rosa [1615 - 1673] each of whom had significant influence on English landscape taste. Several of these, particularly Lorraine and the Poussins, were influential French painters.

Joos de Momper [1564 - 1635], Rubens [1577 - 1640], Jan Brueghel [1568 - 1625] and seven other artists of the Brueghel family, were all influential Flemish painters. These are just a few of the very many

Continental landscape artists who were well known in England during the 17th and 18th centuries. In the first half of the 17th century, Inigo Jones [1573 - 1652] was the most important English artist but many others emerged in the latter part of the century, including Robert Aggas [c1619 - c1682], Robert Streater [1624 -1679], Prosper Henry Lankrinck [1628 - 1704], Robert Streater the Younger [d 1711] and Thomas Manby [d 1695].

Source: Clark, 1976

Rubens, Philemon and Baucis, early 17th C.

Rubens had a major influence on northern European art, out of all proportion to his output. His paintings:

> "were more realistic than anything hitherto seen in painting by his contemporaries, yet they were bursting with the glow and freshness and drama of Titian's landscapes." [Hussey, 1927, 11]

Rubens' paintings contained exquisite detail, sensitively executed and a delicacy of atmosphere that could stand alongside Turner and Monet [Clark, 1976, 100].

Adam Elsheimer [1578 - 1610], a German painter, created classical scenes with an enamelled quality similar to Altdorfer. His *Flight into Egypt* [around 1600] is a night-time campsite scene with powerful dark shapes illuminated by light from the moon and campfire.

Based on the paintings of Elsheimer, Brill and Rubens, Holland produced a generation of landscape painters that produced the "naturalistic type of picturesque landscape" complete with old gnarled trees, water and windmills, rustic bridges, hovels and shaggy animals [Ibid]. The Flemish and Dutch painters had differing styles however, the "Flemings caring more for perfect truth to life, the Dutch for beauty." [Biese, 1905, 194]

The Ogdens distinguished between ideal (or imaginary) landscapes and topographical (or actual) landscapes, the former being by far the more popular.

Most of the topographical landscapes were associated with cities, buildings and ruins. A few were 'prospects' [i.e. landscapes with a long view to the horizon], and included such well known views as Greenwich over the Thames Valley, "the most popular view in England" [Ogden & Ogden, 1955, 59] and described by Barclay as the "best Prospect in Europe" [Manwaring, 1925, 9]. Another favoured location was Richmond Hill where the Thames meandered through a vale of large trees, creating an Italianate-like landscape.

Although there were paintings of actual scenes, the artists used considerable freedom of interpretation to create the mood sought. Side-framing trees, and/or a central clump of trees were common devices to highlight the foreground and to frame the central object of interest [Ogden & Ogden, 1955, 60]. Far prospects might be included and hills enlarged. Figures were often added for variety, to fill space and to direct the viewer.

Towards the end of the century, there was a less sharp distinction between actual and imagined landscapes and the Ogdens considered this to be of "great significance for development of the appreciation of natural scenery" [Ibid, 163]. The aesthetic values imputed by painters in their ideal landscapes were transferred to their paintings of actual scenes, from whence:

> "it was an easy step to transfer the same values to natural scenery itself, to find the same kinds of enjoyment in actual views as in ideal prospects, and to associate with external nature the moods imparted by landscapists in their canvases." [Ibid, 163]

Ideal or imagined landscapes were based mainly on European landscapes:

> "The cardinal fact about seventeenth-century taste is that all the more obvious features of European scenery were admired.... The Europe depicted was mainly pastoral and unenclosed, and the terrain more suitable for grazing and hunting than for plowing and cultivating. As for the

> alleged dislike of barren and mountainous scenery, the paintings do not substantiate it. The liking for great rock masses in the foreground and frequent use of mountains and hills at the horizon, not to mention the Alpine landscapes, make it clear that painters and picture collectors admired mountainous scenery as much as any other kind." [Ogden & Ogden, 1955, 36].

Given the antipathy in literature towards mountain landscape in the 17th century, the positive image of mountains and their frequency in paintings is surprising. The reason for this is not clear but it is noteworthy that the literary view changed once writers began to gain first-hand experience of mountainous landscapes instead of merely writing and reading about their imaginary horrors. Whether painters were documenting an actual landscape or creating an imaginary one, they may have derived their inspiration from personal knowledge of mountainous landscapes. The mountainous landscape paintings doubtless prepared the English mind for a change in its attitude to mountains which occurred early in the following century.

17th Century Landscape Tastes

During the 17th century, ten types of landscapes developed in painting. These were harbours, ruins, farm/villages, forests, rivers, animals, mountains, waterfalls, moonlight and the prospect. Any single painting could include many of these features.

The following summarises features of the principal landscape types, based on the Ogdens' analysis.

Derived from both Flemish and Italianate schools, the paintings often included as much land as water and featured mountains, cliffs, buildings and ruins as well as ships and the sea. Later paintings provided areas for promenading figures.

According to the Ogdens, the "liking for an extensive and variegated view was the dominant characteristic of English taste in landscape" during the first half of 17th century [Ibid, 48], popularity which continued to the second half, albeit for somewhat more limited view.

During the 17th century, Flemish artists were among the first to paint the landscapes they experienced and painted "prospects", scenes from a high viewpoint which "seemed to exude a comfortable sense of plenitude." [Shepard, 1967, 123]. Dutch painters visited England and made a comfortable living painting country manors and setting them amidst idealised parks and gardens. These paintings led to the English enthusiasm for the picturesque. The establishment of landscape gardens fulfilled the paintings' idealised landscapes.

In the 17th century, landscape painting, together with travel painting emerged. Classical themes from Greece and Rome dominated "preconditioning British eyes to wonderful and impossible notions of classical and Alpine landscapes by Gothic artists" [Shepard, 1967, 165]. The standard setting was a northern Italian countryside scene.

The enthusiasm with which society sought to rediscover the glory of the classical worlds of Greece and Rome underlay the importance of ruins in landscapes; in America which lacked ancient structures, even a burnt out house would attract people to ponder the remaining ruins [Shepard, 1967, 184]. America however had dead trees in abundance and painters sometimes used these as a substitute for a ruin [Johnson, 1979, 29]. In England on the other hand, gardeners planted a dead tree in Kensington Gardens to provide the desired effect!

The principles of variety and contrast were important in 17th century landscape painting. Variety was achieved through what would now be regarded as the 'busyness' of paintings, containing varied topographies, trees, fields, rivers, castles, ruins, livestock, and figures. Contrast was achieved through the "juxtaposition of the fertile and barren, the smooth and the rough, the near and the far" together with contrasts of tone and colour [Ogden & Ogden, 1955, 38].

An important mood, at least in the first half of the 17th century, was that of an ascetic mysticism evoked by paintings of saints in wild mountainous settings. The theme was popular in the Renaissance and was "extremely influential in shaping the growth of seventeenth century landscape." [Ibid, 52].

> "The kind of landscape regarded as conducive to religious ecstasy was mountain scenery with rocky crags and ravines, twisted trees and broken limbs. The wilder the scene, the more fitting it was thought for religious contemplation and exaltation, because the farther removed from worldly associations. … Historically, such pictures may be regarded as an important factor in creating the vogue of mountain scenery." [Ogden & Ogden, 1955, 52]

Later in the century, these landscapes gave way to a mood of horror and drama associated with mountains, a mood the Ogdens suggest stemmed from Burnet's ideas about mountains and the qualities of "delightful Horrour, a terrible Joy" expressed by Dennis. The paintings of Salvator Rosa, a Swiss-born Italian painter who best illustrated this mood, were characterised by their wildness:

> "they show sky beyond dark, windy subpromontories among the large rocky debris at the base of the upper slopes, cliffs bounding streams near their junction with the valley floor, sparse trees thrusting through rock outcrops with the flush valley soils adjacent." [Shepard, 1967, 165]

Figures were posed at a critical moment or in a "stance expressive of dramatic emotion" [Ogden & Ogden, 1955, 49]. Storms among the mountains were a popular theme.

The dramatic moods of Rosa's paintings could not be in greater contrast to the dominant mood of landscape painting during the first half of the 17th century, which the Ogdens termed “well being”, “prospering activity”, or “Christian optimism.” “Man and nature are accomplishing their appointed tasks." [Ogden & Ogden, 1955, 50]

This mood of "diffused euphoria" continued throughout the 17th century and was particularly influential among the works of Northern artists. The peaceful scenes evoked a feeling of "a quietly functioning cosmos ordained by God to fulfil purposes essentially benevolent, that is, the feeling of well-being." [Ogden & Ogden, 1955, 146] The physico-theologists could scarcely have said it better, such landscape paintings were a visible manifestation of their philosophy of natural theology.

Another mood, epitomised by the works of Claude Lorraine[38] was the classical landscape - complete with ruins and figures from classical literature. Northern painters who visited Italy "Arcadianized" the landscape. They "felt the rhythms of elegiac verse in Italian scenery, and they saw in it the imagery of pastoral eclogues." [Ibid, 53] This Italianate landscape, the "Italian legend" [Ibid, 147] became the most important of the latter half of the 17th century. Interestingly, almost exclusively non-Italian artists painted them - even Claude was French born.

The Ogdens identified four main components of the Italianate landscape:

- Italian climate and scenery
- ruins and buildings
- contemporary inhabitants
- classical literature [Ogden & Ogden, 1955, 147].

The many hundreds of paintings of this period combined strong images of light, of ruins, of classical figures disporting themselves amidst attractive landscapes, creating a mood of pathos that was evoked by the combination of images of life and of death. But such paintings were also happy. Claude's paintings for example depicted a world in which Virgilian figures:

> "of epic or pastoral quality move nobly amid the beauty of an Italian dawn or evening, the softness of the Italian climate, and the majesty of Italian architecture. The mood is sedately happy, dignified but easy, restrained but highly romantic." Ogden & Ogden, 1955, 148]

The Italianate landscape was based largely on the Campagna region that lies north and east of Rome, an area of volcanic hills and lakes. This new Arcadia with a soft golden light suffusing the scene created a dreamlike quality. The inclusion of ruins in the scenes provided the classical cues so important to the spirit of the age.

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38. Claude Lorraine was born Claude Gelle in Champagne, Lorraine in France. A painting of him in 1777 is labelled “Claude le Lorrain” [Manwaring, 1925, 36 plate] The spelling of Claude Lorraine’s name varies: Claud, Claude and Lorrain, Lorraine, Lorain. He was often referred simply as Claude. The Anglised version, Claude Lorraine is used here.

Source: Clark, 1976
Claude Lorraine, Hagar and the Angel

Claude perfected the Italianate style of scenes of trees, ruins, mountains and rivers.

> "He inspired the very elements with mind and feeling; his valleys, woods, and seas were just a veil through which divinity was visible. All that was ugly, painful, and confused was purified and transfigured in his hands. There is no sadness or denection [sic] in his pictures, but a spirit of serene beauty, free from ostentation, far-fetched contrast, or artificial glitter. Light breezes blow in his splendid trees, golden light quivers through them, drawing the eye to a bright misty horizon..." [Biese, 1905, 196-7]

The standard format of a Claude painting and that of his many imitators was:

> "from a slightly elevated viewpoint, with mountains in the distance beyond a still body of water, a temple or ruin in the middle ground with shepherds or a pagan ceremonies in a park-like clearing, and the near ground with a few identifiable plants and large trees or buildings framing the scene. Such compositions in three planes [i.e. foreground, middle distance, far distance] and muted colour has in the course of three centuries so deeply etched itself on the collective memory that it unmistakably influences general ideals of beauty and scenery. [Shepard, 1967, 124]

Claude, like all artists of his time, did not simply "dash off" a major oil painting. His paintings were based on drawings of actual scenes, generally undertaken in the open and sometimes almost Impressionistic in their appearance. This would be followed by trial studies for the painting in which the composition, balance, tone and other aspects were established. Finally the painting would be executed. The result was what used to be called Keeping - "Everything is in Keeping, there is never a false note" [Clark, 1976, 128]. This approach was classicism at its best and was not broken until the Impressionists of the late 19th century sought to capture the immediacy of a scene.

These three moods: well-being and activity, mountain horror and drama, and the Italianate, dominated landscapes in England in the latter 17th century and through the 18th century.

The 17th century landscapes were largely inspired by influences from the Continent, the 18th century would see an indigenous English taste develop and mature.

(3) Landscape in 18th Century Art

In *Italian Landscape in Eighteenth Century England* [1925], Elizabeth Manwaring demonstrated the profound influence that the paintings of Claude Lorraine, Salvatore Rosa and other Italianate artists of the 17th century had on English taste in the 18th century. There were many imitators of these artists, and countless engravings and prints of their works that adorned the homes the English middle class. Though few of these artists lived to see the 18th century, they nevertheless had an amazing far-reaching influence on art, poetry, literature and garden design in England in the 18th century and beyond. Their influence on gardens is examined in section 6.6. Here their influence on English taste in art is examined.

Although the Dutch and Flemish artists were more accurate in their portrayal of scenes, the Italianate artists were favoured for 'improving' on nature:

> "On their canvases the English visitor saw a powerful representation of scenes already in his memory ... the Virgilian tranquillity, the evocation of a Golden Age, had been felt with infinitely more dreamy sweetness by Claude Lorrain [while] the awe, which he called horror, that had stricken the traveller as he crossed the dizzy crags of his journey, the sense of the might and vastness of nature and the littleness of man, the thrill of the wild and untameable, Salvatore Rosa had felt more passionately." [Manwaring, 1925, vi]

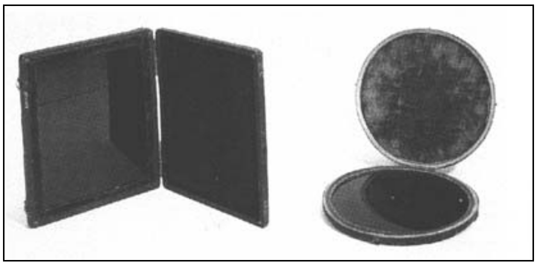
During the 18th century England, art assumed an importance and role not hitherto present. Paintings were to be found, not only in galleries and churches, but also in the homes of all the well-to-do, original paintings in the homes of the rich, prints, engravings and imitations in the homes of the more ordinary folk. Copies were important: “Diffusion of the Italian ideal of landscape came chiefly through the engravers” [Manwaring, 1925, 79]. Books on painting techniques abounded, the number of amateur artists multiplied, and many painting schools were established. By 1730, collecting art had become fashionable and sales and auctions were well patronised. Paintings of the Italianate artists were scoured from Italy and brought to England.

Visits to Italy on the Grand Tour were occasions to view and to purchase originals of the great Italianate artists. English visitors to Italy became so numerous during the first half of the 18th century that by 1740 Lady Hertford complained that summer in Italy was dreadful because of the hordes of English visitors! [Manwaring, 1925, 57] A visitor in the 1790s described the Italianate paintings in her letters with exclamation marks suggesting Baedeker’s star rating of sites:

> “A battle, by Salvatore Rosa!!!”; “A beautiful landscape by Claude Lorain!!!!”; “Two capital landscapes by Salvatore Rosa!!!”; “...a Claude!!!... a Claude!!!...a Claude!!!!” [Ibid, 60-1].

The increasing travel, according to Manwaring, developed the English taste for scenery, pictures and picture galleries.

It is difficult to comprehend now the esteem with which Claude Lorraine was held in England in the 18th century. The top art connoisseurs of the period extolled him; comparisons with Raphael were not uncommon; “a temperate hand, and colour dipt in Heav’n” wrote one enthusiast [Ibid, 39]; Constable described him as the “most perfect landscape painter the world ever saw” [Ibid, 43]; vast outpourings of verse referred to Claude landscapes and if imitation is the best form of compliment, Claude’s paintings were probably among the most copied of any artist.



Claude Glasses

Illustrative of his popularity was the invention of the Claude-glass, a plano-convex, low-toned pocket mirror about 10cm across, encased in leather and used to view the scene. The darkening of the mirror created the muted tones favoured by Claude and was used in sunny conditions while a second glass of silver was used for cloudy weather. Foliage and rocks were particularly Claude-like when viewed through the mirror. The convexity of the mirror miniaturised the landscape, reducing the extensive Lake Windermere for example to manageable proportions. Use of the Claude-glass was absolutely indispensable for viewers of landscape. Its use indicated a “subtle change of attitude to viewing the landscape. For the first time in England the rugged scenery is appreciated for its own sake” [Clark, 1968, 20]. Thomas Gray’s use of the Claude-glass was typical:

> “On the ascent of the hill above Appleby, the thick hanging wood and the long reaches of the Eden ... winding below with views of the Castle & Town gave much employment to the mirror.”
> [Manwaring, 1925, 182]

Claude’s strengths lay in depicting light and especially the rising or setting sun, and also his use of water - rivers and the sea, and of ruins and buildings. His figures though were weak. Richard Wilson, an 18th century painter of the Claude tradition, described his depth of view: “you may walk in Claude’s pictures and count the miles” [Barrell, 1972, 8]. His paintings were made for the eye to wander around and discover. The horizon is the climax of Claude’s paintings and the eye is led back and forth to the foreground and across the painting. The standard that he established became the model for English painters to follow [Ibid, 12].

The regard with which Salvatore Rosa was held by the 18th century English was only slightly less than that of Claude. While Sir

Joshua Reynolds described Claude's paintings as comprising the "tranquillity of Arcadian scenes and fairy-land" [Ibid, 41] - a sweet dream, Rosa's were like a nightmare incarnate, a "sort of wild and Savage Nature" [Ibid, 49]. Thomas Gray described them:

> "Excelled in savage uncouth places, very great and noble style; stories that have something of horror and cruelty" [Manwaring, 1925, 49]

Like Claude, Rosa was immortalised in verse and literature and his paintings copied and imitated. Travelling to the Continent, English travellers saw Claude and Rosa in the landscapes of Italy. Although very different in their styles, Claude and Rosa's names were frequently linked, Claude was characteristic of the beautiful, Rosa of the sublime[39]. The poet James Thomson summarised it in a typical fashion thus:

> "Whate'er Lorrain light-touched with softening hue,
> Or savage Rosa dashed, or learnèd Poussin drew." [Monk, 1935, 210]

Source: Clark, 1976
Nicolas Poussin, Summer

39. The Art Gallery of South Australia [Gallery 13] has examples of these painters including: Claude Lorraine's *Caprice with Ruins of Roman Forum* [1634] , two paintings from Greek history by Salvatore Rosa: *Thales Causing the River to Flow on Both Sides of the Lydian Army* [1663-4] and *The Deaf-mute Son of King Croesus Prevents the Persians from Killing his Father* [1663-4], Gaspar Poussin's *Aminta about to Rescue Silvia* [1631] and a *Landscape* [1650s]. The overriding impression of the Claude is a scene bathed in gold, while that of Rosa's is bathed in black, due in part to the darkening of the varnish over the centuries.

A quote from Thomas West's *Guide to the Lakes* [1776] provided a similar description in the section on mountains:

> "from the delicate touches of *Claude*, verified on *Coniston* Lake, to the noble scenes of *Poussin*, exhibited on *Windermere*-water, and from there to the stupendous romantic ideas of *Salvatore Rosa*, realized in the Lake of *Derwent*." [Hussey, 1927, 126].

The wildness of Rosa's paintings, filled with storms, rocks, mountains and dark forebodings appealed strongly to the 18th century romantics [Monk, 1935, 194]. When Horace Walpole visited Grand Chartreuse with his friend Thomas Gray in 1739, he exclaimed in a letter: "Precipices, mountains, torrents, wolves, rumblings, Salvatore Rosa" [Ibid, 211].

Claude's friend, Nicolas Poussin came to painting late in life and painted "austerely classical works" [Greenhalgh, 1978, 163]. Poussin conceived of his scenes as comprising a harmony of horizontal and vertical elements disposed of in the golden section [i.e. a line is divided into two unequal parts so that the proportion of the smaller part to the larger part is the same as the larger part is to the whole]. He overcame the lack of verticals in landscapes by introducing buildings, which convey a sense of geometry and order [Clark, 1976, 129-130]. His later landscapes combined symbols of both pagan and Christian beliefs.

The various influences on the creation of the English landscape ideal was described by Crook thus:

> "The English landscape tradition of the mid eighteenth century was not, of course, Grecian in origin but Italian: in its early stages, the Roman and Renaissance garden anglicized; in its full-blown phase, the landscape of the *Campagna* filtered through the golden haze of Claude and the Poussins and transmuted empirically into *le jardin anglais*." [Crook, in Clarke, 1989, 47]

The mid 18th century was a period that saw the demise of neo-classical art which had sought to establish perfect balance and harmony along classical lines. The so-called Augustan Age, based on classical theories and tastes, weakened from the 1750s on, giving way to new enthusiasm fired by ideas of sublimity, imagination, original genius and Romanticism [Monk, 1935, 87, 103]. As this occurred the classical origins of the Arcadian landscape weakened and romanticism assumed a stronger influence.

During the latter half of the 18th century, annual art exhibitions contained many paintings of sublime scenes with classical origins and romantic topographical paintings reflecting a growing taste for the natural beauty of Wales, the Lake District and the Scottish Highlands [Ibid, 198].

Overlaying the concepts of the beautiful and the sublime came a new term, the "picturesque". The term originated early in the 18th century, "rises into frequency by 1760, is general after 1780, and ridiculously hackneyed after 1800." [Manwaring, 1925, 167]. Christopher Hussey [1927, 4] considered that each art - poetry, painting, gardening, architecture and even travel - progressively passed through the picturesque phase between 1730 and 1830 and in each case was a prelude to Romanticism. He considered the picturesque to be an interregnum between classic and romantic art that enabled the "imagination to form the habit of feeling through the eyes" [Ibid]. Classical art involved thinking, the romantic and imaginative art of the 19th century involved feeling, whilst picturesque art made one see - "It records without contemplating" [Ibid, 245].

The picturesque painting was rarely an accurate painting of a scene, rather it described the world "as it might have been had the Creator been an Italian artist of the seventeenth century." [Monk, 1935, 204] This illustrates the paradoxes of the picturesque, firstly it delighted in nature but then wanted to "improve" it, and secondly it delighted in English landscapes but represented them as imitations of Claude or Rosa [Andrews, 1989, 3]

The Reverend William Gilpin defined the picturesque as "that kind of beauty which *would look well in a picture*." [Hussey, 1927, 168]. The meaning gradually shifted towards a "landscape that ought to be pictured, a scene that was a potential subject, a source, for creation of an art work." [Kroeber, 1975, 5]. At least initially, the picturesque was equated with Salvatore Rosa's paintings, the irregular and the wild, the sublime - the combination of beauty and horror. But it was also associated with a thatched cottage, a rustic mill, a shaggy ass [Manwaring, 1925, 169] indicative of the close link between the picturesque and the romantic.

Thomas Gray was one of the early users of the term 'picturesque', describing scenes of Roman palaces, churches, squares and fountains as picturesque and noble as also were the cliffs of Dover.

Use of the Claude-glass converted a landscape into a picture. The extent to which the Claude-glass contributed to the emergence of the picturesque does not appear to have been addressed by writers but would seem probable.

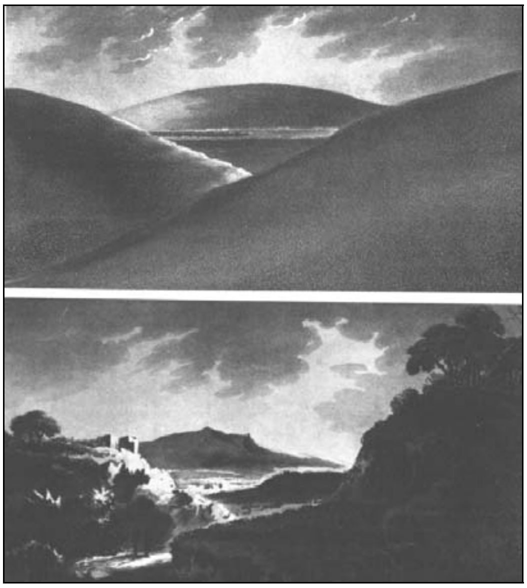
During the 18th century the "blue-stocking ladies" sought out picturesque scenes to paint and their attitudes contrasted with Celia Fiennes, only 50 years earlier. A picturesque picnic in 1754 at Tunbridge Wells in Kent that was attended by Elizabeth Montagu, William Pitt and the Wests was described thus:

> "We drank tea yesterday in the most beautiful rural scene that can be imagined ... [Mr Pitt] ordered a tent to be pitched, tea to be prepared, and his French horn to breath music like the unseen genius of the wood.... After tea we rambled about for an hour, seeing several views, some wild as Salvatore Rosa, others placid, and with the setting sun, worthy of Claude Lorraine." [Hussey, 1927, 96]

During the 1760s and 1770s, Gilpin visited many parts of Britain while on vacation, and a decade later he published his observations in a series of books[40] on the picturesque beauty he observed.

Accompanied by his aquatints, the books were greeted warmly and had a wide influence, satisfying a taste that was already extant. His influence extended to Europe [Hipple 1957, 192].

40. Gilpin's eight books covered the following areas: River Wye and South Wales, Lakes District, Scottish highlands, New Forest, Isle of Wight and Western parts of England, coasts of Hampshire, Sussex and Kent, the counties of Cambridge, Norfolk, Suffolk and Essex, and North Wales. They were published between 1782 and 1809.



Source: Bermingham,1987

William Gilpin, "Non Picturesque" and Picturesque Mountain Landscape, 1792

Gilpin laid down rules to guide the landscape artist defining what he considered to be "correctly picturesque" [Manwaring, 1925, 185]. The perfect river painting has four parts: the river, two side screens that are the opposite banks and that provide perspective, and the front screen which emphasises the river's windings. Gilpin simplified Claude's multi-depth paintings and established that landscape paintings should comprise three parts - the background of mountains and lakes, the "off-skip" [middle distance] of valleys, woods and rivers, and the foreground containing rocks, cascades, ruins [Hussey, 1927, 113].

Groupings of cows were important - two being insufficient for a group: Gilpin reproved his wife for suggesting only two cows for their domestic needs saying "Lord, my dear, *two* cows you know can never group." [Hussey, 1927, 119] "With three, you are sure of a good group, except indeed they all stand in the same attitude at equal distances." [Manwaring, 1925, 186] He also recommended landowners placed five cows in their meadows rather than four as four will not compose [Rees, 1978, 52]. Following Gilpin's formula, books appeared illustrating a range of figures for use in paintings.[41]

Gilpin recognised the subjectivist basis for aesthetics when he wrote to a friend in 1769:

> "I have had a dispute lately … on an absurd vulgar opinion, which he holds - that we see with our eyes: whereas I assert, that our eyes are only mere glass windows, and *we see with our imagination*." [Quoted by Crook, in Clarke, 1989, 45, emphasis added]

This is an excellent description of the distinction between the objectivist and subjectivist approach to aesthetics. In this Gilpin was reflecting the views of the philosopher, Hutcheson [1726]: "All beauty is relative to the sense of the mind perceiving it" and also of David Hume from 1757: "Beauty is no quality in things themselves; it exists merely in the mind which contemplates them... Each mind perceives a different beauty." [Ibid, 48].

Following Gilpin's example, picturesque tours became popular, informed by books on each area[42]. Hannah More travelling down the Wye River in 1789 used Gilpin's book as her instructor:

> "sailing down the beautiful river Wye, looking at abbeys, and castles, with Mr. Gilpin in my hand to teach me to criticise, and talk of foregrounds, and distances, and perspectives, and prominences…." [Manwaring, 1925, 195]

Tours were taken with the express purpose of discovering picturesque scenes, similar to the earlier journeys seeking experiences of the sublime. Contemplation of landscapes was regarded as a legitimate activity for those with taste and involved, as More's description suggests, a proper procedure involving composition of the scene, analysis of its associations and meanings, rearranging objects in one's imagination and adjusting one's position until the scene came right [Barrell, 1972, 5].

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41. For example, W.H. Pyne's *Picturesque Groups for the Embellishment of Landscape* which contained over 1000 subjects of figures such as bandits, ferry boats, gypsies, toll-gates etc much like a computer clip art package of illustrations. See Hussey, 1927, 118.

42. Malcolm Andrews' 1989 book *The Search for the Picturesque - Landscape Aesthetics and Tourism in Britain, 1760-1800* describes the tours in the Wye Valley, north Wales, the Lake District and the Scottish Highlands.

By the 1780s, an English school of landscape painters had become established, paralleling the picturesque poets of the time. Hussey [1927] included an appendix describing nearly 70 such painters. Heffernan [1984, 3] considered that the arts of poetry, painting and landscape gardening together defined landscape in the 18th century leading to the development of the picturesque.

In 1794, the art connoisseur and critic, Uvedale Price published his 3 volume *Essays on the Picturesque*[43] which sought to define the characteristics of the picturesque. He defined its origin to be the:

> "irregular details, rough surfaces, and coarse textures in nature that please the eye with their shadowy chiaroscuro[44]. The picturesque was characterised by roughness, irregularity, abruptness, variation and the broken interplay of light and shade." [Shepard, 1967, 126]

Price's picturesque was thus not simply one of bland insipid pastoral landscapes, or even the strictly classical view. His was a scene of interest, containing features such as bark, rocks, knobbly trees, ruins, old oaks, and rustic bridges. The picturesque thus diversified and made more interesting the pastoral scenes of trees and meadows. Beauty was regarded as smoothness, equality and uniformity in contrast to the roughness, irregularity and variety of the picturesque.

Price sought to be more definitive than Gilpin in his definition of the picturesque, regarding it as a distinct quality lying between the sublime and the beautiful [in Burke's terms], between roughness and smoothness. Awe and horror, which were the hallmarks of the sublime, had no place in the picturesque. While he held that Gothic architecture is picturesque [Gothic ruins were often built in gardens as a picturesque feature], Grecian architecture was beautiful and its ruins were picturesque. Buildings, trees and even people changed gradually from a thing of beauty into picturesqueness with the passage of time. Curiously, nature can combine the beautiful and the picturesque - the rose is an example, a beautiful bloom surrounded by thorny twigs and jagged leaves [Hipple, 1957, 210-1].

Art historian Richard Payne Knight identified the subjectivist foundations of the picturesque, that the picturesque parts of nature are:

> "those which nature has formed in the style and manner appropriate to painting; and the eye, that has been accustomed to see these happily displayed and embellished by art, will relish them more in nature ... The spectator ... applies them, by the spontaneous association of ideas, to the natural objects presented to his eye, which thus acquire ideal and imaginary beauties; that is, beauties, *which are not felt by the organic sense of vision; but by the intellect and imagination through that sense*." [Heffernan, 1984, 3; emphasis added]

Interestingly, Knight defined the picturesque as "merely that kind of beauty which belongs exclusively to the sense of vision; or to the imagination guided by that sense" [Raval, 1978, 251], an obviously subjectivist position regarding the landscape which he derived from Hume.

Despite the extensive debate that occurred throughout the 18th century over the concepts of beautiful, sublime and picturesque little discernible progress was achieved, and successive writers generally failed to develop the concepts of previous writers: "Intellectual history ... is a record of haphazard mutation and opportunistic development" [Ibid, 311]. There was "no consistent evolution" of ideas [Ibid, 317]. The concept of the picturesque has, however endured, and continues to be closely associated with the English landscape; it was among the categories of English landscape taste defined by Lowenthal and Prince [1965, 190], defining it as a preference for the irregular, the complex, the intricate and the ornate. The picturesque is also the basis of a "heavily anglicized" landscape taste in the United States [Hugill, 1986].

(4) Landscape in 19th Century Art

In 1805, Richard Payne Knight, published *An Analytical Inquiry into the Principles of Taste.* In an interesting mix of the objectivist and subjectivist positions,

43. Full title of Uvedale Price's book: *Essays on the Picturesque, As Compared with the Sublime and the Beautiful; and on the Use of Studying Pictures, for the Purpose of Improving Real Landscapes*. London, 1794.

44. Chiaroscuro: the style of pictorial art in which only the light and shade are represented; black (or sepia) and white - Shorter Oxford.

Knight contended that the origin of the picturesque:

> "was objective insofar as it had to do with the pleasure we derive from colour and light, and subjective insofar as it depended on an association made between actual objects and those represented in pictures." [quoted by Barrell, 1972, 57]

Like Alison, Price wrote with the prescience and insight of psychology about the significance of association in the mind, a theme that would be more fully explored during the later 19th century.

Source: Clark, 1976

J.M.W. Turner, Fire at Sea

Price also wrote of the importance of colour in art, advocating the view that colour produced emotions of its own, independent of the content of the scene. During the 19th century, J.M.W. Turner and the French Impressionists built on Knight's revolutionary suggestion, painting landscapes which were abstractions of reality and in which colour, along with line, mass, symmetry, balance, texture and other characteristics were the subject matter.

Towards the end of the 18th century, the picturesque had become rather hackneyed and was attacked by, among others, Wordsworth [in *The Prelude*, Book XII]:

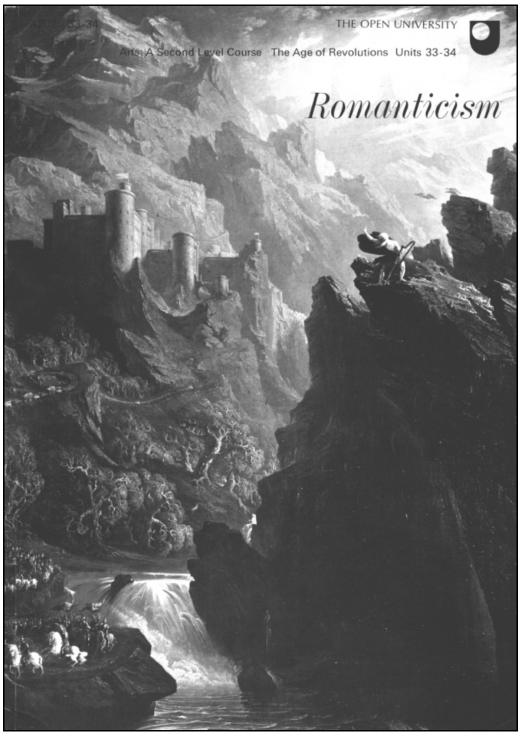
> "...Even in pleasure pleased
> Unworthily, disliking here, and there
> Linking; by rules of mimic art transferred
> To things above all art"

According to Samuel Monk, Wordsworth "most effectively broke the spell that Italian landscape had woven over English taste ... The result was a new ability to see and love the natural world for its own sake" [Monk, 1935, 204]. Romanticism vindicated the "imagination as an interpreter of experience" [Ibid], it was irrelevant whether a painting accurately depicted a landscape, what was important was the eye of the imagination - the inner eye. Seeing into "the heart of things" was the key difference between the picturesque and the romantic. The picturesque traveller sought scenes of Claudian beauty or Salvatorian sublimity, but Wordsworth taught one to not only see but also to interpret by one's own imagination and intuition.

Although originating in the 18th century, the 19th century saw Romanticism blossom into its full flowering. The term "Romanticism" was originally a derisive term, used to describe imaginary absurdities such as from the days of chivalry. However by about 1720 it gained standing and was used to describe interesting, imaginative and even beautiful phenomena [Lister, 1973, 8]. Originating in England, Romanticism spread to France and Germany. Viewed in hindsight, Romantic characteristics are evident from virtually every period. Indeed Clark asserts that artists of the first rank have frequently combined classicism and Romanticism [Clark, 1973, 19]. However the period in which it was dominant was from about 1750 to 1850. At least for the first half of this it paralleled the interest in the picturesque and especially the sublime, a quality with which it had much in common. This period also saw major social dislocation including the French revolution, war with America and the Napoleonic Wars.

Romanticism arose when "art shifted its appeal from the reason to the imagination. ... The Romantic movement was an awakening of sensation…." [Hussey, 1927, 4]. As stated earlier, classical art involved thinking, the picturesque involved seeing, and now Romanticism involved feeling - the picturesque provided a path between the "Cartesian appeal to reason and the Romantic appeal to imagination." [Monk, 1935, 205] It went further, the Romantic uses a scene to "delve into his own psyche and to analyse its effect upon his emotions." [Lister, 1973, 36]

The definition of Romanticism is difficult, indeed the one thing that authorities agree on is its elusiveness in definitional terms. Failing to define it they tend therefore to describe what things and activities are Romantic. It is Romantic to: build an aqueduct over a Welsh valley, revel in the sublimity of the surrounding mountains, paint in exact detail watercolours of plants growing there, travel to remote and exotic countries, and to write and illustrate books about them, study the past, paint historical subjects [Lister, 1973, 3]. A common feature is the link between the individual and the particular. In contrast with classicism, which focused on generalities, Romanticism focused on particulars.



Source: Open University Course Book, *Romanticism*

John Martin, The Bard

The characteristics of the Romantic included [Lister, 1973]:

- strong interest in the historical, a fascination with the past
- an anti-religious stance, particularly anti-Christian
- the symbol of love
- interest in human madness and a preoccupation with melancholy, gloom and death
- imagination, a quality regarded so important that it was regarded as *the* reality
- delight in the inventions and machines of the industrial age
- keen and detailed interest in Nature producing countless books of paintings of birds, plants and other natural phenomena, together with vast collections of natural objects such as shells and rocks

Romantic art, whether painting, poetry or music, did not follow rigid forms; indeed it is not so much on the outward form as "on the steady flow of emotions and ideas that grow out of each other" [Monk, 1935, 149].

The key Romantic landscape painters were: Richard Wilson [1714-82], Alexander Cozens [1717-86] and John Cozens [1752-97] [father and son], Thomas Gainsborough [1727-88] who loved to paint landscapes more than his superb portraits, William Blake [1757-1827], a consummate artist and poet of the first rank, Thomas Girten [1775-1802], J.M.W. Turner [1775-1851], John Constable [1776-1837], John Cotman [1782-1842], Samuel Palmer [1805 - 81], and the French artists Courbet, Géricault and Delacroix. Rosa's savage and wild scenes were considered Romantic rather than picturesque. Lister's book contains a checklist of 32 pages of British Romantic artists.

The English landscape gave plenty of scope for the Romantic artist:

> "the landscape itself, was, and still is, more varied both in form and in atmosphere, than that of any other comparable area. It is an island landscape, swept from all directions by breezes and winds, drenched in mists and fogs, illuminated by hazy sunlight or gentle moonlight. Here, indeed, was material to inspire the cosmic vision of Turner, the dancing lights and clouds of Constable, Cotman's solitude, the meticulousness of John Middleton, and Samuel Palmer's paradises of moonlight." [Lister, 1973, 163]

Based on the Romantic's quest for the emotional content of scenes, Romantic painting was filled with emotion, sublimity and grandeur [Lister, 1973, 36]. Painters toured the British Isles and the continent in search of Romantic scenes, locations such as the Lake District, Wales, Scottish highlands and islands, as well as the Alps and the Pyrenees. However while in picturesque paintings the emphasis was on the scene, Romantic artists sought to instil something of themselves into the painting so that it reflected their own emotions and personality. Thus the artist became the subject: "the Romantic Man saw himself reflected, like an image in a Claude glass" [Lister, 1973, 165].

Turner, an outstanding landscape artist, created scenes of colour and light unseen before. He painted light so that: "every detail, even to the tiniest nuance, is a reflection, a dance, as it were, in accompaniment to sunrays, moonbeams, prismatic raindrops, candlelight, or the glow of fireworks" [Lister, 1973, 122]. Lister regarded him as the greatest English landscape painter: "No other painter has been able so to convey the quality and power of light, of the terror of vastness, of the elemental force of the weather" [Ibid, 168]. Visiting Italy in 1819 Turner produced over 1500 drawings and watercolours in three months, but paradoxically the visit weaned him off his strong classical foundations; he had spent years copying Claude and Cozens. Returning home, he created impressionist scenes consisting of splashes of colour that were called by Ruskin "nonsense pictures" [Clark, 1976, 186].

Turner painted scenes from the Lake District, Scotland, Switzerland and Italy, he specialised in maritime scenes, and throughout his paintings "there is always the Romantic preoccupation with the vastness of mountain or precipice, the infinity of the sea, and, dominating everything else, the pervasiveness of light" [Ibid, 168]. Clark considered that in "the vast range of his work Turner fulfils practically every aim that the earlier Romantics foreshadowed." [Clark, 1976, 195]

Over his lifetime Turner shifted from the representative painter, detailing the scene before him, to an impressionist painter, capturing its essence in regard to colour and light. For example, Turner first painted *The Falls of Clyde* in 1802; 30 years later he painted the same scene. Although the contents and composition were identical the latter appears as though viewed through a fog and the painting comprises "marvellous transitions of colour - all the way from blue to gold" [Clark, 1973, 246].

Constable belonged more to the rustic landscape tradition than Turner, his landscapes are closer to the earth. While his finished paintings lacked immediacy and appeared rather contrived, his rapidly painted watercolours, with sparing strokes, were delights of observation and sparkling light. Constable's specialty was clouds, a dominant feature of his East Anglia flats, and he painted them as they had never been painted before [apart from some of the Dutch painters]. In a letter Constable exclaimed, "I can hardly write for looking at the silvery clouds" [Pevsner, 1956, 150]. Clouds were a Romantic favourite for Constable who saw in them "his own transient but aspiring spirit buffeted, shaped and sometimes left floating in peace, but always changing at the whim of exterior forces" [Lister, 1973, 170].

J.M.W. Turner, The Falls of the Clyde 1802 [top] and 1835-40 [bottom]

Like Wordsworth, Constable loved nature. He said "I never saw an ugly thing in my life." [Clark, 1976, 153] His strong objectivist view is evident: "You never enjoy the world aright, till the sea itself floweth in your veins, till you are clothed with the heavens, and crowned with the stars" [Ibid]. Large landscape paintings, known as "six-footers", established Constable's reputation as a landscape painter [Bermingham, 1987, 136]. The subject of these paintings was a four mile stretch of the canalised Stour River, and included *The White Horse, Stratford Mills, A View on the Stour, The Leaping Horse, A Boat Passing Lock* and most famously, *The Hay Wain*. These were mostly painted in the 1820s.

Samuel Palmer was the last painter of Arcadian myth, the Golden Age, the Virgilian landscape, which, in 19th century

England was fast disappearing under the imprint of industrialisation.

Source: Bermingham,1987

Samuel Palmer, A Rustic Scene

Clark described how Palmer ended the era:

> "Virgil remained his source of inspiration, but his images grew fainter and his style more commonplace. And with him there ended that beautiful episode in European art, which from Giorgione's day till the nineteenth century had been a source of enchantment and consolation. ... by 1850 Malthus and Darwin had made them into moonshine." [Clark, 1976, 143]

With the end of the image of Arcadia to inspire painters, there "vanished the concept of the ideal landscape" and with it the feeling that "some God is in this place" [Ibid, 145].

Eventually Romanticism descended into sentimentalism and painting became photographic realism. Pretty and bucolic scenes replaced the power and insights of Turner, Constable and a host of other Romantic artists. Industrialisation was transforming the countryside and the English landscape. Yet the Romantic spirit lived on in the delight in natural beauty and in the quest to conserve nature and preserve the historical.

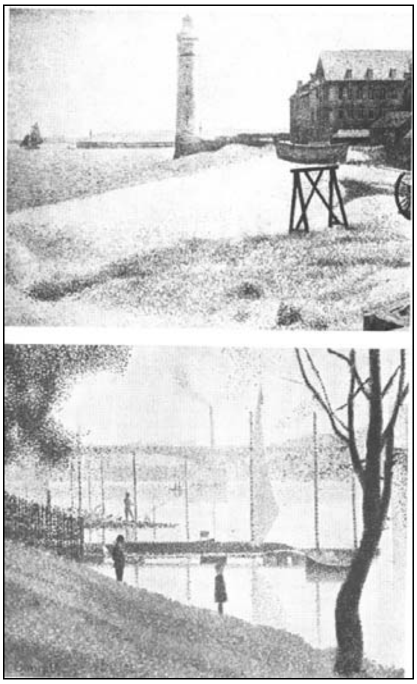
By the mid 19th century, the schools of art ruled and required that nature be improved - it was considered vulgar to paint what one saw [Clark, 1976, 164]. There were artists such as Courbet in France, who rejected the official line and expressed themselves. Another was Daubigny, the grandfather of Impressionism, who had a great influence on painters such as Monet. His paintings were of plain common subjects requiring no effort and thus establishing the approach from then on to the present day.

Monet, Sisley and Pissarro, the early Impressionists, painted scenes of utter naturalism in the 1860s, but with a unity which is lacking where the artist makes no attempt to relate the parts to each other. From the combination of Renoir's skill and sense of colour, together with Monet's perception of nature and tone, Impressionism was born. The sparkle and reflection of light on water was the subject that united them [Clark, 1976, 173]. Impressionism was the "painting of happiness" [Ibid, 198].

Monet and Renoir were joined by other artists including Manet, Pissaro and Sisley. During the 1870s, Impressionism blossomed to its full flowering but by the mid 1880s was in decline. Monet continued exploring the sensation of light, virtually ignoring the subject and concentrating on the effect of light on it. Cathedrals and haystacks were favourite subjects, the former not a good choice because they lacked sparkle. He discovered the waterlilies in his garden pond and responding to nature afresh, "he transposed it, without any loss of truth, into sweeps and scrawls and blots of paint that express his deepest emotions." [Clark, 1976, 177]

Two outstanding Impressionist painters were Seurat and Cézanne, vastly different in styles from each other but profoundly influential in their own unique ways.

Seurat integrated all the influences of his time as he sought to create timeless paintings of the scale of Renaissance frescoes. Working carefully from small field paintings, he built up the scene, establishing its tonality and composition, and with his pointillism technique created paintings of authority. His landscapes, whether of the seaside, a river scene or a park, convey a feeling of stillness, as though all the figures are frozen in time. The pale tonality gives a sense of lightness but not of joy, the quietness of a hospital ward. This is not to suggest that they were without colour, Seurat had developed a pseudo-scientific theory of colour and placed complementary flecks of colour together - orange and purple, green and red, yellow and blue, juxtaposing them carefully to achieve the effect sought.



Source: Clark 1976

Seurat
The Hospice de landscape Phare at Honfleur [top] and
The Bridge at Courbevoie [bottom]

In contrast to the cool scientific approach of Seurat, Cézanne was a more ebullient and rich personality. Painting the landscapes of Provence he gave them "the eternal harmonies of a classical landscape" [Ibid, 222], establishing their pictorial qualities in the way that Claude had established Campagna as the definitive landscape. Cézanne's paintings of Provence over thirty years had a worldwide influence of landscape painters. His paintings of the mountains of L'Estaque or of farmhouses illustrate his desire to capture the solidity of objects by painting them in small facets, each with its unique colour, creating a prismatic quality to his landscapes. Like Monet with his haystacks, Cézanne's model was Mont Sainte Victoire of which he made innumerable studies in a process of development and self-realisation.

Overall, Impressionism "enlarged our range of vision" [Clark, 1976, 178] and it brought colour into art in a way not previously apparent. It also concentrated on the effect of the object on our senses, the subjectivist approach. This may explain why Impressionism continues to hold a profound appeal and influence. Paintings of scenes painted in an objectivist way are seen once and their full message is gained. Impressionist paintings however speak to the senses and to our emotions and we can continue to gain from repeated viewings of them.

Source: Clark, 1976

Cézanne, Mountains at L'Estaque

(5) Landscape & Art - Conclusions

Kenneth Clark considered that landscape painting was the chief artistic creation of the 19th century, a tribute to the contributions of Turner, Constable, Wilson and the many other artists of the Romantic period together with those of the Impressionist era [Clark, 1976, viii]. Its dominance was the culmination of the emergence of landscape painting from its tentative beginnings following the Renaissance with the contributions of the Dutch, French and Italian artists and finally the English landscapists. By the 17th century, landscape painting emerged for its own sake and by the 19th century was the dominant art form [Ibid, 229].

Over these centuries, landscape changed from objective fact to subjective Impressionism. Nature was treated symbolically throughout this period. The artists painted as they interpreted what they saw, and their interpretation has influenced society to see landscape as the artist saw it. So the culture was affected by their contribution. As Clark said, "Almost every Englishman, if asked what he meant by "beauty", would begin to describe a landscape" [Ibid, 230].

Emerging from its subservient role, as backgrounds to paintings of religious and other subjects, landscape painting developed as a subject in its own right through the Dutch, Flemish and other European schools of the 17th century. Claude Lorraine and Salvatore Rosa of this period had an immense influence in shaping aesthetic sensibilities in England in the 18th century. The 18th century saw the sublime, the beautiful and the picturesque defined and distinguished as distinct aesthetic concepts. Romanticism, which appealed to the emotion more than the eye, developed and was followed in France in the later 19th century by Impressionism, which further sought to convey feeling rather than objective fact.

The development of landscape painting has been marked by a progressive shift, or evolution, from the objectivism of the early painters and of Claude's school to the greater emotional content, and subjectivism of the Romantic and Impressionist schools.

6.6 THEME THREE: GARDENS, PARKS AND THE PASTORAL LANDSCAPE

(1) Significance of Gardens, Parks and the Pastoral Landscape

Gardens, parks and the pastoral landscape speak to the subconscious mind of pleasant idleness, of an absence of necessity of work, and of bounteous provision. As enclosed areas, parks and gardens isolate and insulate the individual from the external world, they cosset the individual in an environment in which time and space and the demands of life are less important for a while. Kenneth Clark considered the enchanted garden one of "humanity's most constant, widespread and consoling myths" [Clark, 1976, 6]. Gardens and parks reinforce the attractiveness of pastoral scenes, scenes of bounteous provision and harmony, which provide for human needs without apparent effort.

This section examines the contribution that parks, gardens and the pastoral scene have made in influencing Western attitudes towards landscapes. The assumption is that parks and gardens, being artificial creations, reflect the idealised form of micro-landscape; their design and characteristics epitomise the ideals which society seeks from such landscapes.

As explained earlier [sec 6.3], the word 'paradise' derived from the ancient Persian word *pairidaeza* meaning an enclosed area such as a park. In Hebrew it became *pardes*, meaning a garden or park enclosure, and in Greek *paradeisos* means a kingly or sumptuous and extravagant park [Thacker, 1979, 15].

After hunting, pastoralism represents the next development of human society through the domestication of the horse, cow, sheep and goat. Compared with agriculture which developed later, it did not involve arduous labour, the image of the shepherd tending quietly grazing animals appears leisurely and idyllic and was the basis for much classical mythology. From the earliest times, parks and gardens have held an indelible fascination for humans; in contrast to the pastoral landscape they paradoxically demand considerable effort to create an apparently restful and undemanding environment.

The pastoral landscape in which animals grazed bushes and lower limbs and cropped the grass, created more open areas of standing trees and grass, the progenitors of parks. "The pastoral ideal was a Golden Age of youth and of antique man" [Shepard, 1967, 74]. It formed the basis of dramas of Arcadia, and generations of poets and writers referred to the pastoral landscape in philosophy, theology and allegory. It was a place in which to discuss, to think, to make music and dance and to make love.

(2) The Classical Era

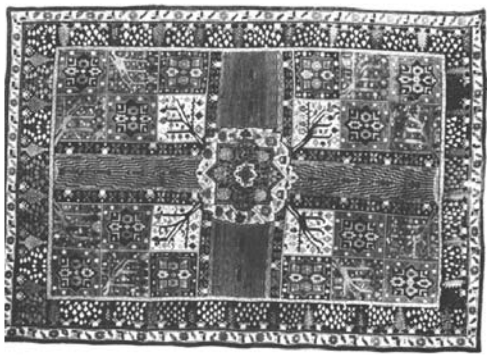
In ancient times, gardens were often sacred groves, places consecrated to a spirit or god. The Old Testament has many references to such groves dedicated to Baal and Homer's *Odyssey* also refers to such areas. In Greek mythology there were garden spirits including Flora, goddess of flowers, Demeter, goddess of corn, and Dionysus, god of vines [Thacker, 1979, 12-13].

In about 500 - 600 BC the Hanging Gardens of Babylon were regarded as one of the Seven Wonders of the World. The Hanging Gardens were constructed on a ziggurat, an artificial hill that enabled the Sumerians to worship their mountain gods. In one of the only two extant descriptions of the gardens, Diodorus of Sicily called them a paradise.

The Persians who conquered Babylon in 538 BC were similarly enamoured with parks and the Xenophon [427 - 355 BC], a pupil of Socrates, described their importance to the Persians:

> "In all the districts the Great King resides in and visit he takes care that there are paradises [Xenophon was the first to use this term], as they call them, full of all the good and beautiful things that the soil will produce, and in this he spends most of his time, except when the season precludes it." [Hunter, 1985, 16]

Many of the Persian parks were extensive, located in the flood plains of rivers, and were walled to confine animals for hunting. Although distant from Europe, Persia continued to exert a powerful influence on Western culture, particularly in regard to attitudes to landscapes. A country of diverse landscapes, ranging from the tropical through the mountainous to the arid desert, Persia's location astride the trade routes to China and India facilitated the movement of its ideas and goods westward into Europe.



Source: Thacker, 1979

Persian Carpet – central water source, four rivers. Plane trees mark intersections. Garden is protected by trees.

Persian rugs, commonly incorporated stylised scenes of trees, rivers and gardens, and were patterned after the ground plan of pleasure gardens. These rugs brought the garden into the house. The rugs spread the Persian's delight in parks and gardens to the west - as early as the 5th century BC Plato had a magnificent set of Persian rugs.

Rugs were shown in Western paintings through to the 16th century often depicting a central water source flowing out through four rivers [cf Genesis account of Eden] and with plane trees around the source. French tapestries with similar depictions of parks, gardens and water carried the imagery into the castles and palaces of Europe.

On conquering Persia, Alexander the Great discovered the extensive parks and was so enthralled with them that he reserved one quarter of Alexandria as park [Shepard, 1967, 66-67]. The Persian parks included shrines and avenues of trees and the influence of these changed the more natural form of Greek parks with their sacred groves. Public parks were common in Greece, the Lyceum being a public park set aside for meditation, a quiet stroll, or discussion.

In Athens, the Philosopher's Garden [or Academy] combined veneration of groves of trees with the Eastern paradise. Plato's house in the Academy, together with its garden and gymnasium became, the model throughout the classical world although by Roman times the gymnasium was replaced with fountains, sculptures and colonnades. Greek cities generally established public gardens for pleasure and relaxation, and included springs, shady nooks and walks and seats - although they disappeared after the Grecian era to be re-established only in recent centuries, they were virtually identical to present day parks.

Both the Greeks and the Romans continued the Persian's love of trees and planted them in the towns, around their villas and homes, near their public buildings and even around their tombs. The Romans combined the functional and ideal to produce as complete an attitude to landscape as has ever been achieved since, at least in the West [Hunter, 1985, 25]. To the Romans, nature was animate and powerful; activities such as farming had to be carried out with due reverence and deference to spirits of nature. Wealthy Romans established country villas, combining agriculture and love of nature with the Greek philosopher's garden. Rome was eventually surrounded by villas and gardens.

When Rome descended into intrigue and political turmoil after the assassination of Julius Caesar in 44 BC, Virgil and others moved to live in the country, finding there the peace and serenity lacking in the city. Together with a later poet, Horace, Virgil dreamed of a new Golden Age "embodying

the virtues of peace, productivity and continuity." [Turner, 1986, 10]
Wall paintings at Pompeii and Herculaneum display the completeness of the Roman appreciation of landscape:

> "... the functional landscape of farming in the plains and foothills, groves, temples and 'sacred sites'. Rocky mountains beyond, lakes and sea coast overlooked by portico villas, islands and ships. These were the views from favoured country villas; in town houses they were the creations of painters who used the device of dividing up the wall with pilasters, columns and architraves, with landscapes in between, to give the illusion of looking through a pierced wall or portico to the countryside beyond." [Hunter, 1985, 32]

The derivation of present day landscape paintings is obvious. The descriptions Pliny the Younger [60 - 111] made of of his villas and gardens provided the basis for Renaissance planners. The landscape setting of his Tuscan villa was of primary importance:

> "The countryside is very beautiful. Picture to yourself a vast amphitheatre such as could only be a work of nature; the great spreading plain is ringed by mountains, their summits crowned by ancient woods of tall trees ... Down the mountain slopes are timber woods interspersed with small hills of soil so rich that there is scarcely a rocky outcrop to be found... Below them the vineyards spreading down every slope weave their uniform pattern far and wide, their lower limit bordered by a belt of shrubs. Then come the meadows and cornfields, where the land can be broken up only by heavy oxen and the strongest ploughs... The meadows are bright with flowers, covered with trefoil and other delicate plants which always seem soft and fresh, for everything is fed by streams which never run dry ..." [Pliny, 1963].

Emperor Hadrian's Villa d' Este at Tivoli, was a vast palace with extensive gardens that respected the spirit of the place, following the lie of the land. Water dominated the setting in the forms of a great canal, cascades, fountains, pools and nymphae. The park in which the villa was set linked it directly to the surrounding agricultural land without any dividing wall to separate the 'ideal' landscape within from the functional landscape without.

With the decline of Rome, many of the villas and estates were given to Christian communities, the villas' owners often joining or leading them [Hunter, 1985, 40].

(3) Middle Ages to 18th Century

In the East, the Mughal emperors established impressive gardens through Afghanistan into India, including an extensive and luxuriant garden surrounding the Taj Mahal at Agra - a garden which has since been cleared to give full view of this magnificent building. In Turkey also, gardens were established with Persian characteristics. The Arabs who invaded Spain in 710 established Moorish gardens, some of which survived in the gardens of the Generalife and the Alhambra at Granada [Thacker, 1979, 41].

Further east, in China and Japan, gardens assumed a symbolic importance that was greater than anywhere else in the world. These are a study in their own right, and although they exerted an influence in the West, particularly in the 19th century, their existence has not had a major bearing on the development of western gardens. The reason for this is because, having a strong symbolic content, Chinese and Japanese gardens can become trite and meaningless if separated from the culture from which they sprang. The symbolism of nature implicit in Chinese gardens, their close links with poetry, the inspiration they gave landscape painters, and the cultivation of many species of flowers and plants in the gardens established gardens as very significant places in Chinese culture. Similarly, gardens in Japan were significant places. Images of perfect pleasure were their basis and strict rules governed the placement of rocks, trees, lakes, islands and other features of the gardens.

In the West, during the Middle Ages, following the decline of the Roman Empire, Christian monasteries became the main centre for the establishment of gardens. Monasteries often established a pleasure garden that simulated the Garden of Eden, cultivation of which was regarded as reliving a part of creation [Glacken, 1967, 348]. Cloister gardens provided a quiet area for study and relaxation. The cloister gardens provided an environment, separated from the world, in which the monks could contemplate God. The monks grew vegetables, herbs, fruits and flowers and in these gardens, which often had a well or fountain in their midst fashioned to symbolise the four rivers which flowed from Eden [Hunter, 1985, 41]. Flowers such as the iris, lily and rose were grown as much for their medicinal properties as for beauty [Thacker, 1979, 82]. From the 11th century, the paradise garden was prominent in the highly idealised epics and songs that extolled the chivalry, knights and courts of the time:

> "The garden [was] the embodiment of sensual delight, a refuge of love and happiness, sheltered by wall, hedge or pale from the unpredictable, disordered and potentially dangerous world outside. Natural reality is distrusted ..." [Hunter, 1985, 50]

A contrary view was that of St Anselm in the early 12th century who considered that things were harmful in proportion to the number of senses they delighted. He therefore rated gardens as particularly dangerous since one could use sight, smell, touch, taste and even hearing [Clark, 1976, 3]. Other more open minds regarded the garden as a forerunner of paradise.

In Old Saxon, the word 'paradise' translated as 'meadow' [Hunter, 1985, 77]. By the 12th century, the pastoral ideal was rediscovered and informed a new sensitivity towards nature.

> "... (the) pastoral fancy still tended to bring the loving soul in touch with nature and its beauties.... Out of the simple words of exultation at the joy caused by sunshine and shade, birds and flowers, the loving descriptions of scenery and rural life gradually develops" [Huizinga, quoted by Shepard, 1967, 75].

Apart from its security, the walled garden had Christian symbolism. This sprang from the Song of Solomon where the virgin bride is described "You are a garden locked up, my sister, my bride; you are a spring enclosed, a sealed fountain." [4:12]. It is a short step from this to equating the virgin bride with the Virgin Mary whom Medieval paintings often showed in an enclosed garden with the means of enclosure - a wall, fence or paling, carefully depicted [Thacker, 1979, 83]. In psychoanalytical terms the symbolism of sexual inaccessibility created by the wall is obvious.

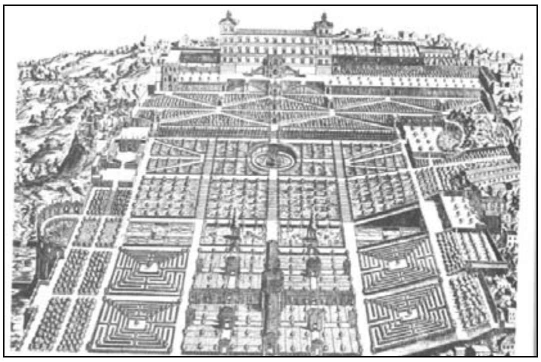
Symbolism extended to the flowers and trees that were symbols of the divine and their inclusion in designs such as early mosaics and as carvings on cathedral pillars contained this meaning. [Clark, 1976, 6]

In England, the landscape garden developed as a lawn or glade encircled by the forest wall, "an inverse oasis, an island of open space in the continuum of forest." [Shepard, 1967, 77].

By the 15th century, hunting parks were being established by every lord who was able to obtain a licence from the Crown to enclose land. The parks appeared relatively natural, even wild, as indicated in paintings of the time. Well-spaced trees were isolated or in stands, providing glades and vistas with the grass grazed by deer or rabbits, which met the needs of the hunt. With the addition of a temple or two and a lake, the landscapes would be almost identical to the planned landscape gardens of the 18th century [Hunter, 1985, 55-6].

Prior to the Renaissance, Italian gardens were characterised by their formality with a central fountain and " a modified monastic patio severely dominated by orthodox symbolism and beautifully integrated into an overall religious architecture" [Shepard, 1967, 78]. During the Renaissance, in the 16th century these blossomed into major works of art. Some like the Villa d' Este at Tivoli were among the "most brilliant gardens of history" [Ibid, 79]. This particular garden, established from 1550 to 1580, provided extensive views over the Campagna towards Rome and was called a water garden because of its extensive use of water in fountains, cascades, sprays and pools. The terrace of the Hundred Fountains, the Dragon fountain, the "joyously fecund statue of Diana of the Ephesians" and female sphinxes with water gushing from their breasts, expressed the symbolism inherent in water as life and fertility [Thacker, 1979, 100].

Renaissance gardens were enclosed by walls and comprised strong axial hedges and topiary, paved paths, grottos, and ponds connected with fountains. These were not gardens in the modern sense - they lacked grass and flowers though they were often surrounded by parkland. Their formality was seen as defining nature in the classical, regular mould, thus improving on the irregularity and imperfection of nature.



Source: Hunter, 1985

Villa d' Este, Tivoli, 16th C.

Alexander Pope [1688 - 1744] provided detailed descriptions of hunting parks and gardens in England - they included the temple, cascades, ruined castle, bridges and lofty trees to frame the view [Ibid, 97]. Pope considered "all gardening is landscape-painting, just like a landscape hung up" [Quoted by Barrell, 1972, 47].

With the outbreak of peace in France in the 17th century, new country houses were established with extensive grounds that were transformed into vast gardens. Gardens were equated with status and French aristocrats sought to out-do each other in the immensity and content of their gardens. Covering hundreds of acres, they contained lawns, hedges, and ponds; some royal parks extended to the horizon, ponds became lakes, paths became avenues, garden temples became palaces, and whole forests [rather than mere hedges] were sculptured.

Versailles, the most extensive of the French gardens, had a Great Canal a mile long along its central axis. The garden was established by Louis XIV between 1661 and 1700 as a creation through which, together with the chateau he could demonstrate his glory to the world. The gardens take visitors a day to cover. In Louis' time Versailles was a water garden with many fountains that today are much fewer and smaller in size. An English visitor in 1698 wrote:

> "In a Word, these Gardens are a Country laid out into Alleys and Walks, Groves of Trees, Canals and Fountains, and everywhere adorned with ancient and modern Statues and *Vasa* [urns] innumerable" [quoted by Thacker, 1979, 152].

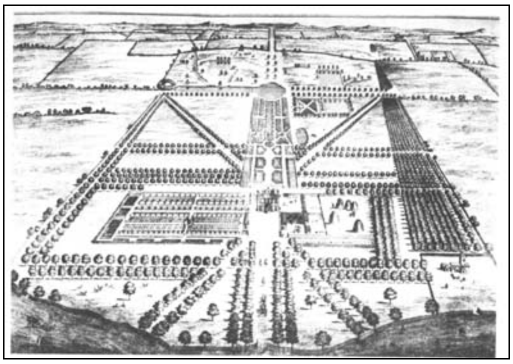
Half a century later, Lord Kames, in *Elements of Criticism* [1763], wrote of Versailles as a monument of depraved taste:

> "its groves of jets d'eau, statues of animals conversing in the manner of Aesop, water issuing out of the mouths of wild beasts gave an impression of fairy-land and witchcraft" [Malins, 1966, 92].

In 1739, Horace Walpole described them as:

> "forced, all is constrained about you; statues and vases sowed everywhere without distinction; sugar loaves and minced-pies of yew; scrawl-work of box, and little squirting jets-d'-eau, besides a sameness in the walks" [Malins, 1966, 5]

He thought them suited to a "great child', his estimation of Louis XIV [Malins, 1966, 119]. The geometrical patterns which underlay the design of these gardens was pure classicism; irregular curves were regarded as deformed, straight lines and circles dominated, trees and flowers were represented by standardised and perfect shapes reflecting the perfection of nature - that nature "is striving to realise herself in regular forms" [Barrell, 1972, 45].



Source: Hunter, 1985

Leyton Grange, Co. Essex, 1720

In 17th century England, some gardens were established following the French formal mode - Hampton Court and St James Park are examples. Palaces and gardens were constructed in the manner of Versailles, examples include Boughton, Cassiobury, Blenheim, Castle Howard, Stowe and an outstanding formal garden at St Paul's Walden Bury in Hertfordshire, built in the first half of the 18th century.

When Celiea Fiennes [1662-1741] toured the country in the 1690s, she visited a number of gardens and her descriptions indicate the widespread formality: "rows of trees paled in gravel walks, fine cut hedges, flower-pots on walls, terraces, statues, fountains, basins, grass squares and exact, uniform plots" [Malins, 1966, 16]. Some of the formal gardens survived the 'natural' gardens of the later 18th and 19th centuries, but the English generally disliked formality - Shaftesbury for example wrote:

> "I shall no longer resist the Passion growing in me for Things of a natural kind; ... Even the rude rocks, the mossy caverns, the irregular unwrought grotto's, and broken falls of waters, with all the horrid graces of the wilderness itself, as representing NATURE more, will be the more engaging, and appear with a Magnificence beyond the formal Mockery of Princely Gardens." [Manwaring, 1925, 122-3]

Shaftesbury preferred what he termed "ordered wildness", which today would seem an oxymoron.

The French gardens were seen to reflect the autocratic monarchy:

> "The subjugation of Nature by Art, whether in the detail of clipped trees and hedges, or in the basically concentric plan of French gardens, was fundamentally autocratic." [Malins, 1966, 16]

The English characteristics of benevolence and moderation were contrary to the French manner and besides, the English lacked the funds to establish such vast gardens.

By the end of the 17th century, country living was an accepted way of life and many estates were established [Turner, 1986, 12-13].

(4) 18th Century Landscape Gardens

In place of the French formality, the English turned to the Italian landscape as epitomising the desired natural and classical associations. It was a landscape portrayed in an idealised way by the Italianate paintings of Claude Lorraine, Salvator Rosa, Poussin and others. At the end of the 18th century, Archibald Alison, in *Essays on the Nature and Principles of Taste* [1790], attributed the creation of English landscape gardening to admiration of these artists' Italianate landscapes [Manwaring, 1925, iii]. He wrote:

> "Our first impressions of the Beauty of Nature had been gained from the Compositions which delineated such scenery; and we were gradually accustomed to consider them as the standard of Natural Beauty." [Ibid].

He argued,

> "the English first copied Italian scenes, with much use of temples, ruins and statutes, but later arrived at more correct imitation of natural scenes, in the spirit of the painters." [Ibid, 162].

In *Italian Landscape in Eighteenth Century England* [1925], Elizabeth Manwaring entitled her chapter on landscape gardens "The Creation of Italian Landscape in England", thus emphasising their roots and objective. In this chapter she traced the influence of the Italianate paintings on the development of the English landscape garden. Christopher Hussey, in *The Picturesque* [1927] similarly argued that the English landscape garden was modelled on the paintings of Claude, Poussin and Rosa. This view has been disputed by Lang arguing that it does not take account of the garden's slow development [Lang, 1974, 3].

The great country estates were established by reclaiming former small enclosures. Influenced by their Grand Tours to the Continent, English gentry surrounded their country manors with parks and gardens. They established settings without walls so that the eye would not be imprisoned and the park extended unbroken to the surrounding countryside. Removal of the walls allowed the landscape garden to blend with the surrounding country. This was a feasible proposition in well-watered England but impossible in the drier Mediterranean or Middle Eastern lands, where it would have resulted in the irrigated gardens contrasting with the surrounding arid land.

The removal of the walls was made possible by the development of the *ha ha*, a sunken fence in the form of a ditch that provided a barrier without interrupting the view. The ditch had to be sufficient width and depth to prevent stock crossing. Its name derived from the expression of surprise on finding the obstacle and came into use about 1712 [Shorter Oxford Dictionary].

One of the early landscape garden planners, the Yorkshire artist, William Kent [1685 - 1748], spent some years in Italy and on returning to England about 1719 set about designing everything from “palaces to petticoats, but especially ... furniture and grounds” [Manwaring, 1925, 129]. In 1743, Walpole wrote approvingly of his gardens: he “can make bleak rocks and barren mountains smile” and, through Kent’s use of the ha ha “He leaped the fence, and saw all nature was a garden”.

Walpole observed the inspiration provided by the Italianate artists: “he [i.e. Kent] realised the compositions of the greatest masters in painting.” [Manwaring, 1925, 130] His imitations extended as far as inserting dead trees in the Kensington and Carlton gardens, reflecting Salvatore Rosa’s motifs. The Stanstead gardens of the Earl of Halifax, according to Walpole, “recall such exact pictures of Claude Lorrain that it is difficult to conceive that he did not paint them from this very spot.” [Ibid, 131]

A later landscape gardener, William Shenstone, a gentleman amateur, commenced work in 1745 and specialised in creating pictures in the landscape - siting seats and summer houses in the best places to view the gardens. He used foliage gradations, the size of trees, and buildings to lengthen vistas, and created “garden-scenes” of the sublime, the beautiful and the melancholy. [Ibid, 135].

As befitted Italianate landscapes, English gardens contained ruins, specially designed and constructed for the setting. Often these were Gothic, sometimes Roman or Greek and ivy and other plants were encouraged to grow over them. While often ridiculed, the artificial ruins reinforced the image of the garden as capturing the landscapes of Claude or Rosa, they were both objects and symbols. Sanderson Miller was a chief designer of ruins (!), mingling classic and medieval, Gothic and Italian. Janowitz argues that ruins “serve as the visible guarantor of the antiquity of the nation, but as ivy climbs up and claims the stonework, it also binds culture to nature ...” [Janowitz, 1990, 54]. Books on the design of ruins appeared up to 1800.[45]

Ruins were one aspect of the falsity of garden decorations: like movie sets some gardens used one-sided bridges through which the garden could be framed, and one writer suggested vistas might terminate with painted canvas backdrops! [Crook, in Clark, 1989, 45].

Over the 18th century, landscape gardens became more complex, including grottos, caves, cliffs, hermitages, falls, statuary, exotic objects and even macabre scenes [Shepard, 1967, 87]. There gradually developed two schools; those preferring the simple lawns and woody clumps - the classic pastoral, and those who followed painting as the model and included many symbolic objects. Many hundreds of landscape gardens were established in England in the 18th century and over the following century their trees came to maturity.

Some authorities of taste, such as the artist Sir Joshua Reynolds, held that gardening is not a fit subject for painting because it is a derivation of nature. However, the landscape designers believed that they were implementing Longinus’ dictum, that “to achieve perfection, art must be disguised as nature”[46] [Heffernan, 1984, 6]

The outstanding landscape garden designer in the 18th century was Lancelot “Capability” Brown [1716 - 1783], who “reigned” from 1750 to 1783 and who designed over 200 parks [Turner, 1986, 98]. He was dubbed “Capability” because he often spoke of “the 'capabilities ’ he discerned in the chaos of nature” [Cook, 1974, 177]. Although in his lifetime he was considered by some to produce monotony and tameness, and is criticised now for his destruction of existing avenues of trees, his creations brought him great fame. He excelled in the use of water - it “was his boast that Thames could never forgive him for the glories of Blenheim” [Manwaring, 1925, 140].

45. See for example, Janowitz, A., 1990. *England’s Ruins: Poetic Purpose and the National Landscape.* Basil Blackwell, Oxford; Zucker, P., 1968. *Fascination of Decay: Relic - Symbol - Ornament.* The Gregg Press, Ridgewood, New Jersey.

46. Longinus wrote “Art is perfect just when it seems to be nature, and nature successful when the art underlies it unnoticed” [Malins, viii]

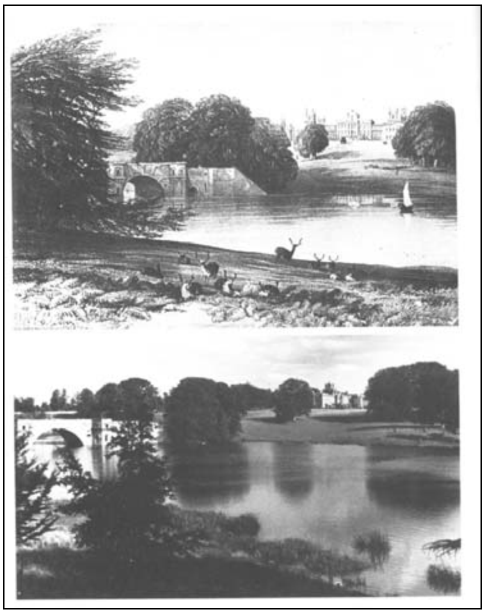
Following the lead of the Italianate painters, Brown used water, clumps of trees and particularly sweeps of lawns very effectively. He guided the landscaping of many country estates, following a formula of unbroken turf, sinuous streams, clumps of trees arranged to provide vistas beyond, and an encirclement of woods. The aim was to capture the peace, tranquillity and idyllic feeling associated with the classic pastoral scene. A minimum of 30 - 40 acres of lawn and trees was required. Undulating belts of trees surrounded Brown's gardens, which served to accentuate contours and hide boundaries. The beauty of these landscaped gardens derived from their sense of detail, smoothness of line, and the gradual rather than sudden changes. "The beautiful landscape was characterised by symmetry, graceful curves, grazing animals, and a mixture of lawn, water and trees." [Shepard, 1967, 87] The tourist, looking for picturesque scenes, revelled in Brown's works.

Brown's reputation was such that shortly before his death a group of Irish noblemen sought him to work in Ireland, but he refused, boasting he had not yet finished England!

In the mid 18th century, Walpole wrote, "the country wears a new face; everybody is improving their places" [Manwaring, 1925, 144]. In the latter half of the century, many books and poems about gardening were produced. Speaking of Capability Brown, one poet wrote of the Italianate influence:

> "At Blenheim, Croom and Caversham we trace
> Salvatore's wildness, Claud's enlivening grace..." [Manwaring, 1925, 146]

The example of Blenheim illustrates the contemporaneous changes to the state of gardens and to fashion. Woodstock Park was established in the Middle Ages. In 1705, Queen Anne gave it to the Duke of Marlborough in recognition of his military victories against the French at Blindheim, after which it was called Blenheim. With the architect Vanbrugh, the Duke of Marlborough set about establishing Blenheim Palace and the gardens. These were originally designed by Vanbrugh and Henry Wise, the Queen's master gardener. Charles Bridgman, an apprentice to Wise designed the Grand Avenue and Vanbrugh designed the Grand Bridge which crossed the River Glyme. To make the River somewhat larger than its rather paltry size, it was proposed to dam it and create a canal. An engineer, Colonel Armstrong, designed a formal canal scheme that would create an expanse of water 30 metres across. This was constructed in the 1720s.



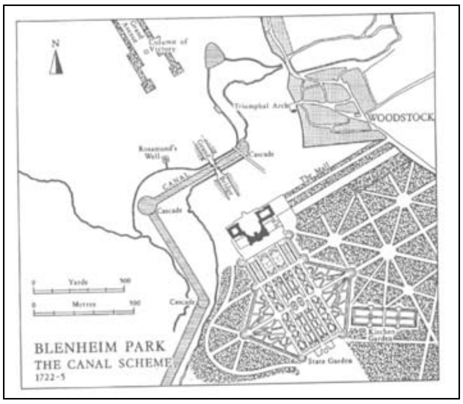
Source: Bond & Tiller, 1987

Blenheim across Capability Brown's Lake, 1842 [top] and 1983 [bottom]

Following Marlborough's death in 1722 and his widow Sarah's death in 1744, the property passed to their heirs. In about 1760, Capability Brown was commissioned by the fourth Duke to improve the grounds. He transformed them "into a 'naturalistic' landscape which retained many of the essential features of the earlier design but at the same time brought them together into a single, united composition" [Bond & Tiller, 1987, 91]. Brown reshaped some areas, created a great lake of 150 acres, created the Cascades - a low waterfall, and established clumps of trees around the lake together with extensive shelterbelt around the park.

After Brown, new designers added classical temples, gardens around the Cascades were established by the fifth Duke in the 1820s, parts of the Great Park were used for agriculture, formal gardens were established near the Palace, and further clumps of trees were planted around the lake, some unfortunately, blocking views. Early in the 20th century, the ninth Duke established a water garden to the west of the palace and replaced the elms of the Grand Avenue, which extended nearly two miles. Unfortunately, these were destroyed in the 1970s by Dutch elm disease and were replaced by the eleventh Duke.

This case history illustrates that gardens, unlike paintings, are living objects that change over time, are subject to the vagaries and stresses of climate and disease, and to changing fashions.



Source: Bond & Tiller, 1987

The Development of Blenheim Park

Toward the end of the 18th century, the Grand Tour extended from Rome to Greece, then to the Aegean as interest grew in Grecian classical culture. As this occurred, 'Greek' ruins were constructed in gardens, instead of Romanesque ruins which dominated in the first half of the century. The Grecian motifs made the Arcadian vision appear even closer [Crook, in Clarke, 1989, 49].

Thomas Whately, who wrote *Observations on Modern Gardening* [1770], considered gardening "as superior to landscape painting as reality to representation." [Ibid, 146] Using five materials, ground, wood, water, rocks and buildings, the landscape gardener "stood with a spade in one hand, and Burke *On the Sublime and Beautiful* in the other" and created "great ideas" or "ideas of beauty or variety" [Hussey, 1927, 152]. Horace Walpole's *Essay on Modern Gardening* [1771] became the standard for the fashionable, Manwaring writes "it was in all polite hands", and provided an historical overview of the subject. Walpole waxed rhapsodical about the English achievements of landscape gardening, a term which he believed he had created:

> "How rich, how gay, how picturesque, the face of the country! The demolition of walls laying open each improvement, every journey is made through a succession of pictures ... Enough has been done to establish such a school of landscape as cannot be found on the rest of the globe. If we have the seeds of a Claud or a Gaspar among us, he must come forth. If wood, water, vallies, glades, can inspire a poet or a painter, this is the country, this is the age, to produce them." [quoted by Manwaring, 1925, 148]

The 18th century saw landscape gardening become a significant enterprise, giving rise to much poetry, literature and debates; Manwaring considered that no other century has seen the garden a "more constant subject of literary treatment than in the eighteenth" [Ibid, 166]. Unfortunately, the French Revolution associated sumptuous gardens with aristocratic decadence, resulting in the destruction of many hundreds of gardens both in England and on the Continent.

The development of the landscape garden and its appearance, not aberrations isolated from the wider cultural ideas of nature, they were a direct manifestation of the ideal landscape as then perceived. Natural landscapes were still regarded as too irregular to contain beauty, so the landscape gardens created islands of perfect "nature". Interestingly the gardens then influenced cultural norms about nature, as noted by garden historian Marie Luise Gothein "the feeling for nature was inspired in the main by the artistic beauties of the garden." [Quoted by Shepard, 1967, 88]

By the late 18th century, however, a new view about landscape gardens emerged, one that was less enamoured with Capability Brown. In 1794, Uvedale Price and Richard Payne Knight respectively, published *An Essay on the Picturesque*, and *The Landscape, a Didactic Poem in Three Books, Addressed to Uvedale Price*. Price considered that gardens should be "judged by the universal principles of painting" [Hussey, 1927, 173]. Knight's lengthy poem (12,000 lines) was a diatribe against Brown's school of landscape gardening.

Brown's mantle was assumed by Humphrey Repton [1752 - 1818], continuing what Price and Knight considered the "insipidity" of the Brownist stamp of landscape gardening. Central to the dispute was the question of whether landscape painting, particularly that by Claude Lorraine, can serve as an adequate basis for landscape gardening. The argument raged back and forth over the following decade and is largely of academic interest now. When Repton published his *Observations on the Theory and Practice of Landscape Gardening* [1803], he argued that a gardener does not follow a painter, yet his designs suggested otherwise - closely following Claude in many features.

Repton sought to emulate the perfection he already saw in nature - in contrast to Brown who sought to bring order out of chaos. His *Red Book* series illustrated before and after scenes of the gardens that he designed. Repton's influence was immense. In Regents Park and St James Park in London [both designed by others], and even in the parks of Olmsted such as New York's Central Park, his touch is evident.

Repton often softened Brown's principles; whereas Brown had turf extending to the house, Repton provided beds of flowers and reintroduced the fountain which had been banished from the 18th century "natural" gardens because of its artificiality. Following his lead, interest grew in the traditional cottage gardens near ordinary houses and with the growth of a more educated and affluent middle class in England, gardening became a popular activity. Gardening manuals and periodicals flooded the market in the first half of the 19th century.

During the mid 19th century, flower gardens were formalised along with hedges, and formality became the hallmark until, in the 1880s, it was countered by works such as William Robinson's *The Wild Garden* [1870] and *The English Flower Garden* [1883]. Robinson denounced the formality of "pastry-work gardening" and the works of "fountain mongers" arguing for a natural approach [Hunter, 1985, 129]. Fashion seesawed between formalism and informality. Thacker terms it a shift from the picturesque of the 18th century to the gardenesque of the 19th, gardenesque being qualities that displayed the art of the gardener. Gardens were "tidy, imaginative, historically-based, attractive and with a comfortable and human scale" [Thacker, 1979, 227]. During the Victorian era:

> "the opulence of the ornamental grounds of their great houses seems incredible: the armies of gardeners required to maintain the parterres of bedding plants and rake acres of gravel, the collections of every exotic tree and shrub that could be induced to survive, and the stonework of terraces, stairs and ornaments." [Hunter, 1985, 123]

William Robinson helped introduce many exotic species into England for use in "natural" gardens and his mantle passed on to Gertrude Jekyll [1843 - 1932], an accomplished landscape gardener, and Edwin Lutyens, a formal garden designer. Working together, the themes of wildness and formality were resolved in outstanding ways. World War 1 effectively ended the great age of landscape gardens in England, the economics of husbanding large gardens in straightened times saw to that. The National Trust in Britain owns and maintains some of the houses and grounds that had been landscaped by Kent, Brown or Repton [cf Thomas, 1983], but the home gardens of today tend to be a pale imitation of the vastness of former times:

> “While the parkland tradition lingers on forgetful of its origins, the garden tradition has become democratised, the weekend hobby of every family lucky enough to own a few square yards of space around their houses” [Hunter, 1985, 132].

Although the Brown/Repton approach to landscape gardening ceased in Britain, its natural style had a major influence in North America, where the natural environment is important. The contrasting American and English cultural attitudes is illustrated by the comments of an American visitor to the view overlooking countryside near London in 1835. The English regarded the scene as one of the most beautiful, varied and extensive. The whole scene was a garden in cultivation, every field enclosed by hedgerows. As these receded in the distance, less and less could be seen of the fields, but the trees could be seen to the extreme distance.

> “And do you call this beautiful?" said [the American], “In America we would consider it one of the most desolate scenes that the mind can conceive. It resembles a country that has never been cleared of wood."[47] [Shepard, 1967, 133].

Such is the influence of culture upon one’s perceptions. The quote also illustrates the fallacy of assuming that the Western cultural perspective towards landscapes is a homogeneous unity, although there are areas of commonality which derive from a partly shared heritage, there are also distinctive national differences. This lends credence to focusing the view in this chapter to mainly that of a single country: England.

(5) Gardens & Landscape Conclusions

Parks and gardens provide an opportunity to create in a small space an idealised landscape, one that surrounds the individual and separates them from the external world. With origins extending back into pre-classical times in Persia, then through the Greek and Roman cultures, gardens have held an eminent position in Western culture. Unlike the gardens of the East that contain significant symbolic import, Western gardens are generally symbol free. However, the free-spirited, natural gardens that were developed in England during the 18th century were seen to epitomise the English characteristics of benevolence and moderation, and contrasted with the formality of the French creations which were regarded as symbols of an autocratic monarchy.

The 18th century landscape gardens were probably England's most lasting contribution to gardens, and their influence has been enormous. Their picturesque qualities, deriving inspiration from the paintings of Claude, Salvatore and Poussin, created images of naturalness, understatement, peace and contentment that transcended their physical elements. Such gardens represented the ideal landscape, classical images of the Golden Age with its pastoral imagery, gardens which did not suffer the irregularities and disfigurements of a natural landscape, but rather one in which everything was in keeping.

The design of gardens reflected prevailing English taste about the wider landscape, as reflected in its attitude to mountains and in its art. The fulfilment of the garden design obviously involves a greater span of time between conception and realisation than in art and in the attitudes towards mountains, but a consistency is clearly apparent between the three.

6.7 SUMMARY

Tables 6.1, 6.2, 6.3 and 6.4 summarise the significant findings for the classical and teleological foundations, the attitudes to mountains, the development of landscape art, and the development of gardens and parks respectively. Figure 6.1 indicates the duration and relative timing of the various influences, significant publications, and life spans of key individuals.

47. See for example, Jackson, 1965, Lowenthal, 1966, Nash, 1975, Erickson, 1977, Gidley & Lawson-Peebles, 1989 and Conzen, 1991 for treatments of the historical development of landscape values in North America.

Table 6.1 Summary of Significant Findings: Classical & Teleological Foundations

Period	**Findings**
Early Christian era & Middle Ages	Beauty as evidence of God Beauty as evidence that the earth is Divinely created [Aquinas 13th c.] Beauty as God's adornment of the earth [Basil, 4th c; Ambrose, 4th c.] Classical principles of restraint, regularity, proportion, symmetry [Augustine, 4 -5th c.] Man helping God beautify the earth - role of monasteries Utility of the earth and its beauty linked [Albert, 13th c; Aquinas, 13th c.]
Renaissance to Late 19th century	Classical principles of beauty Scientific discoveries provided further evidence of God Man invested with power to preserve beauty of Earth and to render it more beautiful and useful [Hale, 1677; Ray, 1691; Derham, 1713; Voltaire, 1768] Beauty of Divine works [Leibniz, 17th c; Boyle, Woodward, 17th c; Ray, 1691] including irregular and asymmetrical features [Boyle] **Opponents to Teleology** Rationalist ways of thinking, separation of nature from mind [Descartes, 1637] Object's character lay in judging mind rather than in object judged [Kant, 1790] Reverie/communing with nature [Rousseau, 1765] Combining understanding of nature and feeling for nature [Goethe] Evolution of species [Darwin, 1859]

Table 6.2 Summary of Significant Findings: Attitudes to Mountains

Period	**Findings**
Early Christian era to mid 17th century	Mountains did not meet classical principles of regularity, harmony, symmetry and proportion and therefore considered not to have been created by God. Mountains described in very negative terms. Regarded as ugly, evil, useless places, indicative of decay and of Man's fallen state.
Mid 17th century to late 19th century	Recognition of utility of mountains [More, 1652; Ray, 1691] Experienced awe and terror in mountains; identification of sublime [Burnet, 1681] Development of concept of sublime [Dennis, 1688; Shaftesbury, 1686; Addison, 1710; Burke, 1757; Kant, 1764, 1790] Aesthetics of the Infinite, late 17th c-early 18th c. Cosmos, oceans, mountains. Recognition of beauty of mountains [Ray, 1691; Nicolls, 1699; Berkeley, 1714; Gray, 1765; Gilpin, 1770] Profound psychological effect of mountains - Romanticism [Gray/Walpole, 1739; Rousseau, 1760; Goethe, 1775; Wordsworth, early 19th c.] Grand Tour, 18th c; Tours of sublime early 18th c; tours of mountainous areas 18th c; tours of picturesque, late 18th c.; Publication of guidebooks.

Table 6.3 Summary of Significant Findings: Development of Landscape Art

Period	Findings
13th to 17th century	Landscapes as backgrounds to religious themes, 13th to 17th c. Seasonal paintings, 1416; altarpieces, 1432. Earliest topographical painting [actual location], 1444 Dutch/Flemish, Venetian landscape painters, 15th - 16th c. Development of perspective, Renaissance, Italy, 15th c. Classical themes. Development of landscape painting in its own right, 17th c; Italianate, Dutch, Flemish & French schools. Classical themes, topographical landscapes, idealised landscapes, travel paintings. Dutch painters introduced landscapes to England, 17th c. Realistic paintings of Rubens [1577 - 1640] Italianate idealised Arcadian classical landscapes of Claude Lorraine [1600-82] & Nicholas Poussin [1593 - 1665] and hundreds of imitators. Sublime wild landscapes of Salvatore Rosa [1615 - 73]
18th century	Major art collections established in England - 18th c. Grand Tour Claude, Rosa & Poussin became major influences in England Demise of neo-classical art - mid 18th c; increasing topographical paintings of Wales, Lake District, Scotland. Picturesque - beauty that would look well in a picture; mid - late 18th c. Fusion of classical and romantic elements. Mainly 1730 - 1830 but continuing influence. Gilpin's [1770] rules for picturesque. His recognition of seeing with imagination [1769]. Price's characteristics of picturesque [1794]. Tours of picturesque scenes, mid - late 18th c. English school of landscape painters established, 1780s Alison's explanation of picturesque by associations it creates in mind [1790]
19th century	Knight's identification of role of intellect & imagination in perceiving beauty [1790s] and with association [1805]. Many writers on psychology of painting in 19thc. Romanticism - origins in 18th c, dominant 1750 - 1850 but continuing influence. Whereas classical art involved thinking, picturesque involved seeing, & Romanticism involved feeling - seeing into heart of things. Importance of imagination. Romantic painting often linked with poetry and classicism. Eventually descended into sentimentality and photo-realism. Impressionism of late 19th c. Focussed on conveying impression of colour and light. Ranged from realism to abstraction. Impressionism speaks to the senses. Landscape painting described by Lord Clark as the chief artistic creation of 19th c, due particularly to the English Romantic painters and the French Impressionists.

Table 6.4 Summary of Significant Findings: Development of Gardens and Parks

Period	Findings
Classical period	Gardens as sacred groves. Persia - parks & gardens esteemed. Persian carpets spread concept to West. Greece - Philosopher's garden and gymnasia often linked. Romans substituted fountains, sculptures & colonnades in garden. Roman villas with extensive parks.
Early Christian era to 18th century	Monasteries - cloister gardens; utility and contemplation. Symbolism of plants - cathedral columns Hunting parks established - 15th c; Arcadian appearance. Renaissance gardens - extensive formal gardens based on classical principles. 16thc. Country houses established in France with very extensive parks and gardens on classical formal lines - 17thc. Some formal gardens established in England but English disliked formality.
18th century	Informal English landscape gardens established inspired by Italianate landscape painting of Claude, Rosa and Poussin. Landscape planners included Kent, Shenstone, Capability Brown and Repton. Many hundreds of gardens established during this century. Appearance of classical images of the Golden Age, pastoral imagery, idealised landscapes. In contrast to the irregularity of surrounding landscapes, the gardens represented perfect "nature".
19th century	Emergence of middle class & smaller properties - cottage gardens. Gardening as popular recreational activity Formalism and naturalism the two poles of influence.

Figure 6.1 Approximate Span of Influence of Various Factors

6.8 CONCLUSIONS

The purpose of this chapter has been to examine the influence of culture upon the perception of landscape quality. In particular it has focussed upon Western cultural attitudes and within that broad range, centred on English attitudes, for the most part leaving aside attitudes of other European countries, the United States, Canada and other Western nations. The vastness of the subject, even when confined to providing an overview of the subject as it applies to England, has necessitated this limited approach.

The time frame of this paper's analysis has been largely the last two millennia, though generally stopping short of the current century which is the subject of Chapter 7.

The two broad influences of Western cultural attitudes to landscape up to the current century were classicism, the influence of the antiquity of Greece and Rome and the teleological view that the physical environment is an expression of God and a proof of His existence.

It is difficult, at the beginning of the 21st century, to comprehend the power that these two influences had on attitudes up to the end of the 19th century. Marjorie Hope Nicolson wrote:

> "it is difficult today, in an age when social, economic, and international problems are paramount, to think ourselves back to a time when these were of far less importance than theological issues" [1959, 77].

These two influences are not independent. It is apparent in the attitudes to mountains, for example, that both classicism, with its emphasis on the regularity and restraint of form, together with the teleological abhorrence of mountains, combined to define Western antipathy towards mountains through to the end of the 17th century. It was not that these factors ceased to have influence after then, rather that there arose a new paradigm, the sublime, which provided a new way of looking at mountains.

As Western culture emerged from medieval times, teleology exerted a dominant influence. The rebirth or rediscovery of classicism during the Renaissance brought the classical influence to the fore, as expressed in architecture, painting and sculpture. Over the following centuries these two influences, classicism and teleology, proceeded in parallel, both exerting significant influence over the culture of the time.

Over the period examined there has been a shift, from viewing aesthetic quality as an inherent quality of the physical landscape, to recognising that the physical landscape contains nothing that is inherently aesthetically pleasing and that such qualitative assessment is of the mind. These are the contrasting objectivist and subjectivist positions which also emerged in the history of philosophy [Chapter 2]. The development of the subjectivist position in cultural perception of landscape reinforces the significance of this finding.

Paraphrasing William Gilpin who described the subjectivist position, "we don't see with our eyes, we see with our imagination". Horace Walpole said of Italy "our memory sees more than our eyes in this country" and, although he was speaking about his classical education, the principle is the same; judgements are made on the basis of what is in our mind rather than what is on the ground. Table 6.5 summarises the differences between these two positions.

On the basis of the above differentiation of the objectivist and subjectivist positions, Table 6.6 classifies the various influences examined in this chapter.

Table 6.5 Objectivist and Subjectivist Positions: Summary

Objectivist	Inherent in the object viewed Objective characteristics
Subjectivist	"In eyes of beholder" as influenced by: • memories • associations • feelings • symbolism as each are induced by the object

The shift from the objectivist to subjectivist occurred in the 18^{th} century, early for the attitude to mountains, later for art and gardens.

The subjectivist paradigm has created the context through the memories, associations, feelings or symbolism it provides, and these determine the acceptability or otherwise of a particular scene, whether mountain landscape, landscape art or gardens.

In most instances however, individuals appraising a particular scene will be unaware of the subjectivist context for their assessment and will believe that they are making objectivist assessments.

Table 6.6 Objectivist and Subjectivist Classification

Factor & Period	Objectivist	Subjectivist
Classical Influence		Classicism
Teleological Influence		Teleology
Attitudes to Mountains		
Pre 18^{th} century		Attitudes based on classicism and teleological view
Post early 18^{th} century	Utility of mountains Beauty of mountains	Sublimity/aesthetics of infinite Psychological effect
Landscape Art		
Pre 18^{th} century	Early landscape painting	
Post 18^{th} century	Topographical painting	Idealised painting - Claude, Rosa etc Picturesque & sublime Romanticism Psychological effects of painting Impressionism
Gardens		
Classical era	Philosophers gardens Roman villa gardens	
Pre 18^{th}century	Monastery gardens Hunting parks	
Post 18^{th} century		Classically inspired formal gardens Italianate inspired 'natural' gardens

The assessment does not involve cognitive processing. That this is so is evident in the attitudes towards mountains for example. Prior to the late 17th century, mountains were universally disliked and then during the 18th century became progressively accepted. When they were disliked, individuals did not analyse the situation and say to themselves, "My classical and scriptural upbringing tells me I must dislike this scene of a mountain." Rather, their response was an instantaneous "revulsion!". The same applies when the cultural paradigm was reversed and mountains were seen as attractive. A person viewing one does not say "The sense of awe and terror that I experience in viewing this scene can be considered sublime which is a positive emotion". Rather, they simply say "I like it".

Similar instantaneous, non-cognitive, responses apply to whether a person is making an aesthetic judgement about a painting, a garden, a person's face, a house, a car or any other object.

The judgement that is made generally, but not invariably, reflects the ruling cultural paradigm relating to that object. Thus the judgement made is not absolute but is relative, relative to the particular cultural paradigm applying to that object at that point in time. In Victorian times it was fashionable [i.e. the cultural paradigm] for women to be plump, in some African countries for women have their necks extended by bands, in contemporary Western culture for women to participate in the workforce, and so on. The influence of cultural norms is thus no different with reference to aesthetic objects than to every other area of life, whether opinions on subjects, types of clothes to wear, correct behaviour in varying situations, etc. In many of these there will be a wide range of tolerance of varying opinions or behaviour, for example in clothing, while in other areas the variation of tolerance will be very narrow, for example in regard to violence.

Further evidence that the cultural paradigm on landscape is subjectivist rather than objectivist is found in the changeable nature of this paradigm over time. Although at any given time landscape attitudes may appear constant, the paradigm does change over time. If the paradigm is objectivist [i.e. is found in the landscape itself] and the landscape itself remains unchanged, then it would be expected that attitudes to it would remain constant over time. The fact that attitudes do change over time and are not absolute is evidence that they are subjectivist.

What is surprising is that in regard to aesthetic objects, where generally a wide variation of opinion is tolerated [e.g. art], that there appears to be a high degree of community conformity to the ruling cultural paradigm. It appears that, in the Western cultural paradigm applying to landscapes, the range of opinion regarding what is preferred is relatively narrow. The evidence for this will be examined in Chapter 8.

A simple model was postulated in Chapter 2 [cf Figure 2.5], in which the subjectivist cultural paradigm attaching to aesthetic judgements about a particular object provides the individual with a largely unconscious determinant of their individual judgements. However those individual judgements will be regarded by the individual as objectivist.

The subjectivist cultural paradigm influences the individual and informs their thinking so that, unconsciously, when asked to give an aesthetic opinion they draw from this paradigm and state that in their opinion they like it. They would be unlikely to do otherwise. When Thomas Burnet found in himself positive feelings aroused by mountains he could not simply say the subjectivist cultural paradigm that he had been brought up with was wrong, he had to find another explanation. His approach was to find a third way, the concept of the sublime that enabled him to appreciate mountains in a way which did not offend the subjectivist cultural paradigm fed on a diet of classicism and teleology.

While it has been argued here that the cultural paradigm exerts a dominant role in determining aesthetic preferences, one must also be mindful of other sources that help shape individual preferences. Freud's psychoanalytical theory suggests that these individual preferences are also influenced by repressed memories, sexual drives and unconscious fantasies and symbolisms. Gestalt and perception theory suggest preferences for certain shapes, groupings and patterns. Information processing theory proposes that certain qualities in a scene are favoured. It is suggested that these account for some of the variation of preferences that occur within the overall paradigm but do not serve as determinants of that paradigm.

The model of subjectivist cultural paradigm within which individuals exercise an objectivist view about aesthetic objects, such as landscape may explain the paradox in the literature on landscape. On the one hand, philosophers such as Hume and Kant assert that aesthetics are subjectivist, that it lies in the mind, but in every day life individuals make judgements about their preferences in which they plainly take an objectivist stance - I like those clothes, it's a pretty picture, it's a beautiful landscape, it's a lovely day. Each of these for the individual is objective fact. The model suggests that their judgements are made within the subjective cultural paradigm that they have absorbed and within which they make their judgements entirely unconscious of the cultural paradigm that causes them to reach it.

If the model is correct, it should be possible for a given culture at a given time to determine the characteristics of the subjectivist cultural paradigm applying to landscapes because this will determine the preferences that the majority of individuals within that culture will possess.

Given the changes in subjectivist cultural paradigms that apply to landscape preferences over time, is there anything that emerges which appears permanent characteristics? Perhaps the one characteristic which has stood the test of time and which has persisted is the image of the pastoral landscape. From classical times, when it reflected the image of Arcadia of the Golden Age, through the landscapes of Claude and Poussin, to the landscape gardens of the 18th and 19th centuries, the pastoral image of rural harmony with large scattered trees, extensive grasslands or lawn, with contented stock or people enjoying the ambience has persisted to the present time. Public parks and gardens reflect this image today, as do favourite rural landscapes. In recent years there has been debate about whether this preference for such landscapes reflects the evolution of humankind in the savanna woodlands of Africa or alternatively, represents an ideal landscape for survival, a landscape which in Jay Appleton's terms maximises survival opportunities of seeing without being seen.

These ideas will be explored further in the Chapters 7 and 8, suffice to say here that for whatever the reason, the pastoral idyllic landscape has held a position of preference in Western culture.

In respect of the survey of landscape quality, this study of culture has further reinforced the subjectivist paradigm as the appropriate model. The range of preferences for landscapes will serve as an indicator of the strength of the cultural paradigm applying in the Australian society to the perception of landscape.

CHAPTER SEVEN

TWENTIETH CENTURY LANDSCAPE STUDIES

7.1 INTRODUCTION

The objective of this chapter is to review landscape studies from the 20th century literature on landscape quality. It commences by examining typologies of landscape studies and then reviews in detail the study characteristics and methodologies.

Since the late 1960s, and paralleling the growth in community concern for the environment, there has been a very major increase in studies of landscape quality over the past 25 - 30 years. Much of the interest has been in North America [i.e. United States and Canada] and Britain, but the approaches of each has varied greatly.

7.2 EARLY 20th CENTURY LANDSCAPE STUDIES

Compared with the last 30 years, the first 60-odd years of the 20th century was marked by few landscape studies and little apparent interest in landscape. Perhaps this is not surprising, given the dire economic situation of the 1930s, the impact of two world wars, and the major social upheavals associated with accelerating industrialisation, the shift of employment from the countryside and growth of the cities.

Prior to World War 2, the main term used in describing landscape was *scenery*, however the use of this term to describe theatre scenery was confusing, so increasingly the term *landscape* came to be used. In the United States, however, the term *scenic quality* is often used.

In the following sections, the development of interest in landscapes is traced briefly by reference to Britain, the United States and Australia.

(1) Britain

Geologists used the term *scenery* as the focus of geological explanations. Many books[48] appeared with titles like *The Scenery of England*, but these did not describe the landscape in its aesthetic terms [other than generally] but in terms of the geological reasons for the appearance of the land. Geologists of the era focussed on the effect of geology on the surface of the earth. Later geologists focussed on the rocks and underlying structures and regarded the surface almost as an irrelevancy.

Geography was the main discipline in which an interest in landscape was kept alive in the early part of the 20th century. In 1920, the President of the Royal Geographical Society, Sir Francis Younghusband, addressed the Society on the theme, *Natural Beauty and Geographical Science*. Beginning his address with the words: "I have something to say which to old-fashioned geographers may appear revolutionary ..." he went on to argue that geographers should "regard the Earth as *Mother-Earth*, and the *beauty* of her features as within the purview of geography." [Ibid, 1] He claimed that, whereas mineral wealth and the Earth's productivity is limited:

> "the natural beauty is inexhaustible. And it is not only inexhaustible: it positively increases and multiplies the more we see of it and the more of us see it. So it has good claim to be considered the most valuable characteristic of the Earth" [Ibid, 4].

Following World War 1, the Council for the Protection of Rural England was formed, together with similar organisations in Wales and Scotland to safeguard the productivity and beauty of the countryside.

In the 1930s, a British geographer, Dr. Vaughan Cornish [who had been in

48 These include: Mackintosh, D., 1869. *The Scenery of England and Wales*, Longmans; Lord Avebury, 1906 [4th ed], *The Scenery of England and the Causes to Which it is Due*. MacMillan; Trueman, A.E. 1938. *The Scenery of England and Wales*. Victor Gollancz; Geikie, A., 1901. *The Scenery of Scotland Viewed in Connection with its Physical Geology*. MacMillan; Stamp, L.D., 1946. *Britain's Structure and Scenery*, Collins.

Younghusband's audience], responded to Younghusband's challenge and wrote extensively and essentially descriptively about scenery,[49] but all of his books are "now neglected by aestheticians and geographers alike" [Fuller, 1988, 12]. Cornish wrote that the:

> "combination of the English village, with the setting of field and hedgerow and coppice, is an Arcadian scene unrivalled elsewhere in Great Britain and unsurpassed in any part of the world" [Cornish, 1934, 199].

In the period leading up to and after the World War 2, when the national parks were being established, Cornish's works had some influence [Appleton, 1975, 52].

In 1932, the Town and Country Planning Act gave local councils power to preserve scenic amenity. Although the World War 2 was a period of immense upheaval, it was also a period in which the English realised that their post-war society needed to change from what had gone before and to prepare for post-war reconstruction.

> "A newer and better Britain was to be built. The feeling was one of intense optimism and confidence. Not only would the war be won: it would be followed by a similar campaign against the forces of want. That there was much that was inadequate, even intolerable, in pre-war Britain had been generally accepted. What was new was the belief that the problems could be tackled in the same way as a military operation." [Cullingworth, 1985,13]

In 1942 an official inquiry on rural land use[50] recommended the establishment of national parks for the enjoyment of the whole nation. The inquiry led to the 1944 White Paper, *The Control of Land Use* which referred to the establishment of national parks as part of a comprehensive post-war plan [Cullingworth & Nadin, 1994, 172]. In 1945, the Dower Report[51] defined national parks as "an extensive area of beautiful and relatively wild country, in which, for the nation's benefit ... the characteristic landscape beauty is strictly preserved..." [Cullingworth, 1985, 198]. The definition also provided for public enjoyment, wildlife, cultural heritage and farming. Dower also proposed protection for areas of high landscape quality.

The focus on landscape beauty during the wartime is striking, perhaps reflecting a deep psychological comfort associated with the character and perceived beauty of their country during the trauma and hardship of war.

While Dower's emphasis was on "relatively wild areas of moor land and rough grazing" [Mosley, 1975, 66], the Hobhouse Report[52], which followed in 1947, saw national parks as being larger and also covering areas of countryside, which had been changed by the imprint of human development and use. Hobhouse called Dower's idea of areas of high landscape quality "conservation areas".

In 1949, the National Parks and Access to the Countryside Act [the NPAC Act] was proclaimed under which, between 1951 and 1957, ten large tracts of private land were designated as national parks. The designation of areas as national parks was based on their perceived natural beauty and recreational potential. Natural beauty was defined as including "scenic beauty, flora, fauna and geological and physiographic features" [Mosley, 1975, 66] - certainly a generous description extending well beyond landscape quality.

The NPAC Act incorporated Hobhouse's concept of conservation areas with the power to designate Areas of Outstanding Natural Beauty [AONB] but it did not provide criteria for their selection. Although of comparable landscape quality with national parks, AONBs were generally smaller, less suitable for outdoor recreation, and did not include extensive areas of open countryside [Robinson, *et al*, 1976, 20]. While the

49 His books on landscape included: *The Poetic Impression of Natural Scenery* [1931], *The Scenery of England* [1932], *Scenery and the Sense of Sight* [1935], *The Preservation of our Scenery* [1937], *The Scenery of Sidmouth* [1940], and *The Beauties of Scenery, a Geographical Survey* [1943].

50 *Report of the Committee on Land Utilisation in Rural Areas* (Scott Report), Cmd. 6378, HMSO, 1942.

51 National Parks in England and Wales (Dower Report), HMSO, Cmd 6628, HMSO, 1945.

52 Ministry of Town & Country Planning, 1947. *Report of the National Parks Committee (England and Wales)* (Hobhouse Report), HMSO

National Parks comprised mainly highland landscapes, AONBs comprised more densely settled lowland landscapes.

By 1991, the national parks totalled 14,011 sq km, or 9% of England and Wales, while the 40 AONBs totalled 20,449 sq km or 11.6%. The parks and AONBs include about one-third of the coastline of England and Wales.

The system of national parks over private land and the designation of AONBs is a uniquely British solution to the competing desires to protect high quality environments with the need to provide food and fibre for a large population. The early emphasis on landscape parallels the experience in other countries. Scenic preservation, along with provision for public enjoyment of the parks, were the major initial reasons for the creation of national parks; concern about the protection of flora and fauna was generally a later factor.

Meanwhile in 1947 the *Town and Country Planning Act* had provided for the designation by councils of Areas of Great Landscape Value within council development plans. Areas were defined subjectively through surveys by one or two individuals, modified through discussions in-house and the results often varied widely from county to county, which became apparent at the county boundaries [Robinson *et al*, 1976, 21].

The first real attempt to move beyond mere descriptions of the landscape and to analyse the British landscape more rigorously began with the work of David Lowenthal, a researcher with the American Geographical Society, and Hugh Prince, a geographer at University College, London. In two seminal papers, *The English Landscape* [1964] and *English Landscape Tastes* [1965] they described the content of the English landscape and English landscape preferences.

Lowenthal and Prince identified variety, openness and atmosphere as key visual qualities of the English landscape. They referred to it as "altogether so tamed, trimmed, and humanized as to give the impression of a vast ornamental farm, *as if the whole of it had been designed for visual pleasure*" [1964, 325, my emphasis].

In their later paper, Lowenthal and Prince identified components of what they considered epitomised the English landscape preferences: the bucolic, the picturesque, the deciduous, the tidy [i.e. order and neatness], façadism, antiquarianism (rejection of the present, the sensuous and the functional; having historical associations), and Pope's *genius loci* - the spirit of the place. The list was derived from the authors' interpretation of the literature and embodied the "past and present virtues of the inhabitants" [Ibid, 186].

In the late 1960s different approaches were developed by Fines [1968], in a survey of the East Sussex landscape, and by Hebblethwaite in a survey of the East Hampshire AONB [Hampshire C.C. *et al*, 1968]. Fines' work in particular, though not without its critics for its subjectivity[53], was influential in encouraging county councils to initiate similar surveys [see Penning-Rowsell, 1974]. A more sophisticated and objective study based on component measurement and statistical analysis was undertaken of the Coventry-Solihull-Warwickshire landscape in 1968 [Study Team, 1971].

The Forestry Commission in Britain acquired extensive tracts of barren highland areas on which it planted softwood plantations. This action provoked continuing controversy on landscape grounds:

> "no other single issue has raised so much controversy as the conifer plantations in the Highland zone of Britain. Everywhere they have been condemned as unsuited to the landscape..." [Simmons, 1965, 28]

Eventually, the pressure was such that the Commission engaged the leading landscape architect, Sylvia Crowe, to advise it [Crowe, 1966].

During the 1980s and 1990s, the Countryside Commission sought to fulfil its statutory obligations for maintaining natural beauty; it embarked on a series of studies. It identified the extent of change of the physical landscape, for example, finding that at the end of World War 2 woodlands covered 7800 square miles while pine forests were only 400 square miles.

53 Eg Brancher, 1969.

However by 1980, woodlands had contracted to 3000 sq miles and pine forests had expanded to 1600 sq miles. Hedgerows, which provide distinctive boundaries of fields, had reduced from 500,000 miles to 390,000 miles [Countryside Commission, 1986].

Following this, the Commission issued *Landscape assessment: a Countryside Commission approach* [CCD 18, 1987]. The approach described the landscape character of areas and essentially comprised the subjective assessment of individual assessors. The method involved [Meredith, 1987, 5]:

- defining the purpose of the assessment and set criteria for judgement
- compiling known information about the area
- travelling throughout the area, recording observations, recording systematically what is seen, including sketches and descriptions
- analysing what makes the landscape special and different from others
- evaluating the landscape against the criteria set, for example an assessment of a landscape's capacity to accommodate a proposed development
- recording decisions arising from the analysis

By 1993 the application of the approach was judged a success [Martin, 1993, 22]. The Commission had updated and expanded it in 1991 in CCP326:*Environmental assessment: the treatment of landscape and countryside recreation issues.*

Concurrently the Commission embarked on a project called New Map of England, which aimed to identify, describe and analyse landscape types at a broad regional scale [Ibid]. The Commission piloted the approach in southwest England before launching it across the country. It is expected to produce 150 maps, each with a detailed analysis of its landscape character.

The approach of the Countryside Commission focuses solely on landscape character, assuming this to be a surrogate for landscape quality. Insofar as landscape quality is addressed, it is treated entirely subjectively and descriptively by individual assessment.

(2) United States

In contrast to England, the movement earlier this century to establish and protect national parks was driven largely concerns about scenic preservation. The loss in 1913 of Hetch Hetchy Valley in Yosemite National Park, for a dam to provide water for San Francisco, spurred the preservationists to gain wider recognition of the natural scenic attractions of the national parks. Arguing against the utilitarians who wanted to use the water, timber and other resources of these "waste" areas, the scenic preservationists argued that scenery also brings dollars. In 1910 there were some 20 distinct organisations directly advocating scenic protection [Runte, 1979, 85].

"Let it not be forgotten that Switzerland regards its scenery as a money-producing asset to the extent of some two hundred million dollars annually", said Allen Chamberlain, an advocate from New England [Ibid, 83]. He and others argued that Americans should see the beauties that America had to offer first, before spending their money overseas, thus combining patriotism, aesthetics and economics. Chamberlain's figures were cited in the Senate in arguments for the Glacier National Park in 1910, and five years later the figure being spent overseas by Americans was said to have soared to $500 million annually. Congressman Taylor argued that Switzerland gained between $10,000 and $40,000 per square mile of scenery per year and that America stood to gain much more [Ibid, 93].

Alliances were struck between the park authorities and railroad companies to provide better access to the parks. As early as the 1870s, the Northern Pacific railroad company had endorsed scenic protection, not for altruistic reasons but rather to promote tourism and patronage of their lines. In the post World War 1 era, private automobiles gradually overtook the railroads as the preferred means of travel, expanding access to the parks. While the interwar years saw the use of automobiles confined largely to the wealthier, following World War 2 the automobile moved from a luxury to a necessity.

In 1951, J.B. Jackson founded the periodical *Landscape* at the University of New Mexico, the journal played a key role in influencing a new generation about landscape aesthetics. This period saw the spread of cities and expanded industrial production, often accompanied by widespread environmental degradation and aesthetic loss. It was a period which demanded concern about the nation's landscape.

David Lowenthal joined other critics of the degradation of the American landscape:

> "The pristine landscape of aboriginal America was a fitting home for the brave and the free. But the brave was exterminated, and freedom became license; far from appreciating the glorious wilderness, the pioneer tore it apart and replaced it with a sordid landscape designed solely for profit." [1966, 115]

Peter Blake's *God's Own Junkyard: the Planned Deterioration of America's Landscape* [1964] was, according to the author, "written in fury" [Lowenthal, 1966, 115]. Similar books[54] documented the wasteland of the American landscape. In 1962, Stewart Alsop wrote:

> "Out of the frontier past has grown a subconscious consensus that there is something manly about messiness and ugliness, something sissified about whatever is handsome, or well ordered, or beautiful." [Lowenthal, 1966, 117]

Numerous books have chronicled the origins of American's love-hate relationship with the environment, and landscape in particular[55].

Concern about environmental blight did not go completely unheeded. In February 1964, President Johnson, partly at the urging of his wife, Lady-Bird Johnson, delivered to Congress a Message on Natural Beauty, a program to beautify America [Jackson, 1965, 1]. Included were proposals to beautify rural and urban landscapes, the nation's highways, and to remove billboards and automobile junkyards along the highways. J.B. Jackson was sceptical about the likelihood of anything permanent resulting from the program. He said that, in a country where "whatever is old is obsolete, and whatever is obsolete is discarded" [Ibid], the wonder of the American landscape is not that it contained such mess but that it also contained so many attractive suburbs and towns. In 1965, the President convened the White House Conference on Natural Beauty [*Beauty for America*, 1965] to stir the nation to action.

Following his English model, Lowenthal [1968] identified the following characteristics of the American landscape:

- size - the sheer vastness of the land
- wildness - relative to European this is particularly apparent to visitors
- formlessness - "compared with Old World landscapes, those of America appear generally ragged, indefinite and confused; parts stand out at the expense of a unified whole" [Ibid, 68]
- insiders and outsiders - viewing the landscape, not as visitors but as inhabitants engaged in its development
- the present sacrificed to the glorious future - a traveller in 1837 noted "they do not love the land of their fathers, but they are sincerely attached to that which their children are destined to inherit" [Ibid, 75]
- the present diminished by contrast with an idealised past - the Disneyland image of history
- individual features emphasised at the expense of aggregates
- the nearby and the typical neglected for the remote and the spectacular - the prominence given to National Parks
- scenic appreciation serious and self-conscious - landscapes improved and signposted

In his whimsical paper "You'll Love the Rockies" [1983], J.A. Walter [an Englishman] recounted his impressions of the American landscape, contrasting it with that of England and the Continent. He found the vast scale of the American landscape daunting, yet the high position of the sun actually served to flatten the landscape compared with the low sun in England that emphasised the smallest undulation. The forest trees of America he found boring and frustrating, in that they blocked the view - yet Americans obviously loved them. In contrast to European landscapes that comprise a delicate balance of forest and village, mountain and meadow, he found American landscapes comprising vivid contrasts - rock spire and desert, ice-clad volcano and forest. The American landscape comprises large-scale examples

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54 Eg Christopher Tunnard & Boris Pushkarev, 1963. *Man-made America: Chaos or Control?*; Stewart Udall, 1964. *The Quiet Crisis*; Ian Nairn, 1965, *The American Landscape: a Critical View.*

55 Eg Michale Conzen [Ed], 1990, *The Making of the American Landscape*, Unwin Hyman; Mick Gidley & Robert Lawson-Peebles, 1989, *Views of American Landscapes*, CUP.

of pure landscapes - all desert, all forest, all mountain ranges, each of enormous extent, in contrast to the incredible variety apparent in English and European landscapes in small areas.

(3) Australia

The appreciation of the Australian landscape was slow to develop. Initially settled mainly with convicts from England and people from various European countries escaping religious persecution [e.g. Germans in Barossa Valley and Hahndorf in South Australia], the antipodean landscape was viewed with eyes used to the temperate climate and soft folds of the English or European lowlands. With the priority being survival, this drove the exploitation imperative until well into the 20th century. The prevailing ethos was "if it moves, shoot it; if it doesn't, cut it down".

Massive change to the original Australian landscape ensued, with the felling and ringbarking of the forest trees, the drainage of swamps, the opening up of roads and railways, and the settling of towns and cities. Grazing by introduced stock, as well as by feral pests such as rabbits, removed the shrub layer and native grasses. Under Aboriginal occupation, fire had been used regularly to open the vegetation and drive out game. With European settlement, fires were controlled when they occurred but were often devastated the land and its inhabitants.

This is not the place to survey the attitudes of the explorers and settlers to the Australian landscape or to trace the way in which artists and writers have interpreted it. However it is worth noting that it was not until the Heidelberg school of painting became established near Melbourne in the late 1880s that a distinctively Australian 'feel' to the landscapes being painted emerged. In a short space of a few years, the *en plein air* style of painting produced by artists such as Charles Conder, Frederick McCubbin, Arthur Streeton and Walter Withers helped to transform the way in which Australians viewed their landscape.

The Sydney periodical, *The Bulletin,* was founded in 1880 and quickly established itself with a "character of outspokenness, incisiveness, and sardonic radicalism" [Heseltine, 1988, 1789]. Following so soon after the impact of the Heidelberg school of painting, *The Bulletin* published works by the growing band of Australian writers during the 1890s, including works by Henry Lawson and Banjo Patterson. The bush ballad was a major form of writing at that time. The characteristic attitude of the period was "ardent patriotism, the equally ardent socialism, the belief in mateship, and the superiority of bush life to that of the coastal cities." [Ibid, 1790]

The Australian art historian, Bernard Smith, has remarked that the idealisation of rural labour was a global phenomenon of the late 19th century and, although by then most Australians lived in the cities, they identified themselves "with the life and attitudes of the Australian rural worker". The "frontier exercised an enormous influence upon the imagination of all Australians." [Smith, 1971, 84]

Thus through art and the written word, the landscape and bush became an Australian icon, representing the best or the ideal, cloaked by the rose-tinted glasses of idealism and patriotism. That this conception of Australia was largely accomplished in the decade 1885 - 1895 is remarkable.

With the beginning of the 20th century, together with Federation of the nation in 1901, a new confidence was apparent, one that was built on the image of Australia that had already been established. Paradoxically, the century has witnessed the gradual growth of the cities at the expense of rural areas and although Australians still exhibit nostalgia for the bush, and experience it in the comfort of their air-conditioned 4WDs, the reality of the bush is something remote to most Australians.

Nevertheless a distinctive love for the Australian landscape is apparent, evident in the popularity of tourism and recreation to experience it [however remotely], of the abundance of beautifully illustrated books, calendars, videos and films of the landscape, the extent of its use as icon symbols in advertising, and of the many conflicts which have occurred when forestry, mining and other forms of 'desecration' of the landscape has been proposed.

As in England and the United States, Australia initially established national parks to protect outstanding scenery and to provide areas for public enjoyment, with protection of flora and fauna a more recent motivation. Unlike the English model, there are no nationally designated areas of outstanding beauty. However, many State and local government planning strategies provide for development control of developments that might degrade or impair the landscape [e.g. Haynes, 1975, 19-20, O'Neil, 1975, 22-23].

Prior to 1965 there had been no attempt to analyse the Australian landscape in an aesthetic or visual quality sense, although there had been numerous works that had examined it from a landform or biological sense - e.g. C.F. Laseron's *Face of Australia*.

7.3 TYPOLOGIES OF LANDSCAPE STUDIES

Making sense of the vast variety of landscape studies over the last 25 or so years of the 20th century has been a continuing focus of many researchers in the field. This section summarises the various classifications or typologies that have been proposed.

(1) Summary of Typologies

Penning-Rowsell, 1973

In 1973, Edmund Penning-Rowsell carried out an early review and separated the studies into two types: those *independent* of landscape users, and those *dependent* on landscape users. Most of the studies were of the first type, and these generally involved the user defining their preferences rather than the researchers observing the users' exhibited preferences.

Brush, 1976

In 1976, Robert Brush distinguished between two types of observer-based assessments:

- *Preferential judgement* This approach elicits an individual's like or dislike for a specific environment. The wide range of personal biases, tastes, and inclinations reflected in preferential judgement is likely to result in a wide variation in responses. This is hardly a firm basis for establishing standards of perceived environmental quality.

- *Comparative appraisal* This approach forces the observer to adopt a certain framework for making judgements, a context that compels the observer to consider the expected appraisal of a larger group of persons. If an observer were forced to adopt a certain psychological set, their assessment would reflect the values that they ascribe to a larger group. The variation in responses of several individuals would be less than the variation in preferential judgements of the same individuals. Therefore, this latter assessment may be more useful in public decision-making.

Dearden, 1977

A further early typology was an annotated bibliography of landscape aesthetics by Phillip Dearden [1977], in a Council of Planning Librarians Exchange Bibliography. Dearden identified two main groupings of studies:

- *Measurement techniques*, in which physical attributes of the landscape are used as surrogates for personal perception;

- *Preference techniques*, in which the landscape is judged in totality, often by reference to criteria established by photographs and questionnaires.

Arthur, Daniel & Boster, 1977

Arthur, Daniel and Boster [1977] presented a synthesis and overview of techniques for evaluating scenic beauty. They grouped the studies into three categories:

- *Descriptive inventories:* analysis and description of the components of landscapes; e.g. Litton [1968], Leopold [1969]

- *Public preference models*: assessment based on public input on preferences; e.g. Daniel & Boster [1976]

- *Economic analyses*: evaluation of nonmarketable environmental goods; e.g. Krutilla and Fisher [1975]

The first two methods can involve quantitative and non-quantitative methods.

Dearden, 1980

In 1980, Dearden followed up his earlier classification by suggesting three groupings:

- *Field-based methods*: these involve classifications of the physical landscapes; e.g. Fines [1968], Wallace [1974]

- *Surrogate methods*: these use observers and photographs as surrogates of the landscape instead of field assessments; e.g. Shafer *et al* [1969], Daniel and Boster [1976]

- *Measurement methods*. these refine the measurement quality of field-based methods to improve reliability and validity: e.g. Linton [1968], the Coventry-Solihull-Warwickshire Study [Study Team, 1970].

It is difficult to accept that Linton's study of Scottish landscapes should be cited alongside the Coventry-Solihull-Warwickshire Study as more rigorous and less subjective than Fines' study of East Sussex. I include both Fines' and Linton's studies in the field-based methods group. Excluding Linton's study, the measurement method is similar to the psychophysical paradigm [see Zube, *et al* below].

Penning-Rowsell, 1981

Penning-Rowsell [1981] viewed the previous dozen or so years of studies, with a particular emphasis on those in Britain, and divided them into three overlapping groupings:

- Early *'intuitive'* methods: circa 1967 - 71; e.g. Fines [1968], Linton [1968], Hampshire County Council [1968], Leopold [1969]

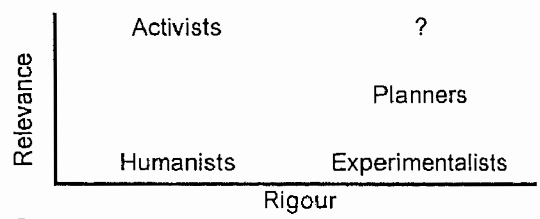
- *Statistical 'sophistication'*: circa 1971 - 76; e.g. the Coventry-Solihull-Warwickshire study [Study Team, 1970], the Manchester University evaluation [Robinson, *et al*, 1976]

- Landscape *'preference'* approaches: mainly circa 1973 onwards; e.g. the work of Kaplan, Zube and Buhyoff

Penning-Rowsell provided extensive lists of studies in each category. His groupings are somewhat superficial and because they focus largely on Britain [apart from his third group], omit the considerable work undertaken in North America.

Porteous, 1982

Douglas Porteous [1982] defined four major approaches to environmental aesthetics based on two criteria, rigour and relevance. Porteous noted that, while rigour was traditionally pursued with vigour regardless of relevance, the more recent trend is towards relevance with as much rigour as possible. He defines relevance as referring to the immediacy of the approach to current environmental problems, while rigour refers to scientific theory building and testing [Ibid, 54]. Porteous proposed a model with four groups involved in landscape research [Figure 7.1].



Source: Porteous, 1982

Figure 7.1 Porteous' Groups Involved in Landscape Research

The *humanists* [or purists] "seek universals intuitively and necessarily eschews immediate relevance and scientific positivism" [Ibid, 54]. Examples are Tuan, Lowenthal and Appleton. The *environmental activists* seek to 'act now' and contrast with the *experimentalists* who say that 'before we can change the world, we must first understand it'. *Planners* is a shorthand term for environmental designers and managers who have to grapple with immediate issues and who often have the training to take a fairly rigorous approach. Porteous considers that no group has reached the "?" position, denoting high levels of both relevance and rigour.

Porteous' approach tends to diminish the long-term contribution that his so-called humanists ['theorists' may be a better term] make. Nevertheless he is correct in identifying two key parameters, relevance and rigour, which should guide work in the field.

Punter, 1982

A further typology, also published in 1982 though rather lesser known than the others, is that by John Punter. Acknowledging the difficulties in categorising the variety and breadth of the contributions on landscape and the range of disciplines that they derive from, Punter proposes three paradigms, *landscape perception*, *landscape interpretation*, and *landscape (visual) quality.*

- *Landscape perception* deals with the mechanics of perception and its links with vision, comprehension, preference and action. The roots of this paradigm are psychology and although Punter mentions information theory, he does not refer to the work of the Kaplans.

- *Landscape interpretation* focuses on the meanings imputed to landscape, especially its social and cultural content. "The comprehension of meaning" according to Punter "involves the search for order and the search for significance." [Ibid, 105] Yi-Fu Tuan is the leading writer on searching for meaning in landscapes.

- *Landscape quality* focuses on visual quality and the qualities of formalism apparent in a landscape. Punter considers this the weakest in terms of substantive research yet paradoxically exerting an "alarmingly strong influence" [Ibid, 108] on the experience of landscape.

Porteous considers that Punter "attempts to integrate the three threads via a materialist perspective, a kind of neo-Marxist aesthetic" and that he is "particularly severe on both critics and academic humanists for their 'privileged indifference' and detachment" [Porteous, 1996, 12].

Zube, Taylor & Sell, 1982

The two most significant evaluations of landscape studies to date were published in 1982 and 1983. The first was by Ervin Zube, James Sell and Jonathan Taylor, the second was by Terry Daniel and Joanne Vining. Both of these evaluations have a strong orientation to studies from North America. Both identify a range of paradigms into which the various studies were assigned. Interestingly there is a close similarity between the two sets of paradigms.

The Zube *et al* analysis was based on a review of 160 papers published in 20 journals during the period 1965 - 80 [see footnote 57 for categories of studies]. The four paradigms identified [Ibid, 8] were:

- *Expert paradigm* - evaluation of landscape quality by skilled and trained observers; skills derive from training in art and design, ecology or resource management

- *Psychophysical paradigm* - testing general public or selected sample for their evaluation of landscape aesthetic qualities or specific properties. Observer evaluations and behaviour are assumed to bear a correlational or stimulus-response relationship to the external landscape.

- *Cognitive paradigm* - this involves a search for human meaning associated with landscapes. Meaning is derived from observation, experience, future expectations and sociocultural conditioning

- *Experiential paradigm* - the experience of the human - landscape interaction is central here, with both being shaped and shaping by the process.

The paper by Zube *et al* was a landmark assessment and was accorded an Honour Award by the American Society of Landscape Architects. The Jury stated: "Definitely an outstanding, excellent study. Lots of innovation, marvellous and well-based synthesis. Without doubt one of the leading, current and best-developed documents relating to the field of visual perception and assessment." [The Jury, 1982].

As shown in Table 7.1, the dominant paradigms in Zube *et al* were the expert and psychophysical. However, whereas the expert paradigm was dominant in the early part of the 16-year period, the psycho physical paradigm became increasingly important as the dominant research direction in the latter part of the period. Table 7.1 also indicates the landscapes or contexts that were the subjects of the studies. Zube *et al* provided a detailed analysis of the studies under each of the paradigms and contexts. On the basis of their findings they recognised the need for the development of a theoretical framework.

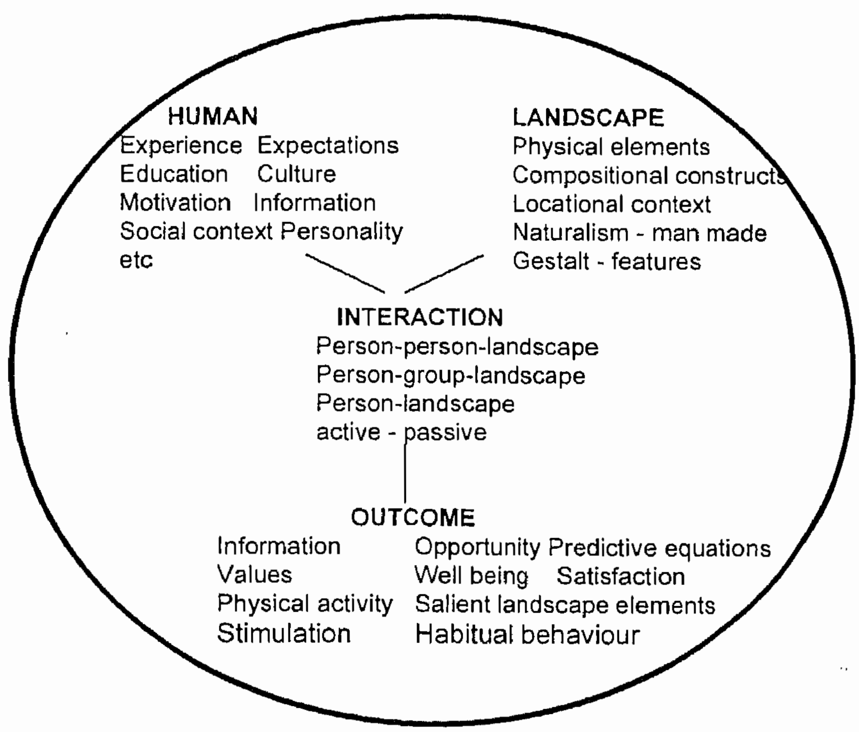
Characteristic of much of the work has been a separation of two types [Ibid, 23]:

1) The separation of theoretical contributions to books or symposium proceedings, while journals mainly publish applications work –

Table 7.1 Frequencies of Paradigms in Studies, 1965 - 80

	Paradigms				
Landscapes	**Expert**	**Psychophysical**	**Cognitive**	**Experiential**	**Total**
Forests	15	13	4		32
Recreation	7	10	3	1	21
Rural	15	13	4		32
Coasts & rivers	7	4	1		12
Natural & man made	7	10	7		24
Socio-cultural			3	4	7
Historical				4	4
Individual experience			1	5	6
Critiques	12	5	2	1	20
Total	**63**	**55**	**25**	**15**	**158**

Source: Zube, Sell & Taylor, 1982.



Source: Zube, Sell & Taylor, 1982, 24

Figure 7.2 Landscape Perception (interaction) Process

their evaluation covered only journals and thus missed much of the theoretical work[56].

2) They tend to focus on the human components of the landscape rather than on the perceptual interaction with the landscape; such work concentrates on the 'what' of landscape perception rather than the 'how' and 'why'. This is particularly apparent in the expert and psychophysical paradigms.

The authors stated: "the most pressing need is for a basic model to which landscape perception research and theory can be fitted and related into a whole." [Ibid] They presented Figure 7.2 as a first step towards the development of a theory of landscape perceptions.

Zube *et al* concluded their paper:

56. Consequently Zube *et al's* paper omits Appleton's book [1975], the Coventry-Solihull-Warwickshire study [Study Team, 1971] and Daniel & Boster's SBE method [1976]. Curiously the survey does not cover any of the Kaplans' work.

"Research without a general theory is fragmentary and has a hit-or-miss quality to it, it is hard to understand how various research efforts fit together, or indeed, if they are measuring the same thing" [Ibid, 25].

Daniel & Vining, 1983

Following on the heels of Zube *et al*, in 1983, Daniel and Vining published an independent study with findings that paralleled those in Zube *et al*. Acknowledging Zube *et al*, Daniel and Vining termed their paradigms 'landscape-assessment models' and defined five such models - ecological, formal aesthetic, psychophysical, psychological, and phenomenological. They described each and evaluated them on the basis of their reliability and sensitivity, validity, and utility.

- *Ecological model*: experts assess the environmental qualities of the landscape including its natural amenities. Naturalism is an important dimension. Leopold's river landscape assessment [1969] is an example.

- *Formal aesthetic model*: analyses landscapes on the basis of their formal qualities - forms, lines, colours, textures and their interrelationships, plus elements such as variety, harmony, unity and contrast as elements. An example is the US Forest Service's Visual Management System based on a system developed by R.B. Litton, an eminent landscape architect.

- *Psychophysical Model:* Psychophysical methods aim at defining the functional relationships between physical stimuli and psychological responses. Mathematical equations are derived to describe these relationships. Examples include studies by Zube, Buhyoff and Hull. The Scenic Beauty Estimation method developed by Daniel and Boster [1976] is a psychophysical method.

- *Psychological Model*: This approach examines the feelings and perceptions derived from landscapes - the "emphasis is on the cognitive and affective reactions evoked by various landscapes" [Ibid, 65]. High quality landscapes may result in positive feelings of happiness, security and relaxation, while low quality landscapes may be associated with negative feelings such as a sense of stress or gloom. The studies by the Kaplans are examples.

- *Phenomenological Model:* This model emphasises the individual's "subjective feelings, expectations, and interpretations" [Ibid, 72] with landscape perception regarded as an encounter between the individual and the environment. Works by Lowenthal and Lynch are examples of this approach.

Both the ecological and formal aesthetic models focus on the characteristics of the landscape whereas the psychophysical, psychological and phenomenological models focus on the effects of the landscape on individuals. Based on their analysis of the reliability, sensitivity, validity, and utility of the models, Daniel and Vining conclude:

"At the present time, none of the models described completely meets all the goals of landscape - quality assessment. By the criteria outlined in this chapter, it is unlikely that either the ecological or the formal aesthetic models can serve as a basis for an adequate landscape - assessment system. For very different reasons, the phenomenological model is inadequate. While neither the psychophysical nor the psychological models are sufficient alone, a careful merger of these two approaches might provide the basis for a reliable, valid, and useful system of landscape - quality assessment." [Ibid, 80]

Unlike the Zube *et al* study, Daniel and Vining did not concentrate on the need for theory development. Rather their emphasis was on the improvement of models of landscape analysis.

Zube *et al* and Daniel & Vining Compared

As stated earlier, there are close parallels between the Zube *et al and Daniel & Vining* classifications [Figure 7.3]. Although Daniel and Vining's *ecological model* is based on expert opinion, it also reflects a strong naturalism ethic and defines landscape quality in biological rather than aesthetic terms.

The *expert paradigm* and *formal aesthetic model* involve assessments of landscapes in terms of their abstract features, including lines, forms, colours and textures, by persons skilled in making such judgements. The *psychophysical paradigm/model* establishes quantitative relationships between physical features and human responses through testing of observers' preferences. The *cognitive paradigm/ psychological model* focuses on the feelings and perceptions of people who interact with the landscape and the meaning that land-

Zube, Sell and Taylor, 1982, Paradigms				
	Expert	**Psychophysical**	**Cognitive**	**Experiential**
Daniel and Vining, 1983, Models				
Ecological	**Formal Aesthetic**	**Psychophysical**	**Psychological**	**Phenomenological**

Figure 7.3 Comparison of Landscape Typologies of Zube *et al* and Daniel & Vining

scapes can hold for people. The *experiential paradigm/ phenomenological model* focuses on the individual experience of the human-landscape interaction, a person's subjective feelings, expectations and interpretations in an encounter with the landscape.

Since these two seminal works, further systems for classifying the growing landscape literature have been proposed.

Fenton & Reser, 1988

Fenton and Reser [1988] classified the approaches into three categories:

1. objective measurement of physical-setting variables
2. use of judges' ratings (normative judgements) to define landscape variables with a clear environmental referent
3. description of landscape variables in phenomenological terms

Their first category combines aspects of psychophysical and expert paradigms, while the second category covers the cognitive, psychophysical and expert paradigms and the third category covers the experiential paradigm. Fenton and Reser suggest an integrative approach to the perception of landscape quality, in which the "inter-relationships between the objective and the perceived dimensions of the environment are simultaneously examined in terms of their contribution to perceived aesthetic quality" [Ibid, 117]. Essentially, they propose relating the landscape's physical attributes with the corresponding judgements and deriving the relationship between the two. This is essentially the methodology of psychophysical studies.

Dearden & Sadler, 1989

Dearden and Sadler [1989] developed a theoretical framework based on whether the landscape judgement is a mixture of elements external to the observer [i.e. objects] or internal to the observer [i.e. the perceptual, affective and cognitive responses] [Figure 7.4].

The ratio of external [E] and internal [I] elements varies with the characteristics of the observer, the landscape and the mode of interaction. Where E exceeds I [E > I], consensus will be high, but where I exceeds E [I > E], consensus will be low. E > I is termed *objectivist*, while I > E is termed *subjectivist*. The authors compared their framework with the five models defined by Daniel and Vining [1983].

While they acknowledge that it is often difficult to assess the I:E ratio, Dearden and Sadler considered that "some techniques, firmly rooted in an objectivist philosophy, are purely landscape oriented and merely assume consensus", whereas "other techniques pay little attention to landscape, assume that each observer is unique, [that] there is no consensus and focus their efforts on a subjective analysis of the individual."

High		**CONSENSUS**		Low
E > I Objectivist		Evaluation Philosophy		I > E Subjectivist
		MODEL SUITABILITY		
Ecological	Formal Aesthetic	Psychophysical	Psychological	Phenomenological

Source: Dearden and Sadler, 1989

Figure 7.4 Theoretical Framework Based on Consensus for Landscape Evaluation

[Ibid, 9] On the basis of their analysis, the authors suggest that the various approaches to assess landscape quality "should not be seen as mutually exclusive, ... [but] rather they are complementary" [Ibid].

Elsewhere, Dearden [1989, 41] defined the objectivist stand of viewing beauty inherent in objects, whereas the subjectivist stand views beauty as being in the eye of the beholder.

At one extreme, the ecological model is focussed wholly on the landscape with no human input while at the other extreme, the phenomenological model is wholly focussed on the human experience and the landscape is almost incidental. The models lying between these two extremes contain elements of both landscape and human involvement. The psychophysical model straddles each and aims to measure both the landscape and human response to it. Dearden and Sadler consider that the psychophysical approach is probably the most favoured approach with good reliability and validity. The phenomenological approach is regarded as the most 'scholarly', while practitioners favour the formal aesthetic.

Dearden and Sadler's identification of the objectivist and subjectivist elements in landscape assessments is welcome, although they appear to confuse objectivity with consensus. Their proposal regarding the relative dominance of external or internal elements appears naïve, as when they state, "in some circumstances beauty will reside more in landscape (i.e. $E > I$) and in others the eye of the beholder will be more critical in influencing landscape judgements (i.e. $I > E$)." [Dearden, 1987, 268] This suggests that the influences on an individual are changeable depending on circumstances. Yet it is difficult to see how this could be in practice, how does a person put aside the innate, cultural and personal influences on their preferences and see the landscape purely in terms of intrinsic beauty? The model appears to have the hallmarks of a theoretical construct that has parted company with reality.

Gobster & Chenoweth, 1989

Gobster and Chenoweth defined three 'descriptor types': physical, artistic and psychological and analysed these types' capacity to predict aesthetic preferences for rural river, forest and agricultural landscapes.

Table 7.2 Summary of Landscape Analysis Typologies

Author	Expert	Psychophysical	Cognitive	Experiential
Penning-Rowsell, 1973	Independent	Dependent on users		
Brush, 1976		Comparative appraisal	Preferential judgement	
Dearden, 1977		Measurement techniques	Preference techniques	
Dearden, 1980	Field based	Surrogate methods Measurement techniques		
Arthur *et al*, 1977	Descriptive inventories	Public preference models		
Penning-Rowsell, 1981	Intuitive methods	Statistical sophistication Preference approaches		
Porteous, 1982	Planners	Experimentalists		Humanists
Punter, 1982	Landscape quality	Landscape perception		Landscape perception
Daniel & Vining, 1983	Formal Aesthetic	Psychophysical	Psychological	Phenomeno-logical
Fenton & Reser, 1988	Objective measurement	Normative judgements		Phenomeno-logical
Gobster & Chenoweth, 1989	Physical Artistic		Psychological	

Note: Arthur *et al* [1977] also include economic analyses. The classification by Porteous [1982] is of the type of researcher rather than the product of their work. His activist category does not fit any of the above paradigms. Daniel & Vining [1982] also included the ecological model.

(2) Evaluation of Typologies

Table 7.2 summarises the ten typologies that have sought to classify the landscape studies. It classifies them under the four paradigms defined by Zube *et al*, 1982 for comparison. In some cases it is difficult to assign the typologies, as the descriptions used differ greatly. However the Table indicates my best judgement as to their placement.

Most of the typologies define only two or three categories and in some instances several of these amount to the same thing - namely the psychophysical paradigm.

(3) An Alternative Typology

The fundamental dichotomy in the way landscape is viewed is between believing that beauty is an intrinsic quality in the landscape versus believing that beauty lies in the eye of the beholder. We have already seen this distinction in Chapter 2 in the history of philosophy of aesthetics and in Chapter 6 regarding the influence of culture on aesthetic perceptions. The distinction is also apparent in the typologies examined here.

Surveys of the physical landscape that define its quality on the basis of the presence or absence of certain attributes are premised on the concept of beauty being intrinsic in the landscape. Conversely psychologically-based studies which evaluate the feelings that people derive from the landscape and which seek the dimensions in the landscape that account for its quality are premised on beauty being in the eye of the beholder.

These different approaches to the way landscape is viewed are quite fundamental, either the landscape quality is regarded as intrinsic or in the beholder [objective or subjective] - there is no recognised middle ground. Few of the typologies examined acknowledge this distinction and most treat the differences in the form of a continuum. Where the physical landscape is assessed, its assessment is in terms such as field based, descriptive inventories, expert, or objective measurement. Gobster & Chenoweth [1989, 49] touched on the differences, stating:

> "All physical descriptors relate to the external dimensions of the environment - what is 'out there' versus what is 'in the head' - and herein lies a critical distinction between physical and psychological descriptors."

Similarly, Dearden and Sadler [1989, 7] came close to the issue in stating:

> "The major philosophical and methodological division has been between those favouring a more reductionist, quantitative-objective approach and those maintaining that it is not possible to apply standard positivist techniques to such a holistic concept as landscape aesthetics."

I propose that this distinction should provide the basis for the major classification of landscape methods, between physically-based methods and psychologically-based methods, the former being those based on viewing beauty as physically intrinsic in the landscape while the latter view it as a human preference.

Dearden and Sadler [1989] proposed an objectivist/subjectivist terminology:

- Physical paradigm = elements external to observer = objectivist
- Psychological paradigm = elements internal to observer = subjectivist

Table 7.3 summarises the differences between these two paradigms. Based on the differentiation between the objectivist and subjectivist paradigms, the various models and methods proposed by various writers could be assigned in an hierarchical manner [Figure 7.5].

Although this framework groups the various paradigms and models of authors together, it is recognised that there are substantial differences between them [e.g. between the cognitive and phenomenological paradigms].

However the emphasis in this framework is to differentiate between the objectivist and subjectivist paradigms, the differences within each are of much less importance than this fundamental distinction.

Table 7.3 Objectivist [Physical] and Subjectivist [Psychological] Paradigms

Characteristic	Objectivist Paradigm	Subjectivist Paradigm
Basis	Beauty an intrinsic quality of the landscape	Beauty in eye of the beholder - human preferences
Aims	Seeks to understand landscape so that it can be better protected and managed	Seeks to understand human preferences regarding landscapes to assist in their management
Causes	Silent on underlying reasons	Seeks to explain why
Methodology	Empirical; applies approach	Experimental; testing hypothesis
Objectivity of approach	Subjectivity presented as objective	Objective evaluation of subjectivity
Standardisation of tools	Lack of standardisation - uses different and unique methods and techniques. Generally field-based.	Standardised research instruments & statistical tools, although used in a variety of ways. Often based on surrogates [e.g. photographs]
Site specificity	Specific to site or area - generally cannot transfer to other localities	Not site or area dependent - in theory can transfer to other localities
Human specificity	Does not differentiate for different human observers, assumes uniformity	Examines effect on preferences of human differences - age, gender, socio-economic, education, etc.
Value of findings	Often of questionable worth and of short-lived value	Results in new knowledge which is of lasting value

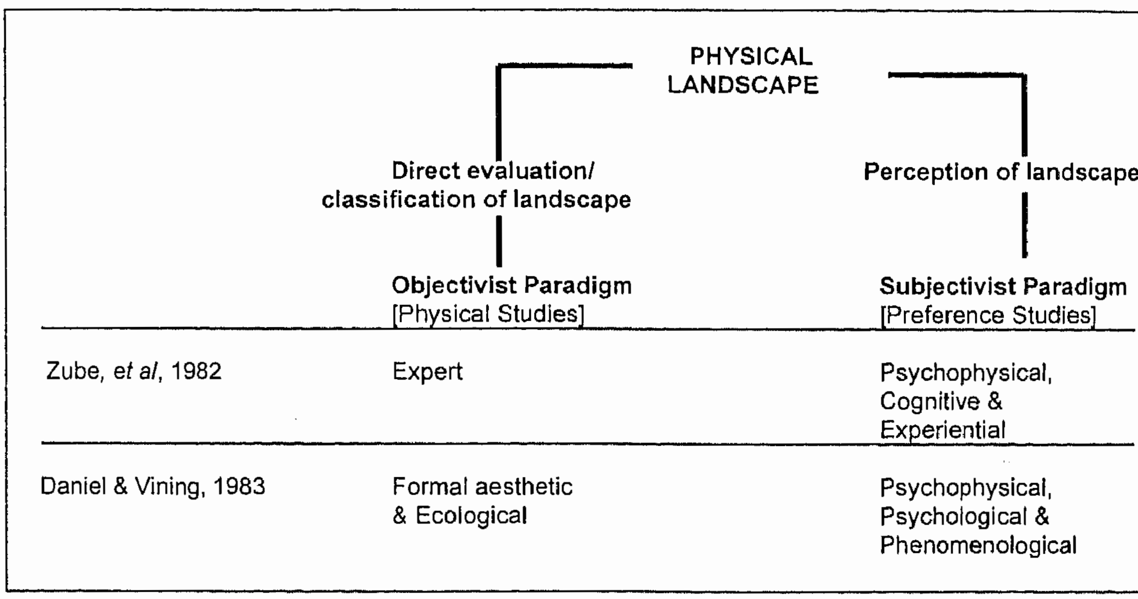


Figure 7.5 Hierarchy of Landscape Assessment Methodologies

In the following section [7.4], the term *preference studies* is used for studies in the subjectivist paradigm, while the term *physical studies* describes those of the objectivist paradigm.

7.4 CHARACTERISTICS OF LANDSCAPE PREFERENCE STUDIES

In this section the characteristics of studies of landscape preferences undertaken over the period 1966 - 1996 are described. In Chapter 8 the findings of these studies are described. Over this 30-year period, some 191 separate preference studies have been published describing a total of 227 surveys[57].

57. Zube, Sell & Taylor's [1982] summary of landscape research papers covered 160 papers from 20 journals, however these included:
    - 63 physical landscape studies
    - 21 studies covering recreational activities
    - 20 critiques of landscape research
    - 16 papers tracing historical or individual [experiential] aspects of landscape

For the purposes of this Chapter, *studies* refers to the complete paper describing the research while *surveys* refers to individual parts of the research project.

Particular emphasis is given to the research instruments developed and used [see Section (6)] as the effectiveness of these determine the understanding gained regarding landscape preferences. The characteristics examined are:

- Year of Studies
- Location of Studies
- Principal Researchers and Centres
- Purpose of Studies
- Theoretical Basis of Studies
- Research Instruments
- Participants
- Participant Characteristics
- Landscape Characteristics
- Landscape Representation
- Statistical Analysis
- Findings

Appendix 7.1 lists the authors of the studies and the factors by which they are analysed in this section. The majority of these studies are derived from journals, plus some published reports and theses.

The compilation covers studies that have as their subject *non-urban landscapes*; it does not cover studies of wilderness, recreation or urban landscapes, except where these relate directly to rural or natural landscapes [e.g. of parklands]. Each of these areas comprises an extensive literature in their own right and while some benefit would derive from their inclusion, it is beyond the scope of this study. In addition to these papers describing preference studies, there is a further extensive literature which discusses landscape preferences and in some cases, these studies.

(1) Year of Studies

Data on the year in which the papers on landscape preference studies were published [Figure 7.6] indicates that the eleven year period, 1979 - 89 was the period of greatest activity accounting for 60% [114 studies] of the total.

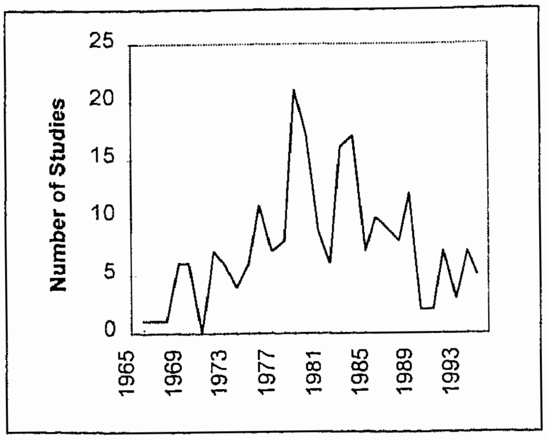


Figure 7.6 Year of Landscape Preference Study

The reasons for the decline in research over recent years is unclear and may be due to several factors: a belief that the field had been thoroughly researched, leaving nothing of significance to find, that the field remains incomprehensible and that further research is unlikely to pay dividends, or perhaps something as simple as the principal researchers moving on to other areas of research[58].

(2) Location of Studies

Table 7.4 summarises the location of studies by country. The United States dominates in studies of landscape preferences, accounting for 71% [159] of those studies. This table includes eight that compare preferences of two countries [e.g. Australia and Italy], so both countries are counted.

Table 7.4 Country of Study Location

Country or Region	Number of Studies
United States	135
Canada	8
England & Scotland	17
Spain	7
Other Europe	11
Asia	7
Australia	10
New Zealand	2
Africa	1
Total	191

Sweden accounted for four of the studies in the rest of Europe [it is probable that there

Thus only 40 studies are directly comparable to those covered in this survey and the majority of these are included.

58. E.g. Dr Bruce Hull appears to have moved to research on experiential aspects of outdoor recreation.

are more studies in languages other than English] and Thailand accounted for four in the studies in Asia. The predominance of studies in the United States reflects the degree by which quantitative studies have become standard in that country compared with other countries where qualitative studies are more prevalent.

(3) Principal Researchers and Centres

Most of the prolific researchers are American. On the basis of the number of papers published on surveys the following are the most prolific:

- Gregory J. Buhyoff, Associate Professor of Forestry & Quantitative Methods, School of Forestry, Virginia Polytechnic Institute & State University, Blacksburg, Virginia [19 studies].

- R. Bruce Hull IV, Associate Professor in Dept of Forestry, Virginia Polytechnic Institute & State University; Doctorate at Virginia Polytechnic Institute under Buhyoff and post doctoral work in Australia. Following a stint as Associate Professor, College of Architecture, Texas A & M University he moved to his current position [13 studies].

- Ervin H. Zube, originally at the Institute for Man and Environment at the University of Massachusetts, Amherst and later at the Landscape Resources Division in the School of Renewable Natural Resources, University of Arizona [10 studies].

- Terry Daniel, Professor of Psychology, University of Arizona, Tuczon, Arizona [10 studies].

- Herbert W. Schroeder, an environmental psychologist with the Forest Service at the North Central Forest Experiment Station, Chicago [9 studies].

- J. Douglas Wellman also an Associate Professor of Forestry, School of Forestry, Virginia Polytechnic Institute. Often published as second author with Buhyoff [8 studies].

- Stephen and Rachel Kaplan, respectively Professor of Environmental Psychology and Professor of Psychology, School of Natural Resources, University of Michigan. S. Kaplan is the theoretician [3 studies] while his wife, R. Kaplan, has conducted many empirical analyses [5 studies].

It is noteworthy that all but one of these researchers were university based, Schroeder is the only one based in a Government research organisation. The leading centre has been the School of Forestry at the Virginia Polytechnic Institute & State University in Blacksburg, Virginia. The University of Arizona has also been another key centre with many other researchers.

(4) Purpose of Studies

The purpose of the studies can be categorised into seven broad groups:

1. <u>Theory</u> development and testing
2. <u>Techniques</u> for measuring landscape preferences - development, testing and refinement
3. Influence of <u>human observer factors</u> on preferences - factors such as culture, socio-economic factors and familiarity with the landscape. These are factors that are dependent on the person viewing the landscape. It also includes the assessment of landscapes by expert vs 'lay' observers.
4. <u>Landscape</u> factors - factors influencing preferences that are dependent on the physical landscape, including naturalness, presence of development, complexity and mystery.
5. <u>Affective</u> effects - the feedback of the landscape upon the observer.
6. Influence of the mode of <u>presentation mode</u> of the landscape including photographs vs field observations.
7. Assessment of the landscape qualities of <u>specific landscape</u> areas or features such as the coast or water.

Because many studies are assessed to have several purposes [e.g. development of techniques while also determining the influence of landscape factors on preferences], the total number of purposes exceeds the number of studies. Table 7.5 summarises the frequency of these purposes.

The various techniques for assessing landscape preferences that have been developed are described below (6). These include the Scenic Beauty Estimation [SBE] method of Daniel & Boster, Shafer's measurement of landscape photographs, visitor employed photography, landscape adjective checklist, and physiological measures.

Table 7.5 Purposes of Preference Studies

Purpose of Study	Number	%
1. Theory development & testing	10	2.9
2. Techniques for measuring preferences	65	19.0
3. Human observer factors influencing preferences	59	17.2
4. Landscape factors influ encing preferences	170	49.7
5. Affective influence of landscapes on observers	13	3.8
6. Mode of landscape presentation	16	4.7
7. Specific landscape areas or features	9	2.6
Total	342	100.0

Studies of how human observer factors affect preferences examine for the influence of factors such as culture, education, age and familiarity. The influence of culture is the subject of 13 studies. A key issue is the extent to which so-called 'expert' preferences differ from the general population and 17 studies examined this issue. By far the principal focus of the studies has been the influence of landscape factors on preferences. This aims to identify what physical factors can explain landscape quality as assessed by subjects.

The extent to which the landscape itself affects observers is examined by a relatively small number of studies [13]. The principal issue in the presentation category is the use of photographs versus field visits for evaluating preferences; 17 studies examine this issue. Very few studies [9] actually aimed to assess the landscape quality of a given area based on preferences; this is surprisingly low as it might be expected to be one of the principal purposes for studying landscapes.

A summary of the purposes of each study is shown in Appendix 7.2.

(5) Theoretical Basis of Studies

Porteous' pithy observation that landscape preference studies are "rampantly empirical" [1982, 63] is borne out by an analysis of the theoretical basis of surveys. Of 227 surveys, only 43 [19%] were considered to have a theoretical basis. The remainder were classed as empirical [Table 7.6].

Table 7.6 Theoretical Bases of Surveys

Theoretical Basis	Number of Surveys
Prospect & refuge theory [Appleton]	11
Information processing theory [Kaplans]	35
Habitat theory [savanna] [Orians]	8
Affective theory [Urlich]	5

Note: Total exceeds 43 because some surveys include more than one theory

Some studies include a theoretical basis with an otherwise heavily empirical approach and test landscape preferences with reference to these theories. These are not included in the category relating to theory in Table 7.6. This category applies only where the *primary purpose* of the study was to develop or test theories and application of this criterion limits the total to the following six studies:

- Balling & Falk, 1982 — Habitat theory
- Clamp & Powell, 1982 — Appleton's prospect & refuge theory
- Gimblett, Itami & Fitzgibbon, 1985 — Kaplans' mystery component
- Herzog & Smith, 1988 — Kaplans' mystery component
- Kaplan, Kaplan & Brown, 1989 — Kaplans' four predictors
- Naser, et al, 1983 — Appleton's prospect & refuge theory

(6) Research Instruments

The form of research instruments used in undertaking research of landscape preferences is vital to understanding the findings of the studies. For this reason a comprehensive examination is undertaken of the instruments that have been developed and used. It is also apparent from this that the properties of different types of measures [i.e. nominal, ordinal, interval and ratio numbers] are important in landscape research. The capabilities of different types of numbers have sometimes been ignored; in particular, ordinal numbers have sometimes been treated as having the properties of interval numbers. Appendix 7.3 contains a summary of different types of numbers and their capabilities in statistical analysis.

Landscape research studies often involves two sets of variables:

- independent - the elements which comprise the landscape
- dependent - the rating of the landscape's visual quality

Studies may seek to relate the dependent variable - landscape preferences, to the elements of the landscape as shown by the independent variables. This is achieved through statistical measures including correlation, multiple regression and factor analysis. Other studies compare the preferences of one population sample with another, no independent variable is used.

Most of the following instruments are used to evaluate the dependent variables, measuring the preferences of observers [Table 7.7]. Shafer's method of measuring the parameters in landscape photographs is one of the few methods available to provide an objective measure of the independent variables.

Types of Research Instruments

Landscape studies utilise a diverse range of instruments to measure the preferences of observers. Approximately 30 different types of instruments are identified in the studies [Table 7.7]. The majority use photographs or similar surrogates rather than requiring observers to view the landscape in the field because research has shown that surrogates can provide similar results as field assessments [see Section 8.4]. While 20 surveys used field assessments, 218 used surrogates.

Among the most sophisticated and solidly grounded techniques are the psycho-physical methods. These include two key methods used in landscape assessment, known as the Law of Comparative Judgement [LCJ] method and the Scenic Beauty Estimation [SBE] method, developed from psychophysics. Because of their significance these are examined in detail.

Psychophysics originated in the 19th century particularly through the work of Gustav Fechner (1801 - 87) who defined it as "an exact science of the functional relations of dependency between body and mind" [Torgenson, 1958, v].

Table 7.7 Instruments Used in Landscape Preference Surveys

Instrument	Survey	%
Psychophysical Methods		
Law of Comparative Judgement method	21	6.1
Scenic Beauty Estimation method	43	12.5
Surrogates		
Rating of photographs	99	28.7
Paired photographs	17	4.9
Q sort of photographs	19	5.5
Visitor employed photographs	6	1.7
Film, video & computer graphics	13	3.8
Total Surrogates	***218***	***63.2***
Descriptive Methods		
Semantic differential	19	5.5
Adjective checklist	12	3.5
Interview or questionnaire	33	9.6
Descriptive rating	3	0.9
Other Methods		
Field assessment	20	5.8
Maps	5	1.4
Physiological tests	4	1.2
Miscellaneous	19	5.5
Independent variable measurement		
Measurement of features on photographs	12	3.5
Total	***345***	***100.0***

Note: Many studies use more than one instrument

More simply, it can be defined as the measurement of sensations and perception [Lindzey, *et al*, 1988, 115]. A basic assumption of psychophysics is that people are reasonably consistent in making judgements or choices among options. Thus, in terms of landscapes, people are unlikely to switch their preferences markedly during a test. Although some variability is acknowledged, it is assumed to display a normal distribution with the true value being represented by the mean [Hull, Buhyoff & Daniel, 1984, 1086].

Law of Comparative Judgement

During the 1920s, Louis Thurstone (1887 - 1955) developed psychophysical scaling laws that enabled the accurate measurement of those psychological attributes resulting from stimuli but which had no physical manifestation. His Law of Comparative Judgement [Thurstone, 1927] is one of the key foundations for research into landscape quality and has been used widely across a range of disciplines, including psychology, engineering, marketing, and ergonomics [Hull, 1986, 319].

The problem that Thurstone addressed was that individuals making judgements about the same feature would give similar but not identical responses at different times. Furthermore while some individuals are consistent in their reliability, others may be very inconsistent. If respondents use, say, a 10-point scale and are asked to rate some feature, they may regard the interval differences between 5 and 6 as different than between 8 and 9. Thus, while the researcher may treat each unit as equal, the respondents may not. Scaling methods provide a means of transforming the raw responses into accurate and reliable scale values that reflect the perceived properties of the features [Schroeder, 1984, 574].

Thurstone defined five cases in the Law of Comparative Judgement [Guildford, 1954, 155-6, Buhyoff & Riesenman, 1979, 229 - 230]. Buhyoff & Wellman [1980, 259] summarised the Law of Comparative Judgement thus:

> "[It] stipulates that the magnitude of difference between any two stimuli along some psychological dimension is equal to the standardized z score derived from the proportion of times one of the stimuli is selected as being greater than the other on the specific dimension."

Case 1 of the law involves a single observer who judges each pair a large number of times [Torgenson, 1958, 167]. It is the ideal case for which the law was initially conceived.

> Case 1. The complete law is expressed thus:
>
> $$R_j - R_k = z_{jk}\sqrt{\sigma^2_j + \sigma^2_k - 2r_{jk}\sigma_j\sigma_k}$$
>
> where R_j and R_k = mean psychological values characteristically attached to stimuli S_j and S_k, respectively; e.g. scenic beauty scales
>
> z_{jk} = the proportion of times j is judged greater than k expressed as the standard normal deviate from the mean of a unit normal distribution
>
> σ_J and σ_k = standard deviations of R_{hj} and R_{hk}
>
> σ^2_j and σ^2_k = variance of R_{hj} and R_{hk}
>
> r_{jk} = coefficient of correlation between R_{hj} and R_{hk}

The key factor in the law is the standard deviation of the differences $R_{hj} - R_{hk}$.

Case 2: Applies the law to group situations in which many observers judge each pair of scenes once.

Case 3: Involves several observers, each judging each pair of scenes several times. Case 3 is widely used in landscape research with photographs of scenes providing the stimuli. This case assumes that there is no correlation between responses to any pair of stimuli. More generally it means that the likelihood is remote that stimuli will interact if they vary in only one aspect. With correlation = 0, the last term in the equation is deleted and the abbreviated law is:

> Case 3
>
> $$R_j - R_k = z_{jk}\sqrt{\sigma^2_j + \sigma^2_k}$$
>
> where R_j and R_k = mean psychological values characteristically attached to stimuli S_j and S_k, respectively; e.g. the scenic beauty scales
>
> z_{jk} = the proportion of times j is judged greater than k expressed as the standard normal deviate from the mean of a unit normal distribution
>
> σ_J and σ_k = standard deviations of R_{hj} and R_{hk}
>
> σ^2_j and σ^2_k = variance of R_{hj} and R_{hk}

The relative values of σ_j and σ_k can be estimated and z_{jk} is known from experimental data.

Cases 4 and 5 further simplify the equation but are not relevant here.

In Case 3, two photographs are shown side by side. The observer is required to judge between the two and chose one on the basis of whatever criteria is defined - such as the preference of one over the other. Each photograph is compared successively with every other photograph. No single photograph should appear twice in succession and indeed the aim should be to space them as far apart as possible. The LCJ method does not permit landscape photographs to be judged as equal; the method relies on discrimination between competing stimuli. The method works best when *n* is an odd number [Guildford, 1954, 160] and yields the proportions of times each landscape photograph is selected over every other photograph.

A limitation of the method is that the number of paired comparisons grows rapidly with the number of photographs. With *n* stimuli, there are *n(n-1)/2* pairs of stimuli required. It is generally impractical to go beyond about 15 pairs [Guildford, 1954]. This would require 105 paired comparisons which is about as many as one could reasonably expect a survey participant to undertake. Increasing the number of photographs by one [to 16] increases the paired comparisons to 120, a sizeable increase for only one extra photograph. An experiment requiring observers to make 120 comparative judgements could suffer from observer fatigue [Hull, Buhyoff & Daniel, 1984, 1095]. While most of the studies using the LCJ method had less than 15 pairs of photographs, one used 29 pairs, requiring 406 paired comparisons [Whitemore *et al*, 1995]. Figure 7.7 indicates the number of paired comparisons that need to be made for *n* photographs.

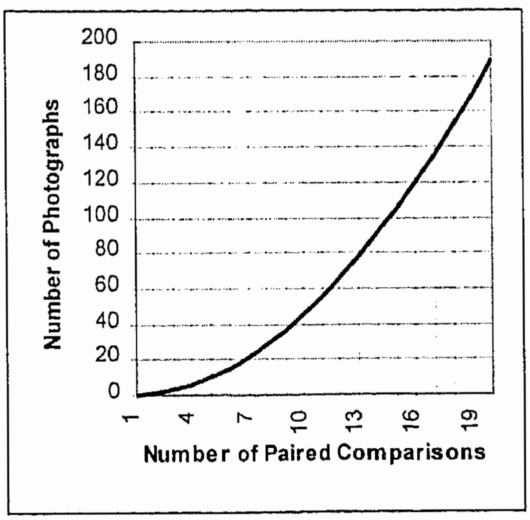


Figure 7.7 Numbers of Photographs for Paired Comparisons - LCJ Method

The LCJ method requires a large number of comparisons of each stimulus to provide sufficient data for analysis, so a balance has to be struck between exceeding the patience of the observers and providing sufficient data for analysis.

Through a series of mathematical steps and data transformations, the LCJ method provides interval scaling between preferences. This enables the results to be analysed using standard statistical methods [see Guildford, 1954, 154 - 177]. The theoretical basis of the LCJ method is further discussed in a range of references[59].

A key researcher who has used the LCJ method extensively is Greg Buhyoff having used the method in 12 of the 21 studies using the method.

- Buhyoff *et* al[60] used the LCJ method in a series of experiments on the aesthetic impact of damage caused to ponderosa pine forests by the southern pine beetle. He used the Shafer method to define the independent variables.
- Buhyoff was also involved in a range of other landscape related studies using the LCJ method.
- Buhyoff, Wellman, Harvey & Fraser, [1978] assessed whether landscape architects could rank order landscape photographs in the same order as a client group.
- Buhyoff, *et al*, [1983] compared the landscape preferences of participants in several countries.
- Buhyoff, Gauthier & Wellman, [1984] identified the parameters in an urban forest that could be used as predictors of visual quality [Shafer method used for independent variable].
- Hull & Buhyoff, [1984] used the LCJ method to assess the reliability of landscape quality assessments after the elapse of a year.
- Killen & Buhyoff, [1983] compared landscape assessments based on computer graphics.
- Wellman & Buhyoff, [1980] assessed the effect of regional familiarity on landscape preferences.
- In a series of four studies, Tips & Savasdisara, [1986a-d], used the LCJ method to examine landscape preferences among Asian participants.

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59. Thurstone, 1948; Guilford, 1954; Buhyoff & Riesenman, 1979; Hull, Buhyoff & Daniel, 1986.
60. See Buhyoff & Leuschner, 1978; Buhyoff, Leuschner & Wellman, 1979; Buhyoff & Riesenman, 1979; Buhyoff, Leuschner & Arndt, 1980;

Scenic Beauty Estimation

The second psychophysical method is the Scenic Beauty Estimation [SBE] method that was developed by Terry Daniel, a psychologist at the University of Arizona, and Ron Boster, a forester with the US Forest Service.

SBE method has its origins in both the Law of Categorical Judgement and the Theory of Signal Detection. The Theory of Signal Detection has close parallels with Thurstone's law [Green & Swets, 1966, 1] and grew out of research to detect a weak message over a noisy telephone [Lindzey *et al*, 1988, 116]. The theory is based on the research finding that the cognitive state of the person doing the detecting - their biases and expectations - influences the results they attain. Providing rewards or punishments for the detection changes the cognitive state and one's willingness to make false alarms or misses. However, one's true sensitivity remains the same. Signal Detection Theory allows the researcher to separate spurious and real influences so as to determine the observer's true sensitivity, provided the observer is neither cautious nor reckless [Ibid, 117].

SBEs "provide an equal-interval scale measure of perceived values" [Brown & Daniel, 1990, 13].

Applying SBE to landscapes, an observer may form a negative judgement about Landscape A that they do not like it. Landscape B however exceeds the implicit criterion the observer sets and results in a positive judgement - "I like it". If, however, the observer's standards were raised for some reason, their judgement:

> "would be negative for both landscapes, **even though their perceived beauty has not changed**. Thus, scenic beauty judgements depend jointly on the perceived properties of the landscape and the judgemental criteria of the observer" [Daniel & Boster, 1976, 13, authors' emphasis].

Ideally, if each observer rated a landscape out of a possible top score of 10, a rating of, say, 7 would be the equivalent across observers. However, this would be unusual because each observer's criterion is unique, and the same landscape will be rated differently by different observers, making the scoring difficult to interpret. For example, one observer may rate a landscape as 3 out of 10, applying very high aesthetic criteria, while another having low aesthetic standards scores it at 8.

These and other problems of observer differences are solved through the SBE method, in which a measure of landscape beauty "independent of observer judgemental criteria." [Ibid, 17] is derived. The SBE method also transforms ordinal ratings to an interval scale, thereby allowing them to be analysed statistically.

The SBE method involves three stages:

1) representing landscapes by colour slides
2) presenting slides to observers
3) evaluating observer judgements

An impartial sampling procedure is used to take the slides. Daniel and Boster used the method mainly for evaluating ponderosa forests on relatively flat topography, but it has since been used across a wide range of environments. With a compass, the photographer walks in a direction determined by a printout of random degrees [i.e. in a range of 1° - 360°]. Having paced out a pre-determined distance the photographer takes a picture moves to the next photo-sampling point again in a randomly determined direction. The procedure is repeated until the desired number of photographs has been taken. Other sampling methods can also be used.

The number of slides will depend on the heterogeneity of the landscape; experience suggests that 3 per sub-area and 15 slides for each landscape are sufficient. Using 20 - 30 observers, the slides are presented randomly for 5 - 8 seconds and observers asked to rate them on a 10 point scale. A presentation involving a total of 100 slides is about the upper limit. The method involves the use of many slides of a relatively small area.

Like the LCJ method, the SBE method assumes that all individuals will categorise each slide in essentially the same location on their respective scenic beauty continuum and that differences among individuals are normally distributed. These categories can then represent a basis from which measurements of scenic beauty can be made. Each category is indicated by a distribution, reflecting both individual differences and variability in perceptual and judgemental processes. The mean of the distribution is assumed to represent the true category [Hull, Buhyoff & Daniel, 1984, 1089].

Hypothetical results of a survey are presented in Figure 7.8. The three graphs indicate the scenic beauty scales assigned The average ratings given by the three observers to each of the landscapes are as follows:

Observer		**Landscape**	
	1	2	3
A	7	6	5
B	5	4	3
C	9	7	4

While the order of these is the same, the scores given for each landscape differ between observers even though the perceived scenic beauty values are identical for all observers. Table 7.8 summarises the derivation of the SBE score using the "by slide" or "by stimulus" method of Daniel and Boster. This method uses multiple observers to rate the scenes and from this a distribution of ratings for each scene is obtained. The rating distributions are converted to frequencies for each rating category [e.g. 1 - 10] and Z values derived. Daniel and Boster's alternative method is "by observer", which uses few observers rating multiple scenes of a given landscape.

Daniel and Boster used the SBE method to compare field assessments with assessments based on slides, and found that slides can adequately represent forest landscapes. Applications of the technique include deriving aesthetic contour maps for National Forest areas, examining the effects of timber harvesting on SBEs and identifying the factors that affect the SBE scores. The amount and distribution of felled timber and stumps have a negative effect, while tree density, tree diameter and crown-canopy cover each contributes positively. The technique can also be used to assess the impact of forest management methods on scenic beauty scores.

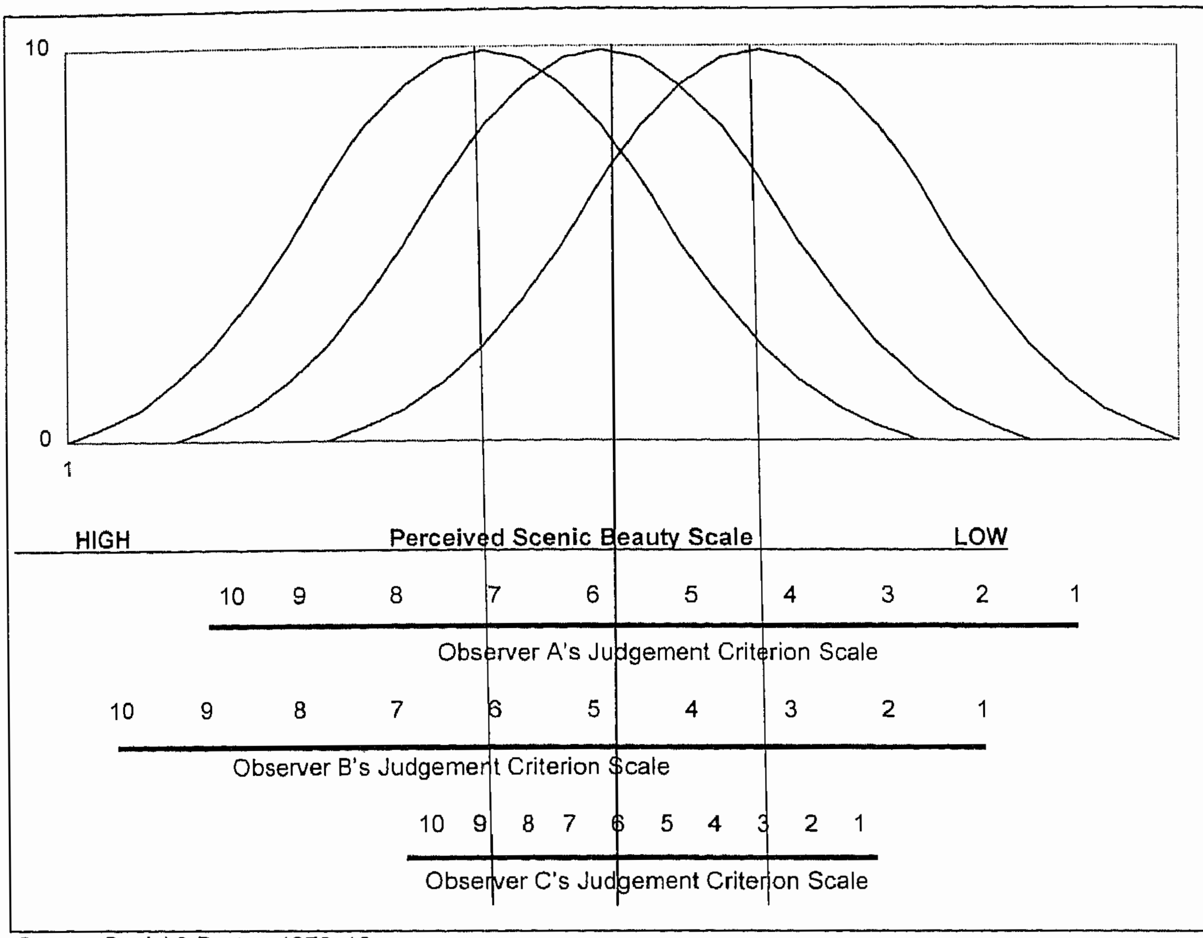
The SBE method was developed for use in forest landscapes and it has been used extensively as an aid in forest management. In forest landscapes it has been used to assess:

- the effect of different mixes of trees on scenic beauty estimates [Brown & Daniel, 1987]
- the impact of southern pine beetle damage on pines and on scenic beauty estimates [Buhyoff & Leuschner, 1978]
- the effect of physical forest features [e.g. stand age, diameter, density of timber, downed wood, overstorey, understorey and ground cover] on scenic beauty estimates as an input into forest management [Arthur, 1977, Buhyoff *et al*, 1986; Daniel & Schroeder, 1979; Schroeder & Daniel, 1981]
- changes in scenic beauty over time with the maturation of the forest to assess management and planning options [Hull & Buhyoff, 1986]
- scenic beauty mapping of a forested area [Daniel *et al*, 1978]
- tradeoffs between scenic beauty and the net present value of timber, grazing and water yields [Brown, 1987]

In many of these studies, forest mensuration was used to provide an objective definition of the characteristics of the forest as the independent variable. Shafer's method of landscape photograph analysis [see below] was also used in several.

Other landscape studies in which the SBE method has been used include:

- identifying and predicting scenic preferences along the Blue Ridge Parkway [Hammitt *et al*, 1994]
- effect of distance to major topographical features on scenic beauty [Hull & Buhyoff, 1983]
- effect of distance of vegetation and scene composition on scenic beauty estimates [Patsfall *et al*, 1984]
- effect of wildlife on scenic beauty estimates (in Australia) [Hull & McCarthy, 1988]
- effect of cultural differences on scenic beauty estimates (in Bali) [Hull & Revell, 1989]
- differences in rural ratings between urban and rural dwellers [Orland, 1988]
- application of the SBE method to urban vegetation [Anderson & Schroeder, 1983]
- relate recreational experience with perceived scenic satisfaction [Ribe, 1993]
- visual penetration as a possible contributor to scenic beauty [Ruddell *et al*, 1989]
- landowner perceptions of scenic beauty [Vodak, 1985]
- alternative changes to the landscape based on photographs and sketches of changes [Schomaker, 1978]



Source: Daniel & Boster, 1976, 18

Figure 7.8 SBE Model - Hypothetical Example

Table 7.8 Derivation of Scenic Beauty Estimation [SBE] for Three Scenes

Scale	Stimulus 1	cf	cp	Z	Stimulus 2	cf	cp	Z	Stimulus 3	cf	cp	Z
1	1	3	1.00			3	1			3	1.00	
2		2	0.67	0.44	1	3	1	0.95		3	1.00	0.95
3	1	2	0.67	0.44		2	0.67	0.44		3	1.00	0.95
4		1	0.33	-0.44	1	2	0.67	0.44	1	3	1.00	0.95
5		1	0.33	-0.44		1	0.33	-0.44		2	0.67	0.44
6	1	1	0.33	-0.44		1	0.33	-0.44	1	2	0.67	0.44
7		0	0.17	-0.95	1	1	0.33	-0.44		1	0.33	-0.44
8		0	0.17	-0.95		0	0.17	-0.95		1	0.33	-0.44
9		0	0.17	-0.95		0	0.17	-0.95	1	1	0.33	-0.44
10		0	0.17	-0.95		0	0.17	-0.95		0	0.17	-0.95
Mean Z				-0.471				-0.26				0.162
Mean of MeanZs		**-0.189**										
Mean Zn-Mean Zall				-0.281				-0.070				0.352
SBE				-28				-7				35

Source: Brown & Daniel [1990, 16]

Note: Stimuli 1, 2, 3 are individual scenes and indicates the scores by three observers on the scale 1 - 10. cf = cumulative frequencies, cp = cumulative probabilities andZ is Standard Normal Distribution [Z tables].

Digitised photographs based on Shafer's method provided the independent variable in about half of these studies, while others used a variety of measures [e.g. distance to back ridge, recreation opportunity spectrum and measures of visual penetration in a forest setting]. Several studies compared preferences between sample populations [e.g. Balinese and tourists, urban and rural dwellers].

Daniel, *et al*, 1973 and Daniel & Boster, 1976 described the development of the SBE method. The following studies have either tested or refined it or compared it with other techniques.

- comparison of LCJ and SBE methods [Hull *et al*, 1984; Schroeder, 1984]
- test ability of SBE to discriminate among very similar forest landscapes [Hull, 1986]
- assess potential for anchoring SBE estimates to known landscapes [Hull, 1987]
- effect of presentational ordering of photographs, i.e. ordered vs random [Schroeder & Daniel, 1980]
- the effect of labels on scenic beauty estimates [Anderson, 1981]
- SBE of photographs compared with computer graphics [Bergen *et al*, 1995]

Because the LCJ and SBE methods both produce interval scale metrics, they do not define absolute scenic values [i.e. no benchmark zero point is available[61]], only relative differences [Hull, Buhyoff & Daniel, 1984, 1095]. Thus, the scores derived from different studies of different landscapes cannot be compared, a SBE score of say 60 in one area bears no relation to the same score in another area. However, Hull considers it possible to compare two sets of landscapes that share some scenes [Hull, 1987, 26].

A difference between the LCJ and SBE methods is that while the LCJ method allows all possible comparisons of the landscape to be assessed, the SBE allows only one change for evaluation. Furthermore, by using a 10-point scale, the SBE method may result in landscapes being rated as similar despite their differences. This is not possible with the LCJ method which requires a choice to be made between landscapes [Hull, 1986, 319].

Of the instruments used in the landscape preference studies, the LCJ and SBE methods were used in a total of 59, 21 by the LCJ method and 38 SBE method. These are key methods by which landscape preferences are assessed.

The report, *Scaling of Ratings: Concepts and Methods*, by Brown and Daniel [1990] provided a comprehensive review of psychological scaling methods and in particular evaluates the application of SBE, Z scores, and other scaling procedures.

Other Instruments

The LCJ and SBE methods have been key developments and applied to the assessment of landscape preferences, but there is a wide variety of other methods.

Paired Photographs

A group of photographs are allocated into pairs and the preference for each photograph in each pair is recorded. This differs from the LCJ method in that each photograph is different, so the sample is not limited to a relatively small number of photographs. Studies have used up to 120 photographs in 60 pairs. The method is particularly popular in Spain - 11 out of the 16 studies using this method were undertaken in Spain by researchers such as Abello, Bernaldez, De Lucio, Marcia and Rodenas.

61. It is difficult to conceptualise the appearance of a landscape of zero value - i.e. complete absence of aesthetic appeal. In an interval scale, a zero may represent the minimum amount of scenic beauty available to observers in the area being evaluated [Hull, 1987, 26], however it does not possess the quality of an absolute zero. While detractions in a landscape may mar it, can a landscape have a negative value? If so, then a zero quality is logically possible. However, contrary to Fines [1968] who used a scale of 1 - 32 to classify the world's landscapes, it is considered that a zero landscape quality is intellectually meaningless. Even a flat, featureless landscape which some might regard as having the pre-requisites of a zero score has its appeal as papers on the Canadian prairies [e.g. Rees, 1977; Evernden, 1983] testify. Even the Hay Plain in western NSW, the archetypal boring Australian landscape, is not totally lacking in appeal.

Rating or Ranking of Photographs

This is the single most prevalent method accounting for nearly a third of all studies [94]. Its attraction lies in its simplicity.

Typically, photographs are presented in a folder, or slides are used and the respondent scores each on a sheet. Various orders of presentation are usually used to introduce a random element. Some surveys introduce the series with a few slides at the beginning to provide a context and to show the range of landscapes being evaluated. End effects are avoided by a variety of techniques [eg the sheet including a larger number of slides than those in the survey, or by not informing the participants of the number of slides. Another method is the use of dummy 'filler' slides at the beginning and end].

In most surveys where this method is used, the scales generally go from worst to best; e.g. 1 = worst, 7 = best. A few surveys reversed this, eg Lyons [1983], Shafer *et al* [1969]. Most surveys use 5 point scales; this was followed in frequency by 7 point and 10 point scales. With few exceptions, even number scales [e.g. 4, 6] are generally avoided as they do not enable a middle scoring. Other scorings include:

- - 2 to 10, with unsightly being rated from -2 to zero [Beckett, 1974]
- 0 - 100 'interval' scale [Coeterier & Dijkstra, 1976]
- 0 - 32 divided into 6 groups, 0 - 1, 1 - 2, 2 - 4, 4 - 8, 8 - 16, 16 - 32, a semi-exponential scale [Fines, 1968]
- 1 - 130, the upper figure being the width of a scoring sheet measured in millimetres; the participants marked their score across the scale and this was subsequently measured [Lamb & Purcell, 1990]
- 1 - 100 [Purcell, 1992]

The dominant basis of the rating was aesthetic preference - how much or little a scene is liked. However, other ratings included:

- mystery [Gimblett *et al*, 1985]
- compatibility of land use with visual quality of land use [Hendrix & Fabos, 1975]
- six variables - identifiability, coherence, spaciousness, complexity, mystery & texture and a criterion variable of preference [Herzog, 1984, 1985]
- six variables - mystery, physical danger, social danger, shadow, nature, vertical depth and a criterion variable of preference [Herzog & Smith, 1988]
- four descriptor variables - mystery, coherence, spaciousness, focus compared with two target variables - preference and tranquillity [Herzog & Bosley, 1992]
- intricate/complex, exciting/fascinating/ intriguing [Kaplan S & R, & Wendt, 1972]
- naturalness [Lamb & Purcell, 1990]
- desirability as a place in which to live or visit [Lyons, 1983]
- ten dimensions - foreground vegetation, mountains, man-changed area, visible distant landforms, green colours, blue colours, unobstructed expanse of view, sky, clouds, and undisturbed forest [Propst & Buhyoff, 1980]
- preference, interest, familiarity, and goodness of example [i.e. typicality] [Purcell, 1992]
- 37 variables covering distance, landscape type, pine beetle damage, forest characteristics; and ratings of residence, privacy, fittingness, obtrusiveness, incongruity, & naturalness [Vining *et al*, 1984]
- preference and familiarity [Williams, 1985]
- six ratings - interesting, attractiveness, exciting, harmony, preference as wall picture, preference as background for picnic [Wohlwill, 1979]

The number of photographs or slides used in studies varied from 6 to 180 with the majority in the 40 - 60 range.

Ratings of landscape on a scale produce ordinal numbers [i.e. the scale is arbitrary and equality of intervals cannot be assumed]. Nor do they possess an absolute zero. In many instances the issue is ignored and no attempt is made to transform the data to interval scaled numbers, which would permit statistical analysis. Many researchers nevertheless performed such analyses on essentially ordinal numbers.

Multidimensional scaling [MDS] programs provide a means for transforming ordinal data into interval scale [e.g. Gimblett *et al*, 1985]. A graphic map is created of interval scale distances of the spatial relationships between objects on the basis of the number of dimensions specified by the investigator [Gobster & Chenoweth, 1989, 57]. A three-dimensional solution in one case produced an R^2 of 0.94 indicating a close fit of the data with the model [Ibid].

Q-Sort of Photographs

The Q-sort procedure was originally developed for personality assessment [the prefix 'Q' has no special significance, Pitt & Zube, 1979, 229]. Based on psychological research, which indicates that the human senses are not capable of discriminating sensory perceptions into more than nine categories [Pitt & Zube, 1979, 229], participants are generally asked to sort a set of photographs into five or seven piles. Even numbers of piles are avoided so as to permit a central group.

The Q-sort allows a large number of stimuli to be evaluated. An advantage it has over a rating form is that the participant can shift items back and forth as they proceed [Cronbach, 1970, 586]. Thus, the photographs in a given pile at the end of the sorting can be regarded as approximately equivalent. Forcing the participant to allocate a pre-set number of photographs to each pile is regarded as being preferable to an unforced choice [Pitt & Zube, 1979, 230].

Applied to landscape research, this method involves participants sorting photographs into a number of separate piles representing a range of values. Pitt [1976] allocated 16 photographs to five piles, while Sellgren used 120 scenes and allocated these to 10 piles. Dearden [1984, 297] asked participants to sort 30 photographs into five piles, with a minimum of three on each pile. Ervin Zube who has used this technique more than other researchers, generally uses seven piles and asks participants to allocate 56 photographs in the following way:

	Highest						Lowest
Pile	1	2	3	4	5	6	7
Number of Photographs	3	7	11	14	11	7	3

The participant selects the three photographs of highest scenic quality then the three of lowest quality for piles 1 and 7, respectively. The next highest and next lowest quality photographs are then selected and so to the middle where the remaining 14 photographs are assigned.

Zube has used the technique in a series of studies evaluating the scenic qualities of the Connecticut River valley [Zube, 1973 & 1974; Zube, Pitt & Anderson, 1975; Zube & Pitt, 1981; Zube, Pitt & Evans, 1983].

An evaluation of the Q-sort method by Pitt & Zube [1979, 233] found the data it produces to be "as reliable and valid a measure of visual quality as most other psychometric methods". Participants require little training and find the procedure enjoyable.

Visitor Employed Photographs [Participant Photography]

As the name suggests, this technique uses the selection of photographs taken by visitors as an indicator of landscape preferences. The method involves loaning park visitors an inexpensive and easily operated camera, and asking them to take photographs of given subjects. This may as broad as "anything they wish" [Cherem & Driver, 1983], preferred scenes, anything of interest, or may be used to provide material for use in framing a questionnaire [Hammitt, 1979].

Gabriel Cherem developed the method in the early 1970s as a means of eliciting the public's view of aesthetic objects. Cherem and Driver [1983] evaluated the method in landscape research, trialing it in three studies. They provided cameras to hikers on a trail[62] and from the hundreds of photographs taken, identified 'consensus photographs' [i.e. scenes photographed by 10% or more of the participants]. They acknowledge that the 10% figure is arbitrary and could be set higher or lower, but it serves to provide a "concrete representation of a scene which offers some common degree of perceptual interest" [Ibid, 66].

Hull and Revell [1989] used the participant photography method in a study in Bali of cross-cultural landscape preferences among the Balinese and Western tourists. Based on the photographs taken, consensus scenes were identified based on 10% of the responses from each culture. These scenes were then re-photographed as representative of scenes familiar and meaningful to both the Balinese and tourists. The SBE method was then used to rate the scenes, using another group of Balinese and tourist participants.

In an evaluation of the method, Chenoweth concluded that it is a tool that 'deserves serious consideration along with other tools

62. Of 512 cameras loaned, only 6 were not returned.

for understanding people's reaction to the landscape ...' [1984, 142].

Semantic Differential

The semantic differential [SD] is the first of the descriptive methods used in landscape research. Charles Osgood developed the SD technique in the mid 1950s as an objective method of measuring perception, meaning and attitudes. It has been used for assessing the reactions of observers to different types of environmental stimuli, including the architecture of buildings; rooms and interiors; snow, rain, fog and other meteorological phenomena; beach scenes; and roadside scenery [Dearinger, 1979, 64].

The SD technique is based on the following prerequisites [Osgood & Suci, 1955, 326]:

- judgement can be made in terms of a continuum, definable by polar terms [i.e. opposites such as like - dislike]
- the many different ways in which meanings can vary can be represented by a single dimension [e.g. scenic quality as a term covering a landscape's aesthetic qualities]
- a limited number of continua can be used to define a quality within which the meaning can be specified

The SD technique involves participants scoring photographs on a series of bipolar semantic scales, each of which has, say, a 7-point guage. The scales might be expressed in terms of:

common/unusual
pleasant/untidy
obvious/mysterious
artificial/natural
weak/powerful
barren/fertile

Some of the studies included a like/dislike scale against which the other scales could be analysed [e.g. Calvin, *et al*, 1972; Evans & Wood, 1980]. The variety of scales is considerable - the landscape studies examined used well over 60 with little duplication. Studies using the SD technique include:

- Shuttleworth [1980] used it to compare the evaluation of landscapes from photographs and field assessments
- Evans & Wood [1980] used it to rate the visual impressions of a scenic highway based on photographic simulation
- Calvin, Dearinger & Curtin [1972] used SD to assess the preferences for natural landscapes and to assess the influence of various factors on these preferences
- Using SD in conjunction with physiological measures, Urlich [1981] compared preferences for urban vs natural scenes
- Winkel *et al* [1969] assessed the influence of personality factors on individual environmental preferences.

Based on the responses of participants to a pool of over 500 sentence descriptors and 3800 adjectives and nouns, Zube [1974] identified eight content categories, including topography, land use, spatial and compositional qualities, and scenic qualities. From these he derived 25 SD scales, which were used to assess the extent of agreement across professional disciplines involved in landscape inventory, evaluation and planning.

The SD technique is a mature methodology that has been used extensively in landscape preference assessment.

Adjective Checklist

The second descriptive method is the adjective checklist that has been used for the evaluation of landscapes. In 1972, Kenneth Craik developed a Landscape Adjective Check List [LACL] based on descriptions of 50 natural landscape scenes by students. He asked the students to list 10 adjective descriptors of each scene and, while not all were able to achieve this, he derived a list of 1196 distinct items. Adjectives that were used six or more times formed the LACL. The LACL comprised 240 adjectives. He proposed that the list be used to [Ibid, 305]:

- derive impressions of landscapes quickly from large samples in the field
- statistically compared descriptions of the same landscapes
- record impressions of landscape
- assess change in landscapes
- evaluate the effectiveness of photographs, sketches and other surrogates of landscapes

Craik used the list to define the attributes of aesthetically appealing and aesthetically unappealing scenes [Ibid, 306]. He later used it in a field assessment of landscape in Marin County, California. The survey identified 104 adjectives that were used by 10% or more of the participants [1975, 139].

It identified the following attributes of the area: clean, hilly, tree-studded, grassy, pleasant, beautiful, natural, green, peaceful, and sunny. Factor analysis was then used to identify four descriptive landscape factors: serene/gentle, dry/barren, beautiful/ picturesque, and blooming/cultivated.

Kane [1976, 1981] in a study of South Australian landscape for the National Trust, developed and applied a bipolar list of 21 adjectives, of which 14 were significant to South Australians as descriptive of their landscape. The adjective pairs included wet/dry, cold/warm, private/public, unstimulating/ stimulating, and disordered/ order. Responses were transformed into a landscape rating score through application of a weighting factor derived from an earlier evaluation of 40 adjective pairs, and a selection of those which related most to beautiful/ugly and like/dislike. The scoring of adjective pairs was undertaken by ten respondents and applied to 46 scenes throughout South Australia. Checklist scores ranged from a high of 80 down to 29.

Feimer [1984] used Craik's LACL, together with an Environmental Adjective Check List of 300 adjectives [also developed by Craik, 1975], and a Regional Q-sort deck of 67 statements to evaluate the influence of the medium of presentation, evaluative context and observer sample on environmental perception. Intercorrelation of the scale scores from the three sources was used to determine the cross procedure convergence in the assessment of environmental perception [Ibid, 68].

Kellomaki and Savolainen [1984], working in Finland, asked participants to express scenic preferences using adjectives. Most of the terms were positive [e.g. inspiring, pleasant, soothing, beautiful] and a few were negative [e.g. monotonous, ugly, repulsive]. Each item was scored in the range 1 - 7 with 1 - 3 being negative and 4 - 7 being positive. The scenic index that was derived had a range of 37 - 72 and was used to compare the assessment of scenic quality in the field vs the laboratory.

Nassauer & Brenner [1984], asked respondents to describe features in the view and to indicate whether they were attractive or unattractive.

The adjective checklist method has not been widely used but can provide an effective and quick method of assessing impressions of a landscape.

Physiological tests

While psychophysical tests and other preference rating methods assume that human cognitive and affective responses to landscapes can be expressed and measured, physiological tests aim to measure these responses more directly. Physiological effects are autonomic [i.e. self governing] responses of the human body to environmental stimuli – the subject cannot intentionally create them.

Human body responses to the stimuli provided by landscapes have been assessed as follows:

- Yeiser & Shilling, 1978, examined the galvanic skin response [cf lie detector] of respondents to terms such as *Corps of Engineers, cull tree, fire, logging*, and *water* each illustrated by a photograph.
- The dilation of the eye pupil is regarded as associated with pleasure and Wenger & Videbeck, 1969, used this principle to measure pupillary dilation in response to photographs of landscapes.
- Roger Urlich who has postulated a landscape theory based on its affective effects has carried out a range of studies using physiological tests. In Ulrich, 1981 he used alpha wave amplitude and heart rate to compare reactions to photographs of scenes of natural and urban environments. In Urlich *et al* [1991], he used a battery of tests: electrocardiogram, pulse transit time [correlates with systolic blood pressure], spontaneous skin conductance responding, and frontalis muscle tension - to assess the rate of recovery from stress from a stressful movie during exposure to videos of natural and urban scenes.

Physiological tests are complex, require specialist equipment and expertise in their administration and their use in landscape research is limited.

Interviews and Questionnaires

- Interviews and questionnaires play an important role in landscape research

Table 7.9 Sample of Studies using Questionnaires

Study	Location of survey	Number surveyed	Comments
Brancher, 1972	field	242	4 per day
Choker & Mene, 1992	residents	240	Nigeria
Civco, 1979	residents ?	200	
DeLucio & Mugica, 1994	field	976	Spain
Hammitt, 1979	field	400	
Hull, Stewart, Yi, 1992	hikers	90	experiential
Hull & Stewart, 1995	hikers	25	experiential
Jones *et al*	mail	400 out of 2000 sent	
Levine & Langenau, 1979	mail	300 returned, 65%	
Ribe, 1993	residents ?	196	
Schroeder, 1991	mail	34 - prior agreement	photo-questionnaire
Shafer & Mietz, 1969	hikers	76	
Shechter, Reiser & Tzamir, 1981	field	150	5 questionnaires
Sommer & Summit, 1995	students	80	
Steinitz, 1990	mail + field	1500 + 200	
Willis & Garrod, 1993	residents + field	300 + 300	
Woodcock, 1982	students	200	3 questionnaires
Yarrow, 1966	mail	217 returned, 54%	
Yang & Brown, 1992	citizens, tourists, students	665 total, 95 - 100% return on questionnaire	Seoul, photo-questionnaire

and are often used in association with other methods. Table 7.9 summarises key aspects of a sample of studies that have employed interviews and/or questionnaires. Evident from the table are the:

- high proportion of field administered surveys - about 50%
- large number of respondents and consequently the enormous time and resource commitment it implies - one survey of 242 averaged only 4 interviews a day - 60 days total small number of students involved in questionnaire surveys - given the predominance of students in all the surveys [over 50%] it is clear that questionnaires are not regarded as relevant or useful for student respondents

Components Checklist

In his study of South Australian landscapes, Kane [1976, 1981]] developed a component checklist method for assessing landscape quality. The checklist comprised eight groups of items covering:

- coastal landforms
- non-coastal landforms
- coastal water
- streams
- lakes and reservoirs
- vegetation cover
- human impact
- composition and temporary factors

The final group included colour, shadows, clouds, winds, reflections, and sounds. Each of the components were scored on a +/-2 basis on whether they made a positive or negative contribution to the scene's overall attractiveness. Only relevant items were scored for each scene. The scores were added, the items which scored +1 or +2 were also added, and then the results combined as follows:

$$\sqrt{P} + (10S/N)$$

Where P = the sum of the high scores [ie +1 and +2]
S = the sum of all scores
N = number of items scored

A total of 46 scenes were scored by ten observers and the results ranged from 10.5 to 22.4. An average for each scene was then derived, scored out of 100.

Kane [1981, 83] noted that component checklists suffer from several problems:

- components whose correlation with landscape aesthetics is actually unproved
- the equal weighting of components
- the assumption that their values are additive

Despite these, Kane considered the method worked well and the results correlated quite strongly [r =0.96] with his bipolar adjective checklist.

Maps

Maps were used in five studies as an adjunct to surveys. Daniel *et* al [1978], mapped scenic quality using the SBE method. Garrod & Willis [1992], used a map of house prices in an economic assessment of the influence of landscape factors on house values in western England. Millward [1985], mapped the zones of visual intrusion of deep coal mining in Canada. Penning-Rowsell [1982], used maps as an aid in a survey of public landscape preferences. Shechter *et al* [1981], used the grid cells from a map of the survey area as the basis for field assessments.

Repertory Grid

The repertory grid [RG] technique is associated with personal construct theory but it is also a complex method that has not been used widely. G.A. Kelly's *The Psychology of Personal Constructs* [1955] postulated that a person's present environmental perception is based on the complex interaction of past experiences in their memory.

> "Personal constructs are the criteria used by a person to describe the conceptual structure which is derived from past experience and to interpret new experiences in terms of existing conceptual structures" [Pomeroy *et al*, 1989, 152].

Because constructs are bipolar concepts that categorise the perceived similarities and differences across a continuum, the repertory grid shows these as a matrix. Individuals sort, rank or rate environmental stimuli, such as photographs of landscapes and these constructs form the individual's grid or matrix. Combined with grids of other participants, an aggregated 'supergrid' is created. Constructs that are common to many individuals will strongly influence the composition of the supergrid.

The RG technique has been used in a range of environmental perception studies, including landscape paintings, urban sketches, environmental cognition, recreation areas, and landscape photographs [Pomeroy *et al*, 1989, 152]. Where participants are familiar with the landscape, strong common personal constructs result [Ibid].

The RG technique involves participants viewing pairs of stimuli [e.g. two landscape photographs shown side by side] and describing how the scenes differ or are similar. Instructions to participants might suggest that they:

> "feel free when describing differences between settings, to use any descriptions you can think of, whether they are differences in the types of things you can do in each setting, or differences in objects and things found within each setting, or differences in how the settings look." [Fenton, 1985, 333]

Using this method, up to 20 constructs were elicited for each subject. The stimuli were then rated on a 7-point scale using the positive and negative poles of each construct as anchors. A supergrid comprising 12 stimuli and 824 constructs was then derived and used for analysis.

The RG technique was used by Fenton [1985] to help in identifying the underlying dimensions of meaning or content that individuals use to discriminate among natural settings and examine relationships between dimensions and judgements of aesthetic quality. Pomeroy *et al* [1989] assessed the application of personal construct theory in interpreting landscape preferences.

Other Methods

A range of other techniques has also been used. These included:

- Film, video and computer graphics These were used as surrogates of the physical landscape and as an alternative to photographs.

- Field assessments These involved carrying out the survey of respondents of the landscape of the area in which they are located. In some cases these were used to compare landscape assessments based on photographs versus the field (Dunn [1976]; Hull & Stewart [1992]; Kellomaki & Savolainen [1984]; Robinson *et al* [1976]; Shuttleworth [1980]; Stewart *et al* [1984]; Trent *et al* [1987]).

- Descriptive rating Shafer & Mietz [1969] showed hikers a set of statements about the wilderness experience, including its aesthetic experience, and asked them to rate them in terms of importance.

- Economic valuation Willis and Garrod [1992] have applied environmental valuation techniques to landscape assessment. They applied the 'hedonic pricing' technique to assess the effect on rural house values of views, woodlands and water. They also applied the 'contingent valuation' technique to estimate the community's willingness to pay for alternative landscape futures in the Yorkshire Dales National Park in England.

- Personality test Marcia [1979], a Spanish researcher, has used personality questionnaires that measure control, extroversion, paranoia, sincerity and doubts, to assess relationships between landscape preferences and personality.

Measurement of Features on Photographs

The final method examined is the only one, apart from forest mensuration techniques, which provides an objective measure of the composition of landscapes as depicted in photographs. It is therefore the only measure that has been developed of the independent variable [i.e. the landscape].

In 1969, Elwood Shafer, a researcher in the US Forest Service, published a unique approach to measuring landscape preferences by measuring areas and perimeters of features on 8" x 10" black and white photographs.

The photographs were of scenes across the US and included forests, mountains, meadows, water and various combinations. A total of 100 photographs were used. A 1/4" clear plastic grid was overlaid on each photograph and the areas of landscape zones were then outlined by pen and measured. The 10 landscape zones were:

- sky
- vegetation in the foreground, mid-distance and distance
- non-vegetation [e.g. exposed ground, mountains, snowfields, grasslands] in the foreground, mid-distance and distance
- water - streams, waterfall and lakes

Figure 7.9 indicates the landscape zones identified in a scene of a lake and distant mountains, framed by trees. Each polygon is identified as set [S_n] that identifies the total squares it contains. Each set is identified by computer, using variables that describe its boundary; the interior number of squares; the area; and the horizontal end-squares. The tonal variations provided by sky, land and water are measured by a photometer and are included in the analysis. Each photograph is described by a total of 46 variables. This was subsequently reduced to 26 zones by removing redundancies.

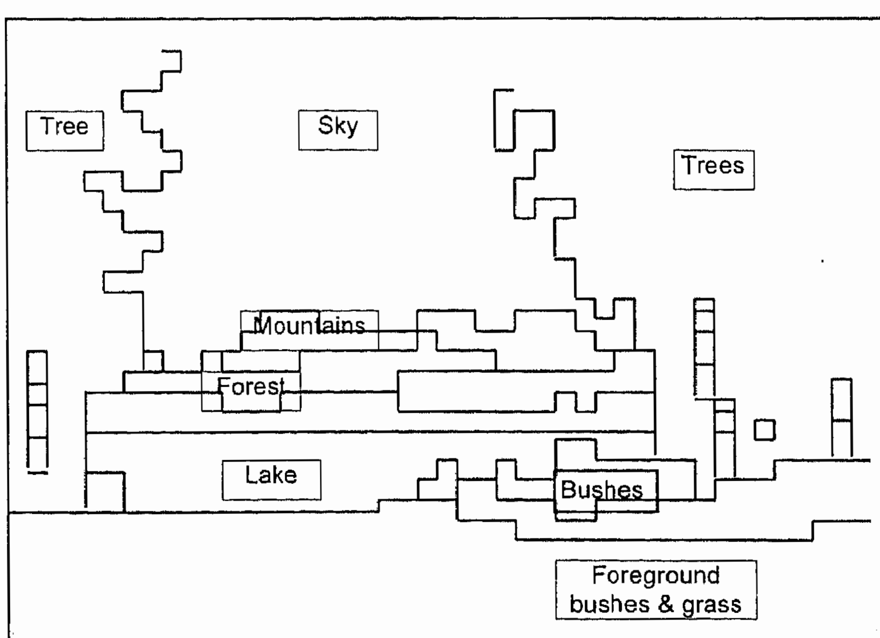


Figure 7.9 Example of Landscape Zones Designated on Photograph [Shafer's method]

The photographic evaluations that describe the elements in the landscape provide the independent variables in the research method. The rating of landscape quality provides the dependent variable and is assessed by asking participants to rank the landscape on a 1 - 5 scale with 1 being high and 5 low. A total of 50 rank orders are obtained for each photograph; these ranks are added and a total score derived for each photograph. These could range from 50 to 250, 50 being most preferred and 250 the least. The actual scores ranged from 71 to 228 [$x = 150$, $\sigma = 37.75$].

Factor analysis of the 26 photographic variables identified nine independent factors. Most variables have high loadings on only one factor. The variable with the highest loading on each factor was used as a possible predictor variable in multiple-regression analysis to explain the dependent variable [i.e. the preference score]. The final equation or model which used 10 significant terms and explains 66% of the variation in landscape preference is as indicated in Table 7.10.

Using the model, the predicted scores of the 100 photographs ranged from 84 to 236 [$x = 150.05$, $\sigma = 30.58$], which approximates that derived from participants.

Table 7.10 Shafer's Predictive Model of Landscape Preferences

$Y = 184.8 - 0.5436\,X_1 - 0.0929\,X_2 + 0.002069\,(X_1 \cdot X_3) + 0.0005538\,(X_1 \cdot X_4) - 0.002596\,(X_3 \cdot X_5) + 0.001634\,(X_2 \cdot X_6) - 0.008441\,(X_4 \cdot X_6) - 0.0004131\,(X_4 \cdot X_5) + 0.0006666\,X_1^2 + 0.0001327\,X_5^2$

where: Y = preference
X_1 = perimeter of near vegetation
X_2 = perimeter of middle distant vegetation
X_3 = perimeter of distant vegetation
X_4 = area of near vegetation
X_5 = area of any kind of water
X_6 = area of distant non-vegetation

Note: negative items contribute positively, while positive items contribute negatively [i.e. the lower the score the better the landscape].

Factors having a positive influence on the landscape's aesthetic appeal are the:

- perimeters of near and middle distant vegetation
- perimeter of distant vegetation multiplied by the area of water
- area of middle distance vegetation multiplied by the area of distant non-vegetation (4) the area of middle distant vegetation multiplied by the area of water.

The resultant scores are ordinal numbers that enable ranking of photographs.

Shafer applied the same methodology in Scotland to assess the whether the same results would derive from a different culture [Shafer & Tooby, 1974]. The same photographs from the US were used and assessed by participants in Scottish campgrounds [Shafer's original study also used campers in the Adirondack Mountains]. An extremely high correlation coefficient of 0.91 was obtained suggesting that the original model is sufficient.

Based on the model, Shafer subsequently identified factors that could enhance the scenic quality of specific landscapes [see Brush & Shafer, 1975] and Shafer & Brush, 1977], for example a farmland scene could be improved by:

- eliminating tree cover in the middle distance and replacing it with fields or pasture
- establishing a lake
- permitting vegetation to encroach in the distant zone

For each of these he was able to predict the change to the score that would result [e.g. establishing a lake would improve the score from 155 to 119 – the lower is better]. Listing the proposed changes and their expected effects enables optimal management decisions to be made.

In a later re-appraisal of Shafer's original model, Brush [1981] found that the landscapes containing high relative relief [i.e. steep hills and mountains] were scored highly by participants, suggesting the need for the model to take the effects of landform into account.

Shafer's model has been criticised as "lacking intuitive appeal since some of the multiplicative independent variables, although mathematically proper, seem illogical (e.g. area of water X area of intermediate veg)" [Buhyoff & Leuschner, 1978, 425]. Nevertheless the critics acknowledge the innovative character of Shafer's work. Whittow [1976] suggests that the method may be seen by some in terms of the "well-known analogy of the computer attempting to describe Shakespeare", but he also recognised its worth. A philosopher, Alan Carlson [1977], issued a lengthy critique of the method in which he identifies three key assumptions in the model:

1) the aesthetic quality of the landscape is meaningfully correlated with certain preferences for that landscape
2) the relevant preferences are those of the general public
3) the presence of the formalist theme

Of these, the third is possibly the most telling. Carlson notes that the methodology is "completely formalist"[63] as the methodology measures only formal aspects of photographs - the shapes of the zones, not their contents, or the relationships between the shapes and lines [Ibid, 141-2]. He also notes that photographs promote formalism, since they present the landscape in a two-dimensional form that more easily enables it to be thought of in terms of shapes, shades, lines and patterns.

Bourassa also identifies the formalist basis of Shafer's approach and is critical of its lack of theoretical origin, stating that the "choice of variables is completely without justification [and] do not even seem to make sense intuitively" [1991, 124]. Bourassa considers the results quite "spurious" as there is no causal link between the independent variables [i.e. the landscape's formal qualities] and the dependent variable [i.e. preference scores]. In another critique, Weinstein is also critical of Shafer's use of regression analysis:

> "With enough independent variables a regression equation can be derived that will correlate perfectly with *any* dependent variable, no matter how meaningless and inappropriate the predictors actually are" [Weinstein, 1976, 613].

63. Formalism derives from the artistic tradition and identifies certain formal aspects of a scene such as shapes, lines, colour, patterns, and the formal qualities which they produce such as balance, proportion, unity and diversity [see Carlson, 1977, 136].

Despite its critics, Shafer's approach has been used widely, simply because as it provides an objective basis for measuring the independent variable in landscape research. Uses include the following:

- Anderson and Schroeder [1983] used the Shafer method to measure the independent variables in urban landscapes and the SBE method of Daniel & Boster [1976] to measure the dependent variable of human preferences.
- Buhyoff & Leuschner [1978] quantified proportions of forested landscapes affected by beetle damage using the Shafer method and compared these with preference scores derived using the SBE method. Buhyoff & Riesenman [1979] used a similar methodology to assess whether the subject's awareness of beetle damage influenced their preference judgements.
- Buhyoff & Wellman [1980] used the Shafer and SBE methods to develop a logarithmic relationship between stimulus and response.
- Buhyoff, Gauthier and Wellman [1984] used the Shafer method together with forest mensuration and the LCJ scaling method to identify objective quantifiable urban forest parameters as predictors of visual quality.
- Carls [1974] followed the Shafer model and included as additional variables - the level of development [low or high development zones] and the number of people in photographs bringing the total number of variables to 53.
- Gregory and Davis [1993] ranked photographs of riverscapes in England and used the Shafer method to identify the elements in the river or riverscape that are associated with high and low preference scores.
- Hull and McCarthy [1988] evaluated the positive influence that [Australian] wildlife has on preferences based on the SBE and Shafer methods.
- Patsfall, Feimer, Buhyoff and Wellman [1984] evaluated the influence that the distance of vegetation and the composition of the scene have on landscape preferences using the SBE and Shafer methods.

Each of these used the Shafer method to establish the parameters of the independent variable, [the physical landscape] against which the preferences obtained from other methods could be analysed.

Research Instruments - Conclusions

The diversity of instruments used in the evaluation of landscape preferences is notable. Although the field of landscape research is relatively new, it has been characterised by considerable innovation and imagination in the application and modification of existing techniques and the development of new ones.

Many of the studies use several methods in combination and a synopsis of these indicates:

- Shafer's method of measuring photographs is used in combination with paired and ranked photographs, and the LCJ and SBE methods
- interviews are used particularly in combination with ranked photographs
- field assessment is used particularly with ranked photographs
- ranked photographs method is the most ubiquitous being used in combination with Q sort, visitor employed photographs, SBE, semantic differential, adjective checklist, Shafer's method, interviews, and field assessment

(7) Participants

The characteristics of the participants in the preference studies are summarised in Table 7.11.

Table 7.11 Participants Used in Landscape Preference Surveys

Participants	Frequency	%
Tertiary students	129	41.1
General community	71	22.6
Visitors to park or site	35	11.1
Natural resource professionals	24	7.6
Design professionals	14	4.5
University staff	14	4.5
Landowners & residents	10	3.2
Children	7	2.2
Other	10	3.2
Total	**314**	**100.0**

Note: Visitors to park or site includes campers [7], hikers & walkers [7]

Rather than use samples of the general community, which may be expected, a sizeable proportion of surveys utilise students from the university campus where the study is being undertaken.

Reviewing the surveys, it is easy to gain the impression, that landscape preferences have been overwhelmingly determined by American students and this is supported by the figures. Well over half [57%] of the surveys used students, and in 38% of surveys they provide the sole subject [Table 7.12].

Table 7.12 Use of Students in Landscape Preference Surveys

	No	%
Total surveys	227	100%
Students used in surveys	129	57%
Students used in surveys (US)	94	41%
Only students used	87	38%
Only students used (US)	63	28%

Of the surveys carried out in the United States [135], 41% used students, and in 28% of surveys students only were used. Although the proportion of surveys in the US that used students is lower than outside the US, in absolute terms the bulk of studies using students are US based.

(8) Participant Characteristics

Studies varied widely in the extent to which they sought data about the characteristics of the participants they used in assessing landscape preferences, and sought to correlate these characteristics with the preferences.

Out of the 227 surveys, 142 [63%] sought no data from the participants, a surprisingly high proportion. Table 7.13 summarises the most frequent characteristics sought.

The first five characteristics in Table 7.13 - age, gender, education, employment and socio-economic status are the most frequently sought. Childhood residence or home origins were sought to relate preferences to where the participant's early acculturation occurred. Studies examining the effect of culture on preferences and those examining the influence of race sought data on these factors.

Table 7.13 Participant Characteristics

Participant Characteristics	Frequency	%
Age	49	22.7
Gender	49	22.7
Education & training	24	11.1
Employment	20	9.2
Socio-economic status	20	9.2
Childhood residence	19	8.8
Culture & ethnicity	8	3.7
Expert/non-expert	6	2.8
Race [i.e. black]	6	2.8
Other	15	6.9
Total		**100.0**

Note: Other included landowner [4], personality [3], resident/non-resident [3], visitor knowledge [2] and religion, marital status and distance travelled [1 each].

Table 7.14 summarises the number of characteristics of the participants sought by the surveys. This indicates that most surveys sought relatively little data [usually none] on their participant characteristics which is perhaps surprising in preference studies.

In some cases certain characteristics may be implicit, because of where the study was done [eg age group, gender, education, employment, socio-economic status, culture, expertise]. The absence of explicit mention does not mean the characteristics were not taken into account.

Table 7.14 Frequency of Participant Characteristics

Characteristics	Surveys
1	25
2	21
3	18
4	14
5	5
6	2
8	1
Total	**86**

(9) Landscape Characteristics

The landscape characteristics were defined by interpretation of the purpose, scope and coverage of the surveys. Inevitably a degree of judgement and subjectivity is implicit in the characteristics identified for each survey, particularly where they covers a range of characteristics [Table 7.15].

Table 7.15 Landscape Characteristics Covered by Surveys

Landscape Characteristic	Frequency	%
Naturalism	138	19.2
Forests or trees	183	25.4
Water	89	12.3
Rural	87	12.1
Urban areas/ development	65	9.0
Mountains & rugged topography	57	7.9
Environmental damage, impacts	29	4.0
Coast or lake shore	24	3.3
Urban parks and gardens	17	2.3
Roads	13	1.8
Other characteristics	19	2.6
Total	**721**	**100.0**

Note: Other covers wildlife [3], distance [2], number of people [5], sound [4], air quality [1] and unstated [4]. Many surveys had multiple landscape characteristics.

The dominance of forest-based landscape research is reflected by the dominance of this characteristic. The majority of these surveys were of US Forest Service areas that were subject to research to assist in their management to ensure cognisance was given to scenic values.

The environmental damage category was frequently associated with forests; for example, the research of Buhyoff on the aesthetic impact of southern pine beetle on ponderosa pines on forested lands. Some surveys covering urban parks and gardens were included where these addressed wider issues than just the urban environment; for example, testing of Appleton's prospect refuge theory [e.g. Naser, *et al, 1983*] or where they formed part of a wider study [e.g. Kaplan & Talbot, 1988].

Naturalism, or the natural character of landscapes, was the next dominant theme, frequently in combination with forests, water, coast, mountains or other natural features.

It is perhaps surprising that mountains and similarly rugged terrain does not comprise a dominant theme in landscape research. Nevertheless, it was included with other characteristics in nearly 60 studies. The mountain landscapes included in the surveys were mainly in the US - the Rockies and the eastern Appalachians and Adirondacks. Other mountain landscapes covered included: Canary Islands [Bernaldez *et al*, 1987], Spain [De Lucio & Mugica, 1994], Bali [Hull & Revell, 1989], Thailand [Tips & Savasdisara, 1986]. Fines [1968] used mountain scenes from the Himalayas, the Alps and Britain in his survey. Apart from Fines' survey, none used scenes from the well-known mountain landscapes of the Alps. No Australian mountainous areas have been subject to preference studies.

Water is a major theme of landscape surveys because with few exceptions it has been found to contribute positively to landscape quality. Together with coasts and lake shores, water is an important aspect of landscape research.

Table 7.16 summarises the number of characteristics examined by the surveys. The number of characteristics examined is surprisingly small - over 80% examined four or fewer characteristics. This indicates that surveys have generally examined landscapes which are fairly uniform; for example, many examine just forests. A large number examine the forest, water and mountains combination.

Table 7.16 Number of Characteristics Covered by Landscape Preference Surveys

Number of characteristics	Frequency	%
1	44	19.4
2	34	14.9
3	50	22.0
4	56	24.7
5	28	12.3
6	11	4.8
7	4	1.7
Total	**227**	**100.0**

(10) Landscape Representation

As has already been described, the majority of studies used surrogates of the landscape rather than survey participants *in situ* in the landscape, which is generally too difficult and expensive. Field surveys were used in 31 studies. Table 7.17 summarises the form of other representations of the landscape.

The dominance of photographs as a representation medium is evident from these figures.

Table 7.17 Representation of Landscapes by Surveys

Representation	Frequency	%
Photographs	189	89.6
Film or video	8	3.8
Artists drawings	9	4.2
Computer graphics	4	1.9
Model	1	0.5
Total	**211**	**100.0**

Note: many surveys used more than one form of representation.

The types of photographs - whether black and white, or colour are indicated by Table 7.18. This indicates the dominance of colour photographs.

Table 7.18 Form of Photographs Used in Surveys

Form of Photograph	Frequency	%
Black & white	25	12.9
Colour	152	78.8
Unstated	16	8.3
Total	**193**	**100.0**

Note: Surveys covered includes 8 using films or video. One of the studies used both b/w and colour photographs in its surveys.

(11) Statistical Analysis

Virtually all the surveys involved statistical analysis of the results. In some cases this was rudimentary - means, standard deviations, but many cases involved sophisticated forms of statistical analysis, including factor analysis and regression analysis. Many surveys used a range of analytical methods. Table 7.19 summarises the main forms of statistical analysis.

Table 7.19 Forms of Statistical Analysis Used in Surveys

Statistical Analysis	Frequency	%
Correlation analysis	68	22.2
Factor analysis	47	15.4
Regression analysis	58	19.0
Analysis of variance	48	15.7
Chi Square	19	6.2
Cluster analysis	13	4.2
Multidimensional scaling	10	3.3
Other	43	14.1
Total	**306**	**100.0**

Note: many surveys used several forms of analysis.

The 'other' category included: correspondence analysis, sensitivity analysis, preference rating, Wilcoxon Rank Sum Test, Mann-Whitney U test, Johnson's hierarchical clustering algorithm and Tukey's Honestly Significant Difference test.

Factor analysis and/or regression analysis was used in 86 [44%] of the studies.

(12) Findings of Surveys

Although the findings of the surveys will be the subject of detailed review in Chapter 8, an overview is presented here. The findings of surveys were assessed under four broad headings:

1) theory - did the survey support, change, or refine the theory or oppose it;
2) technique - did the findings support, change, or refine the technique or oppose it;
3) participant characteristics - did the findings improve understanding; and
4) landscape perception factors - did the findings provide greater understanding of the factors affecting landscape perception and preferences

Table 7.20 summarises the results of this assessment.

Table 7.20 Assessment of the Findings of Surveys

Assessment	Frequency	%
Supported theory	21	7.0
Changed/refined theor	6	2.0
Opposed theory	7	2.3
Supported technique	51	17.1
Changed/refined technique	14	4.7
Opposed technique	7	2.3
Defined participant characteristics	26	8.7
Defined landscape perception factors	166	55.7
Total	**298**	**100.0**

Note: the findings of many surveys applied to more than one category.

The empirical nature of the majority of surveys is again apparent in these figures: 56% defined landscape perception factors; 24% assisted in technique development; and only 11% focussed on theory development.

CHAPTER EIGHT

FINDINGS FROM TWENTIETH CENTURY LANDSCAPE STUDIES

8.1 INTRODUCTION

In this chapter the findings of the 191 landscape preference studies are summarised. The characteristics of these were described in Chapter 7. A model of human-landscape interaction that will guide the analysis of findings was described in Chapter 1. Five components were identified:

- landscape theory
- research methodologies
- characteristics of the observer
- presentation of the landscape - e.g. use of surrogates
- preferences for the landscape and its components

Each component is reviewed in this chapter.

8.2 LANDSCAPE THEORY

This section examines the need for theory and then describes the four principal theories advanced in the area of landscape aesthetics. It also reviews two quasi-theories or models for looking at landscape aesthetics. All four theories are variations of an evolutionary perspective, as each assumes that landscape preferences are survival-enhancing. The theories and models are:

- habitat theory [Orians]
- prospect - refuge theory [Appleton]
- affective theory - psychoevolutionary approach [Urlich]
- information processing theory - a functionalist evolutionary approach [Kaplan & Kaplan]
- tripartite paradigm of aesthetics [Bourassa]
- pyramid of influences [Dearden]

The section concludes by assessing the adequacy of the theories.

(1) Need for Theory

Consistent with the development of a new area of intellectual inquiry, the landscape field has been characterised as "rampantly empirical" [Porteous, 1982, 63], lacking a sound theoretical base to guide it. Appleton similarly stated that the "techniques of evaluation are overwhelmingly dominated by empirical methodology, [and] that they could be greatly strengthened if they were underpinned by a more convincing theoretical base" [1975b, 120]. Buhyoff and Wellman [1980, 258] considered that the point has been reached "where [a] theoretically based model development should become a primary goal".

In a landmark review of over 160 landscape research papers, Zube, Taylor & Sell "identified a conspicuous theoretical void in the majority of the research" [1982, 25]. However, in a subsequent paper, they identified perception research to be based on "a scattering of diverse theoretical origins." [Sell, Taylor & Zube, 1984, 61]. Using the four paradigms of perception research they had identified, they describe these theoretical origins, which are discussed below. Nevertheless Zube, Taylor & Sell also agree with Appleton that the lack "of a unifying theoretical structure does not allow a rational basis for 'diagnosis, prescription and prognosis.'" [Ibid].

While the lack of theory is widely recognised, the reason for the void is less apparent. Part of the reason may be that the philosophy of aesthetics and the literature on landscape design and art history have much about aesthetics but notoriously little of a practical orientation which could apply to landscape quality assessment [Dearden & Sadler, 1989, 6]. Also, because of rapid changes to landscapes, some argue that practitioners "were not going to fiddle with theory while the landscape burned." [Ibid].

Why is it necessary to have a theoretical basis? If the community is concerned about landscape quality, is that not enough? While people's opinions may be sought about the worth or quality of a landscape, there is no way of making sense of these views without a theoretical construct. Theoretical paradigms can provide managers with the basis for management action, by allowing prediction of consequences following action.
A further reason is analogous to the understanding of the human body that separates a doctor from the person in the street in making a diagnosis; as Appleton

aptly put it: “just as the Brisbane wicket after rain used to be said to reduce all batsmen to an equal plane of incompetence, so this absence of aesthetic theory brings the professional down to the same plane as the man in the street.” [1975b, 122] Theory can thus provide a basis for elevating the level of analysis from common to expert. Theoretical perspectives also assist framing problems, in defining what to look for and in what ways to look [Gärling & Golledge, 1989, 204].

Following the comprehensive review that he undertook with Taylor and Sell, Zube stated that the lack of theory and narrow approaches restrict the future growth of the field [Zube, 1984, 104]. The lack of an adequate theoretical base constrains the identification, assessment and protection of landscapes. The “task of theory in landscape aesthetics”, according to Bourassa [1991, 64] “is one of identifying aesthetic *laws*, if they exist, and of identifying the general characteristics or types of aesthetic *rules* and *strategies*.”

(2) Habitat Theory - Orians

Habitat theory is an overarching paradigm within which fit information-processing theory and Appleton’s prospect-refuge theory. Bourassa [1991, 76] suggested the overlap between these two theories and Appleton viewed his theory as having its roots in habitat theory. Habitat theory may be defined as:

> “the theory that aesthetic satisfaction experienced in the contemplation of the landscape stems from the spontaneous perception of landscape features which, in their shapes, colours, spatial arrangements and other visible attributes, act as sign-stimuli indicative of environmental conditions favourable for survival, whether they are really favourable or not.” [Appleton, 1975, 269]

In the early 1970s when Appleton wrote his book, information processing theory (insofar as its application to landscape) was in its infancy.

G.H. Orians, an evolutionary biologist, and the principal advocate of the theory, states that its biological underpinnings are that:

> “natural selection should have favoured individuals who were motivated to explore and settle in environments likely to afford the necessities of life but to avoid environments with poorer resources or posing higher risks.” [Orians & Heerwagen, 1992, 557]

Habitat theory postulates that, because the habitats in which humans are believed to have evolved were dominated by grasslands and scattered trees with water in close proximity, this became a preferred visual landscape for humans. Until recently it has been believed that the East African savanna was the cradle of humanity [Leakey, 1963, 1976]. Balling and Falk state that much of our “biological apparatus, most obviously bipedalism, is that of a savanna primate.” [1982, 9].

Research by Rabinowitz & Coughlin [1970] found that there was a general preference for landscapes that were “parklike” or “obviously man-influenced” [Ibid, 7].

> “Mowed grass and scattered large shade trees seem to be the determining factors. Judges may say, ‘This is nice because it looks natural, away from civilization.’ However, the scenes to which they are referring are not in a wild or natural state but clearly ‘landscaped’.”

These environments, the authors suggest, provide feelings of openness and seclusion, or in Appleton’s terms, prospect and refuge. Habitat theory may provide a plausible explanation for the importance of the pastoral landscape, from the Arcadia of antiquity through the paintings of Claude and Poussin and the landscape gardens of Capability Brown to the municipal parks of today. The preference for parklike landscapes is the only landscape form that appears to have endured across the millennia [see Chapter 6]. Balling and Falk ask:

> “Are many of the parks and backyards people have so assiduously created wherever they have lived in part an expression of an innate predisposition for the savanna?” [Balling & Falk, 1982, 10]

Urlich found in a survey of Swedes and Americans a preference for park-like scenes. These were:

> “distinguished by the presence of scattered trees or small groupings of trees, and all had even or fine ground textures. In some cases the scenes had been landscaped and the textures consisted of mowed grass. The even ground textures contained relatively little complexity; rather, the bulk of the complexity consisted of vertical elements - trees and bushes - which stood out clearly against the unambiguous depth “sheet” of the ground surface. “ [1977, 8]

According to Orians the:

> "savannas of tropical Africa have high resource-providing potential for a large, terrestrial, omnivorous primate ... In savannas ... trees are scattered and much of the productivity is found within two metres of the ground where it is directly accessible to people and grazing and browsing animals. Biomass and production of meat is much higher in savannas than in forests." [1986, 10]

Based on this, Orians suggests that:

> "savanna-type environments with scattered trees and copses in a matrix of grassland should be highly preferred environments for people and should evoke strong positive emotions." [Ibid, 110];

and

> "tree shapes characteristic of environments providing the highest quality resources for evolving humans should be more pleasing than shapes characterising poor habitats." [Heerwagen & Orians, 1993, 157]

G.H. & E.N. Orians photographed African savanna trees, in particular the *Acacia tortulis*, and selected trees varying in height/width ratio, height of branches, extent of canopy layers. Photographs were selected to test four hypotheses:

- trees with lower trunks should be more attractive than trees with high trunks
- trees with moderate canopy density should be more attractive than trees with low or high canopy density
- trees with a high degree of canopy layering should be more attractive than trees with low or moderate degrees of layering
- the broader the tree canopy relative to its height, the more attractive the tree should be [Heerwagen & Orians, 1993, 158]

Measures were taken of each tree canopy's width and height, tree height and trunk height. These were converted into ratios of canopy width/height, canopy width/ tree height, and trunk height/tree height. Respondents rated attractiveness of photographs [b & w] of the trees on a 6 point scale. The study found that trunk height, canopy layering and canopy width/tree height ratio significantly influenced attractiveness scores, but the canopy width/canopy height did not have a significant effect.

The most attractive trees [Table 8.1] had highly or moderately layered canopies, lower trunks, and higher canopy width/tree height ratio. Factors such as broken branches, deformed trunks, and highly asymmetrical canopies, indicators of resource depletion, depressed attractiveness scores.

Table 8.1 Comparison of Most & Least Attractive Trees

	7 most attractive	7 least attractive	*t*	*p*
Mean attractiveness score	3.91	2.9	12.58	.000
Trunk height/ tree height ratio	0.17	0.33	8.24	.000
Canopy width/tree height ratio	1.93	1.53	5.89	.000
Canopy width/ canopy height ratio	3.63	3.56	0.2	.83

Source: Heerwagen & Orians, 1993, 160

Interpreting their results, the authors noted that "a low trunk is easier to climb than a high one; a broad umbrella-like canopy affords greater refuge from sun or rain than a narrow, high canopy." [Heerwagen & Orians, 1993, 160]. The results were considered to support the functional-evolutionary perspective.

Orians and Heerwagen also compared the forms of African savanna trees with maple and oak trees found in Japanese[64] parks and gardens. Comparing three morphological differences - height vs canopy width, trunk height vs total height, and canopy depth vs canopy width - they found close similarities:

> "Garden conifers are highly modified by pruning them to grow broader than tall; trunks are trained to branch close to the ground; foliage is trimmed to produce a distinct layering similar to that of a number of savanna species." [Ibid, 1993, 157].

While suggesting that achieving a growth form similar to that of savanna trees was a criterion subconsciously employed by Japanese gardeners, Orians recognised that many other factors also have had an influence [Orians, 1986, 13 - 15].

64. The choice of Japanese parks and gardens rather than European or North American is not explained.

In another study, Heerwagen & Orians sought evidence for Appleton's prospect and refuge among landscape paintings and the Red Books of Humphrey Repton, the 18th century English landscape architect [see Chapter 6]. Their analysis of Repton's Red Books also examined whether he created savanna-like scenes. These books illustrated the "before" and "after" appearance of properties, showing the effects of his landscaping. Examination of 18 designs found that Repton frequently moved trees out into open space, thereby creating an uneven wood edge, a feature characteristic of savanna environments. In his book, *The Art of Landscape Gardening*, Repton noted that too many trees "make a place appear gloomy and damp" [Ibid, 1993, 155].

According to Sommer and Summit, research on tree preferences in Argentina, Australia and United States found that:

> "respondents preferred canopies to be moderately dense and trunks that bifurcated near the ground. Trees with high trunks and skimpy or very dense canopies were considered to be least attractive by all these groups, findings considered to be consistent with the savannah hypothesis" [Sommer & Summit, 1995, 542].

Sommer and Summit used computer drawn images of tree shapes to test preferences with variations in height and width. They found preferences for large canopies [χ^2 = 195.7, p < 0.001], low trunk height and thin trunk thickness [both p < 0.001], the first two properties being consistent with savanna hypothesis and the third [trunk thickness] being irrelevant [Ibid, 551].

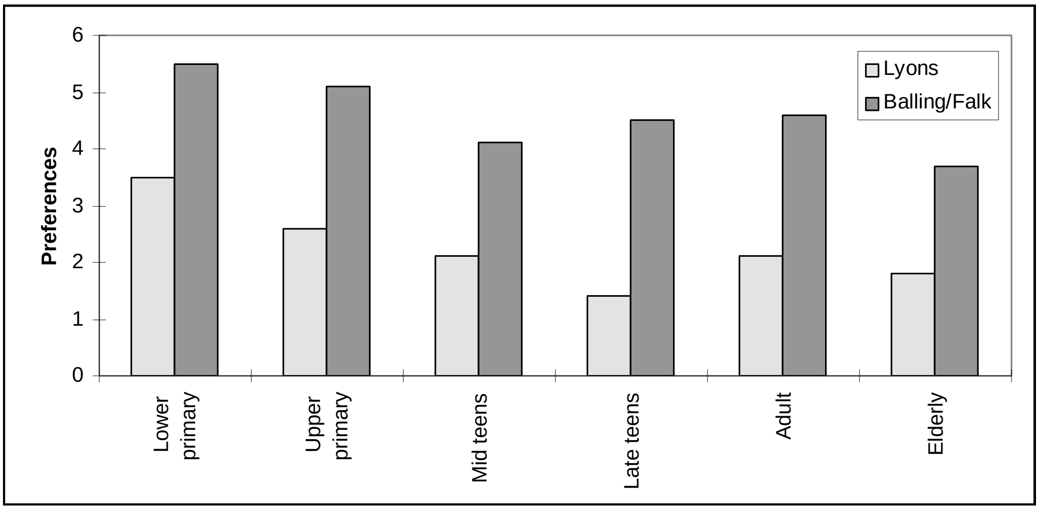
Both Balling and Falk [1982] and Lyons [1983] assessed the preferences for a range of environments illustrating savanna, deciduous forest, coniferous forest, tropical rain forest and desert. Both found savanna to be the most preferred of the five biomes. They found that preference for savanna was highest among the age 8 - 11 year olds after which it slipped behind deciduous and rain forest and, in Lyons' study, behind rain forest. Balling & Falk found that overall preference for natural environments changed as a function of age [Ibid, 16], [F = 89.62, df 5, 492, p <0.001].

Figure 8.1 indicates the shift in preferences for savanna with age. While the scores differ between the studies, the pattern is similar: high scores among the young that fall progressively with age, stabilising in adulthood.

Both found the preference for savanna was strongest when a lush green savanna was used in preference to a drier African-like savanna. The difference was so striking that Lyons dropped the lush green savanna. The use of the greener savanna in the Balling and Falk study probably accounts for the higher ratings.

While Balling and Falk believed the results provide "limited support for the hypothesis that people have some innate preference for savanna-like environments" [Ibid, 22], Lyons disputed this on the basis that the preference for savanna could be related to its familiarity for children who play in savanna-like parks and backyards. Commenting on the functionalist-evolutionary perspective she noted:

> "This perspective is also plagued by the same dependence on optimality theory that is evident in much of biological evolutionary theory; it does not recognize that natural selection is not precise, that the current function of a structure cannot be used to infer



Source: Balling & Falk, 1982; Lyons, 1983.
Note: Lyons study results significant at $p < 0.05$; Balling & Falk at < 0.001

Figure 8.1 Comparison of Preferences for Savanna by Age

its adaptive origin, and that some structures or processes that affect landscape preference may in fact be maladaptive but persists because of the correlational structure of the human genome." [Ibid, 507]

Woodcock [1982] also examined preferences for three biomes: rain forest, savanna and mixed hardwoods and found the hardwood to be the most preferred [rainforest 2.83, savanna, 3.06, dense hardwood with underbrush, 3.04, open hardwood with open ground, 3.73]. It is also possible that this may be due to familiarity as suggested by the Kaplans [1989, 287].

Fenton [1985] analysed the underlying dimensions of meaning or content that individuals use in discriminating natural settings. He found that the majority of participants preferred scenes characterised by: open grasslands, verdant, water, natural, and with pathways [Ibid, 340]. He viewed these findings as supporting the Kaplans' theory, but they also lend support to Orians' habitat theory.

Schroeder [1991], studying preferences for scenes in an arboretum in Chicago, found natural deciduous wood scenes, large trees, and water attracted the highest ratings but scenes of trees and lawn - the classic pastoral landscape, were less preferred.

Among the evidence cited to support habitat theory is the observation that no archaeological evidence has been found to indicate early human occupation of dense forest, rainforests or deserts [Isaac, 1980]. Use of fire by indigenous people, including the Australian Aborigines and the North American Indians, encouraged the development of savanna-like vegetation. While the purpose of this was to create favourable conditions for game, it raises the question whether it was unconsciously directed to create a preferred savanna-like landscape. In both cases the cessation of fires after European settlement resulted in the savanna appearance gradually being lost[65].

Orians [1980] cites the perceptions of early explorers in North America who seemed to prefer savanna-like landscapes, although this may be to provide grazing land and

65. E.g. see Denevan [1992] who suggested that in 1492 the native American landscape was a humanised landscape and that with the decimation of the Indian population by disease and war, the vegetation was re-established. "A good argument can be made that the human presence was less visible in 1750 than it was in 1492." [Ibid, 369]. Similarly Bourassa quotes the archaeologist, Dr Rhess Jones, that after the Aborigines "had either died or had been removed ... soon afterwards it was noticed that the plains were becoming filled with sour grass and light scrub so that it was becoming difficult to graze sheep on them, the attempt being abandoned with great financial loss about 10 or so years later." [Bourassa, 1991, 69] The loss of pastoral landscapes was also apparent in many other locations.

reduce hiding opportunities for natives. Bourassa notes that similar preferences were apparent among explorers and settlers in Australia and New Zealand [1991, 69, 71]. In his book, *Future Eaters* [1994], Tim Flannery included a chapter titled "Like Plantations in a Gentleman's Park", in which he wrote of the settlers' efforts to transform the Australian landscape into an English landscape.

Many early paintings of the Australian landscape also displayed park-like environments. Favoured scenes among painters were pastoral landscapes, environments which also made for good grazing land and which did not require clearing to be productive. By contrast, Bernard Smith refers to von Guerard's paintings of virgin forest that "amply convey the depressing effect so frequently mentioned by travellers and settlers." [1971, 59]. Anthony Trollope, the English novelist, toured Australasia in the 1870s and wrote, "the fault of the Australian scenery is its monotony." [1873, 78].

Tim Bonyhady identifies a triad of images portrayed by the 19th century artists: an "antipodean arcadia untouched by European settlement and occupied only by Aborigines enjoying a bountiful existence" [1985, xii], a pastoral arcadia occupied by squatters and their sheep, and a magnificent wilderness, as yet untamed.

While there are findings and anecdotal evidence supportive of the habitat hypothesis, these are not definitive. Lyons' alternative explanations of familiarity may account for the preferences found by Balling and Falk's study.

(3) Prospect and Refuge Theory - Appleton

Jay Appleton's prospect-refuge theory has become one of the most widely quoted landscape theories. It derives its inspiration from both habitat theory and information processing theory. Hudson described it as a "seminal contribution" [1992, 53]. Appleton, a geographer at the University of Hull, England, described the theory in, *The Experience of Landscape* [1975]. The book's name derives from the view of the philosopher, John Dewey[66], that beauty lay neither in beautiful objects nor in the eyes of the beholder but rather in the relationship between the individual and the environment - what Dewey calls 'experience' [Ibid, 48]. Such experience covers both the habitat theory and information processing theory that aesthetic satisfaction from landscapes derives from their favourability for survival [1975a, 69].

In *King Solomon's Ring* [1952], Konrad Lorenz wrote of seeing without being seen, which relates to habitat theory. Appleton built on this, arguing that a landscape need only provide the appearance of satisfying survival needs. Certain sign-stimuli provided by the landscape comprise the core of Appleton's prospect-refuge theory. He termed the sign-stimuli that provide opportunities to see a *prospect* while those which provide an opportunity to hide he termed *refuge* [Ibid, 73]. Appleton summarised his theory thus [Ibid, 73]:

> "Habitat theory postulates that aesthetic pleasure in landscape derives from the observer experiencing an environment favourable to the satisfaction of his biological needs. Prospect-refuge theory postulates that, because the ability to see without being seen is an intermediate step in the satisfaction of many of those needs, the capacity of an environment to ensure the achievement of *this* becomes a more immediate source of aesthetic satisfaction."

Appleton developed the imagery and symbolism of the theory. Prospects can be direct or indirect and include panoramas and vistas while refuges can be classified by function [e.g. hides and shelters], by origin [natural or artificial], by substance [in the earth such as caves or in vegetation], by accessibility and by efficiency. One senses that some of these are classification for classification's sake but Appleton is nothing if not exhaustive in the development of his theme.

He examined and classified hazards, surfaces and related components, discussed landscapes which are dominated by prospect, refuge or hazard [pp 146 - 168], the place of man in nature [pp 169 - 191] and then reviewed prospect and refuge in parks and gardens, in architecture and urban design, painting, film, literature [pp 192 - 219] and the application of prospect-refuge theory to the landscape gardens of Capability Brown, Repton and le Nôtre's Versailles [pp 220-8]. He commented on

66. The title of Dewey's book, *Art as Experience* (1934) may have inspired Appleton's title.

fashion and taste [pp 220 - 237] and finally described the application of the theory to case studies of landscapes in several countries. [pp 238 - 256].

Over a decade later, Appleton described how he developed his theory:

> "I was looking for a simple model that could relate the idea of preference to a typology of landscapes through the medium of the biological and, more particularly, the behavioural sciences." [1988, 28].

The theory potentially offers an explanation to the perennial question of why people climb mountains. The answer is not "because it's there" but rather because the mountain represents the best prospect available and, hence, being on top of it enhances survival. The fact that this may lead people to climb very high mountains and to even be killed in the attempt does not negate this hypothesis, it merely suggests that optimality applies in the selection of mountains to provide prospects and that high mountains may actually be sub-optimal for this purpose.

In a Spanish study, Abelló, Bernaldez & Galiano [1986] found preferences for forest landscapes, a preference for fertility and plant vigour, some pattern or rhythm, and a structural legibility in winter defoliation [Ibid, 168]. The survival-promoting preferences tend to support Appleton's thesis: they "correspond either to signs indicating environmental virtues (fertility and plant vigor healthy biomass) or hazards (environmental hostility present in defoliated wintry vegetation)..." [Ibid, 173].

Using a very limited sample of four participants [including the authors], Clamp and Powell [1982] sought to test Appleton's theory by rating 40 panoramas of landscapes for landscape quality, prospect, refuge, hazard, and the balance of prospect and refuge. The authors calculated that, although the quality ratings correlated[67] well, there were no significant correlations between preference and prospect-refuge balance [$p < 0.001$]. Some correlation was obtained between preference and prospect. They found a significant negative correlation between prospect and refuge - the finding is not surprising as something that provides good prospect is unlikely to be a good refuge. Overall though, the study failed "either to support conclusively or to negate the central claim of [the] theory" and "despite every effort [by the judges they] remained unconvinced that they were tapping some underlying perceptual force" [Ibid, 8].

Orians suggested that scenes with a high proportion of prospects compared with refuges would be favoured as familiarity of the observer increases and the risks they present decrease accordingly [1986, 9]. He observed that closed forests are deficient in prospect while desert and grassland scenes are deficient in refuge. [Ibid, 16]. Savannas, by contrast provide a good combination of prospect and refuge. Elsewhere, Orians and Heerwagen [1992, 571] suggest that Appleton's theory means that an environment judged pleasant will be one with a balance between prospect and refuge opportunities, with screening elements to provide privacy and variability in desired levels of intimacy in a space.

Heerwagen & Orians [1993] tested the evidence for prospect and refuge in landscape paintings, by examining gender differences in preferences and by examining the before and after pictures by the English landscaper, Humphrey Repton, and by the painter, John Constable. These are summarised below.

Sunsets in Landscape Paintings

Based on a assumption that paintings of sunsets represent refuge symbolism, it would be expected that artists would include references to places in which people could spend the night. Out of 46 paintings of sunsets and sunrises [including many by Frederick Church], 35 were sunsets and 11 were sunrises indicating they believed that "the information provided by a sunset is much more valuable and requires more urgent attention than ... a sunrise." [Ibid, 148] The sunset paintings scored very highly in refuge symbolism: 66% scored highly in refuge compared with 9% for sunrises [$\chi2 = 10.89$, $p = 0.004$]. Sunset paintings had more built refuges whereas sunrise paintings had very few. Paintings that included a built refuge also included additional refuge symbols: 46% had a light in the window, 12% had smoke from the chimney, while 7% had both a light and smoke.

Gender differences

67. A sample of 4 is usually regarded as insufficient for correlations.

Their hypothesis was that females find refuges more attractive: “a greater affinity for enclosure and protected places than do males” [Ibid, 150] due to pregnancy and childcare, as well as protection from the elements, which drain energy. To avoid being trapped or being taken by surprise, an open refuge would be advantageous. Content analysis of 108 landscape paintings, painted by both male and female artists [52 by females, 56 by males] was used. Prospect symbolism included open landscapes, opportunities for views [hills, mountains, rock outcrops], and a view of the horizon at least half the width of the painting. Refuge symbolism included houses and vegetative cover, especially in the foreground. In summary [Ibid, 152 - 3]:

- Women’s paintings: nearly half were high in refuge symbolism compared with 25% for men’s paintings [$\chi 2 = 6.89$, $p = .03$]. 75% had no horizon or peephole, these being symbolic of prospects.

- Men’s paintings: nearly half were high with prospects compared with 25% for women’s paintings [$\chi 2 = 12.07$, $p = .002$]. Nearly 75% had moderate-high prospect symbolism compared with less than half for women’s paintings. The horizon was more than half the width in 58% of paintings compared with 14% of women’s paintings.

<u>Before and After Scenes</u>

Heerwagen & Orians examined the before and after designs of Repton and Constable, the former for his landscaping of properties and the latter of his sketches for later paintings. In 18 scenes Repton enhanced the refuge and prospect character of the properties by:

- adding copses of trees at the water’s edge which increased refuge
- removing trees to open views to the horizon which increased prospect

Examination of nine of Constable’s sketches and paintings indicated that he frequently altered the vegetation to open views to the horizon or to make refuge features such as houses more conspicuous. In six of the pairs he enhanced the refuge conditions by adding buildings and changing vegetation [Ibid, 156].

The findings by Heerwagen & Orians support the prospect and refuge symbolism as an unconscious organising attribute.

Researching forest and field environments, Herzog [1984] used factor analysis to identify three dimensions: unconcealed vantage point, concealed vantage point, and large trees. The parallels with refuge and prospect are obvious. Both the unconcealed and concealed vantage points were moderately well liked with similar ratings of 3.27 and 3.39 on 5-point scale, suggesting little difference in the preferences for each type. He found stronger preferences for large old trees [3.79], which provided a significantly higher rating [$p < 0.05$]. When these trees were viewed in combination with pathways, ratings of 4.0 were obtained. Herzog speculated that this may be due to the large old trees providing an “especially pleasing effect as pathway border elements” [Ibid, 351], - an artistic explanation but it might also suggest that the combination of tree and path provide ideal refuge and prospect combinations. Herzog was aware of Appleton’s work, but confined the implications of the study to Kaplan’s theory.

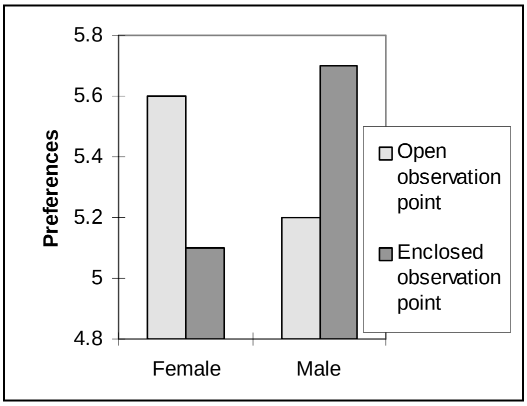
In a study of waterscapes, Herzog [1985] referred to Appleton’s prospect as an affordance in Gibson’s [1979] terms, but did not analyses his findings in these terms[68]. He found preferences were, in order [5-point scale], mountain waterscapes [3.99]; large water bodies [3.28]; rivers, lakes and ponds [3.11]; and swampy areas [2.13]. He found swampy areas to be distinguished by low spaciousness [2.45] while large water bodies were distinguished by spaciousness [4.11] and coherence [3.66]. Spaciousness could be equated with prospect, as both denote similar qualities of openness of view. The mountain waterscapes were high in spaciousness and would also be expected to be high in prospect, while swampy areas were low in spaciousness and would also be expected to be low in prospect [but possibly high in refuge, which tends to be ranked negatively in preferences].

Herzog & Smith [1988] examined canyons and urban alleyways to examine Appleton’s concept of hazard and how this related to Kaplan’s predictor variables of mystery. Overall, they found that “both danger and mystery predict preference, the former negatively and the latter positively.” [Ibid, 342].

68. See Section 8.6 for a fuller description of this study.

Hull & McCarthy [1988] used scenes of the Australian bush to assess the impact on preferences of wildlife in scenes. Three dimensions were identified: water, enclosure and concealed view, the latter corresponding, they acknowledged, with Appleton's theory. In a concealed view, foreground vegetation concealed the view but not enough to block views to the middleground or background [Ibid, 273].

Nasar *et al* [1983] examined the preferences expressed from two locations in a city park. At each location the observer viewed the scene from a protected position [enclosed] and an unprotected position [Figure 8.2]. They assessed the scene on a nine bi-polar adjective scale [e.g. repelling-inviting, relaxed-tense].



Source: Nasar *et al*, 1983

Figure 8.2 Interactive Effect of Refuge and Gender on Preferences

They found that the open views were regarded as safer than closed views [$F = 8.18$, $df = 1, 56$; $p < 0.01$], which accords with Appleton's theory. However they also found that females preferred the enclosed observation point to the open one, while the opposite applied to males [$F = 3.73$, $df = 1, 56$; $p = 0.06$]. The notion of males preferring viewing points with less refuge is contrary to Appleton's theory.

Strumse's [1996] finding of higher preferences for green, grassy fields among women than men [males 2.99, women 3.22; 5-point scale] could reflect a preference for the "open and well defined settings, which most probably induce feelings of security" [Ibid, 27]. Such landscapes offer good prospects in Appleton's terms.

Woodcock [1982] assessed preferences for three biomes [savanna, rain forest and hardwoods] on the basis of six affordances, including primary and secondary prospect, and primary and secondary refuge[69]. He found prospect to be positively related to preference [0.55] while refuge appeared to be negatively related [-0.59], an unexpected result which led him to propose additional predictors including agoraphobia and claustrophobia.

Overall the evidence is not compelling for Appleton's theory and indicates that some refinement may in order. While prospects generally correlate with preference this may derive from the appeal of mountains. Refuges are generally regarded negatively. A strong dichotomy by gender in preferences for prospect and refuge appears present - males preferring open prospects, females preferring safe vantage points. While Appleton regards the balance between prospect and refuge as important, few studies have attempted to tackle what this balance might be.

Kaplan's concepts of coherence, complexity, legibility and mystery appear to have some overlap and parallels with Appleton's prospect and refuge, for example prospect and legibility, refuge and mystery, and this could be explored further.

Appleton's theory has been described as a "sociobiological account of aesthetic value" [Carlson, 1992, 79] while Bunkse [1977, 150] described it as "hide and seek aesthetics". Bunkse considered that the theory "seems to answer many unanswered questions" [Ibid], including the human preference for natural habitats rather than artificial ones, and in treating the vast differences in French and Japanese gardening styles as attempts to fulfil innate, biologically determined preferences. Appleton considered that cultural differences can be explained by their biological underpinnings, a view not universally shared[70]. Jeans stated [1977, 346]: "The

69. The primary prospect is a photo taken from a high vantage point showing the surrounding landscape while the secondary prospect shows a good vantage point; similarly the primary refuge is of a photo which indicates that it was taken from a concealed location, whereas the secondary refuge only indicates good refuges in the landscape.

70. E.g. Bourassa: "While arguments such as Appleton's are rather extreme assertions of a biological basis for aesthetics..." [1991, 49].

survival of primitivist urges in man, like territoriality, is so overlaid by cultural accretions and modifications that it seems uselessly oversimplistic to seek to apply them to human behaviour."

Bunkse also questioned the theory's ability to deal with ambiguities, such as whether darkness is a prospect or refuge, and he cast doubts about its reliance on innate drives saying [1977, 151]:

> "It cannot be denied that a good deal of human behaviour can be compared with animals, but as a species we have developed our own unique traits which can be understood only through direct study of humans. Such understanding must be couched not only in terms of biological drives analogous to those in animals, but also in terms of human imagination and the ability to apprehend the self in the environment, and the will to act originally."

Several reviewers have observed that Appleton's theory, which suggests that each scene has to be broken down into its prospect and refuge symbolism, "is reductionist in the extreme" [Bunkse, 1977, 150]. Jeans [1977, 346] described it as "ridiculously reductionist" while Tuan described it as "a tour-de-force of reductionism" [1976, 104]. Urlich considered Appleton's theory, in which elements are seen to have actual or symbolic survival significance, to be "a rather extreme, ethologically based adaptive position" [Urlich, 1983, 88].

In 1991, Appleton published *The Symbolism of Habitat: An Interpretation of Landscape in the Arts* which extended the theme of *The Experience of Landscape* to the arts. Today, Appleton's concepts are used consciously by landscape designers [Frey, 1986, 56]. They are cited in site planning text-books and are used in the analysis of literary landscapes and architecture [Hudson, 1992, 56, and Hudson, 1993, 76].

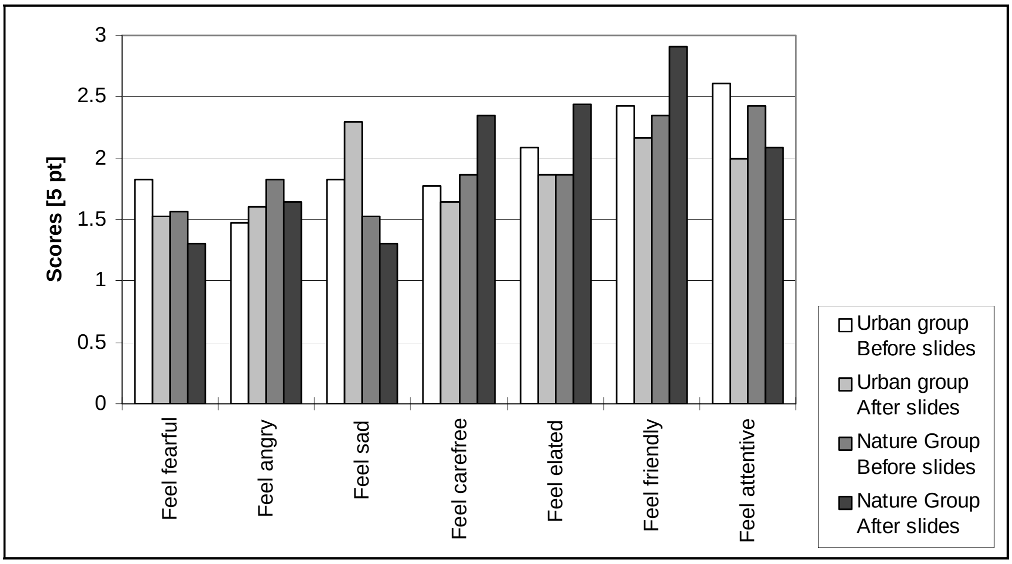
While there is a considerable level of support for Appleton's theory, it lacks strong supporting evidence. The findings of studies suggest the need for further elaboration and consideration of the theory.

(4) Affective Theory - Urlich

Affective theory considers that natural settings and landscapes can produce in their viewers, emotional states of well-being that can be detected through psychological and neurophysiological measures. The main proponent of the theory is Roger Urlich, originally a geographer at the University of Delaware and more recently with the College of Architecture at Texas A & M University.

Affect is used by Urlich synonymously with emotion and include feelings such as pleasantness, calm, exhilaration, caution, fear and anxiety [Ruddell *et al*, 1989, 400] but excludes drives such as thirst and hunger [Urlich, 1983, 86]. Although it is measured on a like-dislike dichotomy, it has also been shown to be highly correlated with scales such as beautiful - ugly or scenic quality scales [Urlich, 1986, 30].

The affective model of preference is based on the premise that emotional [i.e. affective] responses to landscapes occur before cognitive information processing. With the development of cognitive psychology in the 1960s, affects were regarded as products of cognition [i.e. they are post-cognitive]. In a widely quoted paper, *Feeling and thinking, preferences need no inferences,* Zajonc [1980] argued against the prevailing doctrine that affect is post-cognitive and provides experimental evidence that discriminations



Source: Urlich, 1979

Figure 8.3 Affect Scores Before and After Slides

[like-dislike] can be made in the complete absence of recognition memory. He concludes that affect and cognition are:

> "under the control of separate and partially independent systems that can influence each other in a variety of ways, and that both constitute independent sources of effects in information processing." [Ibid, 151]

Urlich also cites evidence in support of affect being precognitive [Urlich, 1986, 30 - 31, Urlich *et al*, 1991, 206-7]. Ruddell, *et al* consider that the affective state "heavily influence the subsequent cognitive appraisal of a setting as contributing to or detracting from personal well-being." [Ibid, 400]

Based on this premise, Urlich constructed a model of affective reactions preceding cognition but both influencing the post-cognitive affective state and actions that then arise [Urlich, 1983, 89 - 93]. He termed the framework a psycho-evolutionary theory, where the positive emotions and physiological effects have survival benefits.

In contrast to the Kaplans' cognitive perspective, Urlich proposed that:

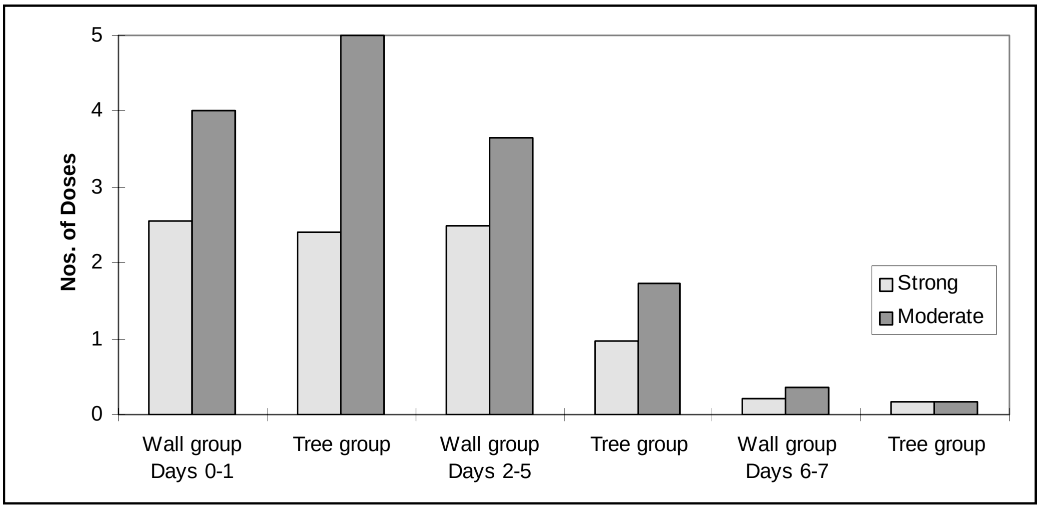
> "immediate, unconsciously triggered and initiated emotional responses - not 'controlled' cognitive responses - play a central role in the initial level of responding to nature, and have major influences on attention, subsequent conscious processing, physiological responding and behavior" [Urlich *et al*, 1991, 207-8].

He also suggested that an "evolutionary perspective implies that adaptive response to unthreatening natural settings should include quick-onset positive affects and sustained intake and perceptual sensitivity" [Ibid, 226].

Basic to Urlich's framework is that of adaptive response, *adaptive* meaning the wide array of actions and functioning which can foster well-being [Urlich, 1983, 93]. Adaptive behaviour may, for example, comprise staying and viewing an attractive scene or setting out to explore it [Ibid, 95].

Urlich [1979] tested participants feelings before and after viewing slides of urban and natural scenes. The results [Figure 8.3] indicates that urban scenes generally resulted in more negative feelings [e.g. one grew sadder, less elated, less friendly], whereas the opposite occurred after viewing the nature slides.

Negative feelings were lessened and positive feelings became more positive [$p < 0.005$] from viewing nature scenes. Urlich showed that the variation attributable to slide content was highly significant [$p = 0.002$]. and concluded that the importance of visual landscapes is not confined to aesthetics, but that they also give rise to emotional states, urban scenes having a negative effect and the nature scenes positive.



Source: Urlich, 1984

Figure 8.4 Analgesic Doses per Patient - wall & tree views

In a second study, Urlich [1981] used psycho-physiological measures to assess the effect of viewing slides of nature with water, nature with vegetation, and urban environments with neither water nor vegetation. He measured alpha waves and heart rates[71] and asked subjects to rate their feelings using semantic ZIPERS scale[72] before and after viewing the slides. He found:

- attentiveness declined but less so for water scenes [$p < 0.001$]
- sadness increased markedly from viewing urban scenes but only slightly for vegetation and was constant for water - the difference between the influence of urban and water scenes was highly significant [$p = 0.005$] but less so between urban and vegetation scenes [$p = 0.07$]
- fear arousal emotion increased slightly with urban scenes, decreased slightly with vegetation and declined more sharply with water [urban/water difference $p < 0.02$]

The physiological measures showed that alpha amplitudes were consistently higher when viewing vegetation than urban scenes with water scenes lying between these [$p < 0.05$]. The significantly higher results for vegetation were cited as one of the most important findings of the study and support "the conclusion that the subjects felt more wakefully relaxed while viewing the vegetation as opposed to urban scenes" [Ibid, 546]. Heart rates were generally higher while viewing either water or vegetation compared with urban scenes - water 71.3 beats/minute, vegetation 71.1, urban 70.2 [$p < 0.20$]. Urlich concluded "people benefit most from visual contact with nature, as opposed to urban environments lacking nature, when they are in states of high arousal and anxiety." [Ibid, 550].

Urlich [1984] reported on investigations of the recovery of patients in a hospital, comparing patients whose rooms viewed a blank wall with those who could see trees [Figure 8.4]. The patients had undergone cholecystectomy [gall bladder] operations. The study found that those who viewed the trees had shorter stays in hospital: 7.96 days vs 8.70 days [$T(17) = 35$, $z = 1.965$, $p = 0.025$], took fewer analgesics sand received fewer negative evaluative comments in nurse's notes: 3.96 per patient for those facing wall compared with 1.13 for those facing trees [$T(21) = 15$, $z = 3.49$, $p=0.001$].

The analgesic doses did not vary significantly between the two groups for the first day or the last days but for days 2 - 5 the difference was statistically significant [$T^2 = 13.52$, $F = 4.30$, $p < 0.01$]. The results imply that "hospital design and siting decisions should take into account the quality of patient window views" [Ibid, 421]. Parsons [1991] considered the results could reflect the differences in complexity between a brick wall and a stand of trees.

71. Alpha waves reflect brain electrical activity. High alpha amplitudes indicate lower levels of arousal and of wakeful relaxation while anxiety is related to high arousal and low alpha amplitudes. Rapid heart rates reflect strong emotions such as anxiety or fear [Urlich, 1979, 532, 536].
72. The ZIPERS scale assesses feelings on five factors: fear arousal, positive affect, anger/aggression, attentiveness, and sadness. A 5 pt scale is used for each.

Urlich also found that individuals shown scenes of cities with trees and other vegetation showed significantly reduced feelings of fear and increased positive feelings of affectation and delight, compared with individuals shown scenes of treeless city scenes [Urlich, 1979].

Urlich *et al* [1991] extended physiological measures to include skin conductance, pulse transit time, muscle tension and heart period. Participants were first tested, they then viewed a ten-minute stressful video [on workplace accidents], and then viewed a second ten-minute video showing everyday outdoor settings - two natural [vegetation and water] and four urban. Pair-wise tests showed that, following viewing natural scenes, positive affect scores increased significantly compared with either the pedestrian mall [$p < 0.01$] or traffic [$p < 0.001$]. Results from the four physiological measures showed that the nature scenes reduced stress, indicating their "greater recovery influence" [Ibid, 222]. The study also found that nature scenes resulted in more rapid recovery from stress, suggesting that even momentary viewings of trees through a window can have benefit.

An early study using eye pupillary dilation as an autonomic measure of aesthetic reaction was undertaken by Wenger and Videbeck [1969]. Applying the technique to both campers and non-campers they found that, although the test provided a reliable pattern of differences between the two groups, the results were *opposite* of their expectations! On the basis of this finding, the authors concluded that another autonomic measure might be preferable and that the information processing hypothesis may better explain the observed pupillary movement.

Parsons [1991] noted that, although there is no direct empirical evidence supporting Urlich's theory, the sensory model of emotions by LeDoux and Henry's[73] model of endocrine responses in stressful situations "constitute *prima facie* evidence for the existence of subcortical 'hardware' and processing which is supportive." [Ibid 6]. He considered that the "immediate affective responses to environments may influence environmental preferences ... and trigger physiological processes that can influence the immune system, and thereby, physical well-being" [Ibid, 2].

Overall, Urlich's research findings provide support for his theory that "immediate, unconsciously triggered and initiated emotional responses - not 'controlled' cognitive responses - play a central role in the initial level of responding to nature" [Urlich *et al*, 1991, 207]. Although Urlich has carried out some of his studies with colleagues, there are few other researchers in what would seem such a profitable field.

(5) Information Processing Theory

During the 1960s and 1970s environmental psychologists focussed attention on the perception of the environment [see Chapter 4]. Of particular relevance to landscape is the work of Stephen and Rachel Kaplan of the University of Michigan who applied the information processing approach to landscape aesthetics to explain the interactions between humans and the landscape.

The Kaplans hypothesise that "the perceptual process involves extracting information from one's environment." [Kaplan, Kaplan & Brown, 1989, 514] They suggest that humans seek to *make sense* of the environment and to *be involved* in it. They identified four predictor variables, two of which (coherence and legibility) help one understand the environment and the other two (complexity and mystery) encourage its exploration [Figure 8.5].

- **Coherence** is the ease of cognitively organising or comprehending a scene - "good gestalt". It involves making sense of the scene. It includes factors which make the scene more comprehensible -

73. LeDoux, J.E., 1986. Sensory systems and emotions: a model of affective processing, *Integr Psychiatry*, 4, 237 - 248. Henry, J.P., 1980. Present concept of stress theory, in E. Usdin, *et al*, [Eds], Proceedings of the Second International Symposium on Catecholamines and Stress, Sept 1-16, 1979, Czechoslovakia, Elsevier.

	Understanding Making sense	Exploration Being involved
Immediate The visual array	**Coherence** Making sense now Orderly, "hangs together" Repeated elements, regions	**Complexity** Being involved immediately Richness, intricate Many different elements
Inferred Future, promised Three-dimensional space	**Legibility** Expectation of making sense in future Finding one's way there & back Distinctiveness	**Mystery** Expectation of future involvement Promise of new but related information

Source: Kaplan, Kaplan and Brown, 1989, 516; Kaplan, 1979, 245

Figure 8.5 Kaplans' Predictor Variables

- to organise it into a manageable number of major objects and/or areas. Research indicates that people hold onto information about scenes in chunks and that up to five can be retained in the working memory. A scene with about five major units will be coherent. Repetition of elements and smooth textures help to identify an area. Changes in texture or brightness should correspond with an important activity in the scene - where it does not, the scene lacks coherence.

  Complexity is the involvement component - a scene's capacity to keep an individual busy, i.e. occupied without being bored or overstimulated. Often referred to as diversity, variety or richness it used to be regarded as the single most important factor. The Kaplans describes it as how much is "going on" in the scene - a single field of corn stretching to the horizon will not have the same level of complexity as many fields of many crops on undulating land with hedgerows and cottages. The more complex scene will tend to be preferred to the simple.

- **Legibility** is the ability to predict and to maintain orientation as one moves more deeply into a scene. It entails "safety in the context of space" [Kaplan, 1979, 244] and is similar, though much broader, to Appleton's concept of refuge. Legibility, like mystery, involves an opportunity to promise to function, to know one's way and the way back. It thus "deals with the structuring of space, with its differentiation, with its readability" [Ibid, 245]. Legible scenes are easy to oversee, to form a mental map. Legibility is enhanced by distinctive elements such as landmarks, smooth textures, and the ease of compartmentalising the scene into parts. While coherence focuses on the conditions for perceiving the scene, legibility is concerned with movement within it.

- **Mystery** is the promise that more information could be gained by moving deeper into setting, e.g. a trail disappearing, a bend in a road, a brightly lit clearing partially obscured from view by foliage. New information is not present but is inferred from what is in the scene, there is thus a sense of continuity between what is seen and what is anticipated. "A scene high in mystery is one in which one could learn more if one were to proceed further into the scene." [Ibid, 244] The Kaplans used the term "mystery" reluctantly because they could not find a more suitable term. A better term might be "anticipation".

In their book, *The Experience of Nature* [1989], the Kaplans described the studies that contributed to the development of their theory.

An early study, Kaplan *et al* [1972] focussed on the single factor of complexity and found a 0.37 correlation with preference. A second study [R. Kaplan, 1975] found a correlation of 0.62 between complexity and two new variables, mystery and coherence. However the correlation between complexity and preference, when assessed independently, was -0.47, in contrast with the original +0.37. She put this down to content, the later study being of urban scenes rather than of nature. Using regression analysis, the R^2 for the three informational factors was a promising 0.49, indicating that together they accounted for around half the variance. Mystery was particularly significant ($r = 0.56$), coherence slightly weaker (0.33), and complexity a negative factor (-0.39).
Coherence and complexity are considered to involve minimal analysis, whereas legibility and mystery require more time and thought. Scenes of high preference tend to be those with legibility and mystery;

coherence and complexity help create the scene, but high levels of these do not necessarily result in high preference.

Through the 1980s, further studies by the Kaplans, Herzog, Anderson and others reinforced and gave coherence to the definition of the informational variables. Following their review of over a decade's research, the Kaplans concluded:

1) "In each of the studies the combination of these informational predictors yielded significant results.
2) Complexity was a significant positive predictor in only a single study (and a negative predictor in urban scenes).
3) Legibility's role is hard to judge. In four of the five studies where it was included, legibility did not play a significant role. In Anderson's study it was found to be a negative predictor.
4) Coherence proved to be a significant predictor in the majority of the studies where it was included; in one case it was the only significant predictor in the regression analysis.
5) Finally, Mystery is the most consistent of the informational factors." [Ibid, 66]

Most of the studies to which the Kaplans referred are summarised in Appendix 8.1, which covers 27 studies; some of these are discussed more fully below.

Abello, Bernaldez & Galiano [1986] concluded from their analysis of forested landscape preferences that plant fertility/ vigour factor was a key factor in preference followed by the strong expression of pattern/ rhythm/recurrent texture of landscape elements. Factor analysis indicated correlations of -0.84 and -0.89 of these respectively with the factors they identified. The authors acknowledged that the results lend support to an evolutionary or socio-ecological basis of landscape aesthetics including Kaplan's "cognitive characteristics related to predicability (pattern recurrent textures) and meaning (legibility of structures, capacity of seeing through barriers)" [Ibid].

Ed Anderson's [1978] study of forest management assessed informational factors for professional, resident and student groups. Table 8.2 summarises these factors as predictors of preference for these groups. All of the factors were consistent across all groups with the exception of mystery, which played a negligible role for the preferences of professionals. Coherence and mystery were the best predictors of preference for residents and students.

Table 8.2 Informational Processing Factors as Predictors of Preference for Groups

Factor	Professional	Resident	Student
Coherence	0.51	0.55	0.53
Legibility	- 0.18	- 0.15	- 0.22
Mystery	0.07	0.42	0.39
Complexity	0.33	0.24	0.30
Spaciousness	- 0.13	- 0.38	- 0.30

Source: Anderson, E., 1978. $p<0.05$

Brown & Itami [1982] proposed a model that related scenic resource values to landscape preference components as defined by the Kaplan model.

The Brown & Itami framework comprises two inter-related systems - the natural (land form) & cultural (land use). These describe the physical components. Landform reflects "immutable" components and the cultural system is reflected by land use and land cover pattern.

Kaplan model:

	Making sense	Involvement
Visual array	Coherence	Complexity
3-D space	Legibility	Mystery

Brown & Itami model:

	Making sense	Involvement
Visual array	Slope Relative relief	Spatial diversity Relief contrast
3-D space	Naturalism Compatibility	Height contrast Internal variety

Brown, Keane and Kaplan [1986] tested this model by comparing the preferences obtained for scenes with those predicted by the Brown & Itami model. The correlation of 0.61 is significant at $p < 0.001$.

A further analysis was undertaken by grouping scenes using factor analysis; four groupings were obtained [Table 8.3]. Comparison of the predicted average values and preference ratings indicated identical rankings for the two procedures [5-point scale].

Table 8.3 Relationship between predicted values & preference ratings

Category	Predicted		Preference	
	Mean	Rank	Mean	Rank
Manicured landscapes	4.16	1	3.80	1
Mostly vegetation	3.62	2	3.50	2
Pastoral	2.91	3	3.08	3
Residential	2.52	4	2.81	4

Source: Brown, Keane & Kaplan, 1986

According to the authors, the results provide support and encouragement for further work. The higher preference values occurred for smooth-textured grassy areas, suggesting that coherence is more important than indicated by the model. Similarly, low preference values occurred in relatively barren scenes, suggesting the importance of complexity.

Gimblett, Itami & Fitzgibbon [1985] asked respondents to rate photographs on the basis of the Kaplans' dimension of mystery using a 5-point scale. Analysis found a high degree of agreement regarding mystery in the landscape and analysis of the photographs identified five attributes that were associated with mystery [Table 8.4].

Table 8.4 Physical Attributes of Mystery

Mean ratings & mystery class	1.0 - 2.0 Low	2.0 - 3.9 Moderate	4.0 - 4.5 High
Screening	none	partial	partial to full
Distance of view	far	moderate	close
Spatial definition	open	partially enclosed	enclosed
Physical assessibility	-	-	defined path
Radiant forest	-	-	forest illumination

Source: Gimblett, Itami & Fitzgibbon [1985]

The five physical attributes were defined as follows [Ibid, 90 - 92]:

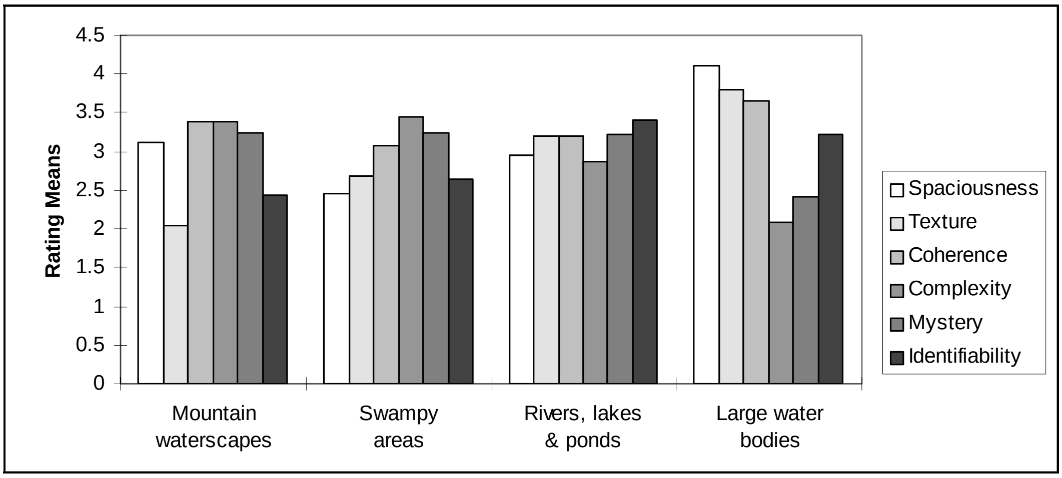
- Screening: degree to which views of the larger landscape are visually obstructed or obscured
- Distance of view: measured from viewer to nearest forest stand; as distance increases, mystery decreases
- Spatial definition: degree to which the landscape elements surround the observer
- Physical accessibility: apparent means of moving through or into the landscape as a result of finely textured surfaces in the foreground; provides way of exploring landscape to gain more information
- Radiant forests are special cases in wooded areas where the immediate foreground is in shade and an area further in the scene is brightly lit. These are consistently ranked high for mystery.

Gobster & Chenoweth [1989] analysed the physical, artistic and psychological variables of landscapes and found that all three aspects could explain preferences. The ten psychological descriptors included mystery, harmony, legibility, awe and pleasantness. They also found that the three variables were interrelated within a definable structure. A conceptual interrelatedness was also found between descriptor variables with the artistic and psychological dimensions defining separate constructs relating to the compositional and affective-informational meanings. Multi-dimensional scaling indicated that the psychological descriptors yielded the highest multiple correlation of $R = 0.84$ [< 0.0005], significantly higher than that for the physical descriptors [$r = 0.67$, $p < 0.05$] or artistic descriptors [$R = 0.69$, $p < 0.05$].

They concluded:

> "These findings should be of interest to those concerned with theory and application in landscape research. Aesthetic theories based solely on formal-artistic, bioevolutionary and other singular sets of properties (i.e. physical-ecological, psychological-affective) etc may not do justice to the richness of human aesthetic response to landscapes. *To build an aesthetic theory of landscapes, investigators need to broaden their understanding of the multidimensional nature of aesthetic preferences*." [Ibid, 68; my emphasis]

In Gregory & Davis [1993], the positive factors [trees, tree trunks and water depth] can be considered as contributing to the legibility and coherence of a riverscape, while the negative factors [water colour, bank channelisation, channel sinuosity and debris in the river] may be considered as



Source: Herzog [1985]

Figure 8.6 Rating of Waterscapes by Variables

contributing to the complexity and mystery of the scene. These are my interpretations; the authors did not assess the riverscapes in informational terms. Water colour, bank stability and water depth together accounted for nearly 90% of the variation in the riverscape preferences.

Thomas Herzog undertook a series of studies in the 1980s to explain and assess the validity of the Kaplans' information processing model.

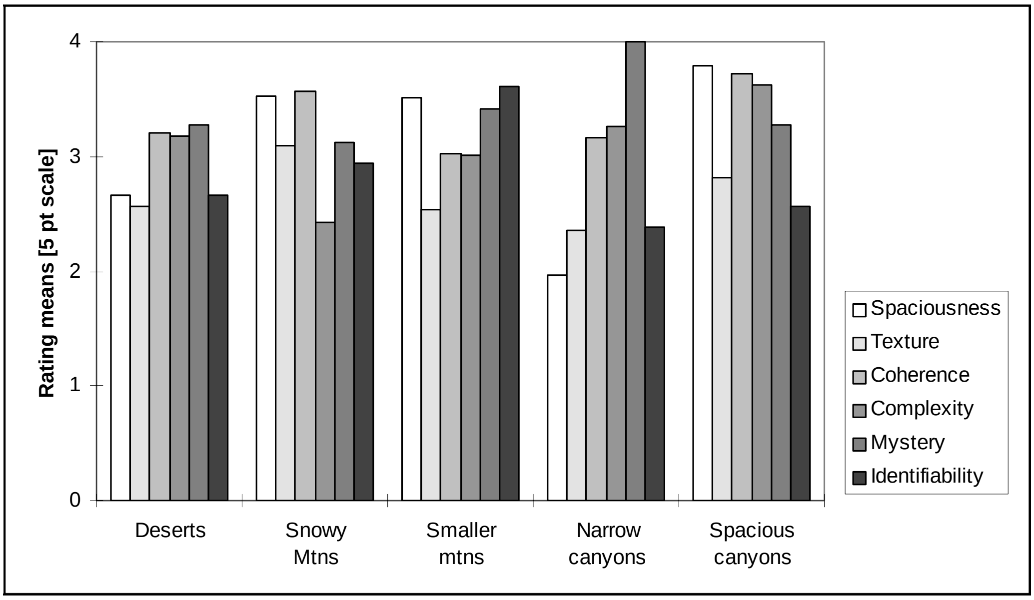
In Herzog's [1984] study of field and forest environments, moderate correlations [0.45 to 0.55] were obtained for the three predictors of the unconcealed vantage point dimension: identifiability [i.e. familiarity], coherence and spaciousness. These help one organise and make sense of a setting in Kaplans' terms. Herzog comments that "their prominence as predictors suggests that when one is out in the open, there is a premium on being able to figure out where one is and where one could get to quickly" [Ibid, 353-4]. In the large trees category, high ratings were obtained for the making-sense [i.e. identifiability, coherence, texture] and involvement [i.e. mystery] properties, which supports the Kaplans' contention that scenes high in both of these properties will be most preferred. Herzog [1985] used the same predictor variables to rate waterscapes [Figure 8.6] and found:

- spaciousness was best shown in large water bodies; these also showed highest texture and coherence but lowest complexity and mystery - these water bodies lack interest and are easy to make sense of;
- by contrast the other water bodies are more interesting, being high in mystery and complexity yet being reasonably coherent;
- they thus reward immediate involvement yet hold out promise of more;
- the distinguishing features of [1] mountain waterscapes are their low textures which suggest that they are difficult to navigate; [2] low spaciousness of swampy areas; [3] identifiability of rivers, lakes & ponds; [4] large bodies of water have the most distinguishing features.

Waterscapes high in spaciousness, coherence and mystery but low in texture [e.g. uneven land] were preferred. Inter-correlations with preference were: spaciousness 0.42 [$p < 0.01$], coherence 0.33 [$p < 0.01$], mystery 0.09, texture -0.15 [Ibid, 235]. Those that are at least moderately high in making sense [understanding] and involvement [exploration] were preferred. The content of the water is also important; rushing water is preferred over stagnant creeks. Herzog found the information approach useful in accounting for waterscape preferences.

Herzog [1987] examined mountainous scenes using the same six predictor variables and preference as the criterion variable [Figure 8.7]. He found [Ibid, 148]:

- deserts are low in spaciousness, [the predictor is a *feeling* of spaciousness offered by the scene] but are only moderate in other ratings
- snowy mountains are high in spaciousness but are of low complexity while smaller mountains are also high in spaciousness and identifiability



Source: Herzog [1987]

Figure 8.7 Rating of Mountainous Scenes by Variables

- narrow canyons have the most extreme profile being low in spaciousness, texture and identifiability but very high in mystery. Spacious canyons [e.g. Grand Canyon] are high in spaciousness, coherence and complexity.

Intercorrelations with preference were: identifiability 0.61 [p < 0.00], spaciousness 0.32 [p < 0.01], texture 0.22 [p = 0.06], mystery 0.13 [p = 0.29]. While the mountain categories are reasonably high on spaciousness, the two canyons differ markedly on this variable. The difference in identifiability between the mountain scenes is likely to be due to the familiarity of small ranges to the participants. The lower rating of texture for small mountains reflects their less smooth, more rugged appearance of the snowy mountains, in which snow and clouds tend to obscure their true ruggedness [Ibid, 148-9]. As texture reflects the affordance of locomotion the results suggest that this is not validly measured by texture.

Again Herzog found the informational approach useful in accounting for natural landscape preferences and supported the approach of examining both content and cognitive processes in the evaluation of these preferences. The “pattern of significant variables changes substantially when content categories are included” [Ibid, 151]. A positive predictor of preference is identifiability [i.e. familiarity] that gives “eloquent testimony to the strong cognitive need to make sense of the environment in such settings.” [op cit]

The basic predictor variables as established by the Kaplans were developed in other studies. Strumse [1994b] applied them, together with perception-based variables [e.g. openness, smoothness, ease of locomotion] in western Norway, and found the informational variables were the most effective predictors of preference [r^2 of 0.66]. Urlich [1977] developed focality [i.e. a focal point], as an extension of coherence, ground textures as a factor in complexity, and depth, or a sense of space, as an element in exploration and legibility. Whitmore [1995] applied the basic predictor variables to a canyon landscape, describing water, vegetation and landforms in informational terms.

The Kaplans’ theory has been subjected to a range of studies and they all provide support for its elements. There would appear, however, to be a fair degree of interpretation required of the application of these four predictor variables in the landscapes studied. The nebulousness of the concepts involved suggests that they are still evolving and this is likely to continue for some time.

The predominance of photo ranking as the main instrument used in the studies is worth noting. The nine studies by the Kaplans and their colleague, Herzog, contributes to this dominance. Out of the total of 227 studies only 29% used photo ranking but 84% of the information processing studies used it.

Stephen Kaplan acknowledges that his approach is an evolutionary view based on habitat theory, with human preferences deriving from the adaptive value offered by particular settings [Kaplan, 1987, 14]. Preferences were regarded by Kaplan as:

> "an intuitive guide to behavior, an inclination to make choices that would lead the individual away from inappropriate environments and towards desirable ones" [Ibid, 14-15].

He stated:

> "The central assumption of an evolutionary perspective on preference is that preference plays an adaptive role; that is, it is an aid to the survival of the individual." [1982, 186].

Every aspect of preference should provide some "discoverable benefit or payoff" [Ibid]. Deriving environmental preference occurs very rapidly and unconsciously. It is:

> "the outcome of what must be an incredibly rapid set of cognitive processes which integrate such considerations as safety, access and the opportunity to learning into a single affective judgement" [Ibid, 187].

Kaplan considered that the character of predictor variables and the nature of preference responses support an evolutionary interpretation. In support, he cited the preferences for savanna [Balling and Falk, 1982], the similarity of landscaped parks to savanna [Orians, 1986] and the prospect-refuge theory of Appleton [1975]. An evolutionary analysis, Kaplan asserted, achieves a number of objectives, it:

- indicates the importance of preference
- provides an expectation of underlying commonality in preferences across individuals
- suggests that preference research has a substantial theoretical interest
- identifies variables likely to be effective in predicting preference [1982, 187].

An evolutionary viewpoint lead Kaplan to conclude that:

> "Aesthetic reactions reflect neither a casual nor a trivial aspect of the human makeup. Aesthetics is not the reflection of a whim that people exercise when they are not otherwise occupied. Rather, such reactions appear to constitute a guide to human behaviour that has far-reaching consequences." [Kaplan, S, 1987, 26]

Kaplan went on to state that organising workspace, arranging one's home, avoiding certain directions and approaching others may reflect factors such as coherence, legibility, mystery and complexity. He concluded that there is clearly more to aesthetics than optimal complexity and that the "acquisition of new information and its comprehension (are) central themes underlying the preference process."

Zube summarised the Kaplans' approach thus [1984, 106]:

> "The Kaplans propose that long term survival of the human species was dependent upon development of cognitive information processing skills which in turn led to preferences for landscapes that made sense to the observer. In other words, landscapes were preferred that could be comprehended, where information could be obtained relatively easily and in a non-threatening manner that provided opportunity for involvement, and that conveyed the prospect of additional information. According to this framework, landscapes that are preferred are coherent, legible, complex, and mysterious."

Balling and Falk summarised Stephen Kaplan's contribution [1982, 8]:

> "Taking an evolutionary perspective, S. Kaplan has asserted that the long-term survival of the extremely knowledge-dependent human species required that people should actually like to obtain information about landscapes, and that they should be able to process certain kinds of environmental information very efficiently."

Bourassa notes that the information processing theory emphasises "only some of the biological bases for aesthetics, not to mention the fact that it ignores cultural and personal modes of aesthetic experience" [1991, 84-5].

(6) Tripartite Paradigm of Aesthetics

Stephen Bourassa, now at the Department of Urban and Regional Planning, University of Sydney, worked for several years in addressing the biological, cultural and personal attributes of landscape perception. He published several papers later consolidated in *The Aesthetics of Landscape* [1991]. The following sums up his quest:

> "If both biology and culture serve as distinct bases for aesthetic behavior, then it is necessary to go beyond both biological and cultural determinism toward a theory which would fully embrace both biological and cultural factors. It is also necessary to consider the role of personal idiosyncrasies

> and particularly personal creativity..." [Bourassa, 1991, 49].

Bourassa drew on the work of the Russian psychologist, Vygotsky. Vygotsky was regarded as a non-person in Stalinist Russia and his ideas have been slow to appear in English. He sought to accommodate both the biological and cultural aspects of behaviour. He focussed on the *process* of development rather than its *product* and, in so doing, was able to provide explanations of behaviour rather than mere descriptions. Vygotsky's tripartite development approach is summarised in Figure 8.8, together with the three modes of aesthetic experience suggested by Dewey's theory of aesthetics.

Bourassa is cautious about paralleling Dewey's modes of aesthetic experience with Vygotsky's theory, but noted that the eminent 18th century Scottish philosopher, David Hume, also suggested a tripartite basis for aesthetics. In his book, *Treatise of Human Nature*, Hume wrote: "beauty is such an order and construction of parts, as either by the *primary constitution* of our nature, by *custom*, or by *caprice* is fitted to give a pleasure and satisfaction to the soul." [Quoted in Bourassa, 1991, 56]. Hume's categories are remarkably similar to Vygotsky and Dewey.

Bourassa questioned whether the aesthetic experience is separate for the biological and cultural modes or whether they are inextricably intertwined. Based on work of the neurophysiologist, P.D. MacLean, Bourassa believed there are dual modes of perception. The neurophysiological research suggests that:

> "instinctual and emotional responses to landscape *could* occur separately from rational and cognitive responses. In other words, there could be separate innate and learned responses to landscape." [Ibid, 59]

Similarly he quoted Izard: "although emotion and cognition are in large measure *interdependent*, another body of evidence suggests as well that emotion processes and cognitive processes have a significant degree of independence" [Ibid, 61]. While cognitive psychology assumes that feeling follows cognition, Bourassa also quoted Zajonc's [1980] argument that affect is pre-cognitive, citing a lack of evidence for the post-cognitive view [see also Kaplan, 1987, 21]. Bourassa cited experiments that have demonstrated preferences for stimuli, even in the absence of any cognitive knowledge of these stimuli [Ibid, 61]. Bourassa urged caution on the issue of pre-cognitive affect and summarised the position thus:

"The research findings ... *suggest* that:

1) there are dual perceptual systems involving both the uniquely human and the more primitive parts of the brain
2) the more primitive parts of the brain function on the basis of emotion rather than cognition
3) the primitive brain can respond to stimuli in the absence of cognitive awareness of those stimuli
4) consequently, affective response to stimuli may under some circumstances occur separately from cognitive knowledge" [Ibid, 63].

Based on this, Bourassa concluded that 'biological' responses to landscape could occur separately to 'cultural' responses. Based on work by Meyer [1979], he then argued that the three levels [biological, cultural and personal] require respectively aesthetic laws, rules and strategies.

Processes of Development		**Products of Development**		**Modes of Aesthetic Experience**
Phylogenesis [biological evol.]	------->	Umwelt [biological world]	------->	Biological
Sociogenesis [cultural history]	------->	Mitwelt [social or cultural world]	------->	Cultural
Ontogenesis [individual dev.]	------->	Eigenwelt [personal world]	------->	Personal

Source: Bourassa, 1991

Figure 8.8 Vygotsky's Development Paradigm + Dewey's Modes of Aesthetic Experience

At the biological level, he reviewed Appleton's prospect-refuge theory, habitat theory and information processing theory. At the cultural level, he reviewed Costonis' cultural-stability-identity theory of aesthetics in which groups seek to perpetuate the symbolic landscape as a means of self-preservation. Finally, for the personal level, he reviewed theories of creativity and its role in landscape perception.

Having established biological, cultural and personal dimensions of landscape perception, Bourassa then sought to demonstrate its application. He noted, for example, that the preference found for natural scenes over urban ones could be explained by his tripartite paradigm; natural landscapes are experienced more in the biological mode while urban landscapes are experienced more in the cultural mode [Ibid, 120]. He also considered that the formalist, objectivist approaches involving quantitative measurement of landscapes could only be applied to the biologically based preferences:

> "Outside of that realm, cultural and personal values must also be considered and landscape aesthetics must be viewed in terms of the experiential interaction of the perceiver and the landscape." [Ibid, 122]

On this basis, he was critical of the method by Shafer *et al* [1969] of deriving regression equations from analyses of landscape photographs, a "kind of gross empiricism [which] can often lead to spurious results." [Ibid, 124]

Although Bourassa has provided a service to landscape interests by constructing an integrated framework within which to consider the biological, cultural and personal dimensions of landscape preferences, it is questionable whether it amounts to little more than a framework or paradigm.

While he initially referred to the need for a theory [p 49] and to his "tripartite theory of aesthetics" [p 64], he subsequently referred to it as a "tripartite framework" [p 66] and a "tripartite paradigm" [p 120]. However, in his final chapter on postmodernism [the relevance of which is unclear], he reverted to referring to "the aesthetic theory presented in this book" and the "aesthetic theory developed in Chapters 1 to 6" [p 133]. It must therefore be assumed that while Bourassa had doubts himself as to whether he had established a theory, on balance he felt that he had.

Based on the *Shorter Oxford English Dictionary* definition of theory as "a systematic statement of rules or principles or a scheme or system of ideas as an explanation of facts or phenomena", the benefit of the doubt should be given and Bourassa's contribution regarded as a theoretical framework. However, despite the critiques he offered of various existing techniques, the application of the framework to the determination of landscape quality is not clear. Nor are there clear ways by which it could be tested or applied in a predictive. Nevertheless, it does provide a comprehensive integrated framework covering the three dimensions which can be used to inform further analysis and to assess the results of studies.

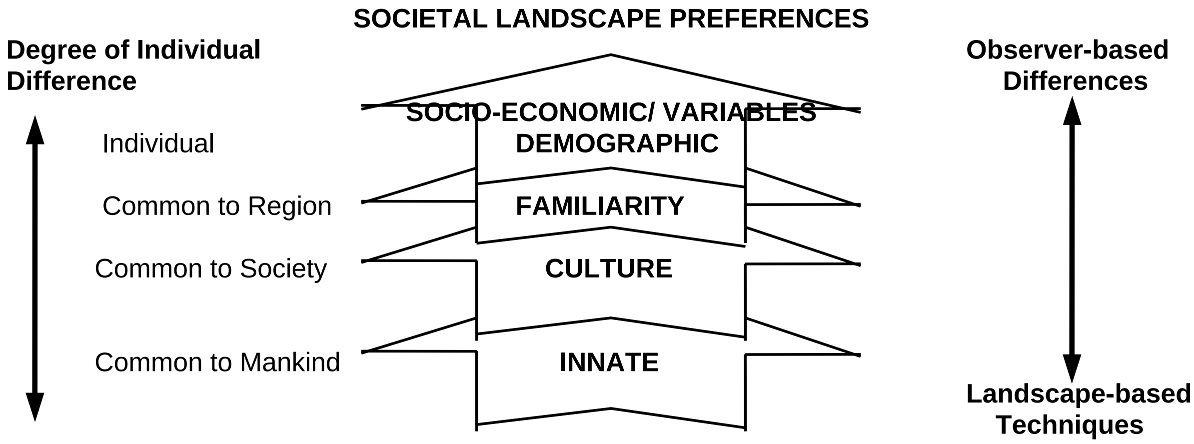
In a review of Bourassa's *The Aesthetics of Landscape*, Seamon [1993] was critical of Bourassa on a number of counts, including a "bias against a formalist approach to landscape", an ignorance of phenomenological research which is supportive of landscape contributing to the aesthetic experience, and his reduction of the aesthetic experience to "the three rather standard ... dimensions of biology, culture, and individual" [Ibid, 524]. Overall, he considered Bourassa's theory "provides little understanding of the powerful feelings that landscape, place, and environment can evoke..." [Ibid, 525].

Since completing his book, Bourassa has ceased to be involved in research related to landscape aesthetics [pers. comm, 1994].

(7) Dearden's Pyramid of Influences

A model postulated by Phillip Dearden [1989] of the University of Victoria, British Columbia has close parallels with Bourassa's tripartite paradigm [Figure 8.9].

Dearden noted [1989, 42] that the hierarchy is not intended to imply the relative importance of the variables but rather recognises that each variable is present in influencing landscape preferences. The emphasis of the hierarchy is to reflect the potential degree of social consensus



Source: Dearden, 1989

Figure 8.9 Dearden's Hierarchy of Societal Landscape Preferences

related to each variable. Innate factors deriving from human evolutionary history are common for all people; cultural factors are common for a particular society, while factors such as familiarity and socio-economic and demographic factors are far more related to particular individuals in time and space.

Based on this model, Dearden suggests that the techniques for landscape assessment need to relate to the degree of individual differences. Techniques which are landscape based [objectivist] are appropriate in assessing innate and cultural factors, but techniques which provide for greater probing of individual perceptions [subjectivist] are appropriate for assessing individual influences.

(8) "Diverse Theoretical Origins"

Having reviewed the key theoretical constructs, we return to the assertion by Sell, Taylor and Zube that landscape perception research is characterised by a "scattering of diverse theoretical origins." [1984, 61]. In their original work, Zube *et al* found a diversity of theoretical backgrounds to the literature: art theory, ecological concepts, stimulus-response behaviourism, signal detection theory, adaptational theories such as 'optimum stimulus level', 'prospect-refuge' and 'information processing'; personal construct theory, behaviour-setting theory, phenomenology and transactional theory [1982, 23].

Sell, Taylor & Zube [1984] grouped these theoretical sources by the paradigms they identified [see Chapter 7]. In many cases the theoretical origins are implicit and assumed rather than explicitly defined in the studies. Zube [1984, 104] described them as "theories and concepts that are embedded, but not always explicit, in much of the work."

Zube went on to describe the theoretical origins according to the disciplines involved in landscape assessment [Ibid, 104]:

Disciplines	**Theoretical origins**
Planners, landscape architects, natural resource managers:	Principles of visual aesthetics and landscape design, ecological theory and biological resource management
Behavioural scientists:	Signal detection, stimulus-response, arousal, adaptation level and information processing
Humanists and cultural geographers:	Sense of place, transactionalism, historicism, phenomenology

While several of these constitute theoretical constructs, others are simply in the form of principles or "rules of thumb" developed by professionals in a discipline. Zube [1984, 105] drew on work by Moore *et al* [1982] in proposing a four level structure of theory:

Level 1: ***Theoretical orientations*** or general theories representing broad concepts that serve as heuristics in orienting ways to look at phenomena and to identify lines of research

Level 2: ***Frameworks*** representing relationships among existing findings that provide a conceptual and systematic organisation to data about phenomena

Level 3: ***Conceptual models*** which provide descriptions of variables and of relationships among variables but not necessarily explanations of

	phenomena within a larger theoretical context
Level 4:	***Conceptual models*** which provide descriptions of variables and of relationships among variables but not necessarily explanations of phenomena within a larger theoretical context

Zube suggests that most of the work has been in levels 3 and 4, which seems a rather generous assessment. Assuming that levels 3 and 4 reflect greater levels of specificity I suggest that habitat theory is at level 1, while information processing and prospect-refuge theories are level 2. Bourassa's tripartite paradigm and Dearden's hierarchy of preferences appear also to be level 2.

Within the social sciences, three main approaches to theory generation have been suggested [Sancar, 1985, 119]:

Universalistic:	Abstracts, formalises and generalises relations using a hypothetico-deductive approach
Situational:	Generates contextually relevant information for planning and management in specific settings
Integrative:	Through induction, generates grounded theory which is based on the premise that the adequacy of a theory cannot be divorced from the process by which it was generated

Sancar considered that Zube *et al's* expert and psychophysical paradigms are situational, while their cognitive and experiential paradigms are of the universalistic type. She considered that none of the paradigms may be associated with the integrative approach. She considered the "need for an integrative approach to fill the theoretical void in landscape aesthetics research" [Ibid].

As much research seeks to verify a preconceived theory but the real issue is the theoretical void that exists, she suggested the real need is for theory generation. She proposes the "grounded theory" approach, which is "based on the premise that the adequacy of a theory cannot be divorced from the process by which it is generated." [Ibid] This may be achieved through comparative analysis, use of quantitative and qualitative data and secondary analysis of substantive data. In particular, the characteristics of the theory would derive from those cases where the following criteria are achieved [Ibid]:

Internal validity:	Conditions are reliably represented
External validity:	Conditions typify those found in other situations
Reflexivity:	New concepts are generated by comparing information obtained through different methods
Translatability:	Consensus is promoted with conflicting frames of reference

These criteria derive from work by Dunn and Swierczek [1977] and are used by Sancar to develop the procedure for what she terms "a reflective-dialectical strategy of inquiry and choice" [Ibid, 123] emphasising the generation of theory rather than the testing of theory.

Carlson [1993] distinguishes between *explanatory* theory, the kind used in science to explain, predict and control, and that which he terms *justificatory* theory, with its origins in philosophy. Justificatory theory:

> "concentrates on our ideas or concept of things, indicates the reasons why these ideas and concepts are as they are, and thereby aids in justifying our views about things." [Ibid, 53]

He suggests, that although writers have noted the theoretical vacuum in landscape studies, it is the justificatory form rather than the explanatory form that should be sought. In contrast to the explanatory form, a justificatory theory seeks to explain why the subject [e.g. landscape quality] is important in our lives. Commenting on Bourassa's approach, he considers that, although it is "rich in orientational, organizational, and explanatory power, [it is] poor in justificatory power." [Ibid, 53]

He believes that justificatory theory is not imposed but rather grows out of a field, being:

> "the result of a lifetime of experience in and appreciation of the landscape, together with deep and reflective thought about the nature and the meaning of such experience and appreciation." [Ibid, 55]

The influence of Carlson's ideas has yet to be seen in landscape research.

(9) Theory - Conclusions

Clearly a robust theory of landscape which provides an all-encompassing framework with which to understand and to predict landscape preferences, does not currently exist. At present there is a range of theories that offer explanations of aspects of landscape preferences but which fall short of a definitive explanation.

Of the theories available, the Kaplan's information processing theory appears the most supportable, based on the range of studies that have assessed its validity and explored the dimensions of the factors involved.

Appleton's prospect-refuge theory has intuitive appeal but the studies undertaken fail to provide conclusive support, if anything tending to indicate its shortcomings and areas in which the evidence is contrary to the theory. Some of his elements have parallels with the dimensions of the Kaplans' information processing [e.g. prospect and legibility, refuge and mystery], although it is acknowledged that each area is coming from very different intellectual positions.

Urlich's affective theory has good support from studies but, like habitat theory, its usefulness in understanding and predicting landscape preferences is limited, Rather it focuses on the positive effect that landscape can play on emotional states of well being.

While the Kaplans' theory offers the most comprehensive explanation of landscape preferences, it is not a theory that is readily applicable in a field situation to evaluate landscape. By contrast, the appeal of Appleton's and Orian's theories is that they offer explanations that can be readily applied in the field.

If the mark of solid theory is in its use in applications, then none of the theories currently available provide a useable framework for the evaluation of landscape in a field situation. While they can offer tantalising glimpses of understanding, they fall well short of comprehensively enabling the evaluation of landscapes.

The conclusion of Gobster and Chenoweth [1989] is confirmed, existing theories based on artistic, bioevolutionary or other properties fail to capture the "richness of human aesthetic response to landscape". They suggest the need for researchers to "broaden their understanding of the multidimensional nature of aesthetic preferences."

8.3 Influence of Observer on Preferences

(1) Introduction

Landscape preferences are the product of "what's out there" with "what's in here", the observable, objective fact of the physical landscape as perceived and interpreted by the eyes and mind of the viewer. That which is "behind our eyes" is as important as that which in front of our eyes.

In this section, the influence of observer characteristics upon preferences is examined to identify the important factors and to gauge their relative importance.

Chapter 7 reported the extent to which the surveys assessed the characteristics of the participants. The key findings were:

- Tertiary students dominated, accounting for 41% of participants, sometimes with other participants, but in 28% of surveys, students only were used

- Members of the general community were 23% of survey participants and visitors to parks or sites being investigated were a further 11%. Other participants included natural resource professionals [8%], design professionals [4.5%], university staff [4.5%] landowners and residents [3%] and children [2%]

- Only 37% of surveys sought data about the characteristics of their participants, a surprisingly low figure but partly explainable by the high proportion of students.

- Age, sex, education, employment and socio-economic status were the main details sought [total 75%]. Other details were childhood residence, culture & ethnicity, expert & non-expert, and race.

(2) Respondent Characteristics

This part examines the influence of respondent characteristics [i.e. age, gender, education, employment and socio-economic status] on their landscape preferences. Appendix 8.2 covers studies that assessed the influence of participant characteristics on landscape preferences.

Balling & Falk, 1982 and Lyons, 1983 both examined preferences for differing biomes by different age groups. Their findings were examined in section 8.2.

Zube *et al* [1983] examined the changes to landscape preferences over the lifespan, covering children, adults and elderly subjects. Figure 8.10 correlates scenic value ratings with the six age groups. It shows that young children [6 - 8 years] correlate reasonably well with the older children [9 - 11 years] but much less with teenagers [12 - 18 years]. Better correlations with adults are achieved by older children [9 - 11 years] while those of teenagers are virtually identical with adults. The correlations with the older adults [over 65] also varied significantly from those with other adults.

Most of the surveys that covered one or more of respondent characteristics did not use these in their analysis of preferences. Only 12 [5% of total] compared the results with some or all of these characteristics. The main reason for collecting this data was to assess whether the sample was representative of the population.

Of the five basic characteristics, only age and to a lesser extent, gender exhibit an influence on preferences. The evidence is conflicting, eight of the 12 studies finding age had no effect while four studies detected some:

- Respondents aged over 25 were more critical of artificial changes to the landscape and more appreciative of natural elements [Banarjee, 1977]

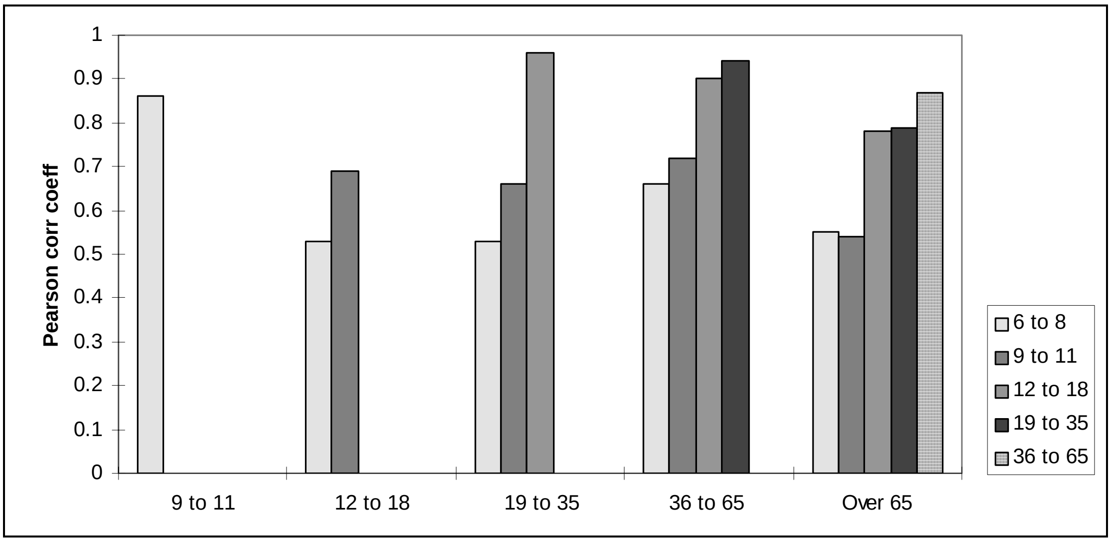
- Preferences weakly related to age [Penning-Rowsell, 1982; Cherem & Driver, 1983]

Only Zube's findings could be regarded as definitive - that the preferences of young children, particularly the 6 - 8 year olds group, differ substantially from older children and from adults. This reinforces the finding by Balling & Falk [1982] and Lyons [1983] that the preferences for savanna by children aged 8 - 11 years differed significantly from older children and adults.

Regarding gender, only two studies found it influenced preferences, which is too limited to be definitive:

- Males are more likely to view the ground, topography & ephemeral objects [Hull & Stewart, 1995]

- Females are more sensitive to lack of cover & to differences in mystery in savanna [Woodcock, 1982]



Source: Zube, Pitt & Evans, 1983

Figure 8.10 Correlations for Scenic Preference by Age Group

Overall, the basic respondent characteristics of age, sex, education, employment and socio-economic status appear to have a nil or negligible influence on preferences. Some indications exist that the preferences of young children [< 11 years] differ significantly from older children and adults.

(3) Children

Preferences of young children [6 - 11 years] differ from adults and older adults [> 65 years] differ from other adults [Zube, Pitt & Evans, 1983] Differences in the landscape preferences of children and adults can indicate the influence of acculturation [socialisation] on these preferences and the extent to which preferences are inherent or are learnt.

The findings of Balling and Falk [1982] regarding preferences for savanna landscapes by children, and the opposing view of Lyons [1983] were examined earlier [section 8.2(2)]. While Balling and Falk regarded the high preferences of young children [8 - 11 years old] to be indicative of inherent preferences with an evolutionary origin, Lyons suggested that this could be explained by familiarity with similar environments in parks and backyards.

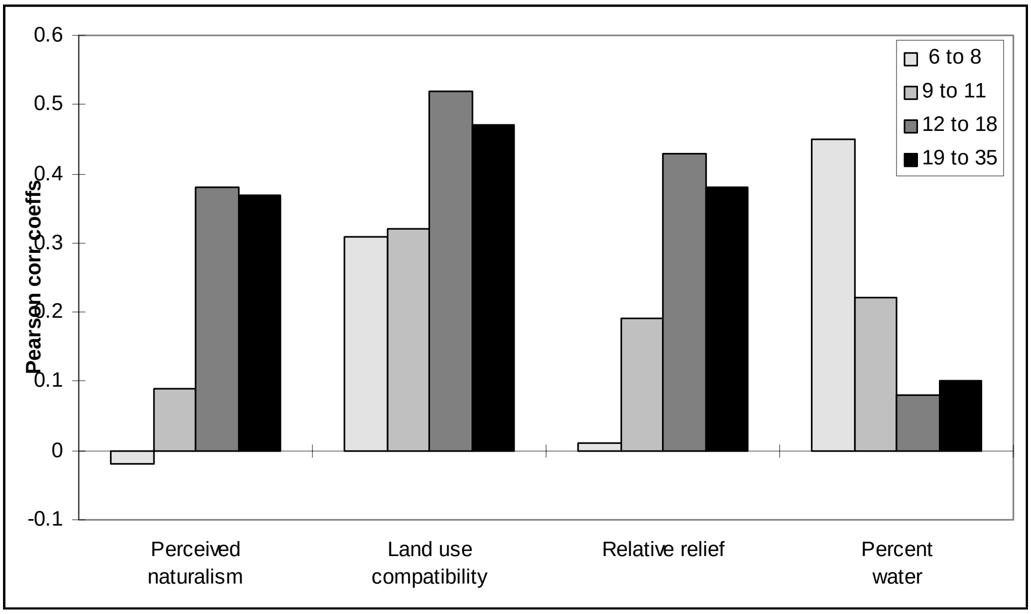
Bernaldez *et al*, [1987] examined the landscape preferences of children on the Canary Islands. Two age groups were used; 11 and 16 years old. Pairs of photographs were used and the children asked to indicate their preference. Factor analysis identified three dimensions:

- illumination: clear, illuminated scenes rich in detail illuminated vs gloomy, shadowed scenes with less detail
- diversity: diverse, contrasted, varied scenes vs more monotonous landscapes
- harshness: rough scenes with edges and aggressive forms vs bland, smooth surfaces

Younger children differed from the older children:

- they disliked darker scenes with less detail [factor 1] [$t = 4.09$, $p < 0.01$]
- they disliked harshness in scenes [factor 3] [$t = 2.92$, $p < 0.01$]

Younger children's preferences for diverse scenes [factor 2] were similar. Interpreting the results, Bernaldez, *et al*, considered that factors 1 and 3 are forms of a more general "risk, uncertainty factor" [Ibid, 173] that play an important role in landscape preferences. They linked this with Appleton's notions of prospect and refuge. While the darkness and deep shadow in factor 1 scenes has links with Kaplan's mystery factor, there is a point at which risk and uncertainty shift from exciting and stimulating to fear and frightening. Fear of darkness, the authors noted, is common among children. The shift in the 11 and 16 years olds on this factor indicates the older children are less



Source: Zube, Pitt & Evans, 1983

Figure 8.11 Correlations with Age Group Scenic Ratings

influenced by this fear and are more inclined to find it stimulating.

Zube *et al*, [1983] carried out a lifespan analysis, examining how landscape preferences changed over age groups. The ages ranged from 6 years to over 70 years. The study found that children rate landscapes differently from adults.

Figure 8.11 summarises the correlations of each age group's scenic ratings with selected landscape dimensions. The 6 - 8 age group and, to a slightly lesser extent the 9 to 11 age group, have markedly different preferences to adults. This indicates that naturalism and strong physical relief are relatively unimportant to children but water is particularly important.

The few studies that have included children indicate that their landscape preferences differ significantly from adults. However there are insufficient studies at present to be definitive.

(4) Personality

Spanish researchers have examined the influence of personality on preferences. The research design involved use of paired photographs of scenes together with a personality test to identify personality types. Factor analysis was used to identify the differences. Maciá [1979] separated the results for male and female. For men, he found:

- men with mature personalities who dealt with reality prefer humanised landscapes [$r = 0.427$, $p < 0.01$]
- men who score high in emotional control prefer pleasant landscapes [$r = 0.543$, $p < 0.01$]
- extroverted men prefer landscapes with diffuse forms and rounded trees [$p = 0.236$, $p < 0.05$]

For women, Maciá found:

- women with a sensitive, insecure personality prefer natural, unaltered landscapes [$r = 0.228$, $p < 0.01$]
- women with astute, worldly personalities prefer dry, cold landscapes [$r = 0.233$, $p < 0.01$]
- extroverted women prefer landscapes with diffuse forms and rounded trees [$p = 0.183$, $p < 0.05$]

Maciá concluded that personality structure conditions landscape choice, and gender can influence preference, either directly or be influenced by personality factors. Abello & Bernaldez [1986] found that the common group had no relationship with personality types, however individuals having low emotional stability prefer landscapes exhibiting "recurrent patterns" and "structural rhythms" [Table 8.5].

The authors comment:

> "Apparently, such individuals try to compensate their lack of stability with extreme preference for environmental regularity and prevision." [Ibid, 24]

Table 8.5 Influence of Personality on Landscape Preferences [correlations]

	Factors		
Personality factor	**1**	**2**	**3**
Common traits	0.02	0.08	
Emotional stability	- 0.02	- 0.18**	- 0.08
Responsibility	- 0.09	- 0.08	- 0.17**

Notes: Factor 1 - fertility, vigour, exuberance
Factor 2 - recurrent patterns & rhythms
Factor 3 - defoliation (structural legibility assoc. with hostility). Significance: ** $p = 0.05$

The strongest relationship of the "sense of responsibility" dimension of personality is with factor 3 and is negative. This indicates that these respondents "reject hostile, cold, wintry scenes with defoliated vegetation, although the same scenes are more legible and generally appreciated" [op cit].

The Spanish studies provide tantalising indications of the influence of personality upon landscape preferences. It is to be hoped that their work will be replicated in other cultures.

(5) Culture

Chapter 6 traced the development of Western appreciation of landscape through three themes - attitudes to mountains; landscape and art; and gardens, parks and the pastoral landscape. That chapter also described the powerful influences of classicism and teleology on Western attitudes.

Given the influence of these cultural factors, it is surprising that studies have found culture to have a negligible effect on landscape attitudes. This section examines these studies. Appendix 8.3 describes 11 studies in which the influence of culture on landscape preferences was examined.

Buhyoff *et al*, [1983] examined the preferences of participants from the US, the Netherlands, Sweden and Denmark for slides of the Rockies and Appalachians. Correlations were highest between the Danish and Dutch and between the American and Swedish [Table 8.6]

Table 8.6 Correlation [Pearson] matrix

	Netherlands	Sweden	United States
Denmark	0.84*	0.755*	0.727**
Netherlands		0.586***	0.550***
Sweden			0.890*

* p > 0.01; ** p > 0.05; *** p > 0.10

In a finding which may reflect familiarity, Buhyoff *et al* noted the:

> "Danes and Dutch prefer flat and open landscapes, whereas Americans and Swedes show a higher appreciation of forested and mountainous scenes." [Ibid, 188]

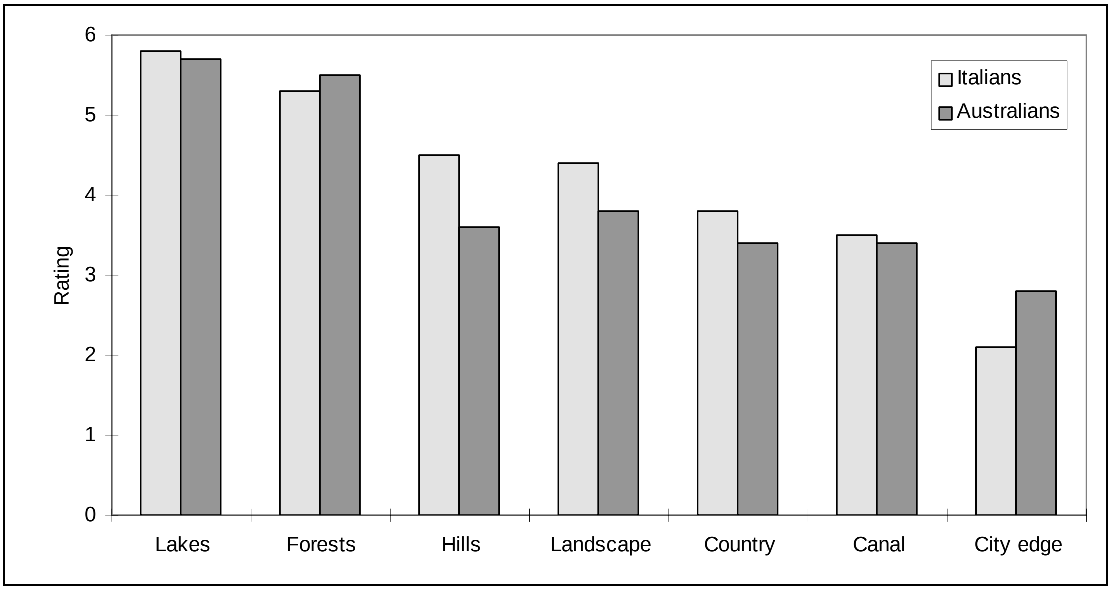
\- a finding which may reflect familiarity.

Hull and Revell [1989] found that the level of agreement regarding the scenic beauty of Bali among the Western tourists was significantly higher [0.86] than among the Balinese [0.79] which was surprising given that the tourists came from many countries [Ibid, 186, 188]. Hull and Revell considered that the Balinese who had been exposed to Western culture for decades might have adopted western values. Nevertheless they considered that the only moderate level of agreement on scenic beauty [$F = 1671$, $df = 2, 777$, $p < 0.001$] suggested that substantial differences existed between cultures; the Balinese preferred scenes with traditional architecture [$t = 2.89$, $df = 48$, $p < 0.01$] while the tourists preferred scenes with people and scenes of wide, lush green tropical rice-field landscapes [$t = 2.06$, $df = 48$, $p < 0.045$].

Certain mountains, trees, agricultural scenes or views towards or away from 'evil' or 'good' would influence the Balinese ratings, yet these meanings would be unavailable to tourists. The authors suggest: "meaning influences aesthetic evaluations of environments. Hence, to some extent, scenic beauty is learned." [Ibid, 189]

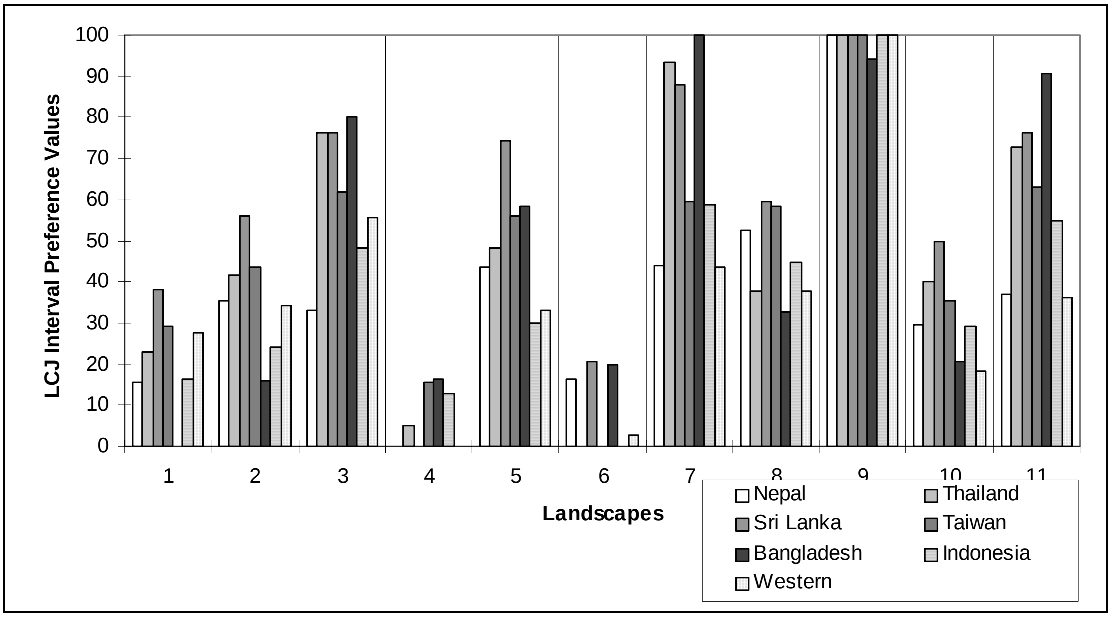
Overall, however Hull & Revell concluded that despite the "enormous differences which exist between the Balinese and western culture" [Ibid, 189] "the results suggest that there was perhaps more similarity than difference between the two groups in their scenic evaluations" of the Balinese landscape [op cit].

Based on the study by Purcell *et al* [1994], Figure 8.12 compares the responses by Italian and Australian students to photographs of landscapes from both countries. Preferences for natural vistas



Source: Purcell *et al*, 1994.

Figure 8.12 Comparison of Italian and Australian Landscape Preferences



Source: Tips & Savasdisara, 1986a

Figure 8.13 LCJ Preference Values for 11 Landscapes

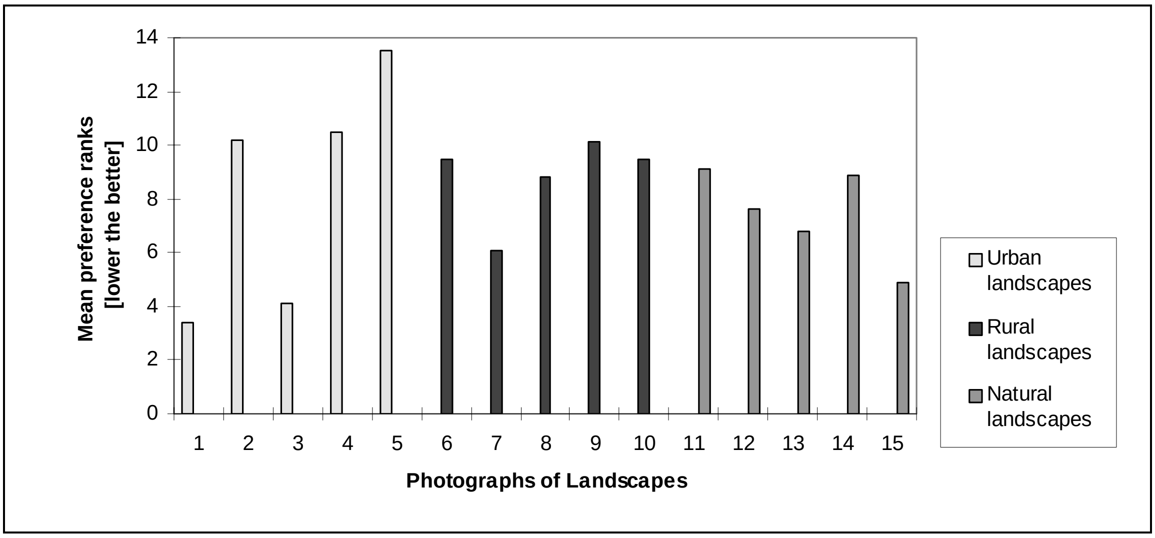
were generally higher amongst the Italian participants than amongst the Australian participants but the differences were only slight.

Sonnenfeld [1967, 1969] studied environmental perception of Eskimos and Americans in Alaska and compared their responses with a control population in Delaware. He was interested in the levels of adaptation to the harsh Arctic environment by differing groups. He found that current and past environmental experience had a major influence on environmental attitudes and perceptions. Preferences for landscapes reflected not only what is attractive but also what was deficient in the home environment [e.g. a lack of fuel in the home environment increased the preference of Eskimos for trees].

Commenting on Sonnenfeld's studies, Zube & Pitt [1981, 72] considered that the differences found between Australian, Scottish and American cultures [Zube & Mills, 1976, Shafer & Tooby, 1973] were not as great as between the Alaskan native and non-native populations that Sonnenfeld had studied.

Figure 8.13 indicates the preference values of Asian respondents obtained by Tips & Savasdisara [1986a], using the LCJ method. It indicates, with some exceptions, a reasonable degree of similarity across different nationalities. Note for example, # 9 [which gained first preference rating of 100 for all but one group - Bangladeshi] and # 4 [which was ranked among the lowest scores in most cases]. The standard deviations, a measure of consensus, ranged from 2 [# 9] to nearly 23 [# 7] and averaged 12.4. The correlations of nationalities with Western tourists [Appendix 8.3] indicated that, apart from the Bangladeshies and to a lesser extent the Nepalese, the responses were comparable with those of Western tourists.

A study that examined a Third World culture's view of landscapes was conducted by Chokor and Mene [1992] in Nigeria. The study is unique in being the only landscape study in Africa and one of the few in a Third World country. The study used 15 colour photographs of urban, rural and natural scenes in and around the city of Warri, which is the hub of the country's oil industry with petroleum, refinery, steel and other industries. Warri is located in flat, marshy terrain surrounded by traditional farming and fishing communities. The photographs were judged by four groups; the poor and uneducated and the rich and educated in both rural and urban areas.



Source: Choker & Mene, 1992

Figure 8.14 Preference Ratings of Nigerians

Figure 8.14 shows the ratings for each landscape. The highest ranks were for natural landscapes followed by rural landscapes - a result not dissimilar to Western studies.

The rankings of urban landscapes varied widely with both the best and worst scenes as judged by the Nigerians. Average scores overall [lower the better] were: urban 8.3, rural 8.8, natural 7.5. Comparing the responses of the four sample groups, Choker & Mene found the rural people preferred urban landscapes while urbanites "overwhelmingly favoured nature scenes over rural and urban scenes" [Ibid, 245]. Perhaps, like Westerners, Nigerian urbanites enjoy a contrast to their home environment.

Overall, these studies indicate that the influence of culture is not as great as might be expected. Acculturation with Western values may be a partial explanation, but is not adequate. For example, Zube and Pitt found to their surprise a very low correlation by a small subgroup of black city-centre residents in Hartford, Connecticut [Ibid, 76], a group that one would expect to be well acculturated.

I have an unease about the use of photographs from the United States in testing the preferences of other cultures [e.g. Shafer & Tooby, 1967; Tips & Savasdisara, 1986a]. Kaplan & Herbert, 1987, found that American students viewed the scenes of Western Australian forests as "foreign" [Ibid, 291] and the opposite may apply to viewing of American scenes by other cultures. The use of scenes from another country introduces problems of unfamiliarity, of possibly associating the scene with tourist travel literature, even of linking with aspirations among Third World cultures to live in the United States. To their credit, Purcell *et al*, 1994, used photographs from both countries in testing the preferences of Italians and Australians. Another option would be to use scenes from a third country, unrelated to either.

(6) Familiarity

Writing about the ongoing change to the British landscape, I.G. Simmons wrote perceptively in 1965 that there was no "right landscape, only a familiar one" [Ibid, 29]. In their seminal paper on English Landscape Tastes, Lowenthal and Prince [1965] identified rejection of the present as one of the characteristics of English preferences - a delight in the history of the landscape and a preference for the familiar.

The British have a particular fascination with the immutability of their landscape, esteeming its beauty and expressing grave concerns about changes brought about by modern agricultural practices, such as the removal of hedgerows which add considerable diversity to the scene. Articles have abounded with titles such as: *"Changes in the English landscape"* [Jackson, 1964], "The British landscape is losing its character" [Lovejoy, 1968], *"The future of the British countryside"* [Green, 1975], *"The farming landscapes of England and Wales: a changing scene"* [Leonard &

Cobham, 1977] and *"Shroud for the Scottish landscape"* [McCluskey, 1986].

The strength of attachment that the English have to their landscape illustrates the important role of familiarity in influencing landscape preferences. While "familiarity breeds contempt" in many situations, landscapes appear to be an exception. Familiarity transforms a mediocre landscape into a scene that is loved and cherished by those who have grown to experience it.

Appendix 8.4 summarises the findings of 12 relevant studies.

Dearden [1984] examined the influence of several factors including familiarity on landscape preferences [Figure 8.15]. He found that respondents who lived in more natural, low-density housing for most of their adult lives feel more positively about rural and natural scenes than residents from high-density housing.

Only three of the correlations were significant:

- housing density occupied as adults correlates with rural and wilderness preferences
- housing density occupied over last 5 years correlates with rural preferences
- the lower the density of housing environment, the higher the relative scores for less developed landscapes.

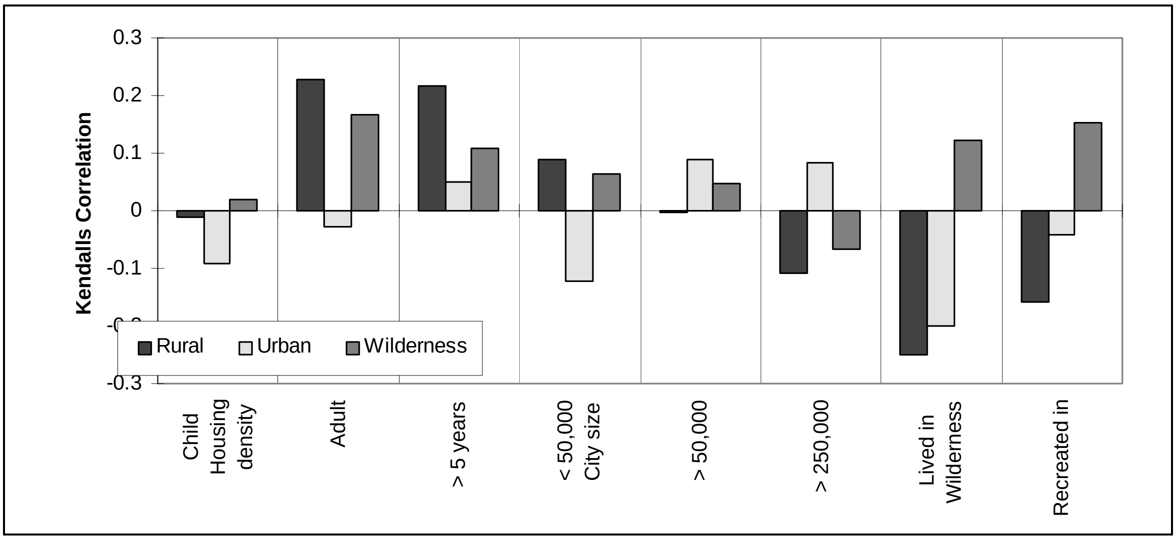
Dearden suggested that housing density occupied as adults is a good predictor of familiarity [Ibid, 299]. No significant relationships were apparent between city size and landscape preference.

Factors perceived by respondents to be important in influencing landscape preferences included past landscape experience, travel, present residential environment and recreational activities. These were the first four ranks out of 11 options and support the influence of familiarity on preferences [Ibid, 303].

Dearden considered familiarity with landscape types to be a persuasive influence [Ibid, 304]. He contrasted this with the finding of Wellman & Buhyoff [1980] of no regional familiarity effect and suggested the viability of generic landscape preference models.

Hammitt [1979] asked some visitors to a bog environment [i.e. wetlands] in a Virginian National Forest to rate photographs of the site prior to their visit and again following the visit. Other visitors were only asked following the visit. Preference was rated on a 5-point scale and familiarity was rated on the visitor's recall of having seen the scene using a 3-point scale [familiar, not familiar, not sure]. Information on prior visits to the site was also obtained [Figure 8.16].

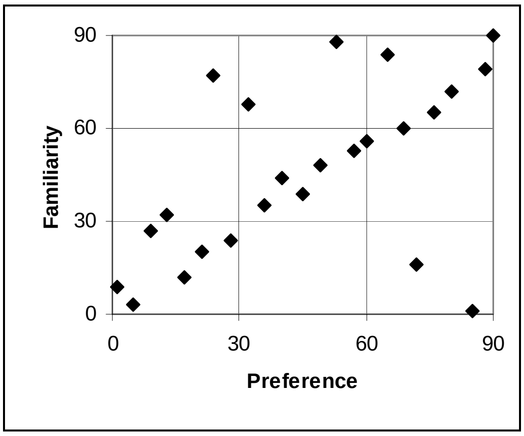
Hammitt found that the ratings of scenes were virtually identical [rho = 0.97] and prior visits appeared also to have virtually no



Source: Dearden, 1984

Figure 8.15 Correlations of Familiarity with Socio-Economic Variables

effect with only one photograph showing significant difference [chi test]. Hammitt considered that “a single on-site experience is sufficient for developing a sense of familiarity” [Ibid, 222].



Source: Hammitt, 1979; units are notional.

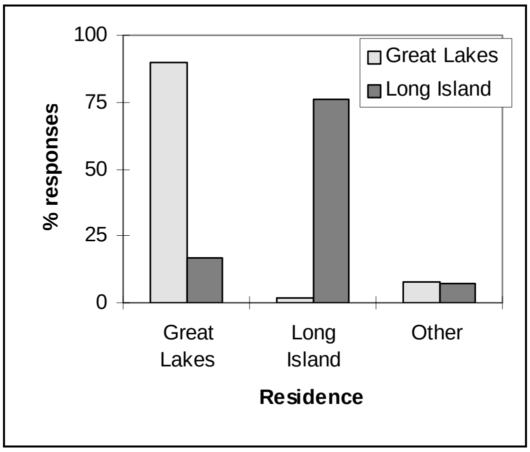
Figure 8.16 Preferences vs. familiarity - Bog environment

Comparison of preference and familiarity indicated a positive relationship [rho = 0.53] with the majority of scenes being strongly correlated. Hammitt considered that scenes high in ‘distinctiveness’ and ‘involvement’ are more familiar than featureless scenes offering little appeal for visual involvement. He also found that high familiarity with low preference can also occur and that therefore “familiarity, *per se*, is [an] insufficient basis for appreciation.” [Ibid, 223].

Although Hammitt did not derive a regression line for his data, the equation for the data in Figure 8.16 is $y = 0.53x + 21.2$, $r^2 = 0.28$[74]. Scenes of low familiarity have a wider scatter of preferences than familiar scenes.

Lyons [1983] asked respondents to indicate their preferences for six biomes and examined their changes with age. Figure 8.29 [section 8.5] summarises the findings. Adults top preferences were for coniferous and deciduous forests. Lyons considered the findings “support the hypothesis that a person’s landscape preference is strongly influenced by his or her residential experience in different biomes.” [Ibid, 503]. Her comment was noted earlier in this chapter that Balling and Falk’s attribution to habitat theory of the savanna preferences of children was more likely to be due to the familiarity of children to savanna-like parks and backyards.

Nieman [1980] examined the landscape preferences of residents near the Long Island coast and the Great Lakes shore and found that the residents strongly preferred the environment with which they were most familiar [Figure 8.17]. Similar results were found when respondents were asked which coastal area they would most prefer to live - in both cases, 82% preferred to live where they were rather than in the other location [Ibid, 55].



Source: Nieman, 1980;
n=981, χ = 59.278, df = 2, p<.01

Figure 8.17 Preferences vs. familiarity: Great Lakes and Long Island

Strumse [1996] assessed the landscape preferences of students for Western Norwegian agrarian landscapes. Contrary to her expectations, she found that the two familiarity variables, geographical region during childhood and population density during childhood, had an insignificant influence on preferences. For example, she found that the preference of students who lived in Western Norway during childhood was 3.62 compared with 3.64 for those who grew up elsewhere [5 point scale]. Similarly, the preference of those who grew up in urban areas was 3.66 compared with 3.60 from rural backgrounds.

Those living in Western Norway had moderate preferences [mean 3.56], for

74. Deletion of the four extreme data points in or near the high preference/low familiarity quadrant and the high familiarity/low preference quadrant yields an equation of y = 0.868+7.84, with a much improved r^2 of 0.82. This suggests a much closer relationship between familiarity and preference than indicated by Hammitt. However the deletion of these data points cannot be justified on the basis that they were incorrect.

western Norwegian agrarian landscapes, while those from other regions had higher preferences [mean 3.83] for the area. However, those living in rural areas had a higher preference for farming landscapes [mean 3.87] than urban residents [mean 3.52]. Overall, Strumse concluded that, while childhood residence and population density did not affect preferences, the respondent's present location did have an influence.

Wellman and Buhyoff [1980] sought to examine the extent to which regional familiarity affected landscape preferences. Students in Virginia and Utah were shown slides of the Rocky Mountains and Appalachian Mountains. Information about their residency was obtained. The experimental group was told they would be evaluating a mixture of Eastern and Western [i.e. in the US] slides while the other group were given no information about the origin of the scenes [control group].

Table 8.7 Comparison of Preferences between Groups

Question	Spearman's Rho	Pearson's r
1. Utah control vs Utah experimental	0.69	0.78
2. Virginia control vs Virginia experimental	0.85	0.93
3. All Utah vs all Virginia	0.92	0.90

Note: $p < 0.05$

The study produced three findings [Table 8.7]:

- prior information about the scenes made no difference to their ranking of photographs
- there was no inherent preference for either region
- subject's evaluated landscapes similarly regardless of the familiarity with the region

Based on these findings, the authors concluded that inherent familiarity does not appear to be present. They found that "subjects from widely different geographic regions evaluated the landscapes, in terms of preference, in essentially the same manner." [Ibid, 110].

Despite this, the studies reviewed indicate that, on the whole, familiarity has a significant influence on landscape preferences and this is usually a positive influence. Among the findings are:

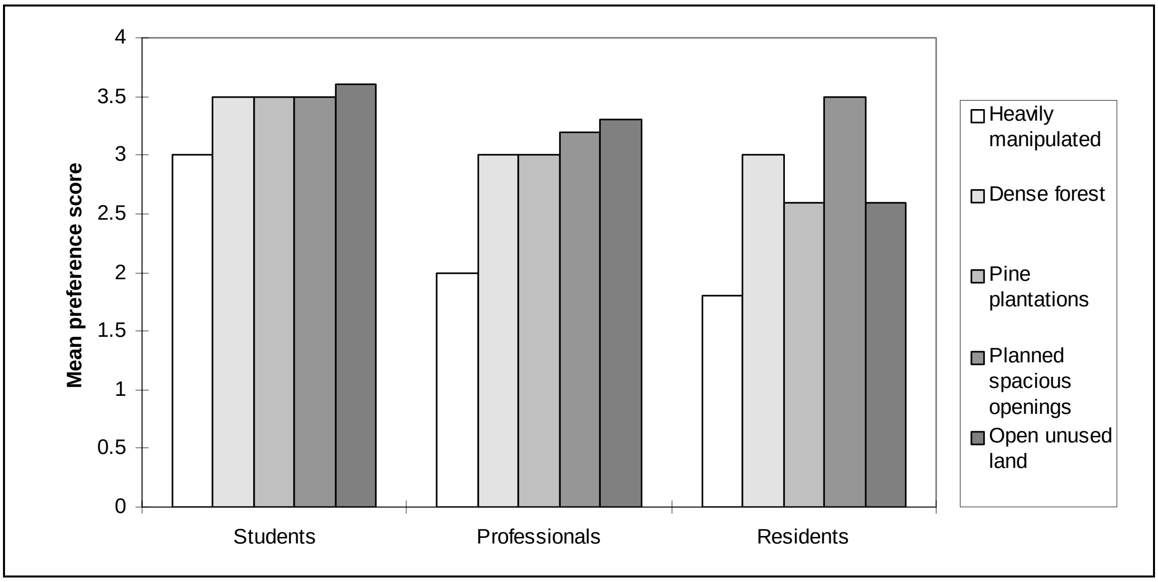
- housing density occupied as adults appears to be a good predictor of familiarity [Dearden, 1984]
- a general familiarity with landscape types tends to be a persuasive influence [Dearden, 1984]
- a single on-site experience is sufficient for developing a sense of familiarity [Hammitt, 1979]
- scenes high in 'distinctiveness' and 'involvement' are more familiar than featureless scenes offering little appeal for visual involvement [Hammitt, 1979]
- high familiarity with low preference occurs - familiarity of itself is an insufficient basis for appreciation. [Hammitt, 1979]
- scenes of low familiarity produce a wider range of preferences than when the scene is very familiar [based on Hammitt, 1979]
- landscape preference is strongly influenced by his or her residential experience in different biomes [Lyons, 1983]
- strong preference for the environment with which the respondents were most familiar [Nieman, 1980]
- while childhood residence and population density did not affect preferences, the respondent's present location did have an influence [Strumse, 1996]

Some studies found familiarity had little or negligible effect on landscape preferences (e.g. Cook & Cable [1995] and Wellman & Buhyoff [1980]). Penning-Rowsell [1982] asserted that familiarity appeared to result in greater criticism of the landscape qualities and that consensus in fact appeared to decline with familiarity. An instance where familiarity had a negative effect was reported by Kaplan & Herbert [1987], who found that pines tended to be regarded negatively among Australian students, whereas the opposite occurred in North America [Lyons, 1983].

Summarising, it appears that, if the respondents do not normally regard the scene positively, familiarity will not alter this basic perception but, however where the scene elicits a positive response, this will be reinforced and even increased by its familiarity.

(7) Expert vs. Lay

In an early seminal study, Fines [1968] initially used respondents with no design training, but then rejected their ratings in



Source: Anderson, E., 1978

Figure 8.18 Landscape Preferences by Groups

preference to a smaller group with considerable training and experience. His justification of this was twofold: firstly, “such people [i.e. those with training] are most likely to seek and to obtain the greatest enjoyment from landscape” [Ibid, 43] and secondly, the majority may some day aspire to similar values - a justification which appears quaint and elitist by today’s standards. However, the assumption underlying Fine’s approach was that the landscape ratings of the majority would differ from that of the trained minority. Does the evidence support his assumption?

Appendix 8.5 summarises the findings of 14 studies that have examined the differences between the expert and the lay in landscape evaluation.

Anderson [1978] examined the preferences of samples of the community, students and natural resource managers in regard to the Michigan landscape. Figure 8.18 summarises the preferences of each group and indicates considerable variation. The study divided residents and students by race [black and white] and analysed the differences further.

Anderson concluded that the preference ratings of professionals were distinctly different from those of students and residents:

> “They tended to prefer scenes of heavy manipulation such as clearcuts, recently cutover areas and poorly stocked areas, dense forest stands, either managed or unmanaged, and open unused lands. Professionals showed less variation in their ratings. The other two groups expressed much greater sensitivity to the range of scenes.” [Ibid, 120]

Buhyoff undertook a series of experiments involving foresters and non-foresters assessing the impact of beetle damage on forests. However, because the focus of these studies was on the perception of damage rather than landscape aesthetics, they are not included here. Some studies that examined the difference between expert and non-expert participants focused on issues other than landscape quality [e.g. Kaplan & Herbert’s study of Western Australian natural settings included an expert group from the wildflower society].

Buhyoff *et al* [1978] assessed the ability of trained landscape architects to reproduce the preferences of their client group. They found that, given general information on what the clients like and don’t like about the scenes, they could “come close” [Ibid, 259] to their client’s rank orderings. Their own personal preferences were found to be quite “unrelated to other person’s preferences” [op cit].

Vodak *et al*, [1985] found that scenic beauty ratings by students who were uninformed about forest harvesting techniques were similar to those of forest landowners: r = 0.93. The correlation was even higher with students who were informed about harvesting methods: r = 0.949. The authors concluded that the result “lends further validation to the use of student panels in landscape aesthetics research." [Ibid, 299].

Zube [1973] used widely differing groups to evaluate photographs of landscapes - the groups included environmental designers, resource managers, environmental technicians, students, housewives and teachers, and secretaries. The first four groups were essentially all male, the latter three mainly [>90%] female. He found close correlations amongst the six groups - r^2 averaged 0.74 [$p < 0.01$]. Zube commented that the data indicated that:

> "agreement tends to be strongest on the evaluation of the highest and lowest qualities - the most scenic and the least scenic - within a group of landscapes. Polar positions are apparently more easily identified on a continuum of scenic landscape values even when the comparison is limited to everyday rural landscape. The innumerable shades of gray that lie between the two poles are much less sharply defined. It is also probable that the wider the range of alternatives being evaluated, the larger the gray area is likely to be." [Ibid, 372].

Based on his findings, Zube suggested that qualitative scenic judgements be limited to three levels - high-medium-low, as more than this may imply a "degree of visual discrimination" that is probably rare.

Resulting from these studies, the similarities between lay and expert observers appear to outweigh the differences. Similar ratings or preferences were found across a wide range of groups, including foresters & city dwellers [Kellomaki & Savolainen, 1984], students, natural resource managers, river users, and university staff [Mosely, 1989], planners, farmers, residents [Sullivan, 1994], landowners & students [Vodak, *et al*, 1985] and environment professionals, wives & teachers, and secretaries [Zube, 1973].

Paradoxically the one professional group whose preferences appear to differ from that of the community are landscape architects. More surveys found that their preferences differed [Anderson & Schroeder, 1983; Brown, 1985; Buhyoff *et al*, 1978; Miller, 1984] than studies that found similarities [Craik, 1972, and Schomaker, 1978]. Thus, while the preferences of natural resource managers generally correspond reasonably well with those of the community, the views of landscape architects appears to be at significant variance to the community.

(8) Reliability over time

The reliability of observer responses has been assessed by examining the extent to which they change over time. Coughlin and Goldstein [1970] examined the consistency of ratings one month after the initial rating. They found a reasonably good correlation of 0.73 between the two ratings. Hull & Buhyoff [1984] reassessed preferences after the elapse of more than twelve months. Individual observer reliability averaged nearly 80% while group consensus values were very reliable [$r = 0.956$, $p < 0.05$]. The authors recommended that group data be used in preference to individual responses.

(9) Influence on Preferences of Observer Characteristics - Conclusions

This section has examined whether preferences are related to observer characteristics. Summarising its findings:

- The basic respondent characteristics of age, gender, education, employment and socio-economic status generally have a nil or negligible influence on landscape preferences.
- The sole exception to the above is that there are indications that the preferences of young children [<11 years] differ significantly from older children and adults, however the number of studies are insufficient to be definitive.
- There is some evidence that personality structure type can influence the choice of landscapes and preferences but again the evidence is confined to a few studies.
- The studies on the influence of culture on preferences have found that culture has a relatively slight influence and the commonalities across cultures appear to be greater than the differences.
- Familiarity with landscape is one of the stronger factors and usually has a positive influence, but some studies have found the opposite. Interpreting this it appears that, if the scene is not normally positively regarded, familiarity will not alter this, whilst where a scene elicits a positive response, this will be reinforced and even increased by familiarity.
- Like the influence of culture, the similarities between lay and expert observers appear to

> outweigh the differences, and similar ratings of preferences were found across a wide range of groups.

Overall, landscape preferences appear to be surprisingly consistent across respondent characteristics of age, gender, education, socio-economic status, culture, and whether expert or a lay observer. Two possible exceptions to this are young children [< 11 years], whose preferences differ from older children and adults, and the influence of familiarity with a given landscape. Generally, familiarity contributes to positive preferences, if the scene is normally regarded positively.

8.4 Mode of Presentation

(1) Photographs

In Chapter 7 it was reported that nearly 90% of studies used photographs to represent the landscape in the surveys of preferences. Most of these [79%] were colour photographs. How adequately do photographs represent landscapes?

Differences between an actual field observation and a photographic representation are immediately apparent. A field observation allows one to absorb a range of scenes of a given area whereas a photograph generally represents a single scene, separated from its context.

Photographs allow viewers to immediately compare scenes from widely separated areas, which is impossible in the field. While the range of landscapes viewed in the field is generally narrow, being constrained by the range of scenes present, the range for a set of photographs of scenes can be far wider. Viewing photographs quickly establishes the relative values of widely dispersed landscapes, an extremely difficult achievement for field surveys; in the field the scenes set their own values unrelated to any common base, and it is difficult, if not impossible, to relate this to a common standard in the field.

Not only does photography save the time and expense that might be required for participants to travel between locations, but it also allows compression of seasonal variations into a few moments – a feat that field observations cannot hope to achieve.

Field observations take time whereas an observer may view a photograph for only a few seconds. Field observations have their own advantages: they generally occur while in motion, observing the same scene from a range of viewpoints, even allowing one to enter into the scene and gain an appreciation of its depth and height and width experientially. In contrast, a photograph represents in two dimensions a scene that one views over time as a spectator, not as participant in the three dimensions of the true scene. Thus, a photograph reduces the experiencing of a scene in the field, not from three dimensions to two, but from four dimensions to two.

This process of simplification focuses attention on the visual quality of the scene rather than on aspects that are irrelevant to this purpose.

The field of vision of the eye is much larger than that contained within the typical photograph: the human eye views a cone of vision of 130° [with peripheral vision extending to 208°] compared with only half of this, 65°, for a wide angled 35 mm camera lens [Shuttleworth, 1980, 63]. Add to this the greater field of view provided by motion, and it is evident that photographs provide a very restricted view. Field observations are frameless, the landscape exists in its totality without being bound by some artificial contrivance to contain it[75] whereas a photograph is a sample of the scene. Viewing a scene in the field allows one to choose what to view, whereas photographs reflect the choices made by the photographer, thus limiting their individuality.

Viewing the scene in the field is frameless, a lateral 360° view plus upwards and downwards. By contrast, a photograph is limited, the frame denying the view beyond. Photographs present a static scene which one observes from a distance, as though in a mirror, without opportunity to enter or become involved - the observer "of the natural environment is in [the] environment in a way in which the spectator of a photograph is not in the photograph" [Carlson, 1977, 143].

75. See Section 6.5(3) for description of the Claude glass which miniaturised the landscape.

In transforming a three dimensional landscape into a two dimensional image, a photograph subtly changes the scene's appearance. A photograph of a scene, particularly a black and white rendition, highlights the formalist qualities of line, form, colour, texture, proportion and balance. Indeed when viewing a photograph the elements can be seen as forms, lines, textures whereas in the field they are trees, grass, water, clouds and so on.

In the field one can be aware of the effect of time, season and ephemeral phenomena such as lighting on the appearance of the landscape - the scene on a dark night, lit by moonlight, snow covered or drenched with rain, the scene amidst a storm, lit by a setting sun, or the boughs of trees bent by a strong wind. Photographs used in surveys are generally taken during the 10 am to 4 pm period to gain maximum light penetration, reduce shadows, and avoid the ephemeral effects provided by sunrise and sunset. Photographs in tourist brochures generally show the scene under ideal conditions; similarly, photographs used in surveys can convey an ideal state that fails to reflect the full diversity of conditions in the field.

Field observations allow the observer to be aware of other stimuli on the senses - the sounds of birds, leaves, wind, water; the smell of the woods and of the air; touching the bark of the trees, the feel of the track under the feet, the coolness of the wind or the water in the stream; and the taste of water or berries off bushes.

While photographs have none of these peripheral stimuli directly, viewing photographs of scenes can bring recollections of the actual experiences in similar locations. This will obviously apply more readily where the observer is familiar with the kind of area represented by the photographs.

Generally speaking an observer in the field has chosen to visit the location and, therefore presumably has a preference for the scenes to be experienced. By contrast, a participant in a landscape preference study has not necessarily any real desire to visit or experience the scenes portrayed. Thus, one would expect the preferences gained from field observers who have voluntarily visited the area to exceed those of a random sample of the community chosen to view the photographs of the same scenes. However, the popularity of a locality may be due to factors other than its landscape (e.g. Dunn, [1976] found that a particular site was more popular than others due to its convenience for local, short-stay recreation trips).

The influence of the photograph goes beyond the emphasis of the formalist, the composition of the landscape elements in a photograph has played a role in shaping community landscape preferences [Stilgoe, 1984]. Since the end of the 19th century the combination of cars and cameras has resulted in the photography of countless scenes, particularly along popular scenic routes.

According to Stilgoe, rules of composition were promulgated by popular magazines - rules such as not allowing the horizon to bisect the scene, having a broad foreground with a tree, fence or road, an unimportant middle ground and having mountains, clouds or other features of interest in the background. Care was taken to avoid anything indicative of industry - telegraph poles along early roads were a bane and an early professional photographer removed these from his negatives.

These rules are clear parallels with the Gilpin's 18th century notions of the picturesque - "that kind of beauty which would look well in a picture" and of the rules he established, particularly of the foreground, middle ground and background.

A range of studies has been conducted into the suitability and effectiveness of photographs as alternatives to field observation. These are summarised below.

The effect on preferences of the location of vegetation in a scene was examined by Patsfall *et* al [1984]. Their first study found that foreground vegetation on the right hand side of a scene gave positive preferences, but this was negative if the vegetation was on the left side. However a second study reversed the slides so that the content that had been on the right was now on the left. The result was that the left foreground was positively valued while the right foreground was negatively valued. The findings suggest that placement of content in the foreground affects preferences rather than its location on one or other side of the scene.

Relevant to composition was Nassauer's [1983] comparison of responses to 50 mm slides and 35 mm wide angle slides. She combined three 50 mm photographs to provide a panoramic scene and compared these with the wide angle view. Responses for 17 pairs of matched sets indicated that the rating of the panoramas were higher than the wide angled scenes [$p < 0.05$].

While clearly there are significant differences between photographs and field observations the cost and logistical difficulty of taking large numbers of observers into the field militate against field based assessments. Dearden's study [1980] near Victoria, BC is one of the few preference studies based on field assessments - 12 observers were transported by mini-bus through the area over two days. Robinson *et al* [1976] also used field methods in surveying the Coventry-Solihull-Warwickshire region of England and Briggs & France [1980] transported observers through the study area in South Yorkshire.

Some studies have overcome the difficulties of field-based surveys by interviewing those on site. Brush and Shafer [1975] interviewed campers in the area being assessed. This results in only those with an interest in the area being interviewed. Differential accessibility of sites may affect the selection of the population being studied [Shuttleworth, 1980, 62].

Photographs can be modified to include or delete certain features enabling assessment of this on preferences. Hull & McCarthy [1988] used photographs of the Australian bush with and without wildlife to assess whether wildlife enhances preferences [it does!]. Similarly photographs can be used to depict changes to the landscape which could not be simulated in the field [e.g. Trent *et al*, 1987, 226; Zube *et al*, 1987, 68].

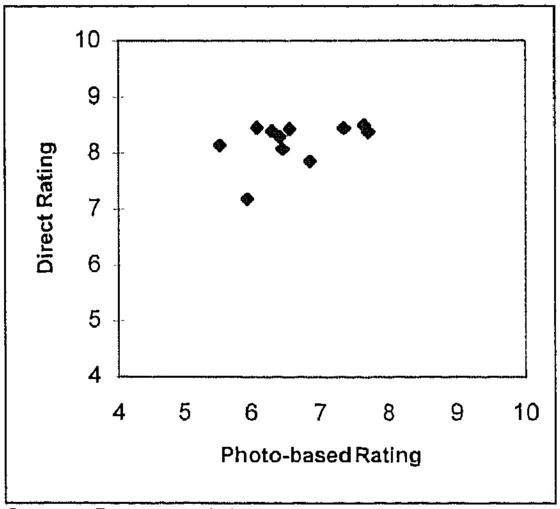
Some techniques to assess landscape preferences would be difficult if not impossible to use in a field situation. In the LCJ, Q-sort and rating methods participants compare a range of photographs at a sitting. The Q-sort method requires participants to place photographs of scenes in up to say seven piles and allows the participant to change their choices. Similarly the LCJ method requires the participant to compare paired photographs; a comparison of 15 scenes requires 105 paired photographs.

Shafer's method of analysing photographs of landscapes would be difficult to replicate in a field situation - he cautiously stated in his paper that the "model does not predict landscape appeal directly. Rather it predicts the appeal for a photograph of a landscape" [Shafer *et al*, 1969, 14]. Photographs thus enable the use of techniques that would be virtually impossible to employ in the field. The SBE method, however, can be used equally in the field and with photographs.

Zube *et al* [1987] traced the development of simulation techniques, from the development of early drawings and models through to photography, videos and animation. They also reviewed the literature on photographic representations.

Given the differences between photographs and field observations, it is not surprising that Carlson states "It goes without saying that photographs are not landscapes and landscapes are not photographs" [1977, 142]. Some surveys have sought to answer the question, how adequately do photographs represent landscapes?

Brown *et al* [1988] found that scenic ratings taken directly in campgrounds were consistently higher than ratings based on colour photographs of the same areas [Figure 8.19]. T-tests for each of the samples indicated that the direct ratings were all significantly higher than the photo-based ratings [$p < 0.001$]. A second test, undertaken the following year and using ranking of scenes instead of rating, derived similar results.



Source: Brown *et al*, 1988

Figure 8.19 Comparison of Direct vs. Photo-based Ratings

Coughlin and Goldstein [1970] found that the ratings of field observers correlated with photograph-based assessments ($r = 0.64$, $p < 0.001$); however the field test used only two observers while the photograph-based test used eleven. Based on this limited study they ambitiously claimed that "there is no reason to suppose that ratings of actual environments in the field would be substantially different from those of photographs." [Ibid, 13] The study also found that photographs taken in one place but in different directions tended to receive similar ratings, suggesting that a single photograph could represent a locality.

Zube *et al* [1975] reported on a series of studies including the responses from field vs surrogate assessments. Using a range of techniques [semantic scales, rank order and Q-sort] and groups of field and non-field populations, they found high correlations between field and non-field assessments. Comparing the field and non-field evaluations for eight views, the average R^2 was 0.92 [Ibid, 164]. ANOVA indicated that only one of the eight views had a significant difference [$p = 0.05$], a view with an R^2 of 0.68. The findings were, they stated, "generally impressive, at least in reference to the use of color, wide-angle photography for assessing scenic resource values." [Ibid, 167].

Daniel and Boster [1976] used their Scenic Beauty Estimation [SBE] method to compare results produced by on-site vs slide judgements of forest landscapes. The SBEs derived from on-site judgements were generally slightly lower [i.e. the scenes were judged to be of higher quality] than those derived from slide judgements. The correlation coefficients were highly significant statistically [Ibid, 51].

Table 8.8 Comparison of On-site and Photograph Ratings

Site	On-site mean	Photo mean	On-site as % of photo mean
Wyre Forest	2.06	2.14	96.3
Highgate Common	2.95	3.08	95.8
Kinver Edge	2.22	2.50	88.8
Arley	2.01	2.28	88.2
Hartlebury	3.04	4.12	73.8
Kingsford	2.05	3.60	56.9

Note: 800 participants.
Means derived from preferences for the 6 sites
Source: Dunn, 1976

Dunn [1976] included an evaluation of the effectiveness of photographs at representing landscapes as part of an assessment of landscape preferences. He asked visitors to six parks near Birmingham, England to indicate how the site compared with its depiction in the photograph. Many respondents were unable to answer this question due to the difficulty they encountered in comparing a single photograph with the "three-dimensional reality of the interview site" [Ibid, 24]. Table 8.8 compares the means obtained for the on-site and photographic evaluations.

On-site evaluations were invariably lower than by photograph but the difference was generally held to be within acceptable limits [no statistical tests given]. At only one site were the differences substantial due to the photograph not capturing the full attributes of the site and the poor quality of the particular photograph. Dunn concludes that results supported "the proposition that photographs may be used to accurately represent landscapes" [Ibid, 25].

Kellomaki and Savolainen [1984] used a variation of the semantic differential method to assess the scenic values of selected tree stands in Finland. Three groups of participants evaluated the scenic values:

- a Basic Group of forestry students assessed the scenic values in the field and laboratory

- a Comparison Group, also students, assessed the values only in the laboratory
- 2 groups of City Dwellers only assessed the values in the laboratory

The results indicated very close assessments between the three groups [p < 0.01] [Table 8.9].

Table 8.9 Comparison of Field and Laboratory Assessments

Group	Mean value	Mean deviation	Range of variation
Basic group - field	56.9	6.8	44 - 63
- laboratory	56.1	7.8	42 - 65
Comparison group - lab	55.1	8.2	43 - 63
City dwellers - lab	55.9	10.2	40 - 66
City dwellers - lab	54.0	9.4	40 - 65

Source: Kellomaki and Savolainen, 1984

While only one group rated the scenes in the field, the mean value of their assessments was only marginally higher than the laboratory assessments but the rating variability was slightly less. This result contrasts with Dunn [1976], who found the field assessments to be slightly lower than photographic assessments.

Although studies had shown little difference between field and photographic assessments, Trent *et al* [1987] suggested that this might be due to their use of closed-end questions that did not allow the respondent to offer free responses. They believed that an open format may result in more evocative assessments, more descriptive terms and a greater focusing on ephemera absent in photographs. They tested their hypothesis in an urban environment. Using closed-end questions and a 5-point rating scale they found an identical rating. Using closed-end questions and the semantic differential method they found no statistical difference between site and slide tests [p = 0.05].

Open-ended responses, in which participants averaged 10.4 responses for sites and 6.8 for slides [a statistically significant difference], were evaluated on the basis of whether they were positive, neutral or negative terms. The responses were very similar and no differences were statistically significant although the findings [Table 8.10] suggest that site assessments gave somewhat more extreme results.

Table 8.10 Preferences in open-ended responses

Preferences	Site %	Slide %	Total %
Positive	39	31	36
Neutral	18	29	22
Negative	43	40	42
Total	100	100	100

Source: Trent *et al, 1987*

Table 8.11 Content in open-ended responses

Responses	Site %	Slide %	Total %
Ephemeral	22	15	18
Evocative	25	16	20
Interpretive	15	14	14
Physical	38	55	47
Total	100	100	99

Note: Site/slide differences significant at p < 0.05. Interpretive refers to design characteristics.
Source: Trent *et al, 1987*

Comparison of the content of the open-ended responses [Table 8.11] indicated that slide views were significantly higher in physical descriptors and lower in evocative responses than site views. Site views were also marginally more ephemeral. The results support the notion that "site views are richer in stimuli, both because they appeal to all the senses and because they are dynamic." [Ibid, 233] The site views tended to produce more subjective responses [e.g. evocative, ephemeral] while slides produced more objective results [e.g. design and physical descriptors] - otherwise the "results do not lead one strongly to favor one mode of presentation over the other." [op cit]

A definitive study on the use of photographs as a surrogate of field observations was undertaken by Shuttleworth [1980]. Being concerned that many of the studies that examined this issue used different populations to assess the sites and the photographs, Shuttleworth used the same group in both situations. The study used landscapes in rural areas and on the urban fringe [East Anglia, England]. Colour and black and white prints were used as surrogates. Semantic differential [SD] and bipolar scaling techniques were applied. The sample population of students [n = 93] was divided into two groups, all of whom visited all the field sites; one half viewed the colour and one half viewed the b & w photographs. Various techniques were used to ensure randomness [e.g. changing the sequence of field vs photograph assessments] and to enable within-group and between-group analysis.

Shuttleworth found no significant differences between groups in responses to landscapes in the field and found little difference in responses to the photographs. However, he did detect distinctly more differences between responses to b/w photographs and field views than between colour photographs and field views [Ibid, 72]. He found that, with b & w photographs, participants tended to "make much more definite and differential responses by reinforcing likes and dislikes; responses to them thus tended far more to extremes of opinion than did responses to colour photographs" [Ibid, 73].

Shuttleworth concluded that the results "indicated that there were very few differences of significance between the reactions to and perceptions of the landscapes either when viewed in the field or as photographs" [Ibid, 74] with any differences being explainable by content. He concluded that photographs can be used, providing they are in colour and are wide-angled to provide a lateral and foreground context.

Finally, Stewart *et al* [1984] were concerned that analyses based on group responses can mask individual differences. A small group of observers evaluated visual air quality in Denver, using both field and photographic assessments, repeating the assessments several times over a period of five months. Stewart *et al* found that the photo-graphic correlations of visual air quality, clarity and cloud cover matched field judgements, regardless of whether these judgements were by the one observer or were the average of several observers [Ibid, 292]. In one test, correlations averaged 0.76 between field observations and judgements of photographs [Ibid, 289] while in additional test, correlations averaged 0.73 and 0.78 [Ibid, 292].

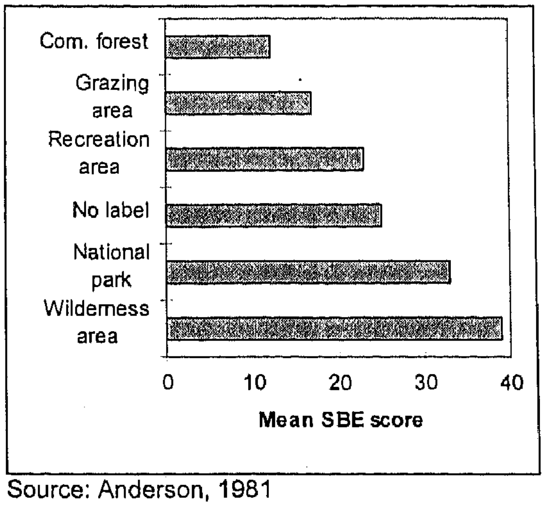
In conclusion, with few exceptions surveys have established that photographs can provide a viable surrogate of landscape, although there are slight differences in responses and certain rules should guide their use. Photographs tend to provide more objective, dispassionate responses, while site assessments can yield a more subjective response influenced by a range of site factors unrelated to landscape quality. Black and white photographs can reinforce likes and dislikes and produce more extreme responses than colour photographs - they may be useful in discriminating landscapes of close similarity of character and quality. Generally, photographs should be in colour and provide a wide view to provide sufficient context.

(2) Labels

Several studies have examined the influence that labelled photographs have on preferences.

Anderson [1981] used the SBE method to assess the effects of labels. A set of 90 slides of ponderosa pine forest in Arizona was divided randomly into six sets of 15 slides each. The experimenter introduced each set as showing either a national park, national forest, a commercial timber stand, an outdoor recreation area, a wilderness area or a leased grazing range. A label accompanied the showing of the slides.

The study found that the SBE scores were affected by the land use designations [Figure 8.20]. Wilderness and national park labels elevated scores while economic uses depressed them. ANOVA tests indicated



Source: Anderson, 1981

Figure 8.20 Effect of Labels on Scenic Quality Rating of Forests

that the labels accounted for a substantial amount of the variance: 12% [$F = 25.87$, df 5, 495; $p < 0.001$]. The findings reinforce the importance of naturalism in positively influencing preferences.

Hodgson & Thayer [1980] used a similar method with labels appearing on identical colour photographs: lake - reservoir, forest growth - tree farm, pond - irrigation and stream bank - road cut [Table 8.12].

Table 8.12 Effect of Labels on Photographs

Group	Natural Label	Human influence
1	20.7	25.0
2	25.2	29.8
3	26.8	38.4
Average	24.3	31.1

Note: Low scores mean better scenic quality, high score - low scenic quality
Differences significant at $p < 0.05$
Source: Hodgson & Thayer, 1980

In all cases, labels implying human influence resulted in the scenes being judged as of lower scenic quality, with the differences in Group 3 being particularly pronounced. The figures indicate that the scores given for human influence are 78% that of the natural labels, considerably less than the Anderson study.

The authors suggested that the labels may stimulate viewers to "supply their own images of what is outside the frame." [Ibid, 177], imagining scenes supplied by the memory of landscapes not actually in the photograph. Alternatively, the labels may cue mental constructs in the viewer's mind with an inherent rank ordering of scenic quality - akin to the adage "don't confuse me with the facts, I've made up my mind".

In a similar study, Vodak *et al*, 1985 obtained different results from Anderson. Student participants were divided randomly into two groups, one group was informed about the harvesting practices, including use of the term "clearcut", but the other group was not given this information. The scenic beauty estimate for the informed students was very similar to that of the uninformed students - correlations with landowner SBEs of 0.95 and 0.93 respectively [$p < 0.0001$]. There were no differences in the scenic beauty evaluations of the two groups leading the authors to conclude "that there was no semantic bias present" [Ibid, 298].

Two studies described the differences in scenes verbally rather than integrating them with the photograph. Simpson *et al* [1976] showed scenes firstly as a baseline and then the subjects were given a written explanation about forest practices as seen in the slides. In *modelling* condition, a forestry 'expert' would then indicate how they would evaluate some sample slides. In the *no-social anchor* condition, no indication was given. The subjects assessed further slides. Where a message had been given, the differences in responses for the clearcut, thinned and natural scenes were marked but were non-existent for the no-message situation. The social anchoring and message increased the subjects' acceptance of the managed areas.

Yeiser & Shilling [1978] used galvanic skin response to measure the intensity of emotion among viewers of natural scenes. The GSR is a physiological measure, as used in lie detection, over which the subject has no control. Using a conservation group and forestry students as subjects plus a control group of non-forestry students, scenes of forest management practices were shown with selected stimulus terms displayed [Table 8.13].

Table 8.13 Galvanic Responses to Scenes and Descriptions

Term	Conservation Group	Forestry Group	Control Group
Cull tree	0.50	- 0.44	0.65
Site prep. area	- 0.38	0.01	- 0.59
Charred slash pile	- 0.62	- 0.23	- 0.51

ANOVA showed that the groups differed [$p < 0.05$] in their response to the *cull tree* term as well as to scenes of site preparation and charred slash piles. Surprisingly, the control group, had stronger antipathy to two of the terms than the conservation group suggesting that the greater knowledge of forestry practices by the latter group actually modified their responses.

The authors drew three conclusions:

- people with no knowledge of the professional terminology [e.g. cull tree] responded to the connotation of the term

- the greater the number of reasons given for motivating a response, the less intense the response
- the longer the time perspective under consideration, the less intense the response.

Overall, these studies indicate that, for whatever reason, appellations given to scenes *do* affect the responses significantly. They indicate the importance of not colouring responses by suggesting or including anything that will constrain or direct the respondent towards a particular response.

(3) Viewing Time

In 1980, R.B. Zanonc argued against the prevailing doctrine in cognitive psychology that affect is post-cognitive. He provided experimental evidence that discriminations [like-dislike] can be made in the complete absence of recognition memory. Urlich also cited evidence in support of affect being precognitive [Urlich, 1986, 30 - 31, Urlich *et al*, 1991, 206-7]. Urlich proposed that:

> "immediate, unconsciously triggered and initiated emotional responses - not 'controlled' cognitive responses - play a central role in the initial level of responding to nature, and have major influences on attention, subsequent conscious processing, physiological responding and behavior" [Urlich *et al*, 1991, 207-8].

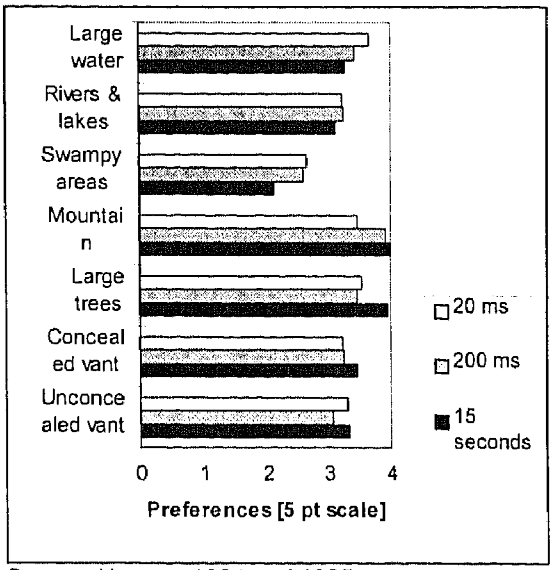
He also suggested that an:

> "evolutionary perspective implies that adaptive response to unthreatening natural settings should include quick-onset positive affects and sustained intake and perceptual sensitivity" [Ibid, 226].

These views are antithetical to the information processing approach which holds that, although preferences are generated extremely rapidly, they are nevertheless the result of cognitive processing. Lazarus [1982] suggests that Zajonc makes the mistake of equating cognition with reality [Ibid, 1022]. Lazarus argues that this process occurs outside of conscious awareness and is virtually automatic. He:

> "regards emotion as a result of an anticipated, experienced, or imagined outcome of an adaptionally relevant transaction between organism and environment [and therefore] cognitive processes are always crucial in the elicitation of an emotion." [Ibid, 1024].

Lazarus considers that this approach "in no way threatens the basic premises of the evolutionary-adaptional perspective" [op cit].



Source: Herzog, 1984 and 1985

Figure 8.21 Effect of Viewing Times on Preferences

Herzog has examined this issue in several studies. Herzog [1984, 1985] included scenes which respondents viewed for 20 milliseconds [i.e. 1/50 sec] or 200 milliseconds [i.e. 1/5 second] and compared the responses with 15 seconds. Tests on the four waterscapes showed that their means differed from each other [$p < 0.05$]. In a mountain waterscapes scene, the 20 ms time differed from the others [$p < 0.05$] while for a swamp scene, the two fast speeds differed from the 15 second time. There were no significant differences in viewing times for the other scenes [Figure 8.21].

The results for the three lower scenes indicated no significant difference between the two high-speed viewings, but these were significantly lower than the mean for the 15 second viewing [$t = 2.37$, $df = 113$, $p < 0.025$].

While short duration viewing times affected preference ratings, the difference is very small. Nor is the difference in one direction - some are lower and some are higher. The findings are probably insufficient to provide definitive support for Zanonc, but it is difficult to comprehend complex cognitive processes being undertaken in as short a space as 20 ms.

Wade [1892] examined whether preferences were affected by respondents being given as much time as they desired to view scenes. He found no relationship between preferences and viewing time.

(4) Mode of Presentation - Conclusions

The mode of presentation of scenes can influence landscape preferences and care needs to be taken:

- providing the photographs are in colour and that they give a sufficient view to provide context for a scene, they can be a reasonable surrogate for the physical landscape and also they tend to yield a more objective response than a field assessment
- labels given to scenes can affect responses significantly, particularly if they indicate a human influence in an otherwise natural scene; it is thus essential that responses be not coloured by providing additional suggestions other than what the scene contains
- short viewing times appear to slightly affect preference ratings but the findings are not consistent

8.5 PREFERENCES FOR LANDSCAPES

(1) Introduction

The preferences for specific elements of nature - water, mountains and trees, are reviewed separately in parts (2), (3) and (4) respectively. Naturalism as a wider concept of preference is reviewed under parts (5). Section (6) covers the influence of wildlife, (7) of skies and (8) of sound on preferences.

(2) Water

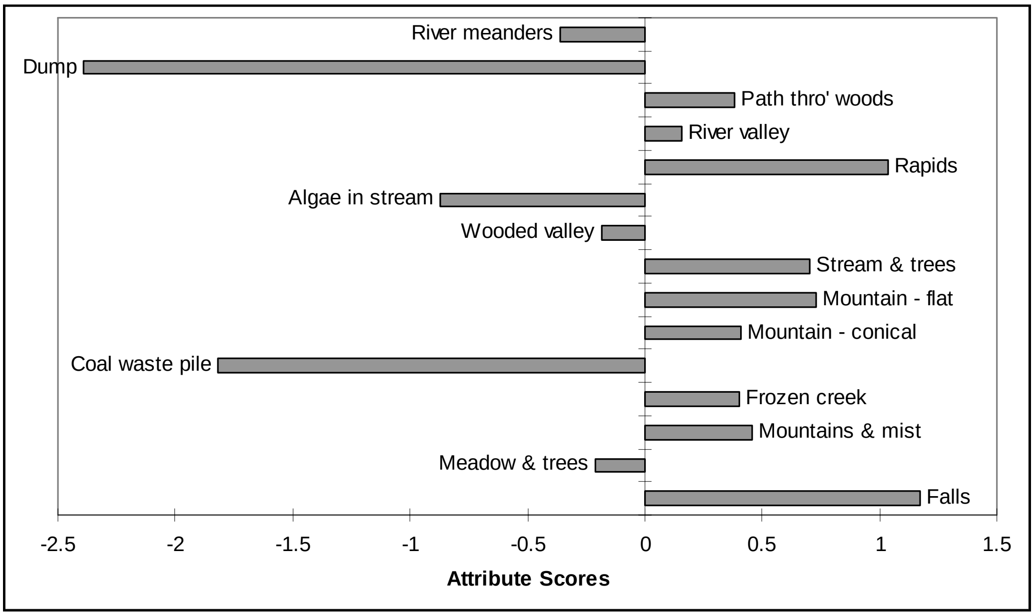
Water has long been recognised as an important element in landscape preferences. Appendix 8.6 summarises 38 studies that have touched on or examined the effect of water on landscape preferences. The following examines some of the studies in more detail.

Calvin *et al* [1972] used the semantic differential technique and factor analysis to analyse responses to photographs of landscapes including several that incorporated water. Figure 8.22 summarises the attribute scores of each scene for the natural scenic beauty factor [Ibid, 465] and indicates that those with water were among the highest positively scoring scenes, although algae in streams was regarded negatively.

In their study of the Nigerian city of Warri, Choker & Mene [1992] found that, in natural scenes, the most preferred landscape was "a natural river or water scenery with a surrounding natural and well-preserved tropical rainforest vegetation" [Ibid, 253]. The presence of water and a river was, after trees and flowers, the most important determinant of landscape quality, although dirty water or waterlogged conditions were regarded negatively. The importance of nature for fishing, farming, hunting and other economic needs was the reason given for the appeal of natural landscapes rather than concern for nature.

Gobster & Chenoweth [1989] derived factor loadings on four factors for river landscapes, forest landscapes and agricultural landscapes. The four factors identified were: Factor 1 artistic descriptor: complexity, uniqueness, topography, calmness of water, awe, arousal; Factor 2 affective-informational: land use variety, degree of alteration, unity, balance; Factor 3 spatial structure: distance, river width, land use variety, enclosure, mystery; Factor 4: river sinuosity. The Factor 1 descriptors together accounted for 61% of the variance and all four Factors accounted for 90%.

Gregory and Davis [1993] identified 22 factors that affected the scenic quality of riverscapes, some positively and some negatively. Scenic attractiveness was increased by the proportion of trees in the photograph, the number of tree trunks and the depth of water. Conversely, water colour, channelisation of the bank, percentage riverbank, the sinuosity of the channel, and amount of litter decreased scenic quality. Using regression analysis, Gregory and Davis derived the equation



Source: Calvin *et al*, 1972; Note: factor scores signs reversed to correspond with positive & negative perception of scenes. Factor scores shown are for Factor 1 - natural scenic beauty factor

Figure 8.22 Scores for Landscape Scenes

shown at Appendix 8.6 to describe the scenic preferences of riverscapes. It indicated that nearly 90% of the average scenic preference variation could be defined by the water colour, the stability of the channel banks and the average depth of water [Ibid, 181].

A definitive study of water preferences was undertaken by Herzog [1985]. Using factor analysis of preference ratings, he identified four waterscape types: mountain waterscapes; swampy areas; rivers, lakes and ponds; and large bodies of water. Based on S. Kaplan's theories of information processing, the study used as predictor variables: spaciousness, texture, coherence, complexity, mystery, and identifiability with preference used as a criterion variable.

Table 8.14 summarises the mean ratings obtained for each predictor variable showing how they varied across each type of waterscape. These indicate that:

- mountain waterscapes were distinguished by low textures
- swampy areas were distinguished by low spaciousness
- rivers, lakes & ponds were distinguished by high identifiability
- large water bodies were distinguished by spaciousness, texture and coherence but were low in complexity and mystery

Table 8.14 Correlation of Variables with Preference

Variable	Correlation
Spaciousness	0.42**
Texture	- 0.15
Coherence	0.33**
Complexity	0.18
Mystery	0.09
Identifiability	- 0.11

Source: Herzog, 1985; ** $p < 0.01$

Herzog found that only spaciousness and coherence were significant predictors of preference [Table 8.14]. Regression analysis of the variables against the criterion variable of preference indicated that "waterscapes high in spaciousness, coherence, and mystery, but low in texture (i.e. featuring coarse or uneven ground surface), were preferred to waterscapes with the opposite characteristics." [Ibid, 235] The six predictor variables accounted for 71% of preference variance in mountain waterscapes, and for 74% in swampy waterscapes.

In terms of content, "mountain lakes and rushing water are the people's choice, whereas swampy areas are unlikely ever to attract an enthusiastic following“ [Ibid, 237]. In terms of predictor variables, the most preferred waterscapes were high in spaciousness, coherence and mystery but low in texture. Large water bodies and mountain waterscapes, both high in spaciousness were the most preferred while swampy areas are lowest in this variable and in preference.

In a later study, Herzog and Bosley [1992] included a wider range of scenes to evaluate the role of tranquillity on preference. Predictor variables used were mystery, coherence, spaciousness and focus, with tranquillity and preference the criterion variables. The preference means for the different landscapes are summarised in Table 8.15 and indicate that in terms of both tranquillity and preference, water ranks highest among the landscapes evaluated.

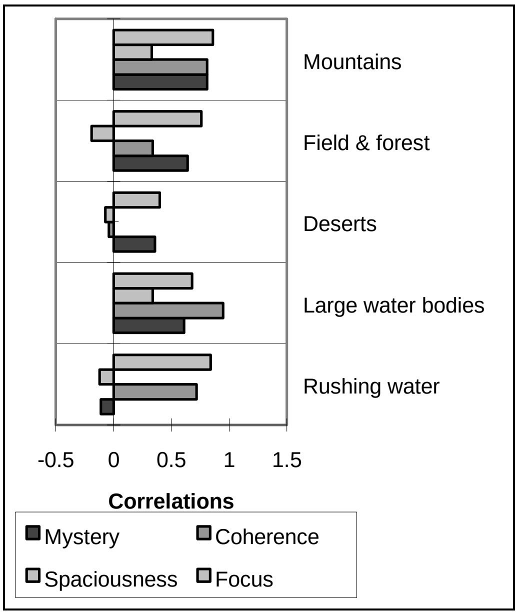
Table 8.15 Comparison of Mean Scores for Tranquillity and Preference
[5 pt scores]

	Tranquility	Preference
Mountain	3.87	3.84
Field-forest	3.51	3.15
Deserts	2.98	2.81
Large water bodies	4.19	3.90
Rushing water	3.76	4.00
Gardens	3.01	3.05
Misty mountains	3.05	2.77

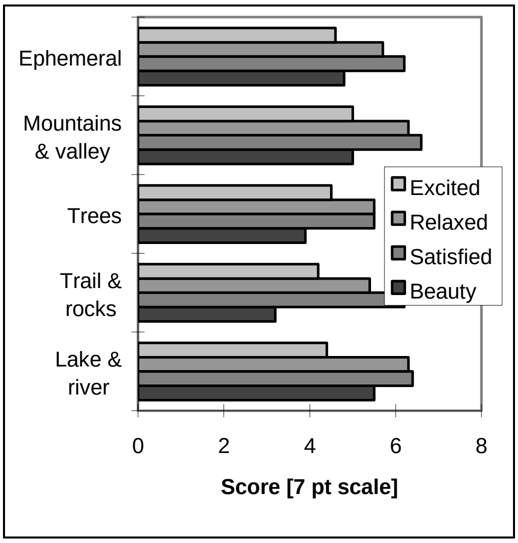
Source: Herzog & Bosley, 1992

Correlations between the descriptor variables and preference for the landscapes evaluated [Figure 8.23] indicated high correlations for coherence and, to a lesser degree, focus. Mystery and spaciousness were negatively correlated for rushing water. Not surprisingly, the authors found that the turbulence in rushing water decreases the sense of tranquillity. While turbulence can focus one’s attention thereby aiding preference, it also conveys a lack of calmness that decreases tranquillity [Ibid, 125].

Using tape recorders and visitor photography, Hull & Stewart [1995] surveyed trail users on the views they encountered. Feeling states were recorded by participants *en route* and were classified thus: beauty, satisfied, relaxed, and excited. Figure 8.24 summarises the average rating of these. It indicates that the water bodies contributed most in terms of beauty and were also rated high for satisfaction and relaxation. However, the water bodies ranked lowest for excitement - which probably reflects the placid types of lake and river encountered.



Source: Herzog and Bosley [1992]
Figure 8.23 Correlations of Preference and Variables



Source: Hull & Stewart [1995]
Figure 8.24 Feeling States along Trails

Palmer [1978] reported the results of an extensive landscape research project in Connecticut River valley led by Ervin Zube. The study identified 22 landscape dimensions, including water/land edge density per unit area and percentage water area per unit area. About 50% of the variation in scenic resource value was explained by seven of these dimensions. Scenic value was found to increase with naturalism [regression coeff = 0.59], landform variation [0.58], water/land edges [0.42] and the length of views [0.33]. Findings related to specific land uses included:

- Farm landscapes - water area density had a major negative influence, suggesting that farm views dominated by large areas of water were not as scenic as those with smaller areas or water accents.
- Open water landscapes - scenic value increased with water/land edge and decreased as the proportion of water surface area increased. An elevated viewer position, increased difference between elevations within the view, and increased naturalism contributed to scenic quality.
- Wetlands and streams landscapes - scenic value increased with naturalness. In contrast to most studies, it was found that diversity in land use and contrast in naturalism decreased scenic quality.

Schroeder [1991] analysed the meaning that the Morton Arboretum in Chicago had for its many visitors. The Arboretum includes water features - lake, pond, stream and river. These, together with the forest and colours were the most frequently mentioned features. Serenity was a word used to describe places with water. The "ability of trees, other vegetation, and bodies of water to function as 'natural tranquilizers' may be one of the most significant human benefits of preserving nature..." [Ibid, 245].

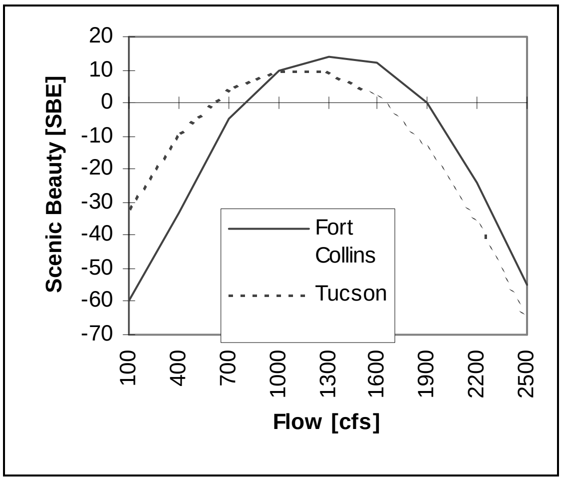
In his analysis of landscape photographs used in the development of a regression equation, Shafer *et al* [1969] found through factor analysis that water features had among the highest factor loadings of any of the variables in a 26 X 26 correlation matrix. The area of the water features - stream, waterfall and lake, yielded slightly higher loadings than the perimeter of these features. Shafer's regression equation contained ten terms and the water area featured in three of these, thereby indicating the importance of water in the landscape.

Urlich's [1981] study found that while attentiveness declined regardless of the environment viewed, "the drop was significantly less when the scenes contained water" [Ibid, 543]. He considered that water had "greater attention-holding properties" [op cit]. He also found that whereas scenes of urban areas increased feelings of sadness, that water had a stabilising effect on emotions and, in particular, sharply reduced feelings of fear [Ibid, 544].

Yang & Brown [1992] found the most preferred scenes to be those with a dominance of water and a Japanese garden style. Reflections across the water of surrounding trees were a common feature.

In contrast to other researchers who used photographs, Brown and Daniel [1991] used 12-second video clips to capture the dynamic nature of stream flow not apparent in still photographs. Although the study focussed on the influence of stream flow volume to scene quality, the researchers took care to ensure that this was not apparent. Paired comparisons were used, one showing a higher stream flow than the other, and the respondent choosing the most attractive. Regression analysis was used to analyse the influence of a range of variables in the landscape estimated from the video scenes. These included the proportion of sky, water, exposed riverbed, stream channel width and vegetation in the scenes.

The results indicated that scenic beauty increases with stream flow to a mid point and then diminishes [Figure 8.25].



Source: Brown & Daniel, 1991

Figure 8.25 Influence of River Flow on Scenic Beauty

In two groups sampled, the scenic beauty was maximised at 1285 cubic feet per second [cfs] in the Fort Collins case and 1092 cfs in the Tucson case. Scenic beauty ratings were similar for low flows at 100 cfs as for high flows at 2000 cfs [all $p < 0.001$]. The findings indicated that flow quantity influences riparian scenic beauty up to a point and then decreases at higher flows.

This finding was consistent across a wide range of vegetation, topographic and scene compositions.

Hetherington, Daniel & Brown [1993] replicated the above finding using sound as well as videos of river flow [see Section 8.6].

Summary - Influence of water on landscape preferences

It is evident from the range of studies that water has a profound effect on landscape preferences. The studies reported that scenic value increased with:

- water edge [Anderson *et al*, 1976; Palmer, 1978; Whitmore *et al*, 1995]
- water area [Anderson *et al*, 1976; Brush & Shafer, 1975]
- channel stability & depth are important factors in river scenic quality [Gregory & Davis, 1993]
- moving water [Craik, 1972; Dearinger, 1979; Hammitt *et al*, 1994; Whitmore *et al*, 1995]

In the Rockies, Jones *et al* [1976] found that water bodies were the third most important landscape component in defining preferences after the high mountains and forests. In New Zealand, Mosley [1989] found water ranked fifth in importance after forests, view angle, relative relief and alpine components [e.g. snow and ice]. Significantly he found the river environment to be more important than the river itself in determining preferences. In the less spectacular landscape of the Connecticut River valley, Palmer & Zube [1976] found that after landform, water was the second most important dimension.

Herzog [1985] assessed the preferences for different kinds of water bodies and found in order: mountain waterscapes; large water bodies; rivers, lakes & ponds; with swampy areas last.
Factors which were found to decrease the scenic value of water included pollution and waterlogging [Choker & Mene, 1992], water colour [Gregory & Davis, 1993], and litter, erosion, water quality and structures [Nieman, 1978]. Interestingly Hodgson & Thayer [1980] found that water bodies labelled as artificial rather than natural [e.g. reservoir instead of lake] scored lower than natural labels [see Section 8.52].

Serenity and tranquillity contrasting with awe and arousal were found to be psychological factors deriving from water bodies [Gobster & Chenoweth, 1989; Herzog & Bosley, 1992; Schroeder, 1991]. Water holds one's attention and has a stabilising effect on emotions [Urlich, 1981].

Overall, water was found to be a major and positive factor by Calvin *et al* [1972]; Choker & Mene [1992]; Dearinger [1979]; Dunn [1976]; Herzog & Bosley [1992]; Hull & Stewart [1995]; Orland [1988]; Shafer *et al* [1969]; Urlich, 1981; Vining *et al* [1984]; and Zube [1973].

Why is water an important landscape element ?

While the studies have thus far established the importance of water in the landscape they offer little explanation of the reasons for this importance. Is it simply, as Bourassa notes, that humans have consistently had a need "to remain fairly close to bodies of water because humans need a constant supply of fresh water" [1991, 68].

It is noteworthy that a significant textbook *Water and Landscape - an aesthetic overview of the role of water in the landscape* [Litton *et* al, 1974] approaches the subject from an objectivist viewpoint as a landscape architect or designer might, and offers no discussion on the role that water might play in our psyche. However, other literature provides some discussion of this.

Herzog [1985] provided a useful review of the information processing approach to water preferences, drawing on the work of the Kaplans, Gibson's affordances and Appleton's prospect and refuge. Given that water is essential for survival and that the key tenet of the information processing approach is that "humans evolved in environments wherein the processing of spatial information was crucial to survival" [Ibid, 226], it would be expected that the preference for water therefore lies in its survival enhancing qualities. Good quality water - fast flowing, large bodies would be preferred over swamps and small ponds.

Herzog's findings about the preferences for different water bodies support this. He concluded from his study that the "results confirm the general usefulness of the informational approach in accounting for waterscape preferences." [Ibid, 239] Based on the results, he suggested that clarity and freshness of water, as embodied in mountain lakes, and rushing water are highly valued. In information processing terms, the most preferred waterscapes are moderately high in both the making sense [i.e. legibility and coherence] and involvement [i.e. complexity and mystery] variables [Ibid, 240].

Urlich however suggests that the appeal of water may be partly biologically-based and largely independent of informational characteristics [Urlich, 1983, 105]. Earlier [1977, 291], he suggested that water may serve:

> "as a focal element and by enhancing subjective depth. The major preference effects of water, however probably stem more from content *per se* than from informational factors."

Balling and Falk [1982] explored the evolutionary model in a study of preferences for differing biomes, including savannas and although their study specifically excluded water, they recognised its importance to their model.

The Kaplans noted [1989, 9] that the appeal of water is not just as a pretty picture - people love to live near water and many recreation activities involve water. Ryback and Yaw [1976] traced the historic value of water as a sacred element, noting the importance of springs to the Greeks; the mythical "fountain of youth" and "water of life" notions, with the concept of Eden being associated as a place of eternal spring. The Christian sacrament of baptism symbolises purification and rebirth and fountains have been symbols of purity. The practice of throwing coins in fountains for a wish or good luck may have developed from an appeasement to the gods of the waters. Whalley [1988] reviewed the importance of water as a landscape element in the gardens of history.

A further idea relates the preference for water to its utility value [transport, fishing, recreation, industry etc], but this use is unrelated to aesthetic preferences. One uses a road, a mineral, air or land for a variety of purposes without any feeling of aesthetic delight being associated with its use. While the ever changing appearance of water [changing light, sparkling, smooth or rough] contributes to its enjoyment, it is insufficient of itself to substantiate the strength of preference for water. Clouds exhibit similar changeability, and consist of water vapour, but they do not stimulate the same level of preference apparent for liquid water.

I believe that these explanations - information processing, evolutionary, cultural, historical, and utility, all fail to explain sufficiently the depth of attachment and affinity which humans have for water and the positive role it plays in landscape preferences. For example, the survival theory fails to discriminate between fresh water and undrinkable seawater despite cues such as sandy beaches and the smell of salt laden air. The dislike of polluted and stagnant water can be due to factors such as smell, concern about health and mosquitoes.

An alternative hypothesis approaches the affinity for water from a psychoanalytical perspective and suggests that it is an unconscious desire for the pre-natal in-utero state in the amniotic fluid that all humans share. I suggest that the desire to view water in its many states [e.g. rivers, falls, lakes, sea], to enjoy recreation in it and on it, to live near it, and to have water features in our cities such as fountains derives from the positive pre-cognitive experience of water gained while in the womb. The ubiquity of preferences for water across all cultures and time lends support to this hypothesis.

The amniotic fluid is a pale straw-coloured liquid, 99% water, formed from maternal plasma and for the first half of pregnancy has a similar composition[76]. Later, in the second half, its composition becomes similar to foetal urine. During the first half of pregnancy the foetal skin is highly permeable to both water and sodium and it can transfer urea, but by the 25th week the skin becomes keratinised and impermeable to the fluid. Additionally, in the second half of the pregnancy there is a constant process of foetal swallowing and urine production of about 500 ml/24 hour period. The volume of amniotic fluid increases with the growth of the baby and stabilises at about one litre by the 28th week. The fluid is in constant change with a complete turnover every three hours. The growing baby thus has a close, vital relationship with its watery environment, drawing from it as well as passing waste into it.

76. The information about the amniotic fluid is largely derived from: Reece, E. A., J.C. Hobbins, M.J. Mahoney & R.H. Petrie, 1992. *Medicine of the Fetus and Mother*. J.B. Lippincott & Co.

The amniotic fluid is of vital importance to the baby permitting movement, protecting it from umbilical cord compression and helping to maintain an even temperature in the womb. It allows symmetrical external growth of the foetus, prevents adherence of the amnion [i.e. the membrane sac] to the foetus, cushions it against injuries and impacts received by the mother, and enables it to move freely, thus assisting musculoskeletal development.

Stages in the development of the foetus are well established [Concar, 1996]:

- 13 weeks - electrical activity occurs above the brain stem and the foetus can possibly feel pain
- 14 weeks - the body responds to touch
- 16 weeks - eye movements commence
- 20 weeks - full movements and responds to sound
- 22 weeks - cortex is fastest growing region of brain and develops its six layers
- 25 weeks - ‘righting reflex’ - foetus has preferred position
- 26 weeks - blinks at light on mother’s stomach
- 22 - 24 weeks - nerves connect to brain’s cortex - some argue the feeling of pain is not possible before now
- 29 weeks - first sign of electrical activity in brain’s cortex

Although a keen debate has been in progress regarding the capacity of the foetus to feel pain prior to birth, and at what stage this occurs, there is general agreement that the foetus is certainly capable of registering its environment from early in the second half of the pregnancy. There would seem no reason, therefore, why it should not start to perceive, albeit in a primitive way as its brain develops, the amniotic fluid in which it is located. Of course, the unborn baby cannot see with its eyes while in the womb, rather it would derive information about its habitat through other senses such as touch.

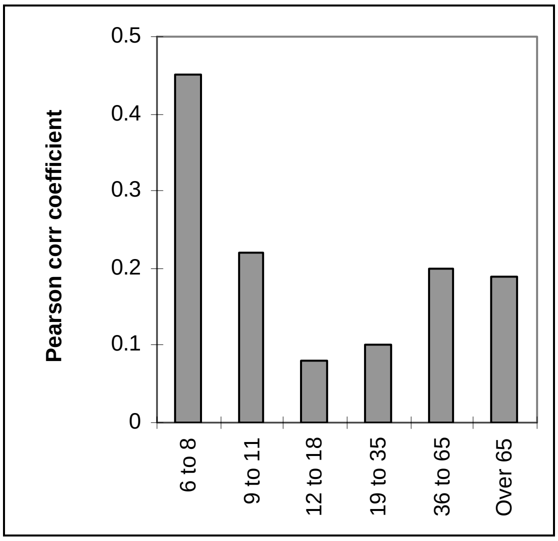
Ryback and Yaw [1976, 82] come close to this when they suggest that the in-utero experience of the womb is our first environment and “may be the basis for ‘pre-conditioning’ of our psychological responses.” They suggest that the soothing rocking of a cradle for the baby and of music for the adult replicates the “monotonous biologic rhythmicity of fluid and organ movement while immersed in an aqueous medium” [op cit].

The amniotic fluid is the first external contact for the baby as they are immersed in it. Thus the first experience of the world outside of self is of fluid.
It necessarily takes a leap into the unknown to suggest that the same in-utero experience of a warm, cosy, safe, quiet and nutritious environment in which every human begins life also provides the explanation for the human preference for water.

The psychoanalytical model may provide a vehicle for understanding this. The basis of psychoanalysis is the unconscious needs and desires of which the person is scarcely aware and which develop during the individual’s earliest years. There is little in the literature on the development of such outcomes from the pre-birth period.

A finding that lends support to this hypothesis is that by Zube *et al*, [1983] which examined the changes to landscape preferences over a lifespan. While they found that children were not particularly interested in either naturalism or mountains [see Figure 4.2], their landscape preferences were strongly influenced by the presence of water [Figure 8.26]. Moreover, this preference was found to decline with age until late middle-age, when it rose slightly.

According to a psychoanalyst colleague, water and the sea are taken to be symbolic of the mother. The nurturing mother womb is the source of creation and has primal connotations. There is a universal desire to return to the womb. Regarding the idea that the in-utero experience might provide the basis for water preferences, he was open - while this could be, it is generally held that a baby does not create fantasies in the womb. However, he admitted the evidence for this was based more on logic than on knowledge.



Source: Zube, *et al*, 1983

Figure 8.26 Correlation of Age Groups with Preference for Water

It is not intended to pursue this line of inquiry at this point except to say that as a hypothesis it may be difficult to obtain the necessary supporting evidence. It is insufficient to point to the ubiquity of preferences for water, although the types of water preferred may provide some measure of evidence. For example, the preference for both fresh water and seawater accords with it. Similarly the preference for running water over still stagnant water fulfils it and for water bodies rather than water vapour in the form of rain, fog, mist, hail and snow. It would be difficult to devise a questionnaire that could provide substantiation. Evidence from physiological and psychoanalytical research may provide support.

(3) Mountains

Given the revolutionary change in Western attitudes towards mountains that occurred during the 18th century it could be expected that studies would indicate that mountains affect preferences positively. Appendix 8.7 summarises the results of 13 studies that have included mountains, and some of these are discussed below.

Brush [1981] re-tested Shafer's original photographs with a similar group of campers and found a strong relationship between landform and scenic preference [Table 8.16]. Brush found the Kendal's rank order correlation between landform class and scenic preference was -0.37 and was very highly significant. The correlation is negative because Shafer's method results in low preferences shown by high scores, thus preference scores decrease as relative relief increases [Ibid, 302].

Buhyoff & Wellman [1980] tested a range of regression functions - linear, exponential, power and $\log_e$ - against preference data. They found the logarithmic scenic preference functions result in the highest r^2 for differing scenes [Table 8.17].

Table 8.16 Frequency of scenes by landform and scenic preference score

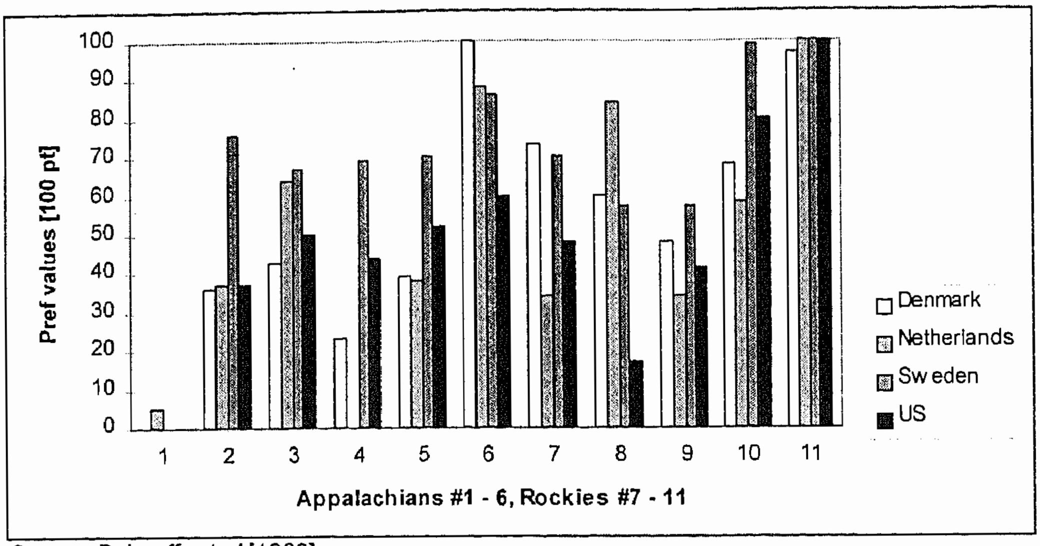
	Preference score	**Flat land**	**Low hill**	**Steep hill**	**Mountain**
High preference	60 - 89				1
	90 - 119			1	3
	120 - 149		1	4	4
	150 - 179	1	3	10	2
	180 - 209	4	2	2	1
Low preference	210 - 239	1		1	
Total		6	6	18	11

Source: Brush [1981]

Table 8.17 Regression Coefficients for Specific Landscape Dimensions

Landscape Dimensions	**Linear**	**Exponential**	**Power**	**Log_e**
Rolling Mountains	.12	1.4E-06	.08	.33
Sharp Mountains	.39	.11	.17	.47
Snow	.14	.06	.14	.48
Foreground Vegetation	.007	.01	.04	.15

Source: Buhyoff & Wellman [1980]



Source: Buhyoff, *et al* [1983]

Figure 8.27 Preference by Nationalities for Mountain Landscapes

With the log function[77], preferences for snow and sharp mountains rose rapidly as the proportion of their area increased to about 15 - 20% and after the inflection point the functions flatten; in other words, a small amount produces a substantial lift in preferences. The converse occurs with rolling mountains and beetle damaged vegetation - the largest drop in preferences occurs as their area increases to about 15 - 20% and then flattens out. Buhyoff & Wellman suggest that scenic management should focus on these ranges when the proportion of area of the given attribute is relatively small because "small changes in landscape dimensions ... will cause substantial changes in preferences" [Ibid, 270].

The implications of the log function are twofold. Firstly, "a small quantity of a dimension that is perceived as positive can substantially improve people's perceptions of the overall landscape if a great deal of it does not already exist." [op cit]. Secondly, the curves imply that landscapes can become "aesthetically damaged" rather quickly [op cit].

Buhyoff *et al* [1983] assessed the preferences for mountain scenes among four nationalities [see section on culture]. Figure 8.27 summarises the preferences for the Appalachian landscapes [LH half] and Rockies [RH half].

The range of values is slightly greater for the Appalachian mountainscapes than for the Rockies, suggesting that the stronger forms and greater scale of the Rockies yields more definite evaluations.

Fines [1969] used a small group to rank 20 photographs representing the world's landscapes [!], although he was vague regarding his methodology. His description of the results and the exponential scale of landscape values he derived [0 – 32] corresponded closely with the height and spectacular appearance of the mountains. His low values were accorded to flat, gently undulating landscapes, marshes, low hills, and coastal cliffs; his higher scores to high hills, lower mountains [e.g. Britain] and great mountains, canyons and waterfalls.

Kane's [1976, 1981] study of the South Australian landscape showed that mountainous scenes ranked among the highest of the 46 scenes subject to the rating. The top five scenes were of mountains and steep gorges in the Flinders Ranges [see (5) Naturalism].

Given the prominence of mountains, it is surprising that in most studies their presence in the landscapes studied appears to be little more than a backdrop to the particular landscape, rather than as a key focal point. Shafer, for example, described mountains in

77. The log functions are: snow y=.1logx; sharp mountains y=.09logx; rolling mountains y=-.08logx; and beetle damaged vegetation y=-.14logx where x is the proportion of area having these landscape attributes and y is the scenic preference.

the scenes as the *distant non-vegetation zone* [i.e. not even designating them with their proper name] in his derivation of a mathematical model [see Table 8.18]. Relatively few studies sought to derive preference ratings for the mountain components of scenes *per se* – rather, they are treated merely as a part of the scene.

Generally, the studies found mountains provide a positive influence on preferences. While some studies found that mountains were ahead of water in terms of preferences [e.g. Hull & Stewart, 1992] others found water to be the leading preference [e.g. Herzog & Bosley, 1992]. Herzog [1987] also found 'spacious canyons' out-performed mountains. However, his example was the well-known Grand Canyon, which may have attracted preferences on the basis of familiarity. As described in section 8.3 [see Figure 8.7 for ratings] he found snowy mountains to be high in spaciousness but low in complexity while smaller mountains were high in both spaciousness and identifiability.

In one of the few detailed analyses of mountain landscapes, Hammitt *et al* [1994] found that multiple ridges of a range, disappearing into the distance were preferred over a single ridge. A Spanish study using scenes from a variety of locations, however, found mountains to be associated with aridity and roughness [DeLugio & Mugica, 1994].

Overall, it can be assumed that mountains have a positive influence on preferences, but this is not as emphatic as water or vegetation because mountains sometimes create negative reactions.

(4) Trees

The ubiquity of trees in studies is striking - out of the 227 surveys, 178 [78%] included trees. Trees are among the most familiar of content elements in landscapes and their contribution to scenic quality is generally positive. This section has examined the findings of surveys relating to the preferences for trees and vegetation. Appendix 8.8 summarises the characteristics and findings of 37 studies that focussed on the effect that trees have on preferences.

Because foresters conducted many of the surveys, a majority focussed on how forest management can affect scenic quality. The following summarises the findings of these.

- Anderson [1978] aimed to develop of reliable approach for assessing visual forest resources and found foresters more amenable to scenes of clear cutting, poorly stocked areas and new growth of cutover stands than were residents or students.

- Arthur [1977] related landscape quality with various forest management treatments and found that large trees, high contrasts and heavy canopies enhanced scenic quality while the amount of slash [i.e. piles of unmarketable wood] affected it adversely.

- Brown [1987] combined assessments of scenic beauty of pine plantations with management costs to identify efficient combinations for producing scenic beauty and the tradeoffs with timber, forage & water benefits.

- Buhyoff and his colleagues undertook a series of studies of the influence of southern pine beetle on the scenic preferences of forest landscapes. These showed that preferences varied inversely with the proportion of visible forest damaged by beetles [Buhyoff & Leuschner, 1978], and that knowledge about beetle damage adversely affected preference ratings [Buhyoff, Leuschner & Wellman, 1979; Buhyoff & Riesenman, 1979]. A linearised logarithmic model was derived for preferences of informed subjects [Buhyoff, Leuschner & Arndt, 1980]. A separate model was derived for pines over 9 years old which found that stand age, the diameter of trees and the stocking density of trees were all positively related to scenic quality [Buhyoff *et al*, 1986] The study also found that scenic quality was optimal for trees of around 1100 - 1200/acre after which scenic quality decreased and also that thin-stemmed trees were regarded negatively.

- Cook [1972] evaluated walker's preferences for hardwood forest trees and the extent by which these accorded with timber quality and found generally a good correlation. Favoured characteristics included balanced form, straight trunk and thick crown, however crooked trunks, leaning trees and even lopsidedness were also favoured.

- Daniel & Boster [1976] developed their Scenic Beauty Estimation method in the ponderosa forests of Arizona. Daniel & Schroeder [1979] applied it to derive a model of scenic quality in a forest landscape, while

Daniel *et al* [1978] used the SBE method to map the spatial scenic beauty of forest landscapes.

- Following early efforts to assess temporal change in the scenic beauty of forests by Hull, Buhyoff & Cordell [1983], Hull & Buhyoff [1986] developed their Scenic Beauty Temporal Distribution method, based on the SBE method, to assess the effects of forest management over time. By including the stand age in their regression equation for scenic beauty, as well as tree density and size, they were able to predict the changes to scenic beauty with time. Decreasing stand density, less productive sites, and increasing stand age increases scenic beauty.

- Schroeder & Daniel [1981] extended Arthur's [1977] study to develop a valid and useful model for predicting scenic beauty of forest landscapes by including a range of forest mensurations of overstorey, understorey, ground cover and downed wood. The relationship between SBE values and physical forest features provided the basis for the scenic beauty prediction model. The model, derived in Arizona, was applied to another forest in Colorado and performed reasonably well.

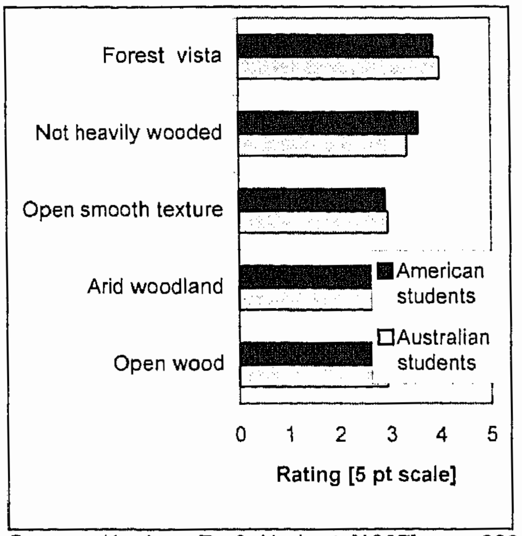
- Schroeder & Brown [1983] tested a range of mathematical forms of scenic beauty regression models[78] and found the nonlinear forms [i.e. log & square root] performed only slightly better than the linear forms.

- Vining *et al*, [1985] evaluated landowner perceptions of hardwood forest management. They found that the amount of dead and downed wood had a strong negative influence on preferences. Clear cut areas and heavily thinned areas were the lowest in scenic preferences while the lightly thinned stands were comparable with the natural stands.

Other studies of trees that derived interesting findings included the following.

Abello *et al* [1986] found from their analysis a preference for images that exhibit "simultaneously greater fertility, some pattern or rhythm, and a certain structural legibility" [Ibid, 168]. The authors believed the findings supported a socio-ecological interpretation of landscape aesthetics as the dominant characteristics have survival promoting meaning.

Kaplan, R. and Herbert [1987] assessed the preferences of students in Western Australia and Michigan for WA jarrah forests. Figure 8.28 summarises the findings for these students [5-point scale] and indicates a close agreement.



Source: Kaplan, R. & Herbert [1987]; p <.0001 except for open smooth texture & forest vista which were not significant.

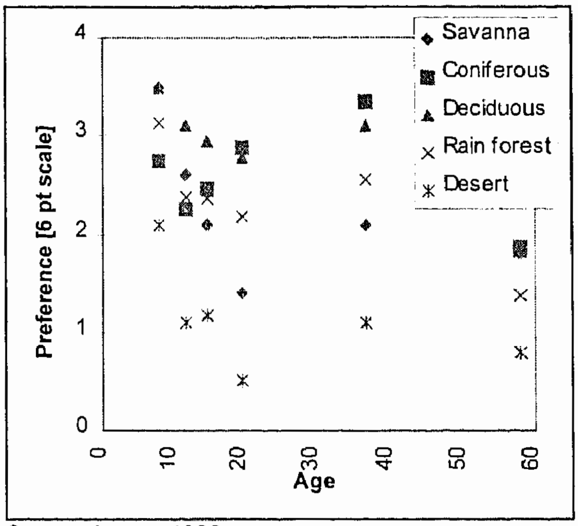
Figure 8.28 Preferences for Australians & Americans for Jarrah Forests

Lyons [1983] examined how preferences for five biomes change with age and found that among adults, the most preferred were coniferous forest closely followed by deciduous forest [Figure 8.29]. Preferences for rain forest were next and the savanna and desert attracted the lowest preferences. The high ranking attributed to conifers is understandable in the northern hemisphere where they are ubiquitous, but would be unlikely in Australia and New Zealand where conifers are generally regarded as inferior to native hardwood forests [Brown, S., 1985; Kaplan R. & Herbert, 1987].

Schroeder [1991] assessed the preferences of people familiar with the Morton Arboretum near Chicago and using cluster analysis identified four groups or clusters of raters [Figure 8.30] Groups 1 and 2 were the largest [11 & 17 respectively] and both preferred the woods the most but group 1 had a higher preference for meadows and a lower preference for the formal and tree/lawn scenes than group 2. Groups 3 and 4 were small [3 & 1 respectively]. Group 3 liked the

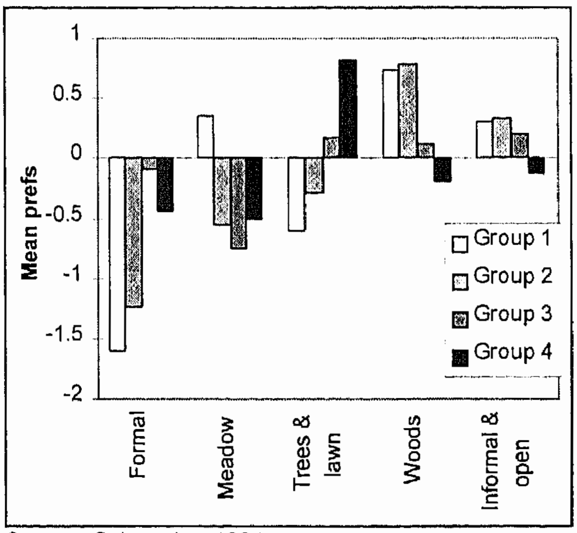
78. The forms were linear, quadratic [i.e. linear + squares], cross-product [i.e. linear + squares + products], logarithmic of main effects, and square roots of main effects.

formal and tree/lawn scenes while group 1 particularly liked the tree/lawn scene. Thus overall there was a strong preference for natural scenes but a distinctive sector of the community who preferred the more formal scenes.



Source: Lyons, 1983

Figure 8.29 Preferences for Biomes by Age



Source: Schroeder, 1991

Figure 8.30 Preferences of Groups for Arboretum Scenes

Shafer *et al* [1969] developed their model for predicting scenic preferences based on 100 photographs of landscapes taken throughout the US. All were photographed when the trees were in foliage. The regression equation derived [Table 8.18] included three factors relating to the vegetation:

- perimeter of immediate vegetation
- perimeter of distant vegetation
- area of intermediate vegetation

Shafer found that factors having a positive influence on the landscape's aesthetic appeal were the:

- perimeters of near and middle distant vegetation
- perimeter of distant vegetation multiplied by the area of water
- area of middle distance vegetation multiplied by the area of distant non-vegetation

Table 8.18 Shafer's Predictive Model of Landscape Preferences

$Y = 184.8 - 0.54x_1 - 0.09x_2 + 0.02(x_1 . x_3) + 0.00055 (x_1 . x_4) - 0.0026(x_3 . X_5) + 0.0016(x_2 . x_6) - 0.008(x_4 . x_6) - 0.0004(x_4 . x_5) + 0.00067x_1^2 + 0.00013x_5^2$

Where x_1 = perimeter of near vegetation
x_2 = perimeter of middle distant vegetation
x_3 = perimeter of distant vegetation
x_4 = area of near vegetation
X_5 = area of any kind of water
x_6 = area of distant nonvegetation

Note: Negative items contribute positively, while positive items contribute negatively; i.e. the lower the score the higher the landscape quality.

- the area of middle distant vegetation multiplied by the area of water.

In Section 7.4(6), the various criticisms of the Shafer approach were summarised, including its lack of intuitive appeal, its formalist theme, and the lack of causal link between the independent variables [the landscape] and the dependent variables [preferences].

In an early study of public preferences, Yarrow [1966] assessed the British public's attitudes about afforestation practices of the Forestry Commission. Interestingly, he found "large majorities" in favour of afforestation of areas such as Snowdonia and the Lake District [Ibid, 62], findings that would probably be very different today. While conifers were supported for upland areas, deciduous trees were preferred for the agricultural areas. Mixtures of conifers and deciduous trees were also favoured. Deciduous trees of mixed heights and conifers of even height were favoured, possibly favouring conditioning by the Forestry Commission. Hard edges of woods were not favoured, and most preferred

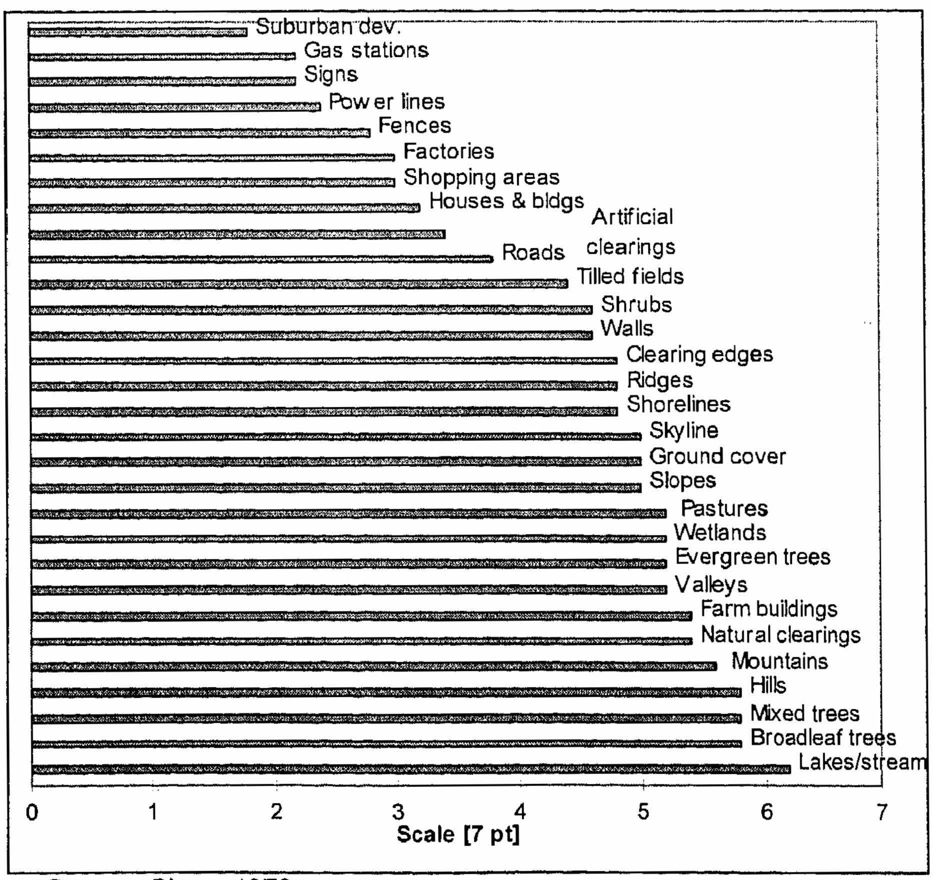
Table 8.19 Summary of Positive and Negative Aspects of Trees and Forest Management

Positive	Negative
Trees	
large trees	dead trees
large, heavy canopies	thin stemmed trees
thick trunks	small trees
straight trunks - but also	conifers [Australia]
crooked trunks	pruned shrubs
balanced form	
older trees	
mixture of trees	
trees along rivers	
foreground vegetation	
native trees	
deciduous trees	
Forests	
stocking density - optimal 440-480/hectare	extensive slash
	clear cuts
extent of ground cover	poorly stocked areas
visual penetration through trees	new growth of cutover stands
native trees	beetle damaged forest
deciduous trees	downed trees
conifers [US]	heavily thinned areas

borders of deciduous and/or mixed trees rather than a continuous border of trees.

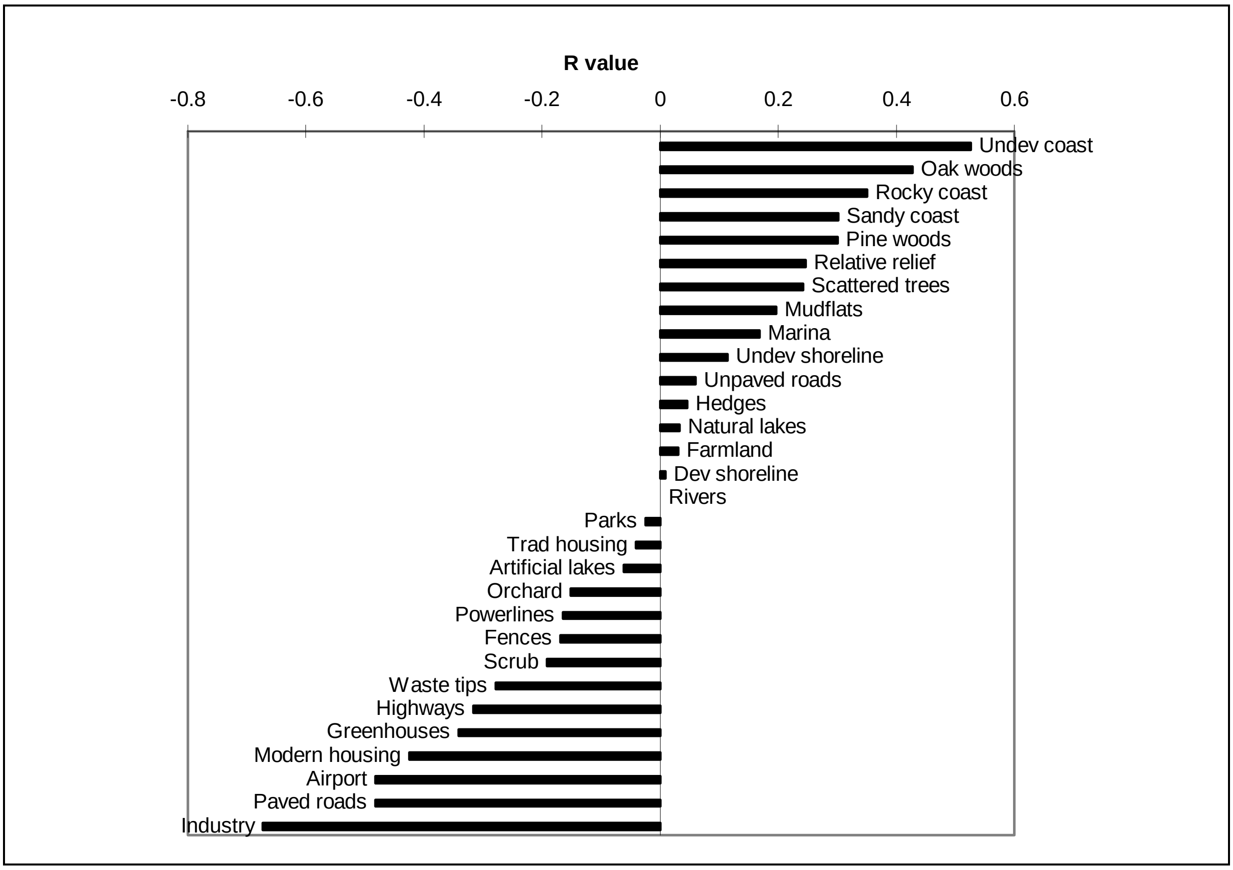
Table 8.19 summarises the key positive and negative aspects of vegetation as derived from the studies reviewed in this section. The results suggest preferences for substantial trees with height, thickness of trunk, and breadth of canopy, trees that have a significant impact on the landscape.

On the one hand, trees are preferred with order, balance, symmetry and a tidiness about them while on the other, possessing diversity and interest provided by mixed species, crooked trunks and age. Similarly, the range of species preferred - native, deciduous, and in the US, conifers - suggest that any trees are preferred to none. Disliked are trees that lack boldness - scrawny, small, thin trees or those that have been changed artificially from a natural form by pruning.



Source: Civco, 1979

Figure 8.31 Ratings of Landscape Features



Source: Dearden, 1980

Figure 8.32 Regression "R" Values - Landscape Elements Vancouver Island

Forests are preferred with moderate density, not too dense but also with a spaciousness of openings and the ground cover being visible. People are more definite about what they dislike in forests - images of slash, downed trees, thinning, and especially clear cuts, destroy the illusion of a natural forest and remind the observer that the forest they are viewing is managed for economic ends.

(5) Naturalism

Naturalism, the natural qualities of the landscape, is the most prevalent element examined by studies. It is the element underlying the specific attributes of water, trees and mountains examined separately. Appendix 8.9 summarises 30 studies in which naturalism has been examined.

Civco [1979] assessed the natural, rural and urban landscapes of Connecticut by asking respondents to rate [7-point scale] the 32 landscape features contained in landscape photographs, features such as lakes, various types of trees, hills, shore-lines, wetlands, roads, fences, houses. Following this, they were asked to rank another set of photographs in terms of scenic quality.

Figure 8.31 indicates the ratings of the landscape features. This indicates that the natural landscape elements were rated amongst the highest while the artificial elements were rated low.

Dearden [1980] measured 30 landscape elements per 1 km grid square on Vancouver Island and used respondents to rate the scenic quality of these grid squares. Using regression analysis, the weights of each landscape element were derived. The 'R' scores are shown in Figure 8.32 and their size indicates the correlation between visual quality and the landscape element [Ibid, 63], with the figure indicating whether it is a positive or negative relationship. The 'R' value is shown here instead of the R^2 to retain the positive or negative relationship.

Many of the positive features are natural elements of the landscape, the top 8 being: undeveloped coast, oak woods, rocky coastline, sandy coast, pine woods, relative relief, scattered trees and mudflats. Interestingly natural lakes and rivers were ranked lower than some artificial elements and the reasons for this are unknown.

Herzog [1984] examined preferences for waterscapes while Herzog [1987] assessed preferences for mountains, canyons and deserts. His findings for these were reviewed earlier and are not repeated here. Suffice to say that both of these natural landscapes produced high preference ratings.

Hodgson and Thayer [1980] examined the effect that varying the labels on photographs had on preferences. Their findings are reviewed in Section 8.4(2) and showed that labels indicating natural sites [e.g. lake] were invariably preferred to ones labelled artificial [e.g. reservoir] [Table 8.20].

Table 8.20 Features Viewed from Road in Rockies

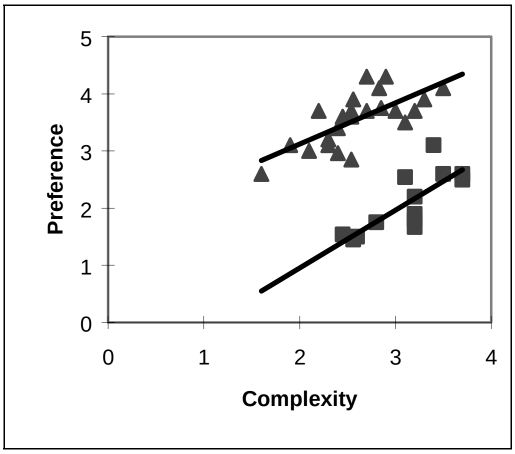
Positive rated scenes	Negatively rated scenes
high mountains 80.5%	deserts 44.3%
cliffs, capes, rocks 49.9%	swamps & marshes 49%
canyons 46.3%	scrubland 46.9%
beaches 44.0%	billboards 78.3%
waterfalls/rapids 72.9%	commercial bldgs 62.6%
ocean 66.4%	industry & railroads 51.8%
swift rivers 52.5%	suburban houses 43.2%
snow & glaciers 51.4%	
evergreen forest 86.9%	
parks & recreation 53.1%	
harbors/waterfront 46.1	

Source: Jones, *et al*, 1976

Jones *et al* [1976], surveyed the community on their enjoyment of views from a road through the Rockies in the State of Washington. Prominent among the positive features were natural scenes, while negative scenes included artificial features but also natural features such as deserts, wetlands and scrubland. This suggests that it is not simply naturalism *per se* which influences preferences, but also the content of the scene.

It is notable, however, that the ratings given to these negative natural scenes were generally less than for the artificial scenes, suggesting that the feelings against them are not as strong as against, for example, billboards, industry and the like.

In an early study, R. and S. Kaplan and J. Wendt [1972] examined the preferences for scenes of nature and of urban areas and found a distinct preference for the former [Figure 8.33]. They found that complexity could not account for the difference in preference values "even though higher complexity values are related to higher preference values within each group." [Ibid, 355]. Correlations between complexity and preference for nature scenes and urban scenes were significantly correlated: r = 0.69 and r = 0.78 respectively.



Source: Kaplan, Kaplan & Wendt, 1972
Note: Triangles - nature scenes, squares - urban scenes

Figure 8.33 Nature & Urban Scenes - Complexity vs Preference

In addition to the influence of mountains on landscape rating, Kane [1976, 1981] showed naturalism to be a key factor. Table 8.21 summarises Kane's descriptions of the topmost 10 scenes and the bottommost 5 scenes and illustrates the strong influence of naturalism.

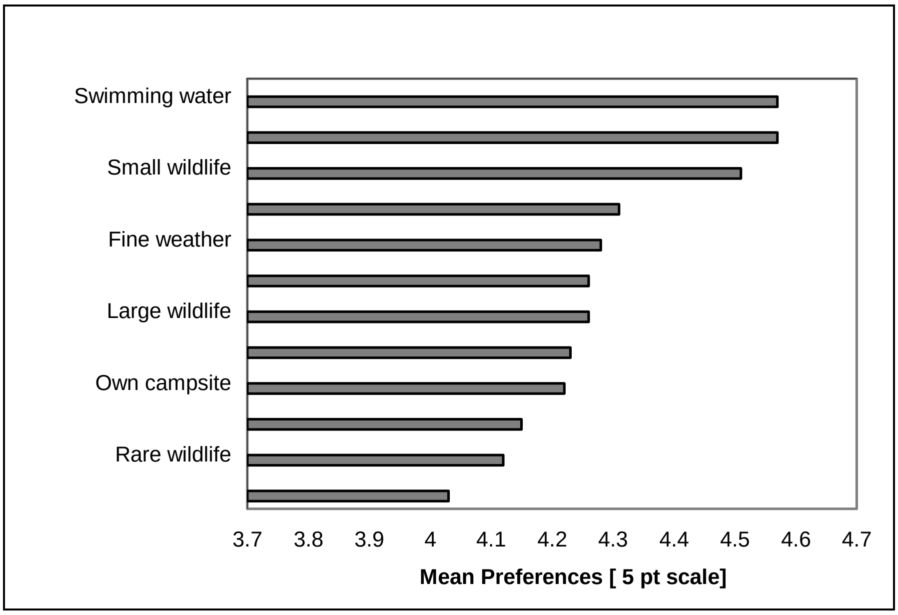
Knopp, Ballman and Merriam [1979] assessed the preferences for 39 environmental elements among users in a river environment. Figure 8.34 indicates the top twelve rankings. Natural landscapes were the equal topmost variable and all of the other elements are aspects of the natural environment.

Lamb and Purcell [1990] examined the perception of naturalness associated with differing vegetation formations found in New South Wales. Perception of naturalness increased with the height of vegetation and density of foliage cover [Figure 8.35]. Vegetation with dominant trees of 10 - 30 m in height were judged more natural with dense foliage than medium cover.

Table 8.21 Influence of Naturalism on Rating of South Australian Landscapes

Rank	Description	Checklist Score	Bipolar Score
1	Warren Gorge near Quorn, FR [Flinders Ranges]	82	80
2	Eastern Wilpena Pound rim from Pound floor, FR	81	79
3	Rawnsley Bluff from highway to Hawker, FR	81	82
4	Aroona Valley from Aroona ruins, FR	79	71
5	Parachilna Creek & Gorge, FR	79	77
6	River Murray & cliffs, Memdelbuik Reserve, near Berri	79	77
7	Cliffs along Murray River, Murtho Park	79	79
8	Murray River & floodplain, Headings Cliff	78	84
9	Seascape from above Sellicks Beach	77	74
10	Mallee scrublands on dunes, Overland Corner	77	81
41	Martins Bend Picnic Reserve, Murray River, Berri	55	71
42	Oraparinna Barytes mine workings, FR	52	41
43	Main street of small town of Carrieton, FR	50	50
44	Small railroad station, Upper Sturt, Adelaide	47	52
45	Mt Barker Road highway interchange, Crafers	41	42
46	Rubbish heap near Victor Harbour	33	29

Source: Kane, 1981



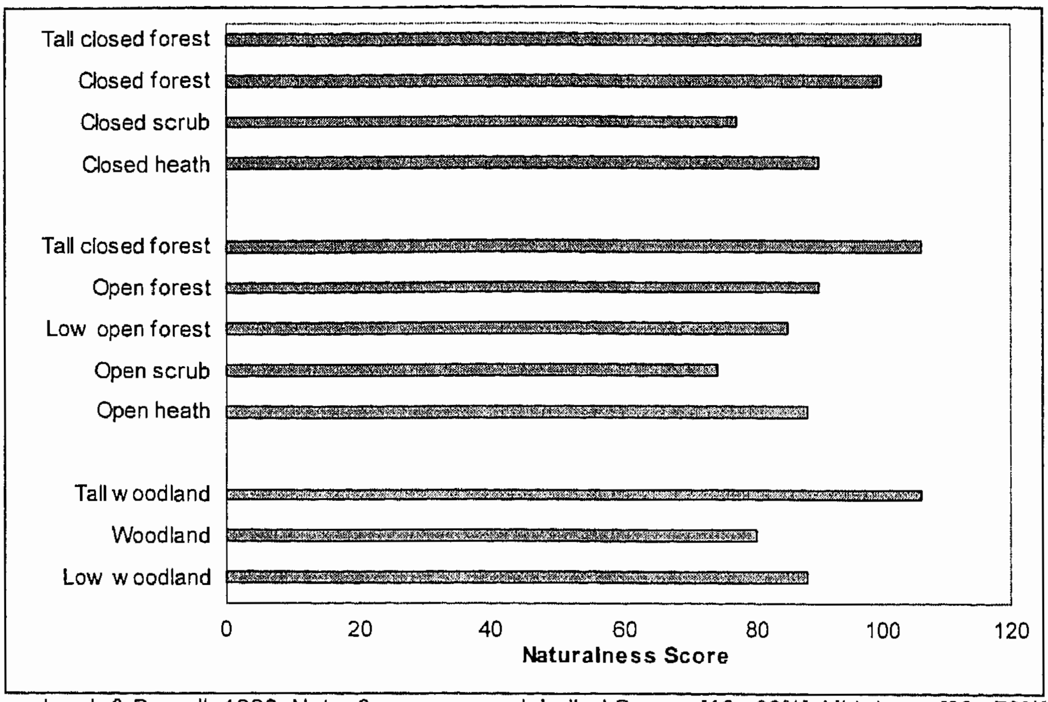
Source: Knopp, Ballman & Merrian, 1979

Figure 8.34 Preferences for Environmental Variables - River Environment

The interaction of height and density is important, not their separate contributions. Low vegetation of 2 - 5 m restrict the extent of view and offer little 'prospect' in Appleton's terms and also limit legibility and mystery of the landscape in Kaplan's terms: "restriction of mid-ground view causes reduced preference" [Ibid, 347]. Changes to the vegetation structure are detectable by respondents and are perceived to reduce its naturalness. The ability to discriminate changes increases with the vegetation density but decreases with its height.

The reasons for structural change included grazing, fire, weeds and dereliction due to failed agriculture. Fire was not regarded negatively, which indicates the influence of familiarity with Australian biomes where fire is considered to be part of the ecosystem.

Grazing and dereliction produced the greatest negative effects on perceived naturalness. The resultant landscapes were "relatively open, park-like, and ordered yet the perceived naturalness is low" [Ibid, 350]. Based on this, the authors suggested that preference and naturalness were not always



Source: Lamb & Purcell, 1990. Note: 3 groups were labelled Sparse [10 - 30%], Mid-dense [30 - 70%], and Dense [70 - 100%]. Tall forest/woodland > 30 m.

Figure 8.35 Naturalness vs Foliage Cover & Height

equivalent. Lamb and Purcell considered that the study indicated the need for an adequately defined naturalness dimension:

"the inadequate distinction between naturalness and preference may have led to a confusion between the contribution of the simple physical attributes of scenes and more complex psychological dimensions contributing to the experience of landscape." [Ibid, 350]. The study also showed that ecological naturalness and perceived naturalness are related but not equivalent.

In New Zealand, Mosley [1989] found scenic attractiveness to be related to the percentage of the scene in native forest [Scenic attractiveness = 4.6 + 3.56*(% native forest)] with an r^2 of .41.

Urlich's studies of the affective implications of natural landscapes were examined in Section 8.2(4) and reinforce the preferences for such scenes.

Stephen and Rachel Kaplan's *The Experience of Nature: a psychological perspective* [1989] focused on the preference for natural settings and reviewed a range of relevant studies. Concluding the book the Kaplans wrote: "Viewed as an essential bond between humans and other living things, the natural environment has no substitutes." [Ibid, 202].

The studies described in this section support the view that nature exerts a powerful influence on human landscape preferences. In most of its manifestations, whether as coast and sea, rivers and lakes, mountains and hills, trees and forest, the natural element nearly always produces positive preferences. There are, however, some natural scenes that tend to be regarded negatively and these include deserts, marshlands and scrubland. Erosion or vegetation debris in streams, though elements of the natural environment, also tend to depress preferences.

Where the presence of humans is apparent, such as through clear felling, grazing, pollution of water, dams and structures, the preferences are affected adversely. Some studies, however, found that the natural element is in fact illusory, having been created artificially, such as in an arboretum or park. The highly preferred savanna-like scene with trees amidst grass is often artificial, either through the grazing of introduced stock or by design.

This suggests that human preference for natural scenes is superficial, that it is concerned with the appearance, not the substance of the scene. Environments that are essentially artificial can be made to appear natural. Such an approach is, of course, well known among theme park designers; the Disneyland creations of contrived nature. Nevertheless, studies have also indicated that human observers are able to discriminate quite finely between natural scenes and those that have human influence.

The ecological-evolutionary viewpoint argues that naturalism preferences are survival-enhancing and that humans are able to discriminate between scenes that contribute to survival and those that may be adverse.

(6) Wildlife

One study focussed on the influence of wildlife on landscape preferences, while several other studies have examined this incidentally to their main focus. Hull & McCarthy [1988] examined the effect of wildlife as part of a study of changeable landscape features. The landscape settings were park-like forests, rivers and grassy fields near Melbourne, Australia. Scenes were photographed with and without wildlife, the wildlife comprising kangaroos, wallabies, deer and swans. The study found that these wildlife had a positive, statistically significant but moderate effect, accounting for less than 10% of the total scenic score [using SBE method]. Wildlife tended to have a greater influence on the less attractive scenes. An expectation of seeing wildlife [e.g. by "wildlife feeding area" signs] can significantly enhance the scenic scores.

Nassauer & Benner [1984], found that the presence of birds, porpoises and animals were positive features in the Louisiana oil and gas development area, though of relatively small importance overall [e.g. factor loadings 0.145 - 0.190 in one of the factors identified compared with 0.400 for a small bay and 0.643 for a sand bar or oyster bar].

Schroeder [1991], in his study of the Chicago arboretum, found the presence of birds was one of the frequently mentioned features of the garden.

These studies, though limited, indicate that wildlife has a positive, if minor, influence on landscape preferences.

(7) Sky

The sky generally comprises a substantial area of a photographed scene and it is unrealistic to assume it has no influence on preferences. Lighting or cloud features can generate interest in an otherwise mediocre scene and can enhance colours and the clarity of the view. Mist, on the other hand can engender a sense of mystery that the Kaplans assert is an important factor in preferences. In flat terrain, the sky's features tend to be more noticeable than in hilly or mountainous landscapes.

Anderson, Zube and MacConnell [1976] described aspects of a major landscape study in Connecticut that included a cloud cover index [the proportion of sky covered by clouds] and an atmospheric clarity index [the amount of haze, smog etc in the scenes]. Scenic resource values [SRV] of 1.92 and 1.53, respectively, were obtained for the two indexes, compared with 1.09 for land use diversity, 5.63 for a naturalism index and 2.05 for a height contrast. The two indexes were correlated with other features giving a correlation of - 0.55 for the cloud index with the SRV while the atmospheric clarity correlation with SRV was 0.30. Both were low and their elimination had little effect on the regression strength.

Arthur [1977] examined the scenic beauty of forest environments and included measurements of clouds. She found that most observers responded favourably to clouds [ß coeff = .78].

Hammitt *et al* [1994] assessed visual preferences along the Blue Ridge Parkway in the Appalachian Mountains, landscapes with thick vegetation and rolling ridges. They found the area of sky in a scene was the most important predictor, though negative, in the equation. Their interpretation was that the area of sky is a surrogate for other features, specifically the absence of attractive features such as ridges, rolling plateau and water. Although they suggest that the lack of visual complexity and involvement [in the Kaplans' terms] of the sky support their hypothesis, it does not appear to provide sufficient explanation. The *absence* of other features is not something that observers would generally notice.

Hammitt *et al* note in passing that the area has considerable haze in summer when the photographs were taken and by reducing the comprehension of the landscape, its value is diminished. This is supported by Herzog & Bosley [1992] who suggested that:

> "mistiness in a mountain setting reduces both tranquillity and preference but the reduction in preference is greater... Mist reduces the ability to comprehend an environment, and in the Kaplans' scheme any such reduction would be especially damaging to preferences." [Ibid, 125].

Mist and haze have a similar effect of reducing the clarity of the scene and its understandability.

In their study of the landscape encountered while hiking, Hull and Stewart [1995] found that clouds comprised only about 0.9% of the view, a surprisingly low figure [compared with 23.8% for ground, 14% for vegetation and 20% for mountains and valley].

Shafer's predictive model of landscape preferences included a measurement of the sky zone area and perimeter and, although their factor loadings were significant, these were not included in the final equation. The factor loadings were equal or greater than for many other features measured:

Perimeter sky	-0.67
Area sky	-0.83
Tonal variation sky	-0.78
Total count sky	-0.85
Perimeter immediate vegetation	-0.94
Perimeter distant vegetation	+0.89
Perimeter stream	-0.83
Area immediate vegetation	-0.92
Tonal count land	+0.56
Tonal count water	-0.56

Note: Negative quantities are more attractive

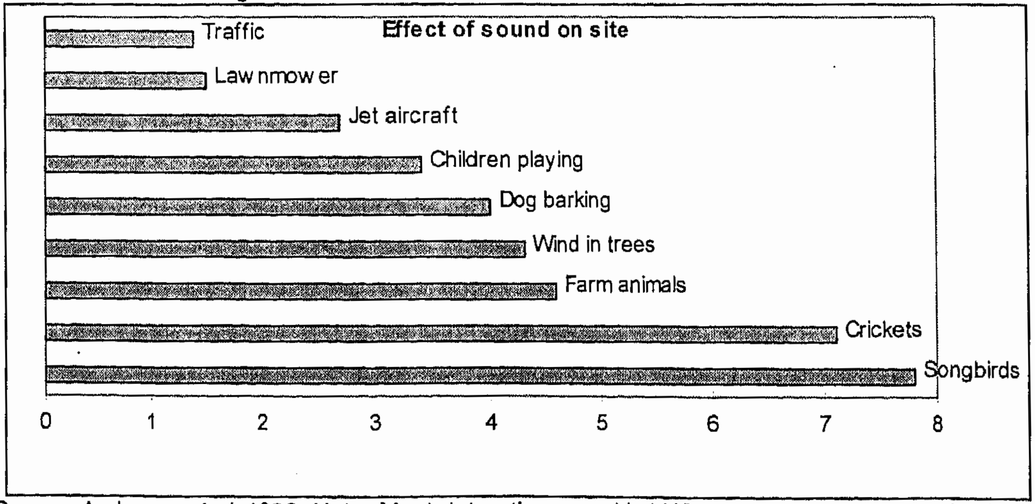
No explanation of the omission of the sky factors was given.

Overall, the sky plays literally a backdrop role in landscapes and appears to be generally disassociated from the landscape itself. There has been insufficient study of the effect of clouds, lighting and other atmospheric features to be definitive about their significance, though from the studies cited they appear to be less significant than might be imagined.

(8) Sound

In a series of experiments, Anderson *et al* [1983] evaluated the effect that different sounds had on preferences for outdoor settings. The sounds used were songbirds, crickets, wind in trees, dog barking, children yelling and laughing, sounds of farm animals, traffic, aircraft and power lawnmower. Each was used for about 20 seconds in a field test and 10 seconds in a slide and sound test. The field sites included a hardwood forest and a downtown street.

Figure 8.36 illustrates the results of one of the experiments that indicate the effect of different sounds on a botanical site with the hardwood forest. The results of this and other experiments led the researchers to conclude that:



Source: Anderson *et al*, 1983. Note: Most detracting sound is LHS, most enhancing sound is RHS.

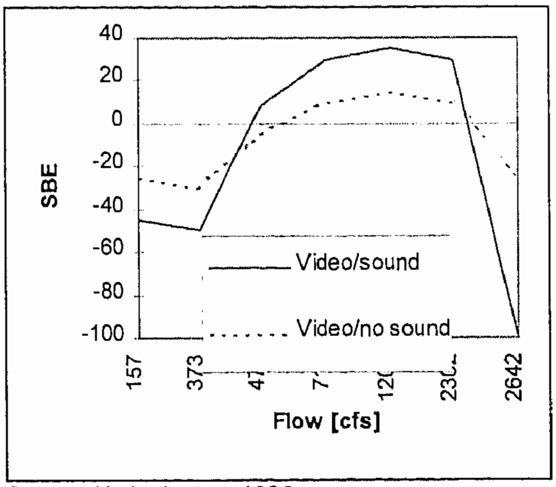
Figure 8.36 Effect of Sounds on Botanical Garden Setting

> "there is an interaction between acoustic and other features of a setting that modifies the effect of different sounds in determining the quality of the setting. Sounds that, in the abstract might be regarded as enhancing did improve wooded, natural, and heavily vegetated urban settings, but not the downtown and other mostly built sites. Detracting sounds affected the tree-covered sites, but not the highly developed locations." [Ibid, 561].

They also found that vegetation creates a higher expectation of environmental quality so that sounds from human sources, including jets, dogs etc can have a greater detracting effect.

This limited research indicates that sounds can influence aesthetic preferences, either enhancing or diminishing them.

Hetherington *et al* [1993] extended the work of Brown & Daniel [1991] in using videos to examine preferences for wild rivers [see Section 8.2], to the use of sound together with videos and slides. The study found [Figure 8.25] that the function curve for the video with sound condition was similar [r = 0.98] to that found by Brown & Daniel [see Figure 8.25] while that for the no-sound condition appear "more linear than polynomial functions" [Ibid, 289].



Source: Hetherington, 1993

Figure 8.37 Influence of Sound on Scenic Ratings

The results indicated that both sound and motion affect judgements of scenic beauty while the results for motion without sound are similar to a static image.

(9) Landscape Component Preferences – Conclusions

This section examined the preferences for key components of the landscape. It found:

Water generally has a significant positive influence on preferences, particularly when in the form of moving water, lakes, edge of water; pollution and colouration of water can diminish its attraction. While open areas of water yield positive responses, swamps and wetlands often provoke negative responses.

Mountains generally have a positive influence on preferences and while some studies found mountains ahead of water in terms of preference, this was not as consistent as for water or vegetation. In some circumstances mountain scenes provoke negative reactions [eg being associated with aridity or roughness]. Most studies tend to treat mountains as backdrops to the landscape, rather than the most dominant object, and few studies derived preferences for the mountain components *per se*.

Trees, whether singly or in forests, generally have a positive influence on preferences. Preferred are substantial trees with height, thickness of trunk, and breadth of canopy - trees that have a significant impact on the landscape. Trees are preferred with order, balance, symmetry and a tidiness about them but trees possessing the diversity provided by mixed species, crooked trunks and age also enhance preferences. Similarly the range of species preferred - native, deciduous, and in the US, conifers - suggest that any trees are preferred to none. Disliked are trees that lack boldness - scrawny, small, thin trees or those that have been changed artificially from a natural form by pruning.

Forests are preferred with moderate density, not too dense but with a spaciousness of openings and the ground cover being visible. People are more definite about what they dislike in forests - images of slash, downed trees, thinning, and especially clear-cuts destroy the illusion of a natural forest and remind the observer that the forest being viewed is managed for economic ends.

Naturalism, the natural qualities of the landscape, underlies the specific attributes of water, trees and mountains. There is no doubt that naturalism exerts a powerful influence on human landscape preferences. Whether as coast and sea, rivers and lakes, mountains and hills, trees and forest, the natural element nearly always produces positive preferences. Some natural scenes are regarded negatively including deserts, marshlands, scrubland and erosion or debris in streams. Human influences in otherwise natural scenes also affect preferences adversely. Paradoxically some artificially created landscapes, such as parklike scenes, can be highly preferred. The naturalism preference may therefore only be superficial, focussing solely on the appearance, not the substance of the scene.

Wildlife appears to have a positive though minor influence on landscape preferences.

Skies provide a backdrop to the landscape and are generally disassociated from the landscape itself. Although there have been only a few studies of the influence of clouds, lighting and other atmospheric conditions, they appear to have less influence on preferences than might be imagined.

Sound and motion appear to have a positive influence on preferences in scenes involving moving water.

Overall the key component affecting landscape preferences is naturalism, as expressed by the specific content of water, trees and mountains.

8.6 CONCLUSIONS

In this chapter the findings of landscape preference studies have been analysed. It has not sought to do this exhaustively or with close attention to the methodologies used or their adequacy but, rather it has focussed on the key outcomes of the studies and how these add to the overall body of understanding.

The chapter examined the evidence supporting the four theoretical constructs: Orian's savanna theory, Appleton's prospect/refuge theory, Urlich's affective theory, and the Kaplans' information processing theory. While concluding that the Kaplans' theory appears the most supportable in terms of empirical evidence, it is also apparent than none provide the complete framework by which landscapes can be understood and preferences predicted.

Using Moore's four-level structure of theory [i.e. 1. theoretical orientations, 2. frameworks, 3. conceptual models, 4. explanatory theories], the present status of the available theories is considered to be at level 2 - frameworks that represent relationships among existing findings that provide a conceptual and systematic organisation to data about phenomena. Zube [1984, 105] considered that most of the work was at levels 3 and 4 but this appears to me to be an over-generous assessment. Levels 3 and 4 that provide greater levels of specificity and coverage of the theories is the direction that theories need to be heading.

These should culminate in explanatory theories [i.e. provide testable hypotheses based on assumptions and concepts about relationships among variables leading to explanation and understanding of phenomena] that are capable of predicting landscape preferences for:

- all types of respondents covering differences in age, gender, education, socio-economic status, culture, familiarity
- all types of landscapes covering the presence of rural, natural, mountainous, water, and vegetation features

It is apparent that theories are currently well short of providing an all-encompassing explanation of preferences.

Examination of the influence of observer characteristics upon their preferences found that they appear to be surprisingly consistent across respondent characteristics of age, gender, education, socio-economic status, culture, and whether expert or a lay observer. Two possible exceptions to this are young children [<11 years], whose preferences differ from older children and adults, and familiarity with a given landscape. Generally familiarity contributes to positive preferences, but this requires the scene to be normally regarded positively.

Studies have established that colour photographs that provide a sufficient context for the scene can provide a reasonable surrogate for the physical landscape and at the same time provide a somewhat more objective appraisal of the landscape. Labels on scenes can affect preferences markedly and should to be avoided.

The key component affecting landscape preferences is naturalism, as expressed by the specific content of water, trees and mountains. Water, in most of its forms [lakes, rivers, sea] contributes a positive influence on preferences, the main exceptions being swamps and wetlands, and polluted or coloured water. Mountains also generally have a positive influence on preferences though, surprisingly, not as consistently as for water or vegetation. Mountains tend to be treated as a backdrop to a scene rather than as the dominant landscape element.

Trees that make a significant impression on the landscape by virtue of their height, thickness of trunk, and breadth of canopy are preferred, but so too are trees that have an order, balance, symmetry and a tidiness about them. Trees possessing diversity provided by mixed species, crooked trunks and age also enhance preferences. In the US, native, deciduous and conifers enhance preferences, however in Australia where conifers are non-native, they detract from preferences. Trees that are scrawny, small and thin lower preferences, as do trees that have been pruned into an artificial shape. Forests with openings and ground cover are preferred over dense dark forests, and signs of human forest management are disliked.

These features - water, trees, mountains are attributes of naturalism, the most powerful influence on landscape preferences. Apart from deserts, marshlands and scrub, natural scenes almost invariably enhance landscape preferences. Scenes which have been artificially created but which appear natural, such as park-like landscapes, are also preferred, suggesting that the naturalism preference is only superficial, focussing on appearance not substance.

Arising from this review of landscape studies of the 20th century, several further conclusions can be drawn:

- Most of the studies have focussed on analysing the contribution of specific attributes to landscape preferences and have isolated these from other factors in order to assess their contribution. This is an essential stage in research - to understand the influence of each factor in isolation through controlling the effect of other factors. However, this means that the synergistic effects of factors tend to be overlooked or minimised. It means the approach is essentially reductionist, not holistic, although a number of studies used multiple regression with high levels of explanatory capability for the given landscape.
- Relatively few studies have examined the assessment of landscapes in regions. Being focussed on the contribution of given factors, their emphasis tends not to have been on the assessment of regional landscapes. While equations were derived for some, few go to the next stage: mapping regional landscape quality based on this information.
- Relatively few studies have been undertaken in Australia. Lamb & Purcell's studies, Williamson & Chalmers' assessment of NE Victoria, Kane's studies of South Australian landscape, Hull & McCarthy's work on the influence of wildlife, and the Kaplan & Herbert study on Western Australian forests are the sum total of studies in Australia.

The studies covered in this paper indicate that a considerable amount of headway has been achieved over the past 20 to 30 years in developing an understanding of what it is in landscapes that people appreciate. The next step is to apply this knowledge in the appraisal of landscapes.

CHAPTER NINE

ACQUIRING THE DATA

9.1 METHODOLOGY

Based on the findings of Chapter 7 on the methodologies of existing studies, and of their findings summarised in Chapter 8, the methodology to be followed comprises the following elements:

- Independent variables Photographs which serve as surrogates of the landscape to be assessed
- Dependent variables Preferences of respondents for the landscapes depicted in the photographs
- Statistical analysis Relationships between the preferences and the landscapes are determined
- Applications The understanding gained is applied including mapping of landscape quality

The relationship of these components is illustrated by Figure 9.1. Figure 9.2 lists the parts of each of the components in the first three steps of the methodology. In subsequent sections, each of these components is described.

Chapter 7 described the range of research instruments used in existing studies. Each of the instruments has advantages and disadvantages and selection must often

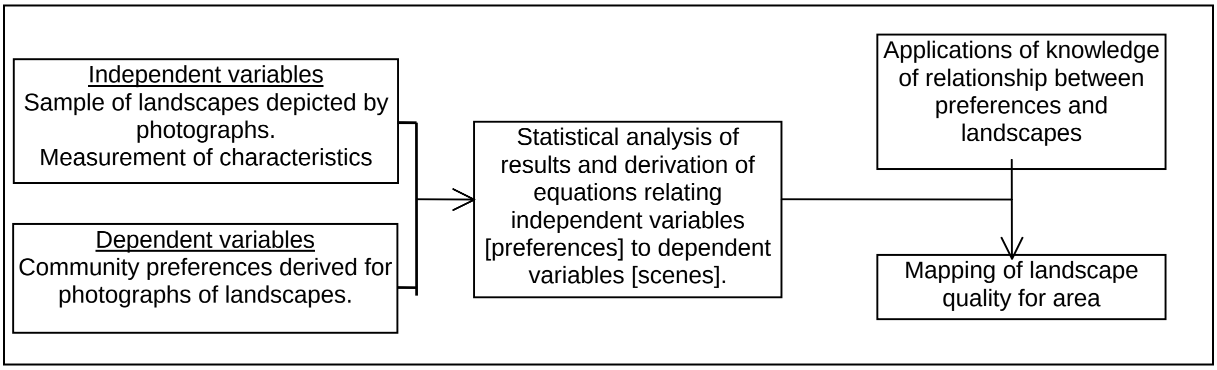


Figure 9.1 Methodology for Landscape Quality Assessment

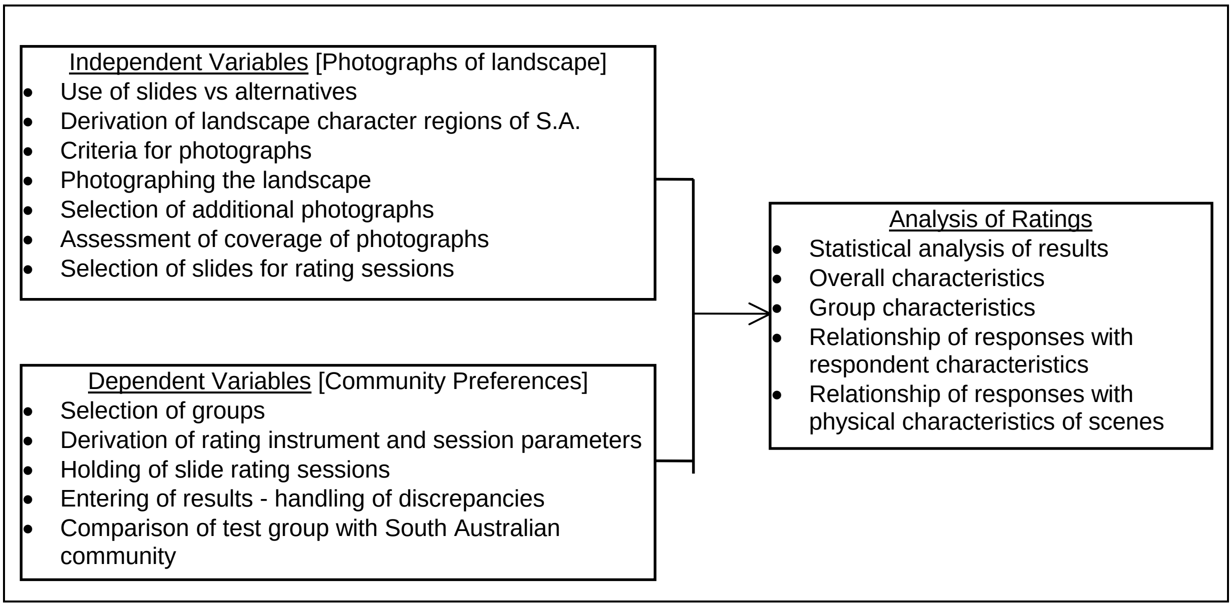


Figure 9.2 Summary of Components of Methodology

seek the best compromise between several competing objectives. For example the paired comparisons method appears capable of providing very precise differentiation between photographs but is limited by practical considerations to about 15 photographs, certainly insufficient for this study. Similarly the Q-sort method offers a reliable and valid method but requires individuals to sort photographic prints of scenes thereby requiring considerable time for each individual and necessitating the expense of large prints. Field assessment of landscape quality is clearly impractical for a large area.

Since many of the studies reported in Chapter 7 were conducted, the Internet has become available and consideration was given to using it to display scenes and obtain responses. Research on landscapes in Scotland has been conducted using this method [Wherrett, 1997]. She found that the sample using it to be extremely diverse but restricted to users of the Internet. The time taken to load the graphics varies with the power of the computer and long delays can test the tolerance of the user. The method has the advantages of no postal or face-to-face interviews and a high degree of automation in processing the replies. Several versions of the survey can be run simultaneously and changes can be made to the questionnaire easily. She gained 81 responses over a 4-week period. A comparison of the ratings of scenes given by the international respondents with a local pilot sample of respondents found a correlation of 0.90.

The sample of participants with access to this medium is unlikely to mirror the community, there is little control over their participation [e.g. an individual could submit multiple ratings], and the participation would be worldwide, not restricted to South Australians. This last point is important as the assessment of landscapes with which one is not broadly familiar can introduce added complications, e.g. scenes of dieback in Western Australian jarrah forests were mistaken as autumn leaf-fall by students in Massachusetts [Kaplan, R & Herbert, 1980]. Similarly coniferous forests are not highly regarded in Australia or New Zealand [Kaplan R. & Herbert, 1987; Brown, S., 1985] but are native in North America. On the basis that landscape quality reflects the preferences of the community, it is considered that the South Australian community should provide the basis of preferences for the study.

While it was possible to invite participation among South Australians by providing them with an Internet address, again the number with access to computers was limited and a considerable investment of time by such respondents would be required. Apart from the novelty of the new technology, it was not apparent that it offered significant advantages over well-established methods.

The most widely used instrument is rating of colour slides and this is the preferred method for the study. Chapter 7 found that of the 211 studies examined, 189 [90%] used photographs as the means of depicting the landscape. While some used black and white photographs and a few used film or video, the majority used colour slides.

Slides have the advantages of having no limitation on number, of being able to be used for small or large groups of respondents, and of being quick and easy for respondents to rate. Moreover most people are familiar with viewing slides and thus novelty or unfamiliarity should not distract from the purpose.

9.2 STATISTICAL DESIGN

The statistical design of the study covers the statistical instruments and methodology to be used in analysis, the size of the sample of respondents required to adequately represent the community, and the size of sample of photographs required to adequately represent the landscapes of the study area of South Australia.

(1) Statistical instruments

Examples of the methodologies and instruments are summarised in Table 9.1. Appendix 9.1 summarises the key features of 32 studies.

Table 9.1 Examples of Statistical Analysis by Landscape Studies

Author	Stage 1	Stage 2	Stage 3	Stage 4
Anderson & Schroeder, 1983	Intergroup correlation	FA of physical characteristics & scenic scores	MR using factors as predictors	
Balling & Falk, 1982	Interrater consistency - ANOVA	t tests - signif of different prefs for biomes	F test of prefs - live vs visit	FA of live/visit data
Carls, 1974	Tests of intergroup correlation	MR of independent variables	FA of variables Identification of factors	ANOVA - respondents / prefs
Cook & Cable, 1995	PCA/corr's - group homegeneity	Divide sample into groups	Derive SBEs	MR and test
Dearinger, 1979	Derive means & SD for sample	Corr's matrix of mean rating. FA	Intercorrelation of factor scores	cluster analysis of differences
Hammitt, Patterson & Noe, 1994	SBE transformation	FA to identify landscape themes	MR of prefs	
Herzog, 1985	Intercorrelation of means	FA of ratings - scores for each	MANOVA - predictor var's & categories	MR of prefs and rating variables
Mosley, 1989	Compared scoring by different gps	MR to predict value of mean score/scene	Test measured values against predicted	
Nassauer & Benner, 1984	Attractiveness frequencies & variances	FA of feature presence classifications	MR of factor scores on ratings	
Palmer & Zube, 1976	Corr. matrix of l/s dimensions & landscapes	FA of these components	Cluster analysis explored rel between l/s dimensions	
Pitt, 1976	Means, SD, $\chi 2$, signif level	LR - physical dimension vs scores	MR of variable's and scores	
Purcell & Lamb, 1984	Means & variances	Cluster analysis	Multiple dimension scaling	
Purcell *et al*, 1994	ANOVA of scene type & subject country	Means & standard errors	ANOVA of naturalness vs preference	
Strumse, 1984a & b & 1996	Mean, SD	FA to identify dimensions	ANOVA of demographic variable vs rating	MCA of demographics as predictors
Vodak et al, 1985	SBE transformation	Correlation coef of group as representative	LR analysis to determine best model	ANOVA of SBEs

Abbreviations: FA = factor analysis, LR = linear regression, MR = multiple regression, corr's = correlations, prefs = preferences, PCA = principal component analysis, SD = standard deviations, var's = variables, MCA = multiple classification analysis [form of MR]

Based on an analysis of these and other studies and consideration of this study's objectives, the following statistical analyses are proposed:

a) Derivation of descriptive statistics [i.e. means, standard deviations] of the scenes for each group and respondent. These will be derived for different types or regions of landscape as well as for the total.

b) Testing of inter-group means for reliability and consistency. Some studies [e.g. Dearinger, 1979, Herzog, 1985] divide the sample in half and analyse each separately as a means of assessing reliability and the need for this will also be considered.

c) Consideration of transforming preferences into interval scale, using either z scores or SBEs.

d) Analysis that compares the physical characteristics of scenes [e.g. area of water, vegetation, degree of naturalness etc] with the preference ratings, and the consequential derivation of equations that describe the relationship.

(2) Sample Size of Photographs

Consideration was initially given to using around 1000 slides to represent the landscapes of South Australia, because any lesser number may not provide adequate representation in a State of nearly 10^6 km^2. It was proposed that the 1000 slides be viewed in five sessions of 200 slides each, plus a common benchmark set of 20 slides to allow calibration between sessions with different participants. The 200 slides would take around 30 minutes to view and, providing a short break was provided halfway, fatigue should not be a problem. A single group of respondents who would attend all sessions was proposed, thereby enhancing consistency and possibly avoiding the need for the benchmark slides. Steps were taken to assemble a group of people willing to participate in the sessions, and around 60 persons had indicated a willingness to participate.

However, this approach was rejected following consideration of experience from the literature and after further viewing of the slides involved. For example, Purcell & Lamb [1984, 37] found that when a set of 180 slides was used, many respondents said after the sessions that too many slides were the same. Principal components analysis was carried out to identify redundancy and components with eigenvalues greater than 1 examined. Considerable redundancy was found and the slide set reduced to 105, a 40% reduction.

Viewing the slides of the South Australian landscape indicated considerable visual similarity across many of the landscape regions, in particular many of the landscapes in the far northern arid region, the southern cereal and sheep growing agricultural area, the mallee vegetation, and even areas of the coastline.

It was considered that there was a risk that redundancy in scenes, whether perceived or real, could result in a progressive decline in the number of respondents attending sessions thereby affecting adversely the results. While new respondents could make up the difference, the changes would introduce undesirable complications into the methodology. Therefore a methodology was required in which respondents attended a minimum number of sessions and the amount of redundancy in the slides was minimised.

Examination of scenes of the South Australian landscape resulted in the development of a hypothesis that landscapes with a high degree of similarity may be represented by relatively few photographs. It was considered likely that the range of preferences for these scenes would vary over a relatively narrow range. Therefore relatively few photographs could represent them. This hypothesis was tested with a small pilot study involving five respondents who rated seven scenes of cereal growing areas in South Australia. The rating scale was 1 - 10. The results are summarised in Table 9.2. A sample of 5 is too small to derive an estimate of the population's standard deviation and is therefore used solely to indicate the range of ratings.

Table 9.2 Preference Rating of Similar Scenes

	Respondents				
Scene	**1**	**2**	**3**	**4**	**5**
1	5	6	4	6	5
2	4	7	3	5	4
3	4	4	4	4	4
4	4	5	3	4	4
5	4	5	3	4	4
6	5	5	4	6	4
7	5	4	5	6	4
	4.43	5.14	3.71	5.00	4.14

The average preferences by respondents for the seven scenes ranged from 3.71 to 5.14, a difference of 1.43 rating units against an overall average of 4.49. The test served to illustrate that the preferences vary over a relatively small range of +/- 0.7 [i.e. +/- 16%] which is considered acceptable. It indicated that similar scenes could be represented by relatively few slides. This assumption will be subject to further testing in the survey to assess its validity.

The literature was examined to assess the average number of photographs used in studies. Of the 32 studies listed in Appendix 9.1, the largest number of photos examined was 720 [Schroeder and Daniel, 1981]. The mean average for these studies was 115, with a standard deviation of 161. However, most of these studies covered relatively confined areas; none covered an area the size of the current study.

(3) Sample Size for Respondents

In 30 of the studies examined in Appendix 9.1, the mean average sample size of respondents is 180 with an SD of 153. The sample size may be defined by the following algorithms:

$$n = (z_{\alpha/2} \bullet \sigma/e)^2$$
$$n = \sigma \bullet (1-\sigma) \bullet (z_{\alpha/2}/e)^2$$
$$n = 0.25 \bullet (z_{\alpha/2}/e)^2$$

where:
n is sample size
z is the z score for α
α is the required confidence level
e is the acceptable error level
σ is the population standard deviation

The first two versions of this formula require knowledge of the population standard deviation [σ], which was unknown at the outset for this study. The third version does not require the population SD as it assumes, for a given population, the maximum value of $\sigma \bullet (1-\sigma)$ is 0.25 [Freund, 1984, 268].

The sample size [n] for various z scores is:

z = 1.91 (95% confidence)	n = 91
z = 1.96 (97.5% confidence)	n = 97
z = 2.57 (99% confidence)	n = 166
z = 2.81 (99.5% confidence)s	n = 198
z = 3.04 (99.75% confidence)	n = 231

all with e held at 10% (+/-5%)

These indicate the minimal Confidence Level percentage confidence that, based on the sample size, the true error does not exceed e for the SA population.

Discussions with statisticians[79] indicated that the number of variables being tested is an important factor in determining the sample size required. The variables referred to include attributes such as the area of water, degree of naturalness, colour etc. A sample of 170 participants would be required for 10 - 12 variables plus respondent variables [i.e. age, gender etc]. This figure was adopted as a minimum to aim for.

9.3 DERIVATION OF INDEPENDENT VARIABLES

In this section, the means of obtaining photographs of the South Australian landscape is described. It commences by establishing principles to guide the sampling of the landscape, describes the trips taken to obtain the photographs and the selection of supplementary photographs, the selection of photographs for the purposes of rating and analysis, and the means for the analysis of photographs.

(1) Principles

South Australia has an area of 984,400 km^2, 80% of which receives less than 250 mm rain annually and is essentially arid desert, together with 3,700 km of coastline [ABS, 1997]. At this scale it is clearly impractical to photograph the entire landscape. It would also be impractical to sample the landscape on a grid basis with photographs taken at say, every 100 km or 10 km intervals. Using a 100 km square grid would require only 100 photographs of South Australia, which is unlikely to be representative. By contrast, a 10 km grid would yield 10,000 photographs, which is likely to be representative but is an unwieldy large number. Moreover, the majority of sites are likely to be remote from access roads making photography very time consuming.

A sample based on a grid would be likely to have a high degree of redundancy, especially in those remote parts of South Australia referred to earlier. Similarly, selecting photographic points at set intervals along roads would also result in considerable redundancy. Neither approach would adequately cover the variety of the more diverse landscapes such as the Mount Lofty Ranges and coast.

Nor would it be satisfactory to invite the public to provide slides for the study, as these are likely to concentrate on popular areas that tend to be areas of high landscape quality and omit the majority of the study area that is of a lesser quality. Many such photographs are also likely to artistically composed which would affect preference ratings.

A guided form of sampling would therefore be needed, one which took into account the need to be representative of the range of landscape quality while also recognising the issue of redundancy and at the same time recognised the practical issues involved in obtaining photographs and having participants rate them. The former factor would maximise the number of photographs while the latter factor would minimise the number. The following principles were

79. Dr R. Correll, CSIRO Div of Math Stats; Mr P. Leppard, Maths and Stats Dept, Univ of Adelaide.

defined together with consideration of how they may be tested to help guide the sampling of the State's landscape:

- **Principle of representativeness**: *including the significant types of landscapes present in South Australia in the sample*.

  Representativeness means that the sample should aim to cover the diversity of landscape regions and significant variations within each region. This led to the definition of the landscape regions and landscape types within South Australia [see (4) below].

  Highly familiar scenes require special consideration; scenes which would have instant recognition such as the Bluff at Victor Harbor, the Remarkable Rocks on Kangaroo Island or Wilpena Pound in the Flinders Ranges. Familiarity with a particular scene enhances preferences as it triggers memories and associations with factors other than the underlying landscape quality. Icons trigger even deeper symbolic associations that need to be separated from landscape quality. Some of these should be included to help assess the influence of familiarity on preferences.

  Laut's classification of the State in *Environments of South Australia* provides a detailed analysis on the basis of biophysical attributes and defines areas of similar characteristics. Although the classification does not classify landscapes, it can provide a gauge of the representation achieved.

- **Principle of equivalence**: *providing the landscapes are of similar characteristics, the preference for each should be similar.*

  This is the issue of redundancy. The principle means that an assessment of, say, a flat farming landscape in the Murray mallee should yield a similar quality assessment as a flat farming landscape on Eyre or Yorke Peninsula. Location is not as important to preferences [unless of a highly familiar scene] as the characteristics of the scene that are present. The equivalence principle would enable a single rating to be derived for similar landscapes and for this to be applied across all such landscapes. While there will be some variation in the landscape quality ratings of similar scenes, it is expected that this variability will be insignificant, i.e. ~ 10% as indicated by the example [Table 9.2].

  The principle of equivalence will be tested by defining the range of similar landscapes, selecting photographs covering the range and testing preferences for these.

- **Principle of complexity**: *sampling should reflect the complexity of the landscapes.*

  Complexity is a function of several factors present in the scene, including landform, land cover, land use, water, naturalness and colour. Much of South Australia is flat, the land cover is largely low scattered trees and bush and the dominant land use is monocultures of cereals and/or grazing. Complex landscapes such as the Mount Lofty Ranges have differences in landform and land cover within a small area, a greater mixture of land use and many water bodies present. Such areas require a greater density of sampling. By contrast, arid and agricultural landscapes are characterised by lesser complexity that can be represented by relatively fewer photographs.

  This principle is an extension of the first principle of representativeness and essentially describes the situation that can be demonstrated empirically. In Laut's analysis, the Mount Lofty Ranges had more environmental associations and units than regions much larger in extent such as the South East or the Flinders Ranges. The density of photographs taken to represent areas such as the Mount Lofty Ranges or the coast will need to be much greater than in agricultural areas or the far north.

(2) Photographing Scenes

A series of trips was undertaken throughout South Australia to obtain photographs of the landscapes (Table 9.3). These were confined mainly to the period through spring through summer to autumn to maximise cloud-free conditions. The long daylight hours also provided considerable time for photography on each day. The timing of the trips covered the full range of seasons in the agricultural region. Travel in the far north region was taken in autumn. Photography was spaced over two summers and thus took over twelve months to complete.

Apart from the far north trip that was undertaken with the author's wife and daughter, all other trips were done singly so there was no potential for external influence regarding what should be photographed.

In summary, 22 trips were made over 50 days, covering 18,700 km, during which 1750 photographs were taken. This averaged 1 photograph per 10.6 km travelled, ranging from 18.5 km/photo in the far north to 3 - 4 km/photo in the Mt Lofty Ranges.

Fuji Sensia 100 ASA colour slide film was used throughout. An Ashai Pentax ME Super SLR camera was used with a Tamron SP 1:4 - 4.5, 28 -135 mm zoom lens adjusted to the 50 mm setting. To minimise artistic influence, no filters were used.

Two further principles were defined to help guide the actual photographing of landscapes. These are the principles of typicality and simplicity.

- **Principle of typicality**: *in sampling landscapes, scenes were selected on the basis that they typified a particular landscape*.
  Such scenes aimed to capture the essential prevailing characteristics of the landscape. This meant that characteristics that were unusual [i.e. they are of limited areal extent] were avoided. Typicality means that scenes were selected to reflect the prevailing characteristics of the landscape [i.e. they were simply average for the given area]. This is not to imply that the landscape quality they represented was mediocre - it could be low, medium or high - but rather that in measuring landscape quality, sampling concentrated on typicality, the modal average rather than the high or low points.

  Care was taken to record as complete coverage of the different landscapes as was practical. Most of the main roads in an area and often some of the secondary roads were driven to ensure a reasonable areal coverage was obtained.

- **Principle of simplicity**: *landscapes were photographed to contain a minimum of components, and complicating factors and distracting elements were avoided*.

  In photographing scenes, care was taken to avoid features such as fences in the foreground, powerlines across the scene, cows or sheep, houses or roads, cars, dead trees and excavations, and the presence of people. The inclusion of any of these can affect preferences and was avoided unless they were considered to be an integral part of the landscape or were quite unavoidable.

  Photographs were not taken from the road, as this would include the foreground grasses, shrubs and fences that would distract from the scene. Rather the photographs were taken from the fence line.

  For the purposes of statistical analysis, the fewer complicating components in a particular scene, the more likely it is that the preferences will reflect the essential components of the landscape. It also meant avoiding artistic composition of scenes such as placing a tree in the foreground or leading the viewer into the scene by the strategic placement of features. The overall aim is to evaluate

Table 9.3 Summary of Landscape Photographic Trips

Date	Location	Weather conditions	Photos	Distance
29/11 - 5/12/97	Adelaide - Ceduna - Pt Lincoln - Quorn - Mannahill [on Broken Hill road] - Jamestown - Adelaide - Riverland - mallee - south east - Adelaide.	Generally sunny with occasional light cloud. Cloud increased after Riverland and rain in SE. Cleared by Robe.	358	4000 km
29/12/97	Fleurieu Pen: Victor Harbor - Normanville, Delamere-Blowhole Ck - Victor Harbor	Sunny	31	180
31/12/97	Fleurieu Pen: Victor Harbor - Inman Valley - Second Valley - Waitpinga - Victor Harbor	Sunny	28	100
4/1/98	Piccadilly Valley	Sunny, some light cloud	9	50
16/1/98	Eastern Mt Lofty Range: Callington - Angaston	Sunny	73	320
13/2/98	Eastern Yorke Peninsula	Sunny, some light cloud	78	760
21/2/98	Central-north Mt Lofty Ranges: Piccadilly - Gawler - Kersbrook	Sunny	60	200
22/2/98	Central Mt Lofty Ranges: Forest Range - Lenswood Agriculture Station	Sunny	49	150
28/2/98	Central Mt Lofty Ranges; Woodside - Kersbrook - Mt Torrens	Sunny	46	200
1/3/98	Central Mt Lofty R. Verdun - Brukunga-Hahndorf	Sunny	35	100
8/3 - 12/3/98	Western side Yorke Pen - Pt Augusta - Gawler Ranges - Ceduna - Nullabor - western coast of Eyre Pen - Whalers Way - Pt Lincoln - Adelaide	Sunny until Pt Lincoln, then rain and cloud	202	3500
14/3/98	Asbourne - Milang - Clayton	Increasingly overcast, trip abandoned	7	120
20/3 - 21/3/98	South east: coast - Mt Gambier - Ngarkat - Tailem Bend	Sunny, some high light cloud	77	1200
11/4 - 24/4/98	Far north: Pt Augusta - Woomera - Andamooka - Roxby Downs - Woomera - Coober Pedy - Marla - Oodnadatta - Coward Springs - Maree - Mangarannie - Birdsville - Cordillo Downs - Innamincka - Lyndhurst - Jamestown - Adelaide	Intermittently sunny with cloudy/cirrus conditions in part. Clouds at Pt Augusta, Roxby, Oodnadatta, Innamincka, Jamestown	227	4200
28/8/98	Central Mt Lofty Ranges: Hahndorf - Mt Barker - Macclesfield - Echunga	Sunny	47	120
29/8/98	Central Mt Lofty Ranges: Sturt Ck - Scott Ck - Bradbury - Mylor - Longwood - Jupiter Ck	Sunny	40	100
17/9 - 18/9/98	River Murray - Riverland: Murray Bridge - Swan Reach - Waikerie - Loxton - Paringa - Berri - Morgan - Swan Reach - Sedan	Sunny	106	870
21/9/98	Lower River Murray - Lower North: Murray Bridge - Mannum - Swan Reach - Sedan - Truro - Eudunda - Kapunda	Sunny, increasing cloud at Kapunda	57	420
27/9/98	Mid north: Roseworthy - Snowtown - Yacka - Clare - Burra - Tarlee	Sunny, increasing cloud after Burra	56	470
1/11/98	Fleurieu Peninsula coast: Victor Harbor - Deep Ck - Second Valley - Sellicks Beach	Sunny	85	350
18 - 22/1/99	South East - Tailem Bend - Keith - Kingston - Beachport - Mt Gambier - Coorong - L. Alex.	Sunny patches but mainly cloudy	39	1100
24/1/99	Middle Fleurieu Peninsula: Clarendon - Mt Compass - Asbourne - Meadows - Clarendon	Sunny, some patchy clouds in south	39	180

the landscape, not the photographic representation of it, and composition that enhances the quality of the scene as a photograph is to be avoided. Based on Shuttleworth [1980], photographs should provide foreground context for the scene.

The following criteria were followed in taking the photographs:

- 50 mm lens - similar to human eye
- photography at eye level, i.e. not elevated or depressed
- horizontal [i.e. landscape] format, not vertical format
- landscape view extending to the horizon - i.e. not a confined close-up view
- ideally sunny conditions - if cloudy, ensure scene is in sun
- good exposure and clarity [e.g. dust free] and not strong side lighting [avoid early morning, late afternoon]

As each photograph was taken, a record was made of the film and exposure number, and a brief description written. The location of the photograph was marked immediately onto a map, generally at 1:250,000 scale, except for the Mount Lofty Ranges where the 1:50,000 scale series was used. The location marked was as close as could be determined. For the final quarter of films taken, a Garmin GPSII geographical positioning system instrument was used to provide positioning coordinates at the time of the photograph and these were recorded in the field.

Where high ranges or hills were present in the scene, the angle of elevation was obtained using a clinometer [Abney Level]. This was used by viewing the top of the feature through a telescopic eyepiece, adjusting the spirit level until it was level, and reading off the elevation in degrees and minutes on the scale. This was recorded with a description of the scene.

Figure 9.3 summarises the distribution of photographs by region. It indicates that most of the photographs were taken in the agricultural regions, in particular the Mt Lofty Ranges and Eyre Peninsula. The Far North and the Flinders Ranges appear low in terms of the numbers of photographs for their area.

Each photograph was given a unique number on the basis of its number on the relevant map sheet. The coordinates of each photograph were mapped using ArcInfo. This was overlain on the CSIRO *Environments of South Australia* data-base [see Appendix 9.2] and the representation of photographs in each environmental association and unit was assessed.

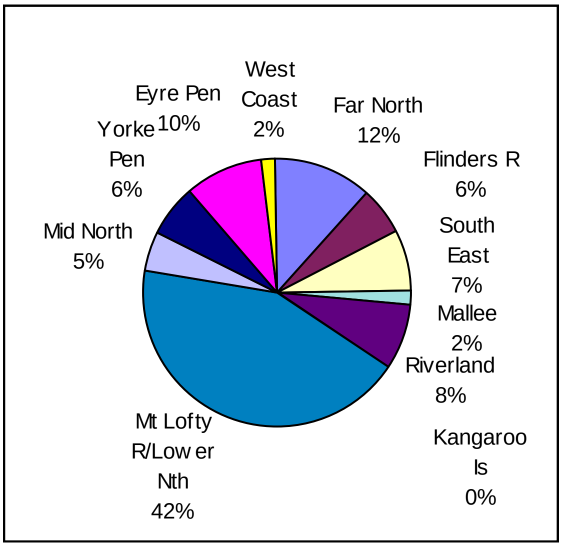


Figure 9.3 Distribution of Slides by Region

(3) Supplementary Photographs

Gaps in the coverage of the photographs were supplemented with additional photographs from various collections. Access was gained to collections held by the Department of Environment and Heritage, specifically the Pastoral Branch, the Biological Survey Branch and the Botanic Garden/State Herbarium. In addition, collections of various individuals, both in the Department and outside, were used. These were generally photographed for environmental purposes rather than aesthetic, and covered areas that would not usually be covered by the casual photographer.

The Pastoral Branch is responsible for monitoring and assessing the pastoral condition of pastoral leases across a large part of the Far North region with the exception of the western and northwestern region. The Dingo Fence divides the pastoral area, north of which is suitable for cattle grazing and south is used for sheep grazing. Most of the Branch's collection related to the sheep grazing area. The Branch's photo-point photographs included a location sign that precluded their use, but in addition it had many slides arranged by the name of the pastoral properties, as well additional general slides of the far north. On average, 100 slides per property were available but many of these were unsuitable for use as they lacked sunny conditions, were poorly exposed, contained strong evening lighting, or failed to meet the criteria in some way. On average, less than one-third of these slides were suitable for selection.

A total of 103 slides covering pastoral stations were selected. In most cases, only one or two slides were selected from each property as being broadly representative of the landscapes they contained. While this may be regarded as somewhat restrictive, it was considered that sampling the arid zone landscapes across one hundred properties should cover most of the landscapes present.

The slides included pastoral stations along the Olary ridge, in the Flinders Ranges, west of Lake Torrens and in the Lake Gairdner area. Geo-coding these slides presented a problem as the data on the location of each slide were held in field books scattered among the staff of the Branch. Location of these and of the slide selected in each book would entail a very large time commitment. As an alternative, therefore, the centroid of each pastoral property was calculated from 1:250,000 maps as representative of the slide's location.

The Biological Survey Branch of the Department undertakes fieldwork in the State's parks, many of which are in the far north region. Slides were selected from the following parks and areas:

Cooper Creek [2]
Nullabor [6]
Gawler Ranges [2]
Yellabina [2]
Tallaringa [1]
Coongie [4]
Yumbarra [2]
Murray Mallee [2]
Kangaroo Island [7]

In some cases the location of the slides was given and its coordinates obtained. In other instances, it was necessary to use the centroid of the relevant park for its geo-code.

A small number of slides were obtained from the collection of the Botanic Gardens and State Herbarium. These were located in the Flinders Ranges [7], Lake Torrens [1] and Kangaroo Is [1].

In addition to these, some private collections of slides of individuals in the Department of Environment and Heritage and the Adelaide Bushwalkers Club were reviewed for suitable photographs, and slides obtained:

Brendan Lay	Far north
Peter Copley	North west
Colin Harris	Far north
Peter Beer	Flinders Ranges
Tony Lothian	Flinders Ranges
Fraser Vickery	Kangaroo Island

In addition, slides were selected from the author's personal collection covering mainly the Flinders Ranges, River Murray, Kangaroo Island and Fleurieu Peninsula.

Altogether, these supplementary slides totalled 426 - 135 from the far north, 237 from the Flinders Ranges, 41 from Kangaroo Island and the remaining 13 from other regions.

The distribution of all slides [i.e. those taken on special trips plus supplementary slides from other collections], is shown in Figure 9.4. Although the greatest number of slides covered the Mt Lofty Ranges and lower north, there were substantially more slides in the Far North, Flinders Ranges and Kangaroo Island. The slides totalled 2176.

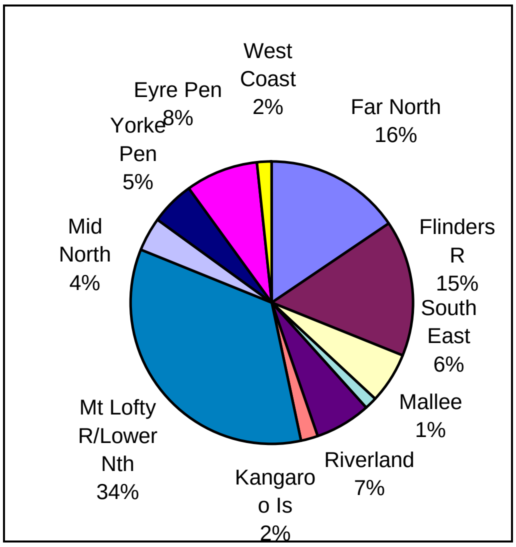


Figure 9.4 Distribution of All Slides by Region

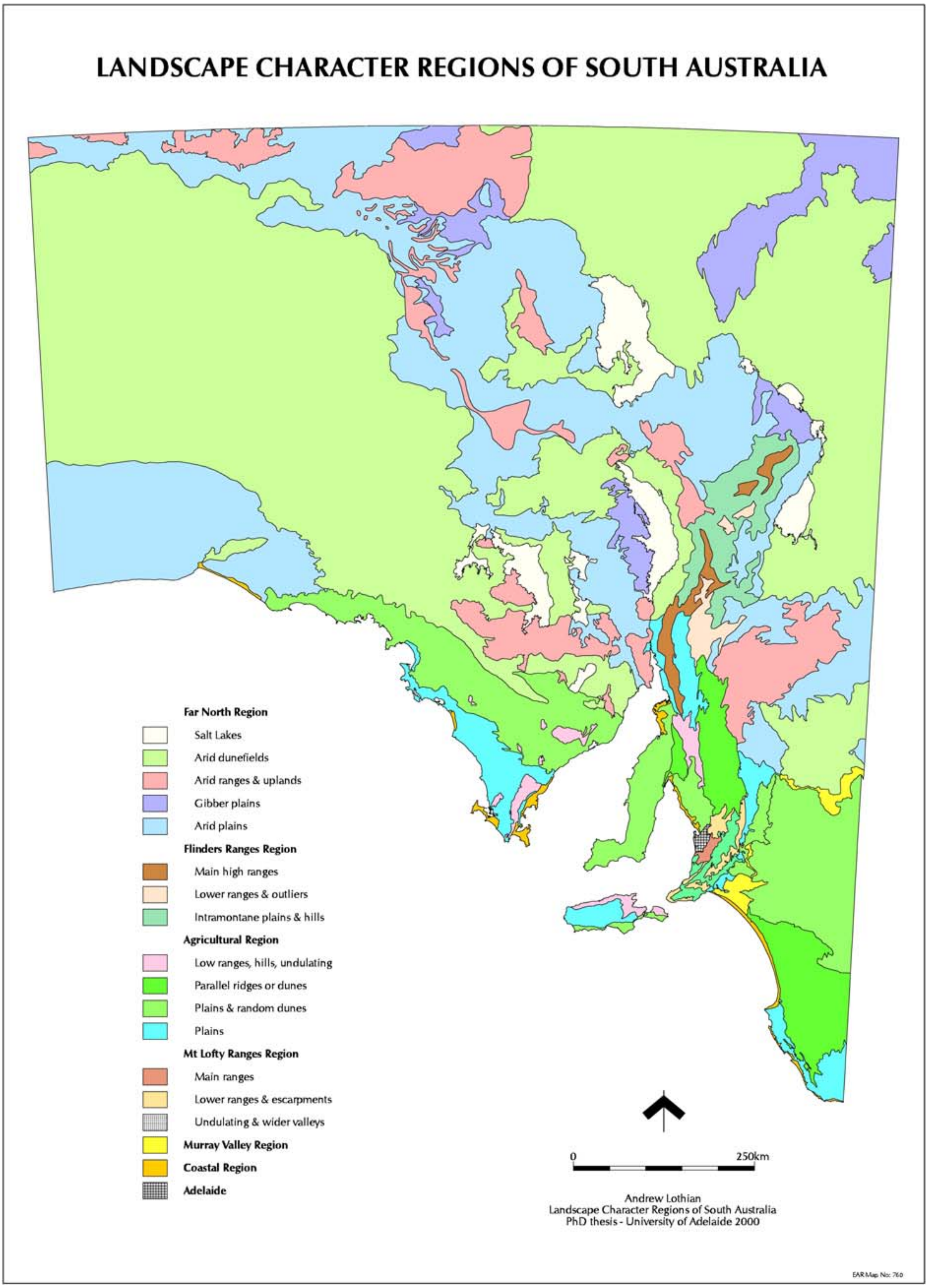


Figure 9.5 South Australian Landscape Character Regions

Table 9.4 summarises the total slides available.

Table 9.4 Location of All Slides

Region	Number	%
Far North	341	15.7
Flinders Ranges	337	15.5
South East	126	5.8
Mallee	28	1.3
Riverland	144	6.6
Kangaroo Island	41	1.9
Mt Lofty Ranges/Lwr nth	750	34.5
Mid North	83	3.8
Yorke Peninsula	111	5.1
Eyre Peninsula	180	8.3
West coast	35	1.6
Total	2176	100.0

(4) Regional Basis for Selection of Photographs

South Australia is a land of generally low relief, the inland area being largely covered by featureless plains, or sand and gibber plains. South Australia Yearbook, 1997.

The selection of slides for rating of preferences was guided, firstly by the classification of landscape character covering South Australia and, secondly by a classification of landscape types. Appendix 9.2 describes the derivation of landscape character regions for South Australia.

Simonds (1961) defined landscape character thus:

> "Landscape character is where there is an apparent harmony or unity among all the natural elements of a landscape, including the landforms, geology, vegetation etc. Each area has its own distinguishing landscape character, and each invokes a distinct response" [quoted by Stuart-Street, 1994, 3]

Simonds' definition focuses on the visual characteristics which identify the landscape and which distinguish it from other areas.

Classifications of landscape character of Victoria, New South Wales and Western Australia were examined. Each of these States adjoins South Australia. Table 9.5 summarises the derivation of these classifications. Maps of the landscape character in the three States are contained in Appendix 9.2.

Table 9.5 Summary of State Landscape Character Derivations

	Victoria	NSW	WA
Factors	lf, lc, wf, lu	lf, lc, lu	lf, lc, wf, lu
Derivation	SL, AP, SI, F & S	SL, SI, F&S	SL, AP, SI, F, V
Regions	9	15	39
Av. Area	25000 km^2	53000	65000

Note: lf = land form, lc = land cover, wf = waterforms, lu = land use
SL = scientific literature
AP = aerial photographs
SI = satellite imagery
F&S = field operatives [e.g. land management personnel] and specialists [e.g. botanists]
V = video
Source: Kirkpatrick, B. & A. Stuart-Street, 1992. Thorvaldson, F., 1996. Williamson D.N. & S.W. Calder, 1979.

While there have been many classifications of South Australia on the basis of geomorphology and physiography [e.g. Jennings & Mabbutt, 1986; Learmouth 1971; Twidale, 1974] and vegetation [e.g. Specht, 1972; Wood, 1958], there have been none of landscape character.

Twidale's [1974] 17 physiographic regions reflected the dominantly arid nature of the State. He identified four broad regions: arid uplands, arid plains, semi-arid uplands and semi-arid plains. Within each of these he described particular ranges, plains and deserts.

The most detailed and relevant classification of South Australia is *Environments of South Australia,* the product of a project undertaken by Peter Laut and associates of the CSIRO Division of Land Use Research in the mid- 1970s [Laut *et al*, 1977].

Environments of South Australia provided an analysis of the South Australian environment on the basis of its biophysical attributes and, importantly for the purposes of landscape character classification, defined a "four-level hierarchy of areal units" being areas of varying size and comprising similar characteristics within each area.

Environmental units were defined as the smallest unit. These are grouped into *environmental associations* that are the primary mapping unit. In turn these environmental associations are combined into *environmental regions* and these into *environmental provinces*.

The State was divided into two broad provinces: the far north arid province, that accounts for nearly 86% of its area; and the southern agricultural province, which covers the remaining 14%. These represent two climatic zones, each with their distinctive landforms, land cover and land uses. The classification was hierarchical: province - region - unit.

As landscape quality is based on the area's physical components, such as landform, land cover, land use and surface water [all of which were used in Laut's classification], the environmental associations can provide a basis for defining landscape character regions. However, as noted by the Western Australian classification [Stuart-Street, 1994, 5], natural system boundaries are not always visually distinct in the landscape. Furthermore, areas defined on the basis of natural systems do not necessarily correspond with landscape regions. Despite these qualifications, natural systems that are based particularly on land form and land cover can provide a guide to the identification and classification of landscape regions.

The derivation of the landscape character based on Laut's classification is described in Appendix 9.2.

Table 9.6 summarises the 10 landscape regions and their area relative to South Australia. The landscape provinces and regions are shown in Figure 9.5.

The landscape regions were divided into landscape units that are shown in Table 9.7 together with their areas.

(5) Definition of Landscape Types

The need to supplement the definition of landscape character regions and units by defining types of landscapes stemmed from the realisation that their areal extent does not provide an adequate basis for assembling a sample of representative slides. If areal extent was to be the sole criterion, then the Mount Lofty Ranges and Murray Valley would be represented by only one slide each, while nearly half the slides would depict the arid dune fields. Landscape character provides a general classification and needs to be supplemented by a finer grained typology.

Table 9.6 Landscape Regions of South Australia

Province and Region	Area as % of SA
Far North Arid Province	**85.63**
Salt lakes	3.07
Arid dune fields	46.69
Arid ranges and uplands	7.49
Gibber plains	4.05
Arid plains	21.77
Flinders Ranges	2.56
Southern Agricultural Province	**14.37**
Mt Lofty Ranges	0.63
Agricultural	12.98
Murray Valley	0.44
Coastal	0.27
Adelaide	0.05

Analysis was therefore undertaken of the slides that had been gathered to identify the types of landscapes they represented. The selection of slides for rating purposes could then cover the range of landscape types.

The landscape types were derived for each region and, as would be expected, there were many commonalities between the two classifications. Landscape classification differed from the regional classification in that it condensed the five regions of the far north province into one region and gave far greater prominence to the landscapes of the remainder of South Australia. Table 9.8 summarises the landscape types derived.

The description of landscape types was then used, together with their regional distribution, as the basis for the selection of slides for rating purposes.

(6) Selection of Photographs for Rating

Nearly 2200 slides were available for selection to rate the South Australian landscapes. The number selected from these needed to be sufficiently small so that the rating sessions were not inordinately long and viewers maintained their interest and concentration.

Table 9.7 Landscape Regions and Landscape Units

Landscape Region	Landscape Unit	Area sq km	% South Australia
Far North Arid Province		**840458**	**85.63**
1. Salt Lakes Region	Lakes Eyre, Torrens, Frome, Gairdner and others	**30120**	**3.07**
2. Arid Dune fields Region	2.1 Western dune fields including the Great Victoria Desert, including southern dune fields	259967	26.49
	2.2 Central dune fields, east of L. Torrens and between L. Torrens and L. Gairdner	35704	3.64
	2.3 North east dune fields including Strzelecki and Simpson Deserts	149141	15.19
	2.4 Canopus dune fields north of River Murray	13477	1.37
	Total arid dune fields	**458289**	**46.69**
3. Arid Ranges & Uplands Region	3.1 North west ranges including Musgraves and Mann Ranges	6730	0.69
	3.2 Central tablelands incl the Breakaways, the Peake & Denison Ranges, & the Bagot Ranges	31238	3.18
	3.3 Gawler Ranges and Middleback Ranges	14066	1.43
	3.4 Olary Spur	15764	1.61
	3.5 Other uplands	5687	0.58
	Total arid ranges & uplands	**73485**	**7.49**
4. Gibber Plains Region		**39766**	**4.05**
5. Arid Plains Region	5.1 Nullarbor	51117	5.21
	5.2 Northern plains	137034	13.96
	5.3 Eastern plains	25559	2.60
	Total arid plains	**213709**	**21.77**
6. Flinders Ranges Region	6.1 Main high ranges	5352	0.55
	6.2 Lower ranges and outliers	4117	0.42
	6.3 Intramontane plains & hills	15621	1.59
	Total Flinders Ranges	**25089**	**2.56**
Southern Agricultural Province		**141092**	**14.37**
7. Mt Lofty Ranges Region	7.1 Main ranges, deep valleys	602	0.06
	7.2 Lower ranges and escarpments	2544	0.26
	7.3 Undulating, wide valleys, plains	2994	0.31
	Total Mt Lofty Ranges	**6140**	**0.63**
8. Agricultural Region	8.1 Hills and low ranges	5524	0.56
	8.2 Ridges or dunes with linear valleys	25530	2.60
	8.3 Plains with random dunes	71759	7.31
	8.4 Plains	24592	2.51
	Total agricultural region	**127405**	**12.98**
9. Murray Valley Region*	9.1 Riverland	1731	0.18
	9.2 Trench	206	0.02
	9.3 Lakes	1629	0.19
	9.4 Coorong	788	0.08
	Total Murray valley	**4354**	**0.44**
10. Coastal Region**		**2665**	**0.27**
Adelaide		**528**	**0.05**
Total		**981550**	**100.00**

* The trench section only includes part of the river valley south of Mannum – omits section to Overland Corner.
** Most of the Coastal region included in other regions; area shown is in defined coastal Environment. Associations.
Note: Figures calculated by GIS. The area shown is 2750 sq km smaller than South Australia's official area of 984300 sq km. The difference amounts to only 0.28%.

However, as many as possible of the different types of landscapes needed to be included in order that the ratings would provide a reasonably comprehensive coverage of the South Australian landscapes.

The slide projector used carousels containing 80 slides so it was decided that

Table 9.8 South Australian Landscape Types

Region	Landscape Type
Far north	Extensive vegetated plains
	Extensive grassland plains
	Extensive chenopod [i.e. saltbush] plains
	Spinifex plains
	Water bodies
	Creek beds
	Gibber plains
	Salt lakes and claypans
	Dunes and swales
	Hills and ridges
	Escarpments, mesas, breakaways, tablelands
	Arid ranges
Flinders Ranges	Rugged ranges and mountains [Northern Flinders Ranges]
	Vegetated, rounded ranges [Southern Flinders Ranges]
	Creek beds
	Low ranges and hills
	Plains with ranges background
	Gorges
Southern agricultural region	Extensive cereal/sheep country
	Arable plains with ranges background
	Hills, low ranges and ridges
	Vineyards
	Pine plantations
	Pastoral arcadian landscapes
	Mallee vegetation
	Eucalyptus vegetation
	Lakes
Murray valley	Deep trench
	Shallow trench
	Dairy flats
	Lakes [Lakes Bonney, Alexandrina, Albert]
	Coorong
Mount Lofty Ranges	High hills and ranges and deep valleys
	Low hills and ranges and shallow valleys
	Horticulture
	Reservoirs
Coast	Steep cliffs and headlands
	Sloping cliffs and headlands
	Rocky coast
	Beaches and dunes
	Beach and high hinterland
	Mangroves and salt marshes
	Coastal vegetation

sessions would comprise viewing two carousels totalling 160 slides. These could be viewed in less than 30 minutes. One carousel of 80 slides was considered insufficient to cover the landscape regions and units, while a set of 3 carousels of 240 slides was considered potentially too long and tiring for participants to rate in a single sitting. The experience of showing two carousels proved satisfactory and participants indicated that they did not find the length tiring.

Having determined that 160 slides would be used, their selection aimed to represent as many landscape regions and units and landscape types as possible. The 160 slides comprises 7.4% of the 2176 slides available.

Five slides of interstate landscape were included with a view to a possible future national assessment of landscape quality. In this event, having a comparison of the South Australia scenes with interstate scenes would assist in benchmarking future assessments.

Table 9.9 summarises the regional distribution of the slides selected for the rating sessions and Table 9.10 summarises the landscape types they represent.

Table 9.9 Regional Distribution of Rating Slides

Region	Slides	% South Australia slides
Far north	27	17.4%
Flinders Ranges	18	11.6
Mt Lofty Ranges	25	16.1
Agricultural region	47	30.3
Murray valley	17	11.0
Coastal region	21	13.5
Total South Australia Slides	155	100.0
Interstate	5	
Total Rating Slides	160	

Many of the slides could be allocated to several landscape types [e.g.: scenes of chenopods with background hills, or coastal scenes with beaches, cliffs, dunes and rocks]. The scenes are shown in Table 9.10 on the basis of their most dominant feature.

The issue of redundancy was examined by including multiple slides of the cereal-growing region. These would test the range of preferences for similar landscapes and provide a test of the principle of equivalence. The scenes of the agricultural region also included several sets of slides of the same

Table 9.10 Landscape Types Represented by Rating Slides

Region	Landscape Type	Slides
Far north	Vegetated plains	3
	Grassland plains	1
	Chenopod [saltbush] plains	3
	Spinifex plains	1
	Water bodies	2
	Creek beds	3
	Stony plains	4
	Salt lakes & claypans	1
	Dunes & swales	2
	Hills and ridges	1
	Escarpments, mesas, breakaways, tablelands	3
	Arid ranges	3
Flinders Ranges	Rugged ranges/mountains [Northern Flinders Ranges]	7
	Vegetated, rounded ranges [Southern Flinders Ranges]	2
	Creek beds	1
	Low ranges and hills	5
	Plains, ranges background	1
	Gorges	2
Agricultural region	Extensive cereal/sheep country	27
	Arable plains, ranges background	2
	Hills, low ranges and ridges	2
	Vineyards	7
	Pine plantations	2
	Pastoral "arcadian" l/s	2
	Mallee vegetation	3
	Eucalyptus vegetation	1
	Lakes	1
Murray valley	Deep trench	9
	Shallow trench	2
	Dairy flats	1
	Lakes [Bonney, Ramco, Alexandrina, Albert]	3
	Coorong	2
Mt Lofty Ranges	High hills, ranges, deep valleys	5
	Low hills, ranges, shallow valleys	15
	Horticulture	4
	Reservoirs	1
Coast	Steep cliffs & headlands	3
	Sloping cliffs & headlands	4
	Rocky coast	3
	Beaches & dunes	5
	Beach & high hinterland	3
	Mangroves/salt marshes	2
	Coastal vegetation	1

landscape taken in different seasons to test the effect of seasonal colour and lushness.

Not all landscape regions and units and landscape types could be covered adequately. Under-represented compared to the area were the vast arid plains and dune fields, the salt lakes, the lower hills of the Flinders Ranges, agricultural areas of Kangaroo Island, and areas of mangroves.

The presentation order of the slides comprised two parts: ten representative slides at the beginning, and the remaining 150 slides randomised.

The ten slides at the beginning of the rating session represented each of the six landscape regions, several landscape types and an interstate scene. The far north region was represented by three slides to represent the variety of this extensive region. The ten slides were selected also to indicate the range of landscape quality likely to be encountered in the full set of 160 slides ranging from flat bare gibber through to the rugged Flinders Ranges and Musgrave Ranges, the coast, the River Murray, the agricultural region and the Mt Lofty Ranges.

Showing this range at the outset was designed to assist participants to set their criteria in rating slides. Some studies termed these "training slides" [e.g. Simpson, *et al*, 1976].

The remaining 150 slides were randomised to ensure that no bias was present in the order of their presentation. While random number tables or other means could have been used for the randomisation, a physical randomisation method was used as follows:

The slides were placed face down in a box that was tilted about to mix them, the slides were selected randomly, placed in 8 separate piles which were subsequently split. The final selection was randomly from each of 8 piles and the slides placed in the two carousels.

Appendix 9.3 lists the selected slides by region and Appendix 9.4 describes each slide in the sequence they occurred in the rating session.

9.4 DERIVATION OF DEPENDENT VARIABLES

In this section, the derivation of community-based preferences for the slides selected is described. The section describes the rating instrument used and the conduct of the rating sessions, the rating sessions held and the characteristics of the respondents who participated.

(1) Rating Instrument

A review of rating scales in the literature found they ranged from 5 to 10. Examples are shown in Table 9.11.

Table 9.11 Examples of Rating Scales

Reference	Scales
Anderson & Schroeder, 1983	0 – 9
Arthur, 1977	0 – 9
Balling & Falk, 1982	1 – 10
Bergen *et al*, 1995	1 – 10
Brown & Daniel, 1991	1 – 10
Carls, 1974	1 – 5
Cook and Cable, 1995	0 – 9
Hammitt, Patterson & Noe, 1994	1 – 5
Miller, 1984	1 – 5
Mosley, 1989	0 – 9
Shafer, Hamilton & Schmidt, 1969	1 – 5
Strumse, 1994a & b, 1996	1 – 5
Vodak *et al*, 1985	1 – 10

A 0 - 10 scale would provide 5 as the mid point but it was considered that the zero could be ambiguous to some participants as indicating the complete absence of landscape quality. A ten point rating scale [1 -10] was selected which provides a choice of 10 points. The mid point is between 5 and 6, which tends to force participants to choose which side of the median they prefer [Figure 9.6].

The rating instrument comprised a double-sided A4 size sheet [see Appendix 9.5]. The front page contained the rating table for 160 slides, while the reverse side contained questions covering respondent characteristics The rating table was arranged in four columns and numbered consecutively down each column from 1 to 160, with 40 in each column. The slide number was clearly marked, although the number of each slide was generally not indicated during the session. The rating scale [Figure 9.6] was displayed at the top of the rating sheet with the following instructions:

> "Rate how much you like the scene shown in the slide. Rate from low scenic quality to high scenic quality. Use the whole range in the scale."

The participant information covered the data summarised in Table 9.12.

Table 9.12 Participant Information Sought

Characteristic	Categories
Age	6
Gender	2
Education	6
Family income	6
Birthplace country	open question
Grow up - city or country	3
Familiarity with South Australia	6 regions 3 categories

Table 9.13 Viewing Intervals for Slides

Reference	Number of Slides & Viewing time
Abello & Bernaldez, 1986	60 slides X 10 seconds
Anderson, 1981	60 X 8, followed by 30 X 5
Anderson & Schroder, 1983	60 X 8, 80 X 5
Balling & Falk, 1982	20 X 8
Bergen, *et al*, 1995	21 X 10
Cook & Cable, 1995	20 X 8, 40 X 6
Daniel, *et al*, 1973	150 X 5
Daniel, *et al*, 1978	100 X 8
Herzog, 1984	100 X 15
Kaplan & Herbert, 1987	60 X 10, 10 shown at beginning to provide range
Lamb & Purcell, 1990	71 X 10
Mosley, 1989	80 X 13, 60 s break between blocks of 20
Purcell & Lamb, 1994	180 X 10
Strumse, 1994a	60 X 10, 5 filler slides at beginning and end

1	2	3	4	5	6	7	8	9	10
very low				moderate				very high	

Figure 9.6 Rating Scale

Question 4 asked the family's income to cover the situation where the spouse is not working and therefore would indicate virtually nil income. Question 5 on the country of birthplace was open-ended and participants wrote the name of the country. Question 6 asked whether the participant's formative period was spent in a rural or urban environment, or in both. Question 7 sought to categorise the participant's familiarity with the various regions of South Australia, familiarity being a factor that tends to enhance preferences [see section 8.3(8)].

The time interval for viewing each slide commenced at 8 seconds. This was based on existing surveys, a summary of which is shown in Table 9.13.

These intervals are summarised as follows:

Timing	Number
5 seconds	1
8	2
10	5
13	1
8 s/5 s	2
8 s/6 s	1

In practice, it was found that 8 seconds was quite sufficient and, once participants had become comfortable, the latter two-thirds of slides were generally shown at a slightly faster rate, gradually decreasing to a 6 second interval.

(2) Instructions to Participants

The literature was reviewed to assist in framing instructions for participants in the slide rating sessions. Table 9.14 summarises the literature.

Based on these an introduction to the session was derived [see (3) below].

(3) Slide Rating Sessions

The setting for the slide ratings sessions was standardised as far as possible. A Rollei P 37E slide projector with carousel was used throughout all sessions. This projector had a 2.6 metre extension cord to change the slides and this enabled the operator to sit at a distance from the projector. The projector was normally placed so that the slide filled the width of the screen, generally at least 1.8 metres wide. The projector was placed on a stand so that it was approximately level with the screen and distortion from an upward tilt of the projector minimised. Chairs were arranged so that all participants could gain an uninterrupted view of the screen.

Rating sessions followed a standard pattern:

1. Participants took their seats and while waiting for the session to commence filled out the personal details on page 2 of the rating sheet.

2. When all participants were present, the author introduced the session by reading the following instructions:

Introduction to photo rating session

Thank you for coming today.

Your participation is important because it will help me develop an understanding of what South Australians like and dislike about the landscape of the state.

I will be showing you a total of 160 slides. This may sound a lot but we will do them in two lots of 80 each with a short break in between. You will view each slide for 8 seconds so that all 160 can be seen in just over 20 minutes. In case you think 8 seconds is not long, you will find it quite long enough.

I ask you to rate the scenic attractiveness of each scene on a rating scale of 1 to 10, with 1 being very low and 10 being very high. I ask that you try and use the entire range, don't sit in the middle. Also think of yourself standing in the scene and asking yourself, how much do I like this scene. I don't want you to rate the quality of the photograph of the scene but rather the scene itself.

Two further things. Firstly I ask that you rate the scene on what you think about it, not on what you think others would prefer or what they should prefer. Secondly, if you have training and knowledge in the life sciences - botany, biology or in land management, I ask that you put this aside. I'm looking for rating of scenic quality, not on the extent of overgrazing or degradation or in terms of ecological significance.

I'll start by showing you 10 slides which will show the various regions of South Australia and will indicate the range of scenic quality you will see.

Before I do this, are there any questions?

Table 9.14 Summary of Surveys on Instructions to Participants

Reference	**Summary of Instructions to participants**
Anderson, 1981	Assign value between 0 and 9 on basis of personal evaluation of scenic attractiveness
Arthur, 1977	Assign a number from rating response scale for 0 to 9
Bergen, *et al*, 1995	Use full scale in ratings. Preview scenes to familiarise viewers with variation in types and to establish their rating criteria
Brown & Daniel, 1987	Assign 1 rating per scene and use full range of scale
Brown, *et al*, 1988	Rate areas represented by photos, not the photos themselves
Brown & Daniel, 1991	Informed participants that study was to better understand how people perceive scenic beauty. 20 preview scenes to give full range of scene types & enable them to adjust rating scale.
Brush, 1979	View slides in terms of attractiveness as place to be in, not as picture or work of art.
Buhyoff *et al*, 1978	Judge on their own preference, not on what they thought others would prefer of what they should prefer. Judge total landscape, not parts.
Cook & Cable, 1995	Purpose of survey described. Rate from low to high scenic beauty. Asked for information on visits outside region
Hull, *et al*, 1984, Hull & Revell, 1989	Asked to judge landscape scenic beauty.
Miller, 1984	Asked to use full range. First 10 slides shown quickly.
Mosley, 1989	Asked to rank each scene for scenic attractiveness
Nassauer & Benner, 1984	Rate photos from least to most attractive
Patsfall, *et al*, 1984	Rate each scene according to its scenic beauty, defined simply as the "overall scenic quality of the landscape, its general beauty."
Purcell & Lamb, 1984	Described aim of study and reasons for use of case study. Importance of people's perceptions of scenic quality in planning described. Reasons for using slides rather than *in-situ* judgements discussed and outline of slide selection procedure given. Idea that variation in scenic quality discussed and slide selection procedure outlined. Procedure for assigning numbers to indicate scenic quality explained. Explained that 10 represents highest quality scenery and 0 means absence of any scenic quality. Purcell, 1987 and Purcell & Lamb, 1994 had similarly comprehensive explanations.
Ruddell, *et al*, 1989	Asked to rate from very low to very high in scenic quality. Asked to rate the scenic beauty of the slide, not their evaluation of its technical quality. Ten warm up slides shown to establish comparative standard.
Schomaker, 1978	Asked to evaluate each slide and assign numerical value to scene.
Simpson, *et al*, 1976	Asked to rate from very disapproving to very approving. Training slides shown first.

3. The session commenced while the author silently timed 8 seconds for each slide. The first 10 slides were shown through quickly and then repeated for rating purposes. At the end of the first 40 slides, participants moved to the top of the second rating column and the number of that slide was called out to ensure everyone was at the same point.

4. After 80 slides, a pause was taken to change the carousel and, after an interval of about one minute, the session resumed. At the end of the 160 slides the session concluded, the sheets were collected, and the participants thanked. The session took about 30 minutes from the time of filling out the participant information sheet to the end of the rating session.

Seventeen slide-rating sessions were held as summarised in Table 9.15. The participants can be allocated to the following three categories:

Type	Number	%
Community	49	15.4
Professional	99	31.0
Students	171	53.6
Total	319	100.0

Arrangements were made with for Adelaide's *The Advertiser* newspaper to include in their outdoor section of 4 December, 1998 an invitation to participate in public sessions to rate landscape quality. This was followed up by a ten-minute interview with Philip Satchell on 5AN at 3 pm on 4 December about the project and an invitation for listeners to participate in sessions that were held. The

Table 9.15 Slide Rating Sessions

No.	Date	Participants	Location	Source of participants
1.	23/11/98	#1 - 3	Home	Family
2.	26/11/98	#4 - 23	8th Fl, 77 Grenfell St	Mainly EPA/EPD, DEH
3.	30/11/98	#24 - 48	9th Fl, 91 Grenfell St	Mainly EPA/EPD, DEH
4.	3/12/98	#49 - 60	Netley offices	Resource Info Group, DEH
5.	4/12/98	#61 - 62	Kensington offices	Heritage & Biodiversity, DEH
6.	5/12/98	#63 - 64	10 Pultney St	Public
7.	8/12/98	#65 - 84	187 Rundle St	Environment Institute of Australia [SA Division]
8.	9/12/98	#85 - 92	North Tce	Planning South Australia
9.	14/12/98	#93 - 97	Kensington offices	Heritage & Biodiversity, DEH
10.	14/12/98	#98 - 123	Magill campus	Summer school of environment.
11.	15/2/99	#124 - 129	University of Adelaide	Lecturers & supervisors
12.	18/2/99	#130 - 158	Pt Adelaide TAFE	3rd yr, environmental management students
13.	18/2/99	#159 - 177	Pt Adelaide TAFE	1st yr, environmental management students
14.	10/3/99	#178 - 180	University of Adelaide	5th year landscape architecture students
15.	17/3/99	#181 - 215	South Terrace	General meeting of Adelaide Bushwalkers Club
16.	24/3/99	#216 - 309	Flinders University	1st year environmental management students
17.	12/4/99	#310 - 319	Tea Tree Gully	Friends of Angove Park

Assessment of South Australia's landscape quality

As part of my research into the assessment of landscape quality in South Australia I am holding a session at lunchtime, [date] to carry out a rating of landscape slides.

I need a large group of people to rate the slides on a 1 - 10 scale on the basis of their scenic beauty. No experience or qualifications is required and the survey will play an important part in developing the means for measuring landscape quality.

If you would like to take part please come along. Bring a clipboard and a pen. Please email/phone me to let me know. Details are:

[time and date]
[location]
Bring clipboard and pen

If you are unable to attend the … [date] session but would be like to assist, I may hold a further session. Please email/phone me if you would like to be notified.

public sessions were held in an easily accessible location in the city of Adelaide on Pultney St [just north of the Target shop] at 7.30 pm, Friday evening and at 11 am and 2 pm on Saturday. Signs indicated the location of the ground floor lecture room in which the sessions were held.

Unfortunately despite this publicity only two persons arrived, both at the final session. It was apparent therefore that the publicity was insufficient, the timing was inconvenient, or that the community was not interested.

Participation in sessions 2 to 5 and 9 were held in conference rooms of the Department of Environment and Heritage following emailed messages throughout the Department. The email message was sent to staff in the Environment Protection Agency and Environment Policy Division and subsequently to the Heritage and Biodiversity Branch at Kensington.

The message followed a more extensive message sent several months previously about the project and which invited participation in a series of rating sessions. Reminder emails were sent when a second session was held. The message was sent to 888 people throughout DEH and 68 [7.7%] responded positively.

The relatively low participation rates [Table 9.16] have implications for the characteristics of the participants. Although the email messages emphasised that no experience or qualifications were required, the project failed to attract participation by staff that lacked technical qualifications or expertise. Holding the sessions during lunchtime may have affected participation. The non-participation issue is examined further in the analysis of results.

Table 9.16 Participation rates in rating sessions

Location	Total possible	Total participants	%
EPA/EPD +others	243	19	7.8
EPA/EPD +others	243	25	10.3
RIG, Netley	110	12	10.9
Kensington	129	7	5.4
Planning SA	163	5	4.9
Total	**888**	**68**	**7.7%**

Several sessions were held with students at tertiary institutions. These provided a more efficient means of obtaining a large number of respondents at a single session. These sessions were often followed by a brief description of the research project and some of the earlier results. Minimal information was provided beforehand, other than the standard introductory material to avoid influencing participants.

In the largest rating session [Flinders University] slide #1 was misplaced and could not be used. As this session involved 94 participants, the omission meant that the responses to slide #1 totalled 225 instead of 319.

9.5 DEFICIENCIES IN RESPONSES

In tabulating the responses of participants, several deficiencies were detected. These were the use of split ratings and half ratings, and the use of zero as the base point.

(1) Split Ratings and Half Ratings

The instructions given at the outset were explicit in asking respondents to rate the slides on a 1 - 10 scale and this was reinforced by the reproduction of the scale at the top of the rating sheet. Despite this, a number of respondents divided their ratings and gave either a half rating [e.g. 5½] or a split rating [e.g. 5 - 6]. Seventeen respondents split or halved a total of 201 slide ratings - this represents 0.39% of the total. Ten of these respondents were in the Flinders University sample.

In ten cases, only 1, 2 or 3 slides were split in this way. One individual split 65 of the slides, 40% of the total. The remaining six respondents split 8, 12, 18, 22, 27, and 39 slides, respectively.

In all of these cases, the rating was taken down to the next integer [e.g. 5.5 became 5]. While it could be argued that some accuracy was lost by this decision, it was considered that, unless all respondents were given the opportunity of splitting ratings, every split rating was an aberration.

(2) Zero Ratings

Seven respondents used zero ratings instead of one for the lowest rating of slides. This was despite the verbal instructions reinforced by the 1 - 10 scale at the top of the rating sheet. Three respondents used zero for only one slide, one used it for two slides, another for four slides and another for six slides. One respondent rated 22 slides as zero.

9.6 CHARACTERISTICS OF PARTICIPANTS

Participants completed details about themselves to enable comparison of the sample with the South Australian community as a means for assessing their representativeness. The data would also enable relationships between preferences and participants to be identified. The questions covered age, gender, education, income, childhood residence and familiarity with regions of South Australia. Some respondents failed to answer all questions the question with the most missing values was about income, which was not answered by 25 respondents.

As noted in Chapter 8, 63% of the 227 surveys examined sought no data on participant characteristics. Of those that did, the most frequently sought information covering age, gender, education, employment, socio-economic status, and childhood residence.

Data were obtained from the Australian Bureau of Statistics on the characteristics of the South Australian community.

(1) Age

Table 9.17 and Figure 9.5 summarise the age characteristics of participants and compares these with the South Australian community. While the sample of respondents had a lower cut-off point of 16 years, there was no upper limit set although very few aged more than 70 years participated in the survey. Therefore the percentages for the South Australian community have been calculated for the 16 - 70 age span. Although the categories of age cohorts did not match exactly, the difference is considered slight.

Table 9.17 Age of Participants

Participant Characteristics		South Australian Community	
Age Groups	%	Age Groups	%
16 - 20	25.4	15 - 19	9.5
21 - 30	21.9	20 - 29	20.7
31 - 40	12.5	30 - 39	22.7
41 - 50	19.1	40 - 49	20.8
51 - 60	15.0	50 - 59	14.7
61 - 70	6.0	61 - 70	12.0
Total	100.0		100.0

Note: 1996 Census data used for South Australian community

Students were asked to indicate their age if less than 20. While not all did so, the following indicates the ages of those who provided this information [about 70% of the cohort]:

Age	Number
16	1
17	14
18	24
19	19

The respondent sample closely paralleled the community age profile in three of the six cohorts but differed in the other three. The large number of students in the sample resulted in the youngest cohort, 15 - 20 years, being over-represented over two-fold compared with the community. At the other end of the scale, there are many more people in the community greater than 60 years old than were represented in the sample. The sample also somewhat under-represented the 30 - 40 age group.

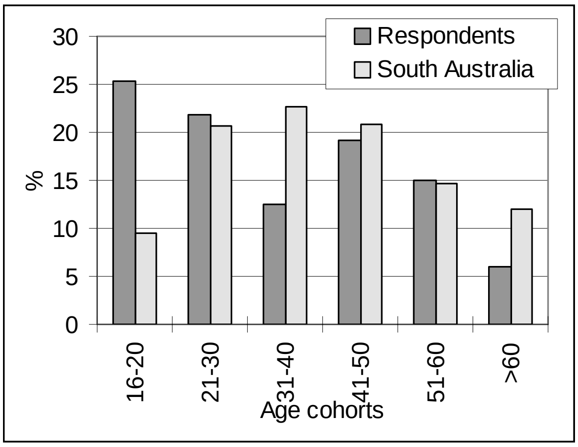


Figure 9.7 Ages of Participants

Gender of Participants

The gender of the participants is slightly weighted to males compared with the community but the difference is not considered significant [Table 9.18].

Table 9.18 Gender of Participants

Gender	Participants	Community
Males	55.1%	49.6%
Females	44.9	50.4

Note: 3 missing values

Educational Levels of Participants

A six level classification of education was used and this yielded the results indicated in Table 9.19.

Table 9.19 Educational levels of participants

Education	**%**
Below year 10	0.3
Year 10	6.3
Year 12	41.2
Technical/trade qualification	10.7
Degree or diploma	21.7
Post graduate degree or diploma	19.8
Total	100.0

Note: 1 missing value

The ABS uses a far more complex form of classification, involving nine levels. Table 9.20 summarises the approximate equivalents of the community for the survey.

Table 9.20 Educational levels of community

Education	%
No qualifications/inadequate description	75.1
Basic vocational/skilled vocational	13.3
Assoc diploma/undergrad diploma/degree	10.0
Post graduate degree or diploma	1.6
Total	100.0

Overall the participants were far more highly educated than the community at large [e.g. nearly 20% held postgraduate qualifications, compared with 1.6% in the community]. Although participation in the survey required no qualifications or experience, and this was emphasised in the publicity, relatively few people without qualifications appeared willing to participate.

Family Income

This question was the least satisfactory of the participant information questions as the question was labelled "Family Income". This terminology was used to cover the situation where an unemployed person may have a partner earning an income, and also to cover full-time students to reflect their parent's income. Without this provision these respondents would be listed as having no income. Some respondents probably considered only their own income while others may have considered their family income. A further problem is that many students would probably not know their parent's income - the same problem may occur regarding the income of one's partner.

Table 9.21 Income Comparison

Income	Participants	South Australian
< $20,000	16.3%	37.4%
$20 - 30,000	13.3	26.4
$30 - 40,000	17.0	21.4
$40 - 50,000	13.9 }	}
$50 - 60,000	10.9 } 53.4	} 18.7
> $60,000	28.6 }	}
Total	100.0	100.0

Source: ABS, Weekly earnings, South Australia, Aug 1997
Note: 25 missing values in participant's incomes

Table 9.21 compares the responses of participants with the wages and salaries of South Australians.

The weekly earnings data of the ABS do not correspond exactly with the annual income question of the survey, but the best approximation is shown. Although the ABS data were for 1996, it is unlikely that the proportions would have changed significantly.

Bearing in mind the questionable reliability of the participant data on income, the figures suggest that the sample enjoyed much higher incomes than the community. The proportion in the lowest income category was less than half that of the community, while the proportion in the highest category was nearly three-fold the community representation.

Country of Birth

Table 9.22 summarises the birthplace of the participants and compares them with the community. The participants parallel fairly closely the South Australian community's birthplace characteristics.

Table 9.22 Birthplace of Participants

Birthplace	Participants	Community
Australia	80.5%	76.1%
New Zealand	1.3	0.8
Europe [incl. UK]	13.2	18.0
Other	4.9	3.6

Note: 11 missing values

The respondents from Europe were drawn mainly from the UK, but also included Poland, Denmark, Sweden and Germany. The 'Other' category covered United States [5] and Canada [2], Asia [Japan, South Korea, Indonesia], South Africa, Maldives, Nauru and Papua New Guinea.

Childhood residence

Table 9.23 summarises the location of the childhood residence of participants. No equivalent data are available covering the community.

Table 9.23 Childhood Residence

Childhood Residence*	%
In the country	24.8
In a city	57.4
Both	17.9
Total	100.0

* Question: "Where did you grow up [0 – 10 years]?"

Given that 73% of South Australian live in Adelaide, these results suggest that a slightly greater proportion of the survey participants resided in the country - at least during their childhood.

Familiarity with South Australia

Participants were asked to rate their familiarity with six regions of South Australia and the results are summarised by Table 9.24 and Figure 9.8.

Table 9.24 Familiarity with South Australian Regions

	Familiarity		
Region	**Very**	**Somewhat**	**Nil**
Far north	14.6	50.6	34.8
Flinders Ranges	27.0	52.7	20.4
Agricultural	25.1	58.6	16.3
Mt Lofty Ranges	39.5	45.8	14.7
River Murray	19.4	66.1	14.4
Coast	42.9	51.7	5.3

Note: 3 missing values in the Far North category

A 3-point rating scale was used: *very familiar*, *somewhat familiar*, and *not familiar*. The rating is inherently subjective and provides only a general indication of familiarity. Nevertheless, it indicates that participants were most familiar with the Mt Lofty Ranges, followed by the coastal region. Participants were least familiar with the far north region and surprisingly the agricultural region was the next least familiar region.

Allocating two points for "very familiar" and one point for "somewhat familiar" and zero for nil familiarity yields the results shown in Table 9.25.

The scoring indicates that the coast and the Mt Lofty Ranges are the regions with which participants were most familiar. The Flinders Ranges and agricultural region were of comparable familiarity. Participants indicated a relatively low familiarity with the River Murray and the Far North regions.

Table 9.25 Scoring of Regional Familiarity

Region	Familiarity Score
Coast	129
Mt Lofty Ranges	118
Flinders Ranges	81
Agricultural region	75
River Murray	58
Far North	43

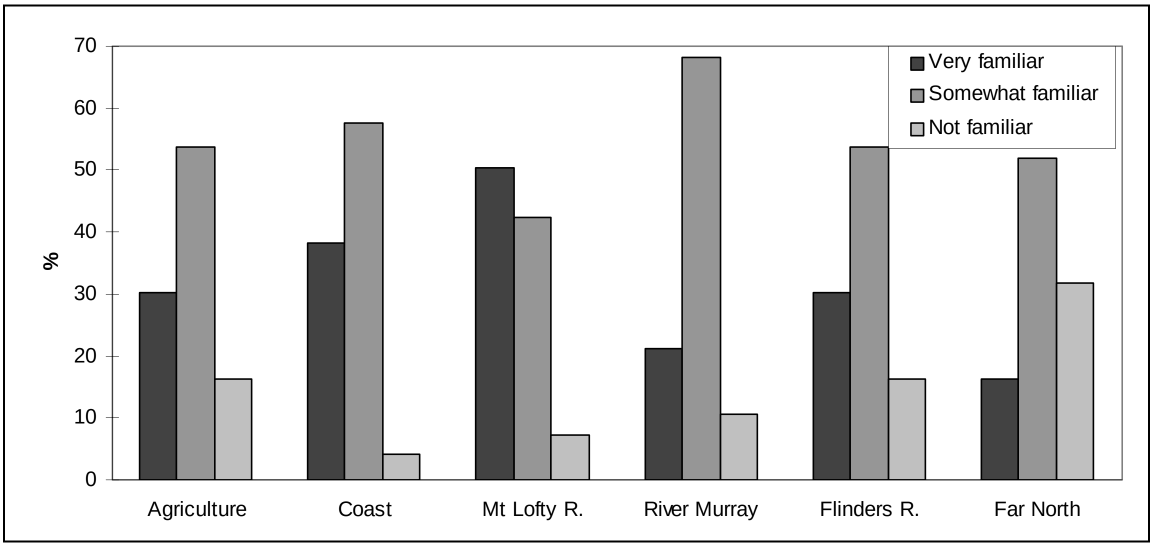


Figure 9.8 Familiarity with South Australian Regions

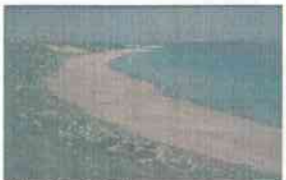
Set of 160 Scenes Scenes 1 - 32


#1, $\bar{x}$ = 4.76


#2, $\bar{x}$ = 6.37


#3, $\bar{x}$ = 3.93

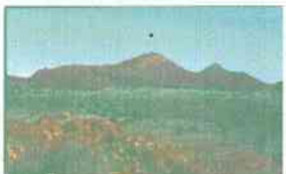

#4, $\bar{x}$ = 6.49


#5, $\bar{x}$ = 7.65


#6, $\bar{x}$ = 7.42


#7, $\bar{x}$ = 6.56


#8, $\bar{x}$ = 3.63


#9, $\bar{x}$ = 7.03


#10, $\bar{x}$ = 8.18 Interstate


#11, $\bar{x}$ = 4.89

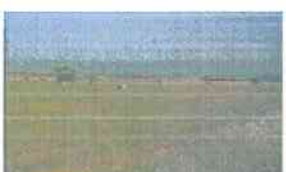

#12, $\bar{x}$ = 5.39


#13, $\bar{x}$ = 4.94


#14, $\bar{x}$ = 6.66

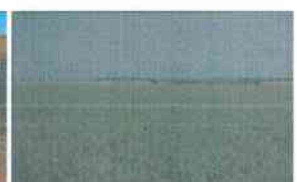

#15, $\bar{x}$ = 8.19 Interstate


#16, $\bar{x}$ = 4.94


#17, $\bar{x}$ = 4.79


#18, $\bar{x}$ = 8.52


#19, $\bar{x}$ = 6.87


#20, $\bar{x}$ = 4.93


#21, $\bar{x}$ = 5.58


#22, $\bar{x}$ = 4.67


#23, $\bar{x}$ = 8.16


#24, $\bar{x}$ = 4.59


#25, $\bar{x}$ = 5.74


#26, $\bar{x}$ = 4.35


#27, $\bar{x}$ = 4.78


#28, $\bar{x}$ = 4.74


#29, $\bar{x}$ = 5.06


#30, $\bar{x}$ = 6.16


#31, $\bar{x}$ = 7.81


#32, $\bar{x}$ = 8.27

Scenes 33 - 64


#33, $\bar{x}$ = 7.55


#34, $\bar{x}$ = 6.15

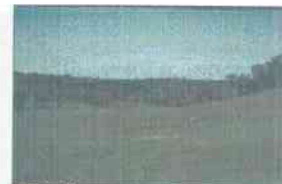

#35, $\bar{x}$ = 7.51


#36, $\bar{x}$ = 6.13


#37, $\bar{x}$ = 4.54


#38, $\bar{x}$ = 5.11


#39, $\bar{x}$ = 5.41


#40, $\bar{x}$ = 5.41


#41, $\bar{x}$ = 6.09


#42, $\bar{x}$ = 3.39


#43, $\bar{x}$ = 7.07


#44, $\bar{x}$ = 6.98


#45, $\bar{x}$ = 5.92


#46, $\bar{x}$ = 5.48


#47, $\bar{x}$ = 7.56


#48, $\bar{x}$ = 6.80


#49, $\bar{x}$ = 6.66


#50, $\bar{x}$ = 6.14


#51, $\bar{x}$ = 7.04


#52, $\bar{x}$ = 5.29


#53, $\bar{x}$ = 5.64


#54, $\bar{x}$ = 3.57


#55, $\bar{x}$ = 5.83


#56, $\bar{x}$ = 4.69


#57, $\bar{x}$ = 6.08


#58, $\bar{x}$ = 6.95


#59, $\bar{x}$ = 4.80


#60, $\bar{x}$ = 5.40


#61, $\bar{x}$ = 6.87


#62, $\bar{x}$ = 5.42


#63, $\bar{x}$ = 6.38


#64, $\bar{x}$ = 2.40

Scenes 65 - 96

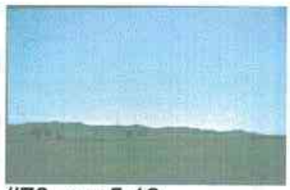

#65, x = 5.11


#66, x = 4.99


#67,x = 8.78, Interstate


#68, x = 5.16


#69, x = 7.30


#70, x = 5.19


#71, x = 5.13


#72, x = 6.84


#73, x = 4.43


#74, x = 5.55


#75, x = 4.47


#76, x = 4.36


#77, x = 5.40


#78, x = 6.97


#79, x = 4.11


#80, x = 8.71


#81, x = 6.04


#82, x = 5.33


#83, x = 3.98


#84, x = 5.59


#85, x = 5.98


#86, x = 4.43


#87, x = 4.01


#88, x = 6.38

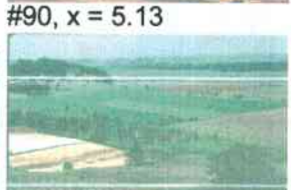

#89, x = 5.36

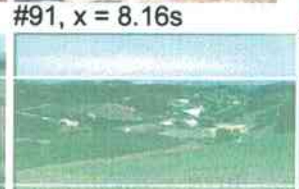

#90, x = 5.13

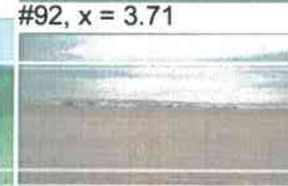

#91, x = 8.16s


#92, x = 3.71


#93, x = 6.80


#84, x = 5.59


#95, x = 5.48


#96, x = 3.11

Scenes 97 - 128


#97, x = 8.23


#98, x = 6.43


#99, x = 4.50


#100, x = 6.66


#101, x = 4.12


#102, x = 4.13


#103, x = 6.11


#104, x = 8.38


#105, x = 5.79


#106, x = 7.63


#107, x = 8.05


#108, x = 7.55


#109, x = 6.96


#110, x = 4.84

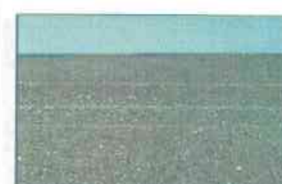

#111, x = 5.93


#112, x = 4.73


#113, x = 7.41


#114, x = 7.29


#115, x = 6.15


#116, x = 2.81


#117, x = 4.30


#118, x = 4.75


#119, x = 5.15


#120, x = 8.41


#121, x = 6.68


#122,x = 8.69 Interstate


#123, x = 5.49


#124, x = 7.55


#125, x = 4.93


#126, x = 6.68


#127, x = 5.77


#128, x = 8.88

Scenes 129 - 160

#129, $\bar{x}$ = 4.20

#130, $\bar{x}$ = 5.31

#131, $\bar{x}$ = 3.28

#132, $\bar{x}$ = 6.12

#133, $\bar{x}$ = 4.11

#134, $\bar{x}$ = 7.95

#135, $\bar{x}$ = 5.16

#136, $\bar{x}$ = 7.62

#137, $\bar{x}$ = 7.98

#138, $\bar{x}$ = 5.37

#139, $\bar{x}$ = 4.64

#140, $\bar{x}$ = 7.22

#141 $\bar{x}$ = 7.86

#142, $\bar{x}$ = 6.30

#143, $\bar{x}$ = 5.91

#144, $\bar{x}$ = 3.62

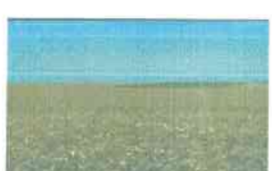
#145, $\bar{x}$ = 4.27

#146, $\bar{x}$ = 5.35

#147, $\bar{x}$ = 7.01

#148, $\bar{x}$ = 6.33

#149, $\bar{x}$ = 5.01



#150, $\bar{x}$ = 3.28

#151, $\bar{x}$ = 6.87

#152, $\bar{x}$ = 7.40

#153, $\bar{x}$ =5.42

#154, $\bar{x}$ = 6.58

#155, $\bar{x}$ = 4.99

#156, $\bar{x}$ = 5.41

#157, $\bar{x}$ = 7.68

#158, $\bar{x}$ = 4.64

#159, $\bar{x}$ = 4.37

#160, $\bar{x}$ = 6.62

CHAPTER TEN

ANALYSIS OF PREFERENCES

10.1 APPROACH TO ANALYSIS

The analysis presented comprises two major parts:

In the first part, brief analyses are presented covering:

- the overall statistics of the data set
- the groups of respondents
- the respondent characteristics such as age, gender, education, income etc. It also examines the influence that familiarity with the South Australian landscape has on preferences
- the preference ratings of scenes are examined on a regional basis, assessing the overall ratings of landscapes at the level of the landscape region and landscape unit.

In the second more extensive part, detailed analyses are presented covering the preferences related to landscape types or the content of scenes. This covers the influence of following attributes on preferences:

- land form
- land cover
- land use
- presence of water
- diversity
- naturalism
- cloudiness
- colour

Finally a comprehensive summary and discussion of the findings is presented.

ANALYSIS OF PREFERENCES PART A

10.2 OVERALL STATISTICS

In this section the overall statistics of the responses to the scenes are presented.

The data set comprises 319 respondents and 160 scenes, a total possible of 51,040 data units. However because the first slide was omitted from the assessment by the 94 students at the Flinders University, there are 50,946 data units. This data set excludes the data relating to respondent characteristics which comprises a further 3,828 data units [i.e. 319 by 12 characteristics of data].

This section examines firstly the statistics relating to the ratings of 160 scenes and the following section examines the statistics relating to the 319 respondents. Appendix 10.1 summarises the means and standard deviations of each scene.

(1) Responses to Scenes

The mean of responses to the 160 scenes was 5.88 with a standard deviation of 0.92 that indicates a quite tight distribution. Table 10.1 summarises the key statistics for the distribution of responses to the scenes.

Table 10.1 Key Statistics of 160 Slide Ratings

Statistic	Value
Mean	5.8806
SE of Mean	5.163E-02
Median	5.94
Mode	5.93
SD	0.92
Variance	0.85
Skew	-0.15
Kurtosis	0.44
Range	5.83
Minimum	2.67
Maximum	8.50
Percentiles	
25	5.32
50	5.94
75	6.47

Omitting the five interstate scenes, the mean of South Australian scenes is 5.83 and standard deviation of 0.93. These are the figures that will be used in the analysis of landscape types in the second part that focuses on the South Australian landscape. However in this first part the statistics for the entire set of 160 scenes are described.

Figure 10.1 shows the distribution of means for the responses to scenes.

The standard deviation of 0.92 indicates that, assuming the distribution is normal;

- +/- 1 SD covers 68% of observations:

4.98 to 6.80
- +/- 2 SDs covers 95.5% of observations: 4.04 to 7.72
- +/- 3 SDs covers 99.7% of observations: 3.12 to 8.64

Thus over 95% of responses lie between the ratings of 4 and 8.

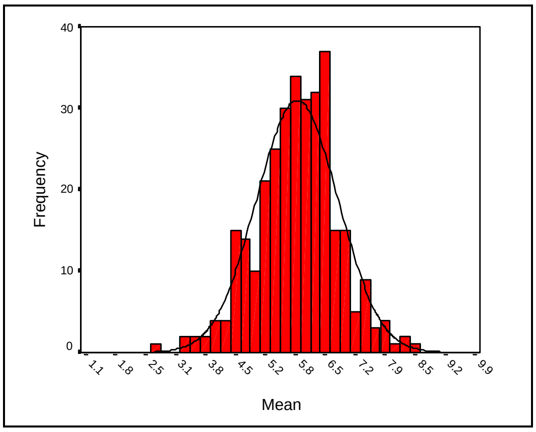


Figure 10.1 Distribution of Means of 160 Slide Ratings

The median of the 1 - 10 rating scale is 5.5 so the mean of 5.8806 is slightly above this point. The distribution of means has a slight negative skew [-0.15] towards the higher values. The 5% trimmed mean is 5.8843, very near to the mean and thus indicating that any outliers do not greatly alter the mean. The mean therefore provides a good measure of the distribution. The interquartile range is 1.13 and covers 50% of the distribution between the 25 and 75 percentiles.

Figure 10.2 plots the means against the standard deviations. This indicates a very weak relationship, $y = -0.43x + 6.76$, $r^2 = 0.05$, between the mean and standard deviations. Interestingly the distribution suggests that as the quality of a scene is perceived to increase, so the standard deviation [or variance] decreases. Variance would normally be expected to increase with ratings, i.e. higher the rating, the higher the SD. The trend is thus opposite of that expected. This indicates that respondents rate scenes of high quality slightly more consistently than scenes of lower quality. A similar occurrence was found by Lamb and Purcell, 1990 for respondents assessing naturalness of scenes, and by Williamson and Chalmers, 1982. It suggests that the judgement of what a community prefer is more homogeneous than what it dislikes.

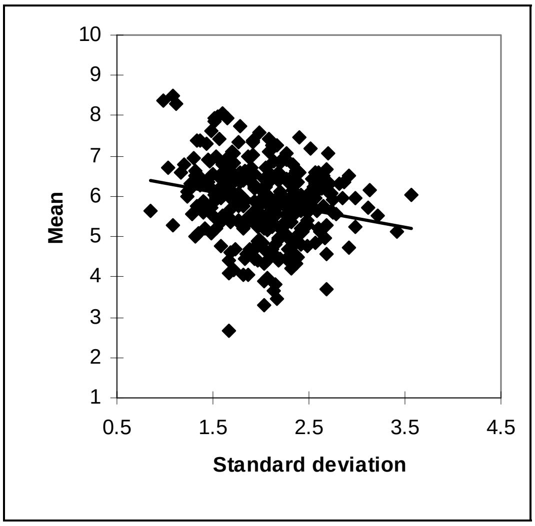


Figure 10.2 Means vs Standard Deviations of Slide Ratings

QQ plots were used to examine the normality of the distribution using. Figure 10.3 shows a QQ plot for the means of the ratings of 160 scenes that indicate that the distribution is normal.

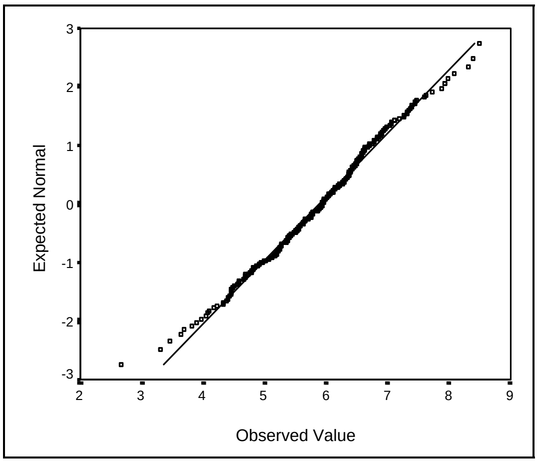


Figure 10.3 QQ Plot of Means of Scenes

The normality of the distribution is further examined by the stem and leaf plot of Figure 10.4. This indicates a high degree of symmetry in the distribution of ratings.

Figure 10.5 summarises the distribution of scenes arranged in ascending order. Overall the distribution has a slight ‘s’ curve, curving down at the lower ratings and arcing up slightly at the top ratings. This suggests a tendency to place a slightly more extreme value on scenes of low or high quality. The simplest line of best fit, a simple linear trend

```
4.00 Extremes    (=<3.6)
   4.00        3 .  6889
  17.00        4 .  00012333444444444
  28.00        4 .  5555566666677777888888999999
  47.00        5 .  00001111111222222222222222333333333333344444444
  72.00        5 . 555555555555555666666666666777777777777777788888889999999999999999999999
  72.00        6 . 000000000000001111111111122222222222222223333333333333333444444444444444
  46.00        6 .  5555555555555555666666666677777888888899999999
  18.00        7 .  000011122333334444
   7.00        7 .  6678999
   1.00        8 .  0
   3.00 Extremes    (>=8.3)

 Stem width:    1.00
 Each leaf:      1 case
```

Figure 10.4 Stem and Leaf Plot of Means of Scenes

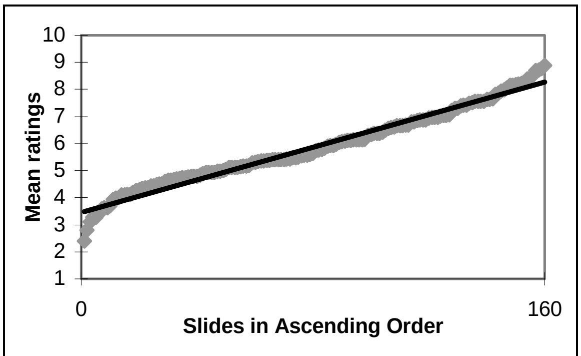


Figure 10.5 Ratings of Scenes Arranged in Ascending Order

line[80], has the equation: $y = 0.03x + 3.45$, $r^2 = 0.98$. This line is shown as the black line on Figure 10.5 and provides a good approximation with the exception of the lowest and highest rated scenes. The equation indicates that, arranged in ascending order of means, the scenes increase on average by 0.03 for each scene, commencing at a base of 3.45. Thus the 50th rated scene has a score of 4.95.

(2) Ratings of Respondents

The previous set of statistics described the ratings for the 160 scenes and examined the extent of variation in the ratings of scenes. In this section the ratings of the 319 respondents are described. It examines the extent of variation between respondents, the degree to which they differ in their rating of the scenes. Table 10.2 summarises the key statistics for the 319 respondents' ratings.

80. The two-order polynomial line of best fit has the equation: y = 4E-05x2 + 0.02x + 3.61; r2 = 0.98. The r2 is virtually identical to the straight line and the added complexity of the formula is not considered warranted.

Table 10.2 Key Statistics of 319 Respondents' Ratings

Statistic	Value
Mean	5.88
SE of Mean	0.119
Median	5.69
Mode	4.43
SD	1.42
Variance	2.00
Skew	0.11
Kurtosis	-0.635
Range	6.48
Minimum	2.40
Maximum	8.88
Percentiles	
25	4.81
50	5.69
75	6.96

The mean is identical to that of the ratings of scenes [5.8806] that is to be expected, but most other parameters differ. Overall the distribution has a greater spread than that of the scenes and this is reflected by the larger standard deviation [1.42 here cf 0.92] and range [6.48 cf 5.83]. The 5% trimmed mean is 5.8783 that is similar to the mean and indicates the absence of any significant outliers that may affect the validity of the mean. The interquartile range of means is 2.15 which is nearly double that of the scenes [1.13], reflecting the greater spread of the distribution.

The distribution of respondents' mean ratings [Figure 10.6] indicates a series of high points and a positive skewness towards the lower ratings. The QQ plot for the distribution of respondent means [Figures 10.7] indicates a high level of normality, while the stem and leaf plot [Figure 10.8] indicates a fairly symmetrical distribution, though as for the histogram, it has a depression in the middle.

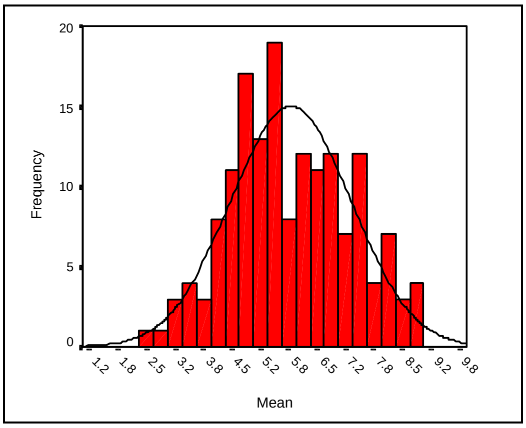


Figure 10.6 Distribution of Mean Ratings of Respondents

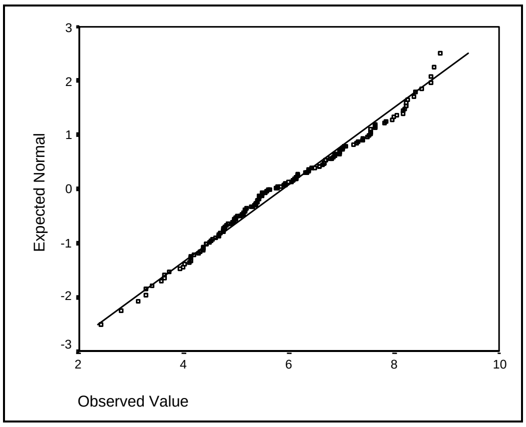


Figure 10.7 QQ Plot of Respondents' Means

```
Frequency    Stem &  Leaf

   1.00       2 .  4
   1.00       2 .  8
   4.00       3 .  1223
   6.00       3 .  566799
  15.00       4 .  011111233334444
  21.00       4 .  556666777777788999999
  27.00       5 001111111123333333444444444
  13.00       5 .  5555677789999
  17.00       6 .  00011111113333344
  18.00       6 .  556666667788889999
  11.00       7 .  00002233444
  12.00       7 .  555556668899
   9.00       8 .  011122234
   5.00       8 .  56778

 Stem width:     1.00
 Each leaf:      1 case(s)
```

Figure 10.8 Stem and Leaf Plot Respondents' Means

Figure 10.9 shows the distribution of ratings by respondents arranged in ascending order, similar to Figure 10.5 of slide ratings.

The curve is very similar to the former curve and the equation for the line of best fit[81] is similar: $y = 0.01x + 4.33$, $r^2 = 0.93$.

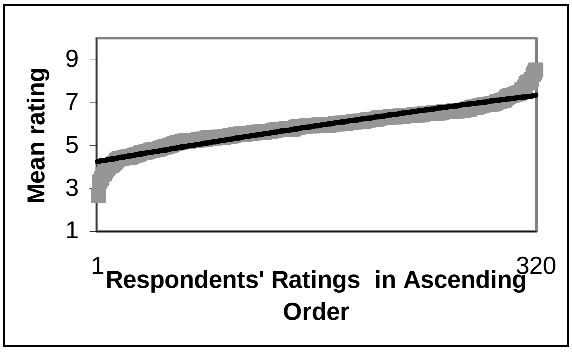


Figure 10.9 Ratings of Respondents Arranged in Ascending Order

A z score transformation[82.] of the respondent ratings of scenes was undertaken. The effect of this is to remove linear differences which occur between respondents, for example their starting points [i.e. lowest rating] may differ and some may use the entire range so their intervals between ratings are larger while others are more restricted [Brown & Daniel, 1990].

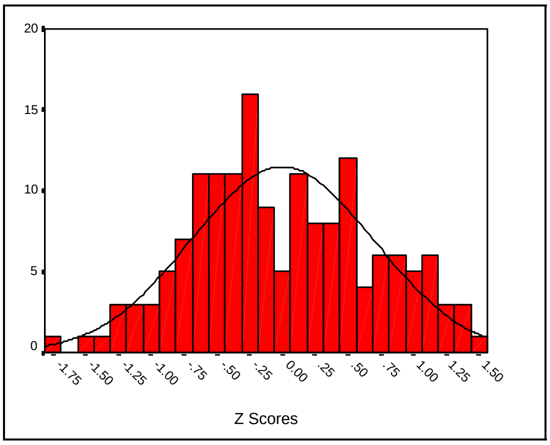


Figure 10.10 Distribution of Z scores for Respondents

The distribution as shown in Figure 10.10 is very similar to the conventional distribution [Figure 10.1]. The mean of the respondents' distribution is of course zero and the standard deviation of 0.52. The range of z scores is from -1.85 to 1.48. The respondents displaying the extreme values [Figure 10.10] had directly opposite

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81. The two order polynomial is: y=-5E-06x2 + 0.01x + 4.2; r2 = 0.93

82. Z scores show the distance from the mean in standard deviation units. Thus a z score of 1.50 is 1.5 SDs from the mean.

responses to the same set of scenes. The respondent with a z score of -1.85 rated the scenic quality as 1 in 54 of the scenes, however the respondent with the z score of 1.48 gave the highest rating of 10 to 39 scenes. By far the majority of respondents however, followed the instructions to use the entire range of the rating scale and the overall distribution assumes a classical bell shape.

Consideration was given to using z scores as the unit for analysis. While the z scores deals with linear differences, the raw data has the distinct advantage that it reflects the original rating scale and the results will thus be in units which will be more readily interpretable and understandable. Z scores are particularly useful for small samples but with over 300 respondents and a distribution which has been shown to be close to normal, z scores offer no advantage.

(3) Correlations between Respondents

The correlations [r] between respondents provide a measure of respondent consistency in rating the scenes. The correlations assess the level of agreement between respondents. Where there is a high level of agreement, i.e. the scene is rated equally by respondents, then the correlation approaches 1.00. Low levels of agreement yield figures that approach zero. Statisticians prefer to use r^2 as the basis, thus a correlation of 0.7 indicates 0.49 level of agreement. Table 10.3 illustrates a section of the correlations and Figure 10.11 illustrates the distribution.

With 319 respondents the total possible correlations exceed 100,000. The SPSS program is limited to 100 variables [i.e. respondents] so the correlations were performed in batches of less than 100. Overlaps between the batches enabled a check of the consistency of the results between them and they were found to be identical[83].

Table 10.3 Correlations between Respondents

Resp	1	2	3	4	…	318	319
1	1.00	0.68	0.75	0.70			
2		1.00	0.67	0.55			
3			1.00	0.59			
4				1.00			
5							
6							
7							
…							
318						1.00	0.62
319							1.00

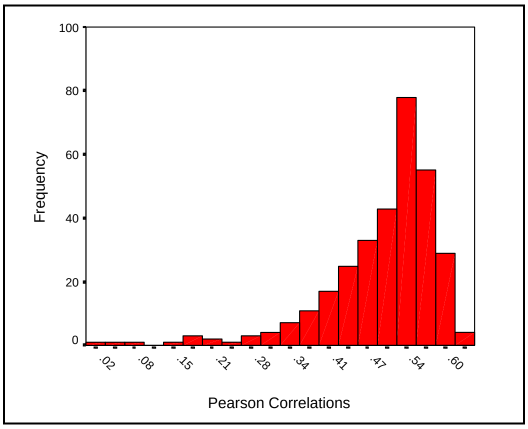


Figure 10.11 Histogram of Correlations

The average correlation for each respondent was determined from each row [or column]. These provide an overall assessment of the degree of agreement for each respondent with other respondents. It is not to be expected that this would approach 1.00 as it would be extremely unlikely that all respondents would be in agreement over all of the scenes. The correlations also enable the identification of respondents whose ratings differ considerably from all others.

83. For example batch one covered respondents 90 - 189 while batch 2 covered 180 - 265, thus with an overlap of 180 - 189. The results for 180 - 189 are as follows:

	Correlations	
Resp.	90 - 189	180 - 265
180	1.00	1.00
181	.57	.57
182	.58	.58
183	.53	.53
184	.67	.67
185	.65	.65
186	.53	.53
187	.65	.65
188	.59	.59
189	.52	.52

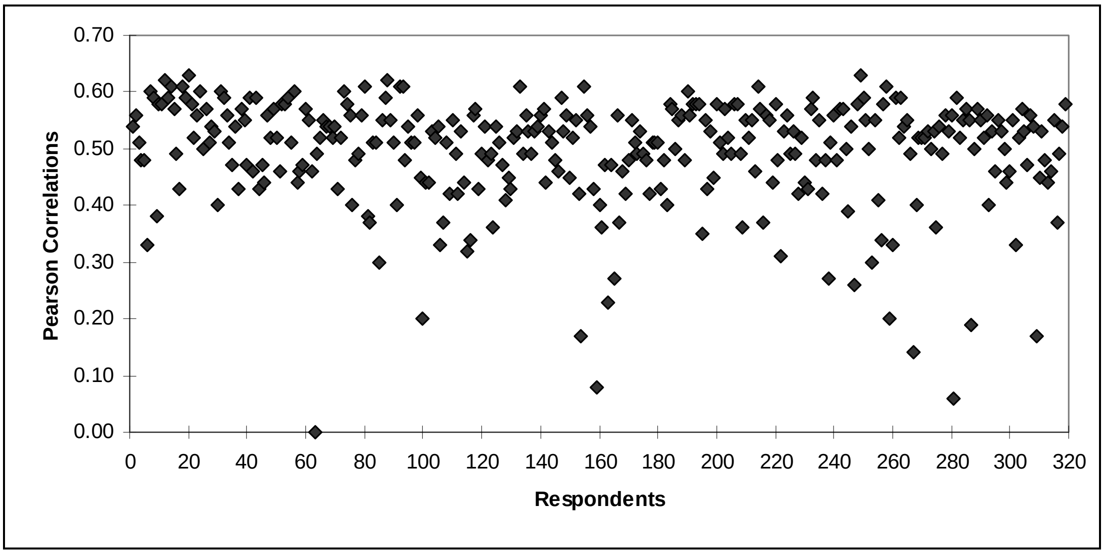


Figure 10.12 Distribution of Correlations between Respondent Ratings

Table 10.4 Respondents with Low Correlations

Category	Respondent	Correlation	Group	Characteristics*
0.2 - 0.299	238	.27	Flinders Uni	Australia, M, 18
	165	.27	Pt Adelaide TAFE	England, F, 21-30
	247	.26	Flinders Uni	Australia, M, 51-60
	163	.23	Pt Adelaide TAFE	Australia, F, 41-50
	100	.20	Uni SA Magill	Japan, M, 21-30
	259	.20	Flinders Uni	Australia, M, 31-40
0.1 - 0.199	287	.19	Flinders Uni	Australia, M, 18
	154	.17	Pt Adelaide TAFE	Australia, F, 21-30
	309	.17	Flinders Uni	UK, M, 41-50
	267	.14	Flinders Uni	Australia, M, 19
0 - 0.99	159	.08	Pt Adelaide TAFE	Australia, M, 18
	281	.06	Flinders Uni	Australia, M, 19
	63	.00	Public invitation	Australia, F, >60

* Respondent birthplace, gender, age group

Figure 10.12 provides a visual indication of the distribution of Pearson correlations between the ratings of the respondents. Figure 10.12 provides a histogram of the distributions. All correlations are significant at 0.01 level (2 tailed). The mean correlation [r] was 0.49 that indicates that the respondents were in agreement with about a quarter [i.e. $r^2 = 0.24$] of the scenes.

The distribution identified several respondents with low correlations. Those with correlations less than 0.3 totalled thirteen as summarised in Table 10.4 together with the groups they were in and their individual characteristics.

Notably all but one of the respondents with low correlations were from the student populations. These include only three who were born overseas which is 23% of the sample compared with 18% for the entire 319 respondents. The difference is not significant [χ^2= 0.5, df 1, p = 0.5]. Five of the respondents are males in their late teens, 38.5% of the sample compared with 25% in the entire respondent population. Again the difference is not significant [χ^2= 1.33, df 1, p = 0.25].

The sole non-student respondent had a correlation of zero. Inspection of her rating form indicated that she omitted scenes 2, 3 and 8. It is possible that her ratings were assigned to different scenes, however comparison of her ratings with other respondents, including examination of adjacent ratings to see if they indicated misplacement, did not indicate this. It was therefore included in the sample.

Consideration was given to deleting the twelve student respondents with low correlations. This was rejected because firstly, they amount to less than 4% of the total respondents and so their influence is minimal, and secondly and more importantly, they represent a segment of the population whose landscape preferences differ markedly from that of the general population. This may be a function of their age and it seems important that their opinions should not be excluded.

(4) Overall Statistics - Summary

The distribution of responses to the scenes has a mean of 5.88, slightly above the scale's median [5.5] and a standard deviation of 0.92 that suggests a tight distribution. Over 95% of the responses occur between the ratings of 4 and 8. The distribution of respondent's ratings is somewhat more widely spread, with a SD of 1.42. Both distributions exhibit normality. Correlations between respondents provide a measure of respondent consistency. The overall average was 0.49 that indicates that respondents were in agreement with about quarter of the scenes. Thirteen respondents had low correlations [<0.3] and all but one of these were students including several who were overseas born and several in their late teens. Neither attribute was found to be significant.

10.3 GROUP STATISTICS

(1) Aggregation of Groups

The slides were shown to a total of seventeen groups, ranging in size from two to 94. The group participants were allocated into nine major groups as indicated by Table 10.5. The nine consolidated groups used for analysis are summarised by Table 10.6. It is recognised that groups 2 and 4 are small but neither group can be easily combined with

Table 10.5 Consolidation of Respondent Groups

Group	Participants	Number	Original Group	Consolidated Group
1.	1	1	Home [author]	DEHAA
2.	4 - 23	20	DEHAA [EPA/EPD]	DEHAA
3.	24 - 48	25	DEHAA [EPA/EPD]	DEHAA
4.	49 - 60	12	DEHAA [Netley]	DEHAA
5.	61 - 62	2	DEHAA [Kensington]	DEHAA
9.	93 - 97	5	DEHAA [Kensington]	DEHAA
8.	85 - 92	8	Planning SA	Planning SA
7.	65 - 84	20	Env. Inst. of Australia	Env. Institute of Australia
11.	124 - 129	6	Uni of Adelaide Lecturers	Uni of Adelaide Lecturers
1.	2, 3	2	Home [family]	Public
6.	63, 64	2	Public invitation	Public
17.	310 - 319	10	Friends of Angove Park	Public
15.	181 - 215	35	Adelaide Bushwalkers Club	ABW
12.	130 - 158	29	Pt Adelaide TAFE	Pt Adelaide TAFE
13.	159 - 177	19	Pt Adelaide TAFE	Pt Adelaide TAFE
10.	98 - 123	26	Uni SA Magill campus	Uni SA & Uni Adelaide
14.	178 - 180	3	Uni Adelaide l/s arch students	Uni SA & Uni Adelaide
16.	216 - 309	94	Flinders University students	Flinders University students

Acronyms
ABW Adelaide Bushwalkers Club
DEHAA Department of Environment, Heritage and Aboriginal Affairs
EPA Environment Protection Agency
EPD Environment Policy Division
TAFE Technical and Further Education

Table 10.6 Groups of Respondents for Analysis

Number	Group	Respondents
1	Department of Environment, Heritage & Aboriginal Affairs	65
2	Planning South Australia	8
3	Environment Institute of Australia (South Australian Division)	20
4	University of Adelaide lecturers	6
5	Public	14
6	Adelaide Bushwalkers Club	35
7	Port Adelaide TAFE	48
8	Uni of South Australia (Magill) and Uni of Adelaide - landscape students	29
9	Flinders University students	94
	Total	319

Table 10.7 Key Statistics of Respondent Groups

Group	Mean	5% trimmed mean	SE of mean	Median	Standard Deviation	Minimum	Maximum	Inter-quartile range
1	5.97	5.95	0.11	5.97	0.96	3.96	8.50	1.14
2	6.28	6.29	0.31	6.54	0.86	4.94	7.44	1.52
3	5.85	5.84	0.18	5.70	0.80	4.46	8.07	0.58
4	5.69	5.68	0.30	5.67	0.73	4.92	6.58	1.28
5	6.13	6.08	0.20	5.96	0.75	5.18	7.94	0.83
6	5.03	5.04	0.16	5.28	0.95	3.31	6.47	1.83
7	6.07	6.12	0.13	6.17	0.93	2.67	7.63	1.16
8	6.34	6.32	0.17	6.37	0.91	4.68	8.39	1.35
9	5.85	5.83	7.86E-02	5.81	0.76	4.44	8.31	0.99

another group as they comprise, respectively, planning professionals and university lecturers. The allocation of respondent groups into these nine groups is solely for the purposes of assessing their characteristics and differences [see next section] and for the remainder of the analysis the 319 respondents are treated as a single group.

(2) Characteristics of Groups

Table 10.7 summarises the key statistics for these nine groups. These statistics indicate generally a close similarity between seemingly diverse groups. Apart from group 6 [Adelaide Bushwalkers Club], the means range over only two-thirds of a rating unit [i.e. 0.65]. The groups with the highest average ratings were the University South Australia [Magill] students [Group 8] and Planning South Australia [Group 2].

Highest mean 6.34	**+7.8%**
Overall mean 5.88	**0%**
2nd lowest mean 5.69	**-3.2%**
Lowest mean 5.03	**-14.5%**

Figure 10.13 Summary of Means

The means extend from +7.8% of the overall mean to -14.5%. However if Group 6 [ABW] is omitted, then the second lowest mean is 3.2% below the overall mean [Figure 10.13]. The standard error of the mean is reasonably small and indicates that the mean provides a good estimation for samples drawn from the same distribution.

The standard deviation varies from 0.73 to 0.96. This corresponds with the size of the total ranges, a large standard deviation such as 0.96 yields a large range - in this case 4.54, whereas the range for a small SD of 0.73 is 1.66.

The trimmed means differ only slightly from the normal means, the average difference is 0.02. This suggests that outliers are not a problem and that accordingly there is no need to analyse the results with the extreme values omitted.

The boxplot[84.] [Figure 10.14] shows the group distributions and the relationship between the groups. Apart from group 6 [Adelaide Bushwalkers Club], the medians lie across a range of 0.87 while the ABW group lies somewhat lower. The boxes vary from small for the groups 3 and 5 to large for group 6.

The ABW group [Group 6] is distinguished by its lower ratings than other groups. Its lower mean has the effect of dragging down the overall mean somewhat compared with the other groups. Without this group, the overall mean would be 5.9856 [SD 1.40], about 1.7% higher than the 5.8806 mean. While the group has experience of a wide range of landscapes across Australia it is not unique in this regard among the groups sampled and this factor does not appear to provide a sufficient explanation of the difference. Further analysis of the respondent characteristics is provided in the next section that may help elucidate the

84. The boxplot shows the interquartile range [i.e. 25% - 75% of values] and the outliers show the highest and lowest values. It provides a useful visual image of the variance of data and the relative position of differing groups.

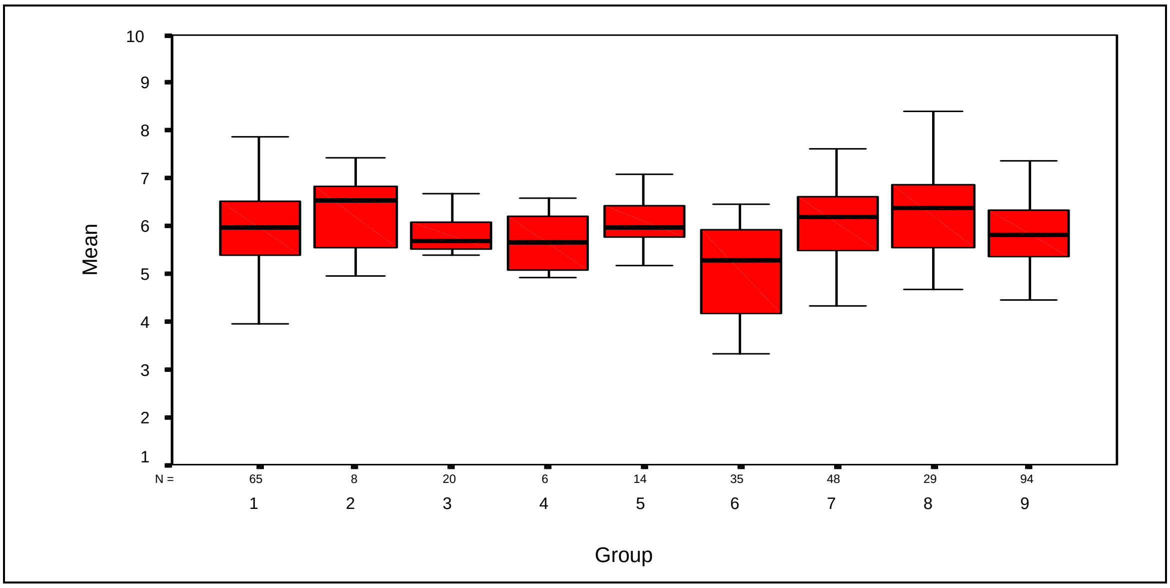


Figure 10.14 Boxplot of Group Distributions

Table 10.8 Group Ratings in Descending Order

Group	Name	Mean
8	University South Australia [Magill + Uni Adelaide l/s students	6.34
2	Planning South Australia	6.18
5	Public	6.13
7	Port Adelaide TAFE students	6.07
1	DEHAA	5.97
3	Environment Institute of Aust.	5.85
9	Flinders University students	5.85
4	University Adelaide lecturers	5.69
6	Adelaide Bushwalkers Club	5.03

Note: Groups 3 and 9 had equal mean ratings

reasons. Arranging the groups in descending order of ratings [Table 10.8] indicates that the student ratings are distributed across the scale from top through to the third from the bottom. The environmental professional respondents are largely near the mean value of 5.88 and include the groups from the Department of Environment, Heritage & Aboriginal Affairs and from the Environment Institute of Australia. Interestingly the planning professionals in Planning South Australia rated the scenes somewhat higher than the average. Public respondents were also slightly above average.

A further insight into the distribution of ratings can be gained by comparing the group means for each scene. In Figure 10.15 the slide rankings are arranged in ascending order and the average ratings for each group shown. Although the figure is not very legible in black and white [it was originally in colour] the comparison illustrates the consistency of ratings between groups. Most values occupy a narrow band along the mean. The band of values narrows slightly for the low and high values suggesting greater consistency for the scenes at the extreme ends of the rating range. The values for Group 6, Adelaide Bushwalkers Club [i.e. lowest dark line] are consistently lower than most other groups across the full range of values.

An ANOVA of all groups indicated that the differences are significant [Table10.9], however omitting Group 6 from the analysis [Table 10.10] the differences between the other groups are not significant. In both ANOVAs, the differences within the groups are far greater than between the groups.

Table 10.9 ANOVA - all Groups

	SS	df	MS	F	Sig.
Between groups	36.08	8	4.51	5.97	.000
Within groups	234.36	310	.76		
Total	270.43	318			

Table 10.10 ANOVA - all Groups Except Group 6 [ABW]

	SS	df	MS	F	Sig.
Between groups	7.49	7	1.07	1.45	.185
Within groups	203.58	276	.74		
Total	211.07	283			

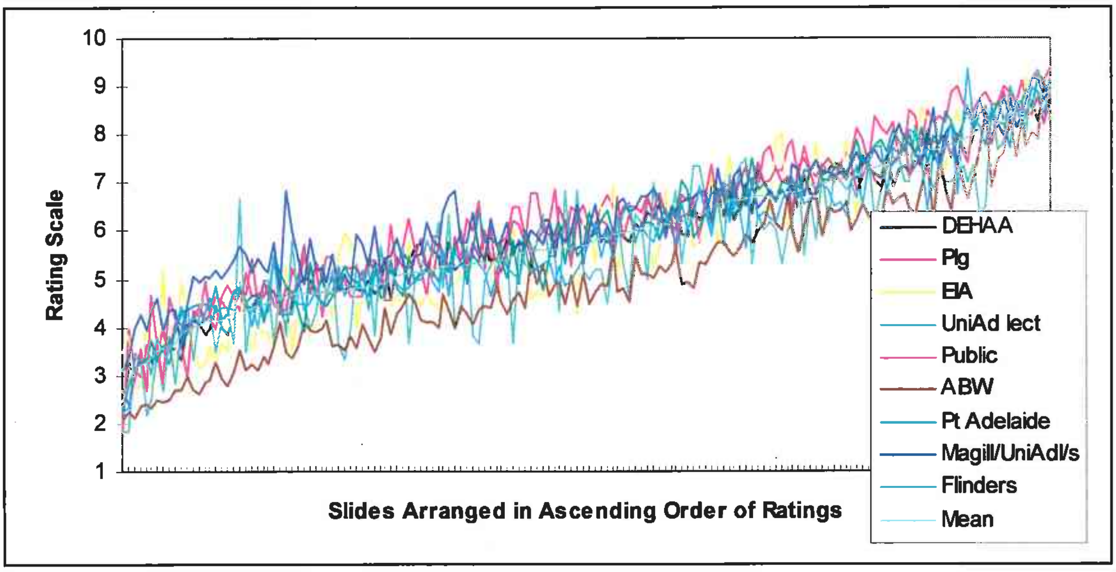


Figure 10.15 Comparison of Group Means for Slides Arranged in Ascending Order

Table 10.11 Post Hoc Test [Bonferroni] - Group 6 and Other Groups

(I) GROUP	(J) GROUP	Mean Diff (I-J)	SE	Sig.
6	1	-.9379	.182	.000
	2	-1.2534	.341	.010
	3	-.8240	.244	.029
	4	-.6586	.384	1.000
	5	-1.0998	.275	.003
	7	-1.0399	.193	.000
	8	-1.3079	.218	.000
	9	-.8229	.172	.000

The ANOVA results are further supported by post hoc tests using the Bonferroni test. Table 10.11 summarises the relationship between Group 6 and the other groups and indicates that the differences are significant in all but one instance [group 4].

The Bonferroni test for groups with group 6 excluded found none of the differences between the groups are significant. Analysis of correlations between groups indicated that most exceeded 0.90 [Table 10.12].

Frequency distributions and QQ plots were produced for each of the group data to examine the normality of distributions. Figure 10.16 contains the distributions and the QQ plots for each of the nine groups.

The groups with larger number of respondents, over about 30, generally display normal distributions, whereas those with smaller numbers display scattered distributions. Leaving aside the small distributions, the Adelaide Bushwalkers Club [group 6] has a bimodal distribution.

Although part of the ratings of this group are similar to the overall average, peaking around 5.7, the other peak is around 3.9 and it is the influence of this peak that brings its overall mean low. The students at the University of South Australia [Magill]/University of Adelaide [group 8] also had a bimodal distribution, but not as pronounced as group 5.

Table 10.12 Correlations between Groups

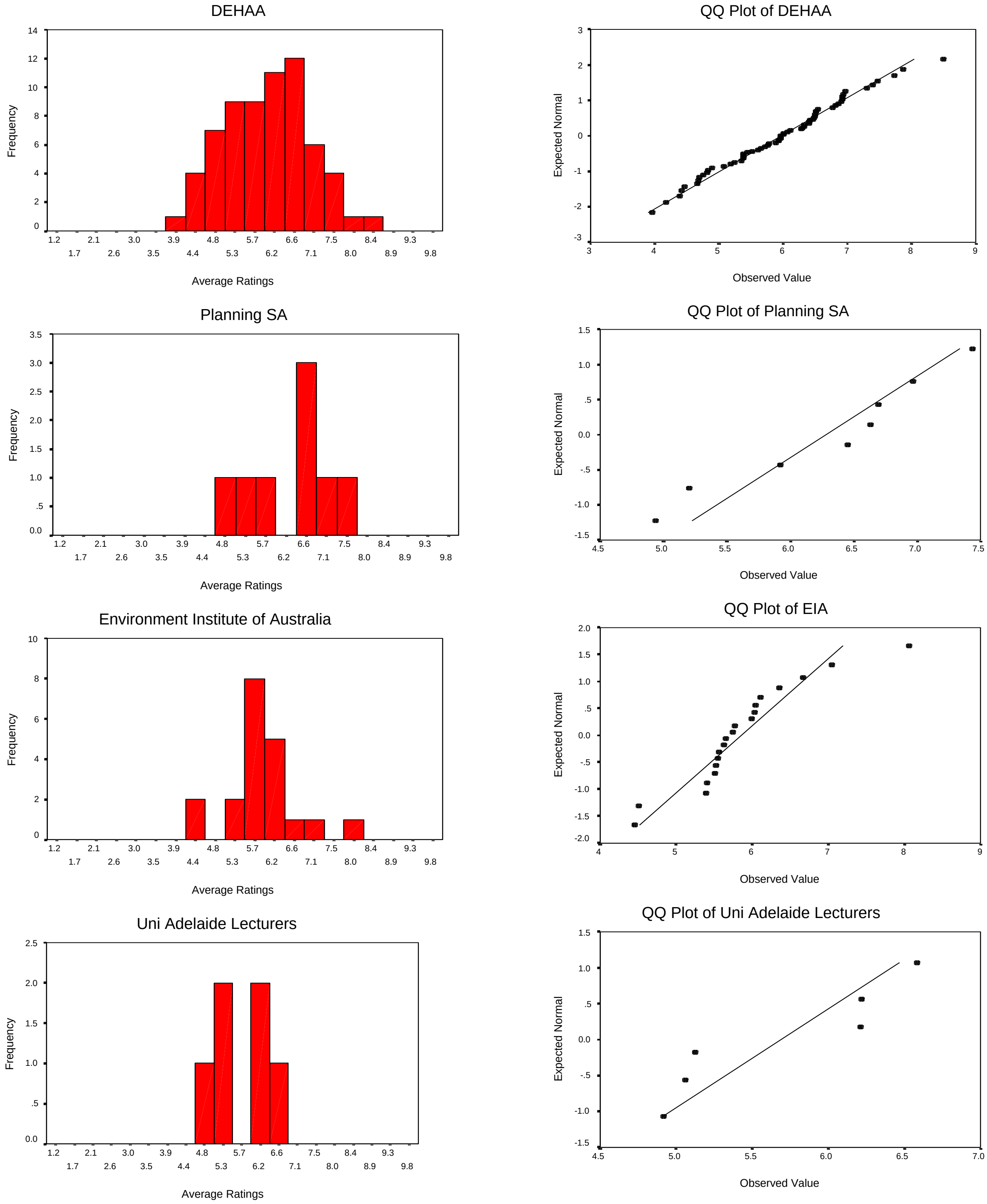
	DEHAA	Planning	EIA	UniAd	Public	ABW	PtAdTAFE	UniSA	Flinders
DEHAA	1.00	0.95	0.92	0.89	0.98	0.98	0.95	0.93	0.93
Planning		1.00	0.91	0.82	0.93	0.94	0.95	0.92	0.93
EIA			1.00	0.77	0.88	0.93	0.93	0.85	0.90
UniAd				1.00	0.86	0.86	0.82	0.87	0.84
Public					1.00	0.94	0.93	0.92	0.92
ABW						1.00	0.95	0.92	0.92
PtAdTAFE							1.00	0.94	0.96
UniSA								1.00	0.95
Flinders									1.00

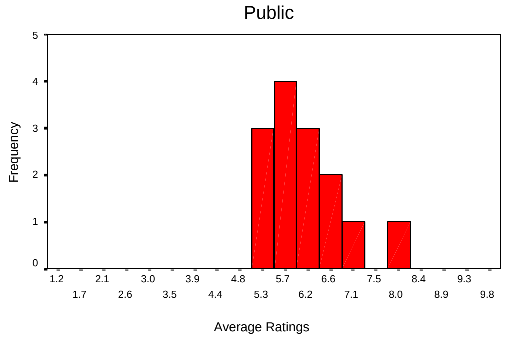
Note: All are significant at the 0.001 level [2 tailed]

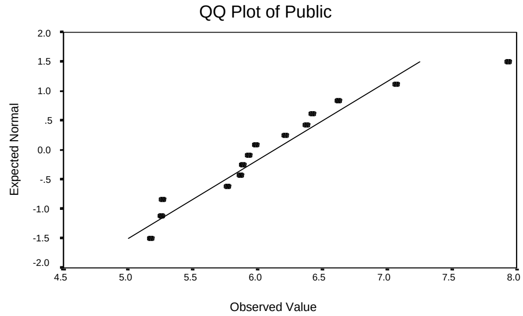
(3) Groups - Summary

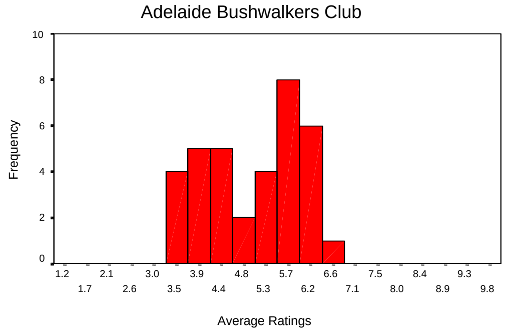
The groups are fairly consistent and their ratings, varying from +8% to -3% from the overall mean. However one group [ABW] had particularly low ratings and lower this range to -14.5% below the overall mean. The trimmed means are similar to group means and indicate that outliers do not present a problem and the mean is a reliable indicator. Student groups were distributed from above the overall mean, through to just under the mean which indicates that they are good raters of landscape. Similarly environmental professionals scored around the average but the planning professionals rated a little higher. The public respondents were also a little above the mean.

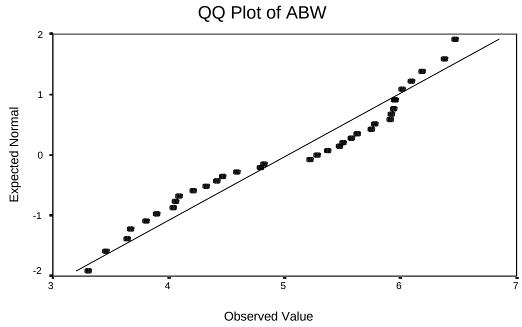
Figure 10.16 Distributions and QQ Plots of Respondent Groups

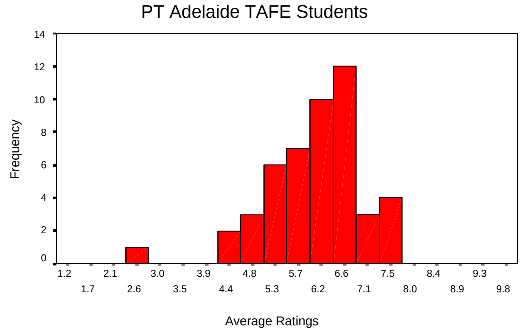


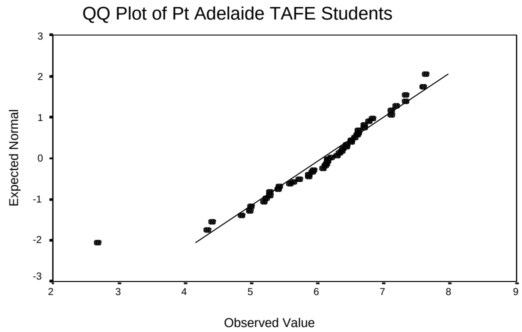

Public
Frequency
0 1 2 3 4 5
1.2 2.1 3.0 3.9 4.8 5.7 6.6 7.5 8.4 9.3
1.7 2.6 3.5 4.4 5.3 6.2 7.1 8.0 8.9 9.8
Average Ratings

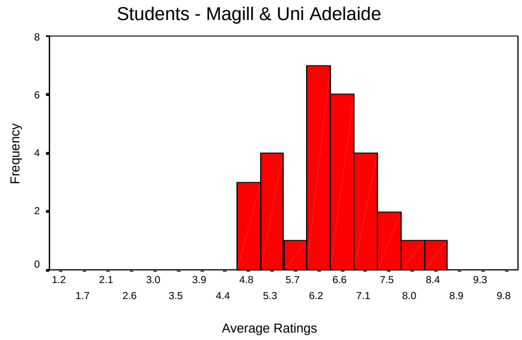

QQ Plot of Public
Expected Normal
2.0 1.5 1.0 .5 0.0 -.5 -1.0 -1.5 -2.0
4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0
Observed Value

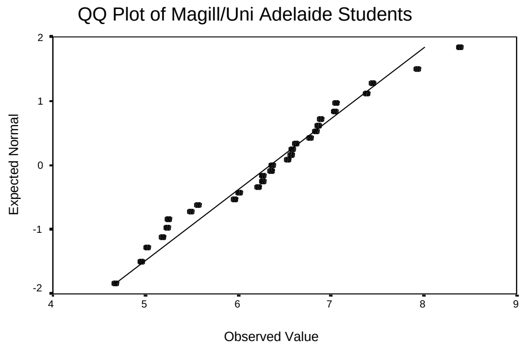

Adelaide Bushwalkers Club
Frequency
0 2 4 6 8 10
1.2 2.1 3.0 3.9 4.8 5.7 6.6 7.5 8.4 9.3
1.7 2.6 3.5 4.4 5.3 6.2 7.1 8.0 8.9 9.8
Average Ratings

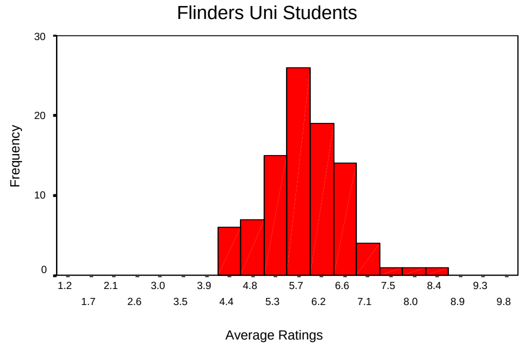

QQ Plot of ABW
Expected Normal
2 1 0 -1 -2
3 4 5 6 7
Observed Value

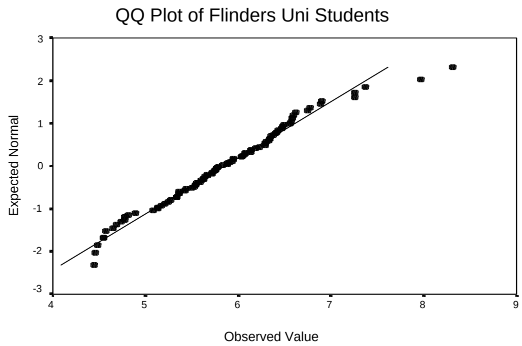

PT Adelaide TAFE Students
Frequency
0 2 4 6 8 10 12 14
1.2 2.1 3.0 3.9 4.8 5.7 6.6 7.5 8.4 9.3
1.7 2.6 3.5 4.4 5.3 6.2 7.1 8.0 8.9 9.8
Average Ratings


QQ Plot of Pt Adelaide TAFE Students
Expected Normal
3 2 1 0 -1 -2 -3
2 3 4 5 6 7 8 9
Observed Value


Students - Magill & Uni Adelaide
Frequency
0 2 4 6 8
1.2 2.1 3.0 3.9 4.8 5.7 6.6 7.5 8.4 9.3
1.7 2.6 3.5 4.4 5.3 6.2 7.1 8.0 8.9 9.8
Average Ratings


QQ Plot of Magill/Uni Adelaide Students
Expected Normal
2 1 0 -1 -2
4 5 6 7 8 9
Observed Value


Flinders Uni Students
Frequency
0 10 20 30
1.2 2.1 3.0 3.9 4.8 5.7 6.6 7.5 8.4 9.3
1.7 2.6 3.5 4.4 5.3 6.2 7.1 8.0 8.9 9.8
Average Ratings


QQ Plot of Flinders Uni Students
Expected Normal
3 2 1 0 -1 -2 -3
4 5 6 7 8 9
Observed Value

10.4 RATINGS BY RESPONDENT CHARACTERISTICS

In Chapter 9 the characteristics of participants were compared with the community. In this section these characteristics are summarised and the ratings by each class examined.

(1) Age

Table 10.12 summarises the number of respondents in each of the age classes and their relevant statistics.

Table 10.12 Average Ratings by Age Class

	Age Classes					
	17 - 20	**21 - 30**	**31 - 40**	**41 - 50**	**51 - 60**	**>60**
Resp.	81	70	40	61	48	19
%	25.40	21.9	12.5	19.1	15.0	6.0
Mean	5.90	6.06	5.88	5.88	5.63	5.77
SD	0.87	0.84	0.80	0.96	0.99	1.30
Range	4.33 - 8.31	2.67 - 7.94	3.96 - 7.48	3.46 - 8.39	3.31 - 7.94	3.81 - 8.50
IQ range	1.22	0.99	1.16	1.23	1.21	1.97
Skew	0.30	-0.98	-0.20	-.056	-.016	0.27

The means for age groups vary across a relatively small range [0.43]. There is a slight trend downwards in ratings from the 21 - 30 group onwards although this is offset slightly by the > 60 age group [Figure 10.17]. The 21 - 30 age group has a strong negative skew to the higher ratings as reflected in its mean, while the 17 - 20 and >60 age groups are skewed to the lower ratings. Interestingly the ratings of the 17 - 20 age group [5.90] which comprised tertiary students, are very close to the overall mean of 5.88 and their SD [0.87] was also similar to the overall SD [0.92].

Apart from the >60 age group, the standard deviations are fairly consistent. It is difficult to identify the reason why the SDs for the >60 group should be 50% more than other age classes, indicative of far greater variability of opinion within that group. The SD's increase in each of the age classes from the 31 - 40 group but the increase in the > 60 group is well beyond that of the other intervals. The mean for the >60 group is in the middle of the range of means of classes.

Figure 10.17 indicates that the overall trend in ratings decreases with age as indicated by the algorithm: $y = -0.05x + 6.05$; $r^2 = 0.52$.

The boxplot [Figure10.18] indicates similar size boxes [i.e. interquartile range] for all classes, however the 21 - 30 group is slightly smaller [IQ 0.99] and the >60s group is double [IQ 1.97]. This indicates a wider range of opinion about preferences in the >60s age group and a narrower range for respondents in their 20s.

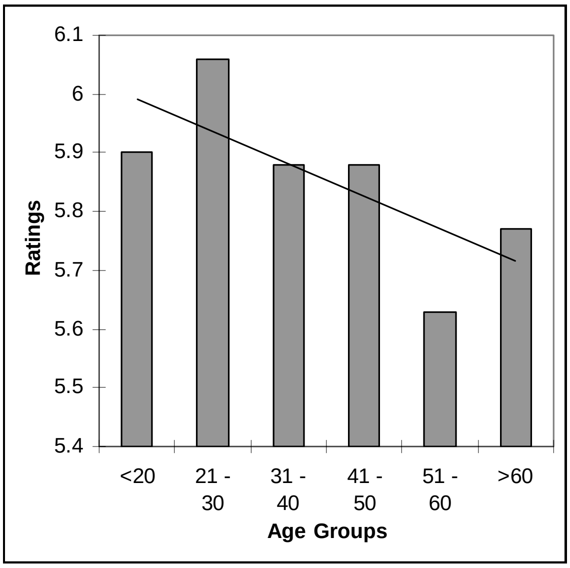


Figure 10.17 Average Ratings by Age Class

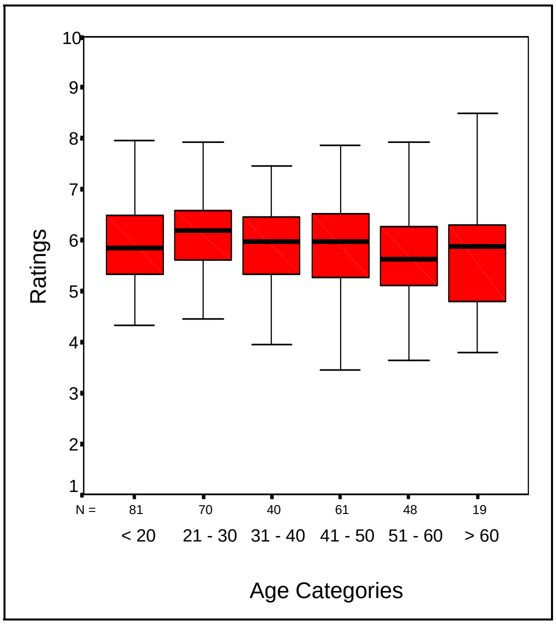


Figure 10.18 Boxplot of Ratings by Age Class

The ANOVA found no significant differences between the age classes [Table 10.13]. The major differences are within the age classes rather than between them. The Bonferroni test found no significant differences between the age classes.

Correlations between the age classes are summarised by Table 10.14. This indicates very high correlations between all age classes, which gives confidence in using the ratings across the range of ages.

Table 10.13 ANOVA of Age Classes

	SS	df	MS	F	Sig.
Between groups	5.58	5	1.12	1.32	0.26
Within groups	264.85	313	0.85		
Total	270.43	318			

Table 10.14 Correlations between Age Classes

	1	2	3	4	5	6
1	1.00	0.98	0.94	0.93	0.94	0.92
2		1.00	0.97	0.96	0.96	0.94
3			1.00	0.98	0.97	0.94
4				1.00	0.98	0.96
5					1.00	0.97
6						1.00

Overall, while the ratings by age classes are reasonably consistent the SD's for the >60 age group indicate a much wider range of opinion than by other groups. This suggests that the use of small groups of older people should be minimised in surveys of this kind unless complemented by younger respondents. The ratings and SDs by students [17 - 20] were close to the overall average, indicating that they can make good subjects for rating purposes.

(2) Gender

Table 10.15 summarises the number of respondents for each gender and their relevant statistics. The distributions for each gender are shown by Figures 10.19 and 10.20.

Table 10.15 Average Ratings by Gender

	Male	**Female**
Number	176	143
%	55.2	44.8
Mean	5.75	6.04
SD	0.88	0.95
Range	3.31 - 8.50	2.67 - 8.39
Interquartile range	1.11	1.23
Skew	-0.268	-0.122

Males rate the landscapes about 5% lower than females and the ANOVA indicates that the difference is significant [Table 10.16]. The differences within each gender group are much greater than that between genders.

Table 10.16 ANOVA of Gender Classes

	SS	df	MS	F	Sig.
Between groups	6.69	1	6.69	8.05	.005
Within groups	263.74	317	0.83		
Total	270.43	318			

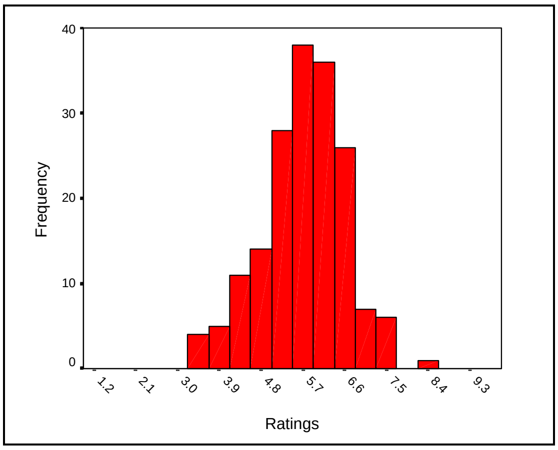


Figure 10.19 Distribution of Ratings by Males

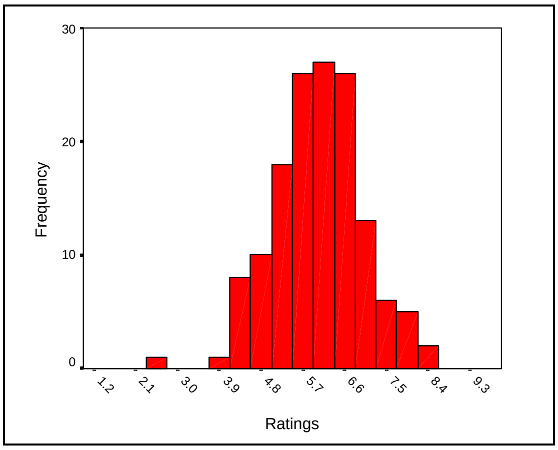


Figure 10.20 Distribution of Ratings by Females

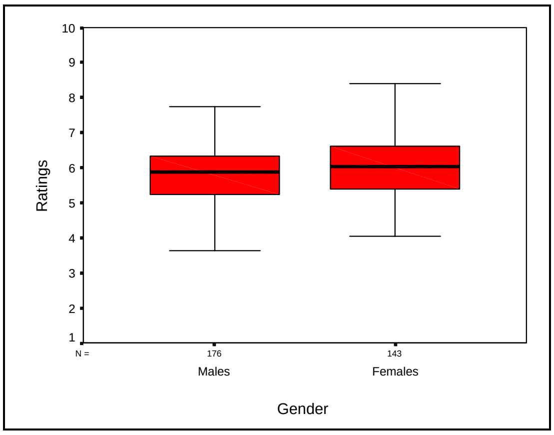


Figure 10.21 Boxplot of Ratings by Gender Class

The boxplots [Figure 10.21] indicate the slight difference in ratings by the genders. As shown by Table 10.14 the interquartile range of the female respondents [i.e. the box] is slightly larger than for males and indicate a slightly wider range of opinion.

The correlation in ratings between the genders is 0.985, $p < 0.01$ [$r^2 = 0.97$], which is very high and indicates negligible difference between male and female.

(3) Education

Table 10.17 summarises the number of respondents in each of the education classes and their relevant statistics.

Table 10.17 Average Ratings by Education Class

	Education Classes				
	Tech/ Trade	Year 10	Year 12	Degree/ Diploma	Post Grad
Resp.	34	20	131	69	63
%	10.7	6.3	41.2	21.7	19.8
Mean	5.79	5.83	5.91	5.89	5.90
SD	0.76	1.22	0.85	1.00	0.98
Range	4.17 - 7.40	3.31 - 7.97	2.67 - 8.31	3.64 - 8.50	3.46 - 8.39
IQ range	0.93	1.67	1.12	1.32	1.06
Skew	-0.374	0.097	-0.303	-0.186	-0.027

Note: excludes one respondent < year 10 education, mean 4.81

The means by education class have a very narrow range, from 5.79 to 5.91. The largest standard deviation was with the year 10 respondents but the year 12 respondents had the second smallest SD so it cannot be assumed that consistency of opinion varies with education. The group with the lowest mean was by those with technical and trade qualifications and these were also the most consistent group with the lowest SD and interquartile range.

Figure 10.22 indicates the relationship between preferences and education and assumes that the technical/trade education is lower than year 10. On the basis of this, the relationship is $y = 0.03x + 5.78$; $r^2 = 0.73$.

The ANOVA [Table 10.18] indicates that the differences in preferences by different classes of education are not significant.

The boxplots [Figure 10.23] indicate similar medians across all classes although the interquartile ranges vary from 0.93 to 1.67 [Table 10.16] as reflected in the size of the boxes.

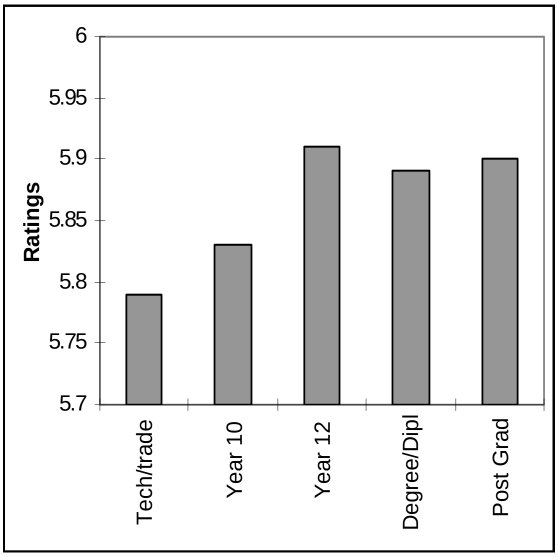


Figure 10.22 Trend of Average Ratings by Education Class

Table 10.18 ANOVA of Education Classes

	SS	df	MS	F	Sig.
Between groups	1.61	5	0.32	0.37	.87
Within groups	268.44	312	0.86		
Total	270.05	317			

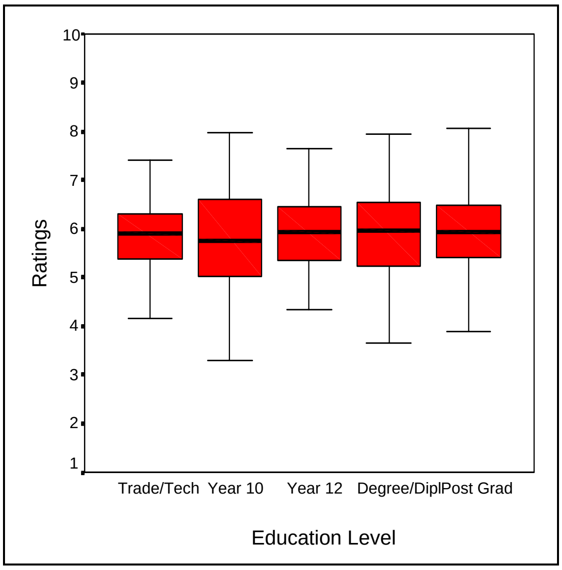


Figure 10.23 Boxplot of Ratings by Education Class

Table 10.19 summarises the correlations between the education classes. Leaving aside class 1 that comprised a single individual, the high correlations indicate that education does not serve to separate the aesthetic ratings of individuals.

Table 10.19 Correlations between Education Classes

	1	2	3	4	5	6
1	1.00	0.69	0.69	0.72	0.71	0.70
2		1.00	0.96	0.96	0.98	0.98
3			1.00	0.95	0.95	0.95
4				1.00	0.96	0.94
5					1.00	0.98
6						1.00

Note: Class 1 was one individual only

(4) Income

Table 10.20 summarises the number of respondents in each of the income classes and their relevant statistics. Figure 10.24 is a boxplot showing the medians and quartiles for each group. The results cannot be regarded as ideal as there were 25 missing responses for the income question and the question was not clear as some respondents considered family income while others considered only their individual income [see Chapter 9].

The ratings vary over a narrow range of only one-third of a rating unit [0.33] although they do trend downwards with increasing income. A close relationship between age and income is suggested as the trends are similar and also possibly between income and education although this does not show the downward trend.

Table 10.20 Average Ratings by Income Class

	Income Classes					
	< $20k	$20 - 30k	$30 - 40k	$40 - 50k	$50 - 60k	>$60 k
Resp.	58	39	50	43	32	84
%	16.3	13.3	17.0	13.9	10.9	28.6
Mean	6.02	6.06	5.96	5.84	5.73	5.85
SD	0.90	0.95	1.03	0.73	0.80	0.93
Range	3.31 - 7.63	2.67 - 8.07	3.81 - 8.50	4.09 - 7.07	3.89 - 7.25	3.68 - 8.39
IQ range	1.22	0.97	1.11	0.94	1.05	1.31
Skew	-0.47	-0.71	0.11	-0.48	-0.52	0.25

Note: 25 missing values

Figure 10.24 indicates the relationship between ratings and income: $y = -0.06x + 6.11$; $r^2 = 0.70$. The ANOVA indicates the differences between the income classes are not significant [Table 10.21]. The Bonferroni test found no significant differences between the classes.

The boxplots indicate very similar medians, boxes and whiskers although the interquartile ranges for the <$20k and $60k

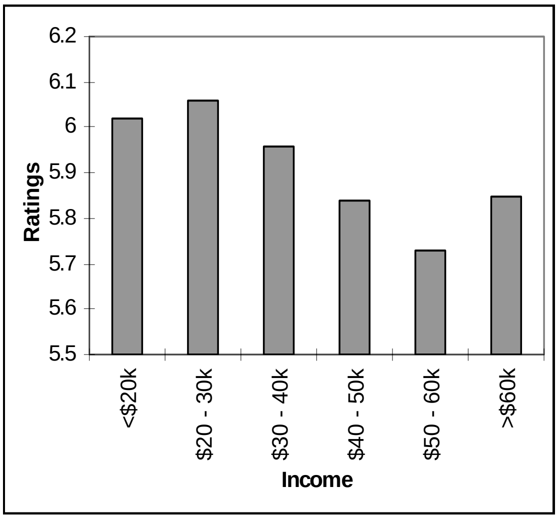


Figure 10.24 Relationship between Ratings and Income

Table 10.21 ANOVA of Income Classes

	SS	df	MS	F	Sig.
Between groups	3.14	5	0.63	0.77	.58
Within groups	245.99	300	0.82		
Total	249.13	305			

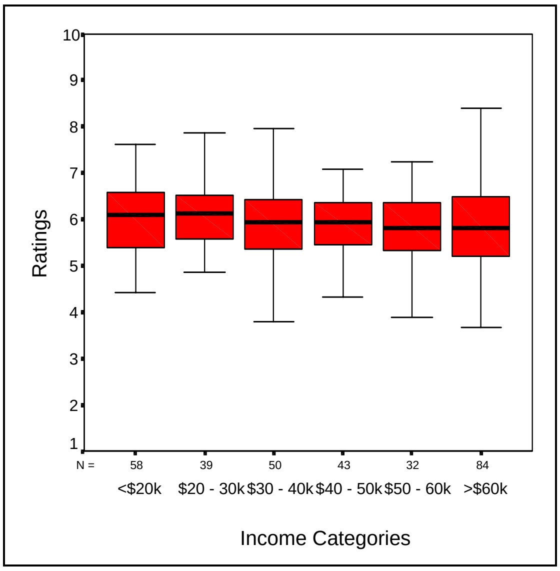


Figure 10.25 Boxplot of Ratings by Income Class

classes are greater than for the others [Figure 10.25]. Correlations for income classes were not calculated because of the deficiencies in the data referred to above.

(5) Country of Birth

Table 10.22 summarises the number of respondents in each of the country of birth classes and their relevant means and standard deviations. No pattern is apparent in these figures.

Table 10.22 Average Ratings by Birthplace Class

	Australia	Europe	Other
Resp.	257	39	16
%	81.8	12.5	5.1
Mean	5.88	5.80	5.87
SD	0.92	0.99	0.77

Notes: Australia includes NZ, Europe includes UK

The ANOVA found no significant differences in preferences between the classes of birthplace with the major difference being within each birthplace class rather than between classes [Table 10.23].

Table 10.23 ANOVA of Country of Birth Classes

	SS	df	MS	F	Sig.
Between groups	0.26	2	0.13	0.15	0.86
Within groups	265.40	309	0.86		
Total	265.99	311			

(6) Childhood Residence

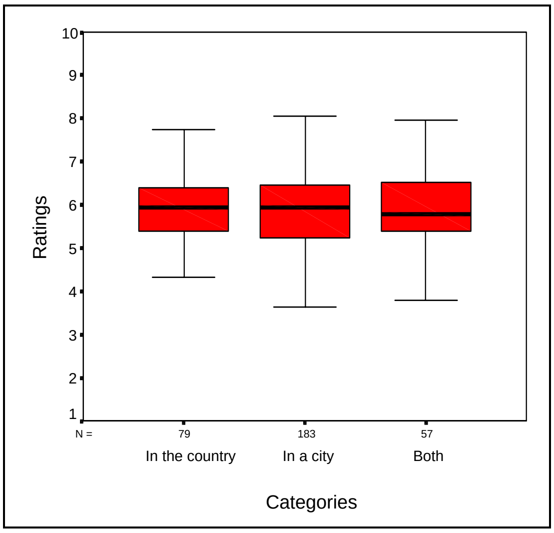


Figure 10.26 Boxplot of Ratings by Childhood Residence

Table 10.24 summarises the number of respondents in each of the childhood resident classes and their relevant statistics.

The location of childhood residence influences ratings [Figure 10.26]. Preferences are slightly higher [1.4%] for those from the country than for those from the city. Ratings of those who resided in both country and city are higher again [2.7%] However the ANOVA and Bonferroni tests found that the differences are not significant [Table 10.25].

Table 10.24 Average Ratings by Childhood Residence

	Country	City	Both
Number	79	183	57
%	24.8	57.4	17.9
Mean	5.91	5.83	5.99
SD	0.88	0.91	1.00

The correlations between the three classes of childhood residence are very high as summarised by Table 10.26.

Table 10.25 ANOVA of Childhood Residence Classes

	SS	df	MS	F	Sig.
Between groups	1.19	2	0.60	0.70	0.50
Within groups	269.24	316	0.85		
Total	270.43	318			

Table 10.26 Correlations between Childhood Residence Classes

	Country	City	Both
Country	1.00	0.99	0.98
City		1.00	0.98
Both			1.00

All significant at 0.01 [2 tailed]

(7) Correlations between Respondent Characteristics

Table 10.27 summarises the correlations between the respondent characteristics. It indicates the characteristics that are significantly correlated are:

0.01 correlation
Age - Income [0.291]
Age - Education [0.456]
Age - Birthplace [0.157]
Income - Education [0.375]

0.05 correlation
Age - Gender [-0.138]
Income - Gender [-0.139]

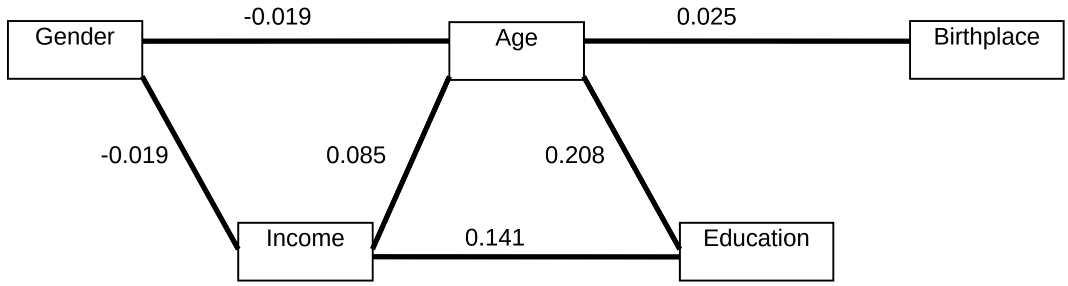
These relationships are summarised by Figure 10.27. This indicates that the age characteristic is a key and links with most other characteristics. The strongest relationships are age - education [0.456] and income - education [0.375] thus supporting the earlier finding in Section 3.4. Both relationships are positive. The negative correlations with gender may be due to this being dichotomous whereas the other characteristics are multiple. Although the correlations shown are significant

Table 10.27 Correlations of Respondent Characteristics

		Age	Income	Gender	Education	Birthplace	Grow up location
Age	Correlation	1.000	.291**	-.138*	.456**	.157**	.008
	Significance	.	.000	.014	.000	.005	.882
	N	319	306	319	318	312	319
Income	Correlation	.291**	1.000	-.139*	.375**	.021	.083
	Significance	.000	.	.015	.000	.719	.148
	N	306	306	306	305	299	306
Gender	Correlation	-.138*	-.139*	1.000	-.099	-.020	.028
	Significance	.014	.015	.	.078	.726	.621
	N	319	306	319	318	312	319
Education	Correlation	.456**	.375**	-.099	1.000	.024	.050
	Significance	.000	.000	.078	.	.677	.375
	N	318	305	318	318	311	318
Birthplace	Correlation	.157**	.021	-.020	.024	1.000	-.024
	Significance	.005	.719	.726	.677	.	.674
	N	312	299	312	311	312	312
Grow up location	Correlation	.008	.083	.028	.050	-.024	1.000
	Significance	.882	.148	.621	.375	.674	.
	N	319	306	319	318	312	319

Note: Pearson correlations used. All significance tests are two-tailed

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).



Note: r^2, not r, are shown. Solid lines are significant at 0.01 level, dashed lines are significant at 0.05 level

Figure 10.27 Correlations [r^2] between Respondent Characteristics

statistically, those with links to gender and to birthplace are very small.

(8) Summary of Respondent Characteristics Ratings

Based on the ANOVA tests, gender is the only characteristic of respondents which has a statistically significant influence on preferences. Preferences decrease with increasing age and income but other factors also influence the relationship. In contrast, increasing education does appear to increase preferences slightly.

The actual influence of these factors on preferences is small, e.g. across the age groups it is less than half a rating unit, while even for the strongest link, age, the difference is only 0.43 of a rating unit. These absolute and relative sizes of the values are summarised by Table 10.28.

Table 10.28 Size of Ranges of Values

Factor	Highest to Lowest Values	Range	Range as % of lowest value
Age	5.63 to 6.06	0.43	7.63%
Gender	5.75 to 6.04	0.29	5.04%
Education	5.79 to 5.91	0.12	2.07%
Income	5.73 to 6.06	0.33	5.76%

Table 10.28 indicates that generally the differences in the various factors amount to very small proportions of the ratings, the largest being 7.6% for age.

The >60 age group appears to have a far greater variability of opinion in its preferences than younger age groups. Neither country of birth or childhood residence in city or country had any significant influence on preferences.

The results give confidence that various groups that are used in surveys as samples of the community are likely to be reasonably representative of community values.

(9) Familiarity

Respondents were asked to indicate their familiarity with various regions of South Australia on a three class basis: very familiar, fairly familiar, and not familiar. The results [Chapter 9] indicated that the regions ranked in the following order of familiarity [from most to least familiar]:

1. Coast
2. Mt Lofty Ranges
3. Flinders Ranges
4. Agricultural region
5. River Murray
6. Far North region

Familiarity is the degree to which respondents profess that they are familiar with a region and this might be gained through direct experience such as by visiting it or even living in it, or through access to surrogates such as film, television, videos, books, magazines and media coverage. Tourist regions such as the Flinders Ranges, parts of the coast and the River Murray, may gain through surrogates.

The analysis assumes that respondents rated familiarity in a consistent way across all regions. Given that some regions are very extensive while others are small, this is an ambitious assumption but for the purposes of the study is considered adequate. Table 10.29 summarises the means and standard deviations for the three classes of familiarity for the six regions.

Table 10.29 and Figure 10.28 shows that there is a clear influence of familiarity on preferences, with the preferences in most regions increasing with greater familiarity. The fall-off in the trendlines of most regions suggests that *fairly familiar* is optimal in terms of preferences and that greater familiarity results in only a marginal increase in preferences.

Table 10.29 Familiarity with South Australian Regions

Familiar	Agric.	Coast	Mt Lofty	River Murray	Flinders Ranges	Far north
Very						
Mean	5.96	5.98	5.94	5.97	5.83	6.16
SD	0.97	0.87	1.00	0.92	0.91	0.92
Fairly						
Mean	5.91	5.83	5.90	5.88	5.94	5.96
SD	0.86	0.95	0.85	0.89	0.89	0.90
Not						
Mean	5.67	5.51	5.68	5.74	5.80	5.65
SD	1.03	0.99	0.91	1.04	1.01	0.91

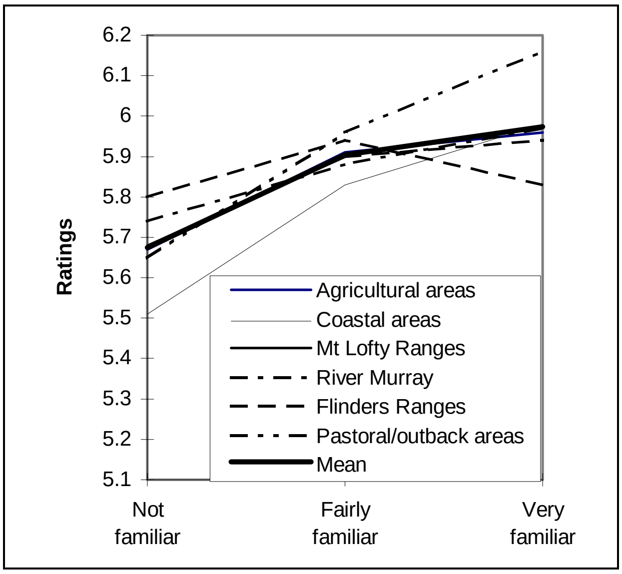


Figure 10.28 Effect on Ratings of Familiarity with Regions

In the Flinders Ranges, preferences decline for the *very familiar* group that may suggest that the familiarity derives in part from non-personal experience such as media. However for the outback area, which is not dissimilar to the Flinders Ranges, the trendline increases strongly with familiarity, indeed unlike the other regions, it does not drop off appreciably.

The overall trendline for all regions [Figure 10.28] is: $y = 0.15x + 5.55$, $r^2 = 0.91$. The relationship is not strong; about a 5% increase from not familiar to very familiar.

For several of the regions, the standard deviation dips slightly in the *fairly familiar* class but the difference is very slight.

Given that there is a relationship between familiarity and preferences, it might be expected that the rating of regions would correspond with their level of familiarity. However the arrangement of the regions in order of the *very familiar* class does not correspond with their means with the three less familiar regions [agriculture, R Murray and far north] having higher means than highly familiar regions [coast, Mt Lofty Ranges, Flinders Ranges] [Table 10.30].

Table 10.30 Ratings of Regions in Order of Familiarity

Region in order of familiarity	Mean*
1. Coast	5.98
2. Mt Lofty Ranges	5.94
3. Flinders Ranges	5.83
4. Agricultural region	5.96
5. River Murray	5.97
6. Far North	6.16

* Mean of very familiar

Note: Ratings of regions are explained in Section 10.5, Regional Analysis

ANOVA were undertaken for all regions to assess the significance of familiarity on ratings. The following summarises the findings:

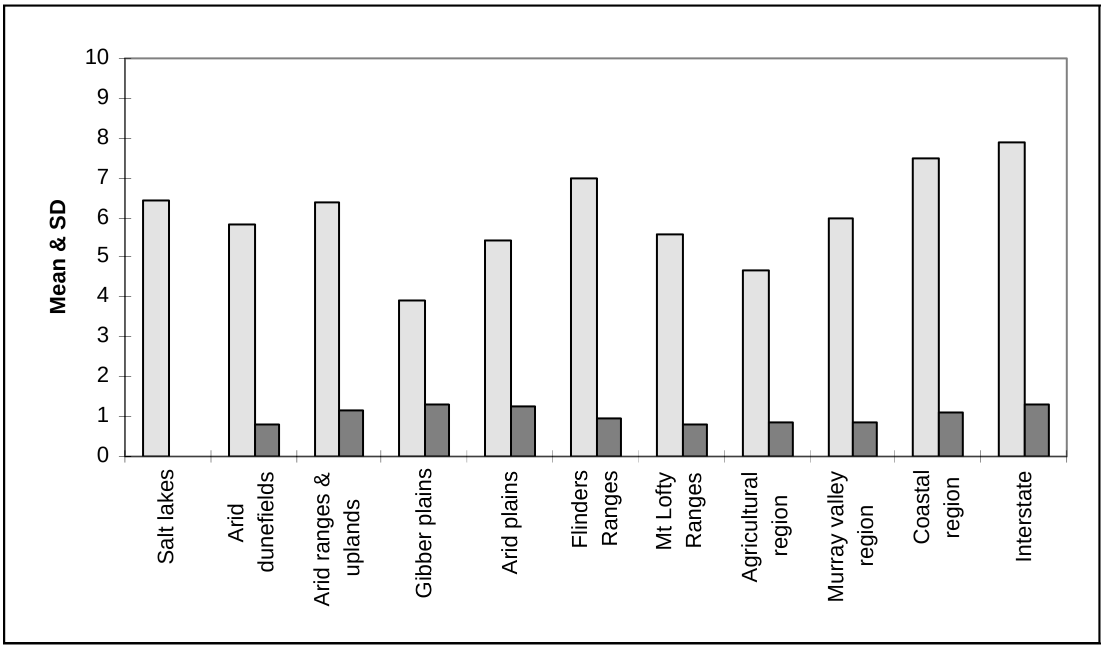
Agriculture	F= 1.70, df = 2, 316, p = 0.18
Coast	F= 2.40, df = 2, 316, p = 0.09
Mt Lofty Ranges	F= 1.43, df = 2, 316, p = 0.24
River Murray	F= 0.78, df = 2, 316, p = 0.46
Flinders Ranges	F= 0.72, df = 2, 316, p = 0.49
Far North	F= 6.53, df = 2,316, p = 0.002

The results indicate that the differences in familiarity are significant only in the Far North Region. The means of preferences for this region range from 6.16 for very familiar to 5.65 for not familiar and is the largest of all regions; a difference of 0.51

Table 10.31 Average Ratings by Landscape Region

Region	Area [sq km]	Nos. Scenes	Mean	SD
1. Salt lakes	30380	1	6.43	-
2. Arid dunefields	438660	8	5.82	0.81
3. Arid ranges & uplands	88720	9	6.36	1.14
4. Gibber plains	40230	4	3.90	1.30
5. Arid plains	208735	4	5.43	1.26
6. Flinders Ranges	28150	17	7.01	0.96
7. Mt Lofty Ranges	5170	31	5.57	0.81
8. Agricultural region	140885	41	4.66	0.83
9. Murray valley region	4030	19	5.98	0.83
10. Coastal region	2860*	20	7.67	1.14
Interstate	-	5	7.89	1.32

* Includes only units within the coastal region; most of this region is contained within the agricultural, Mt Lofty Ranges and Murray Valley [i.e. Coorong] regions.



Note: Means - light columns, SDs - dark columns. Salt lakes are represented by only one scene.

Figure 10.30 Mean Ratings and Standard Deviations of Landscape Regions

of a rating unit. The Bonferroni test found the two differences to be significant as illustrated in Figure 10.28.

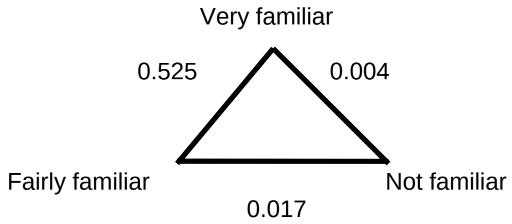


Figure 10.29 Significance of Differences between Familiarity Classes

Bonferroni tests applied to all other regions found no significant differences.

In summary, preferences in most regions decrease with their lesser familiarity but the rating of regions did not correspond with their level of familiarity. The differences in familiarity are only significant in the Far North region.

10.5 REGIONAL ANALYSIS

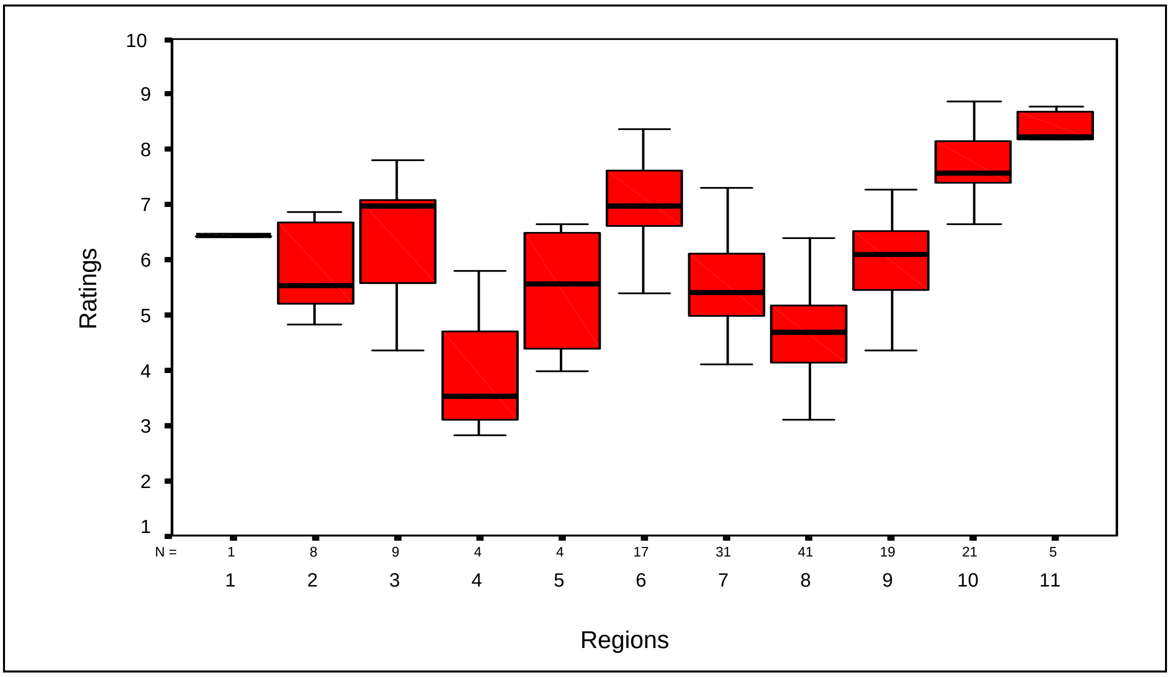
In mapping landscape character, South Australia was divided into two broad provinces, the Far North Arid Province and the Southern Agricultural Province [see Chapter 9]. Within each of these provinces, six landscape regions were defined in the Far North province and four regions in the Southern Agricultural province. Table 10.31 and Figure 10.30 summarise the average ratings for each region, and Table 10.32 shows the regions in rank order.

Table 10.32 Ranking of Landscape Regions in Descending Order

Region	Mean Rating
Coast	7.67
Flinders Ranges	7.01
Arid ranges	6.36
Murray Valley	5.98
Arid dunefields	5.82
Mt Lofty Ranges	5.57
Arid plains	5.43
Agricultural region	4.66
Gibber plains	3.90

The order of these suggests a strong influence of naturalism and elevation in the ratings. The low rating of agricultural regions suggests the converse of naturalism and the influence of generally flat land in depressing preferences. Similarly the low rating of gibber plains suggest a lack of diversity of land form and land cover.

The interstate scenes were of high quality landscapes and can not be regarded as representative of interstate landscapes. Thus the fact that their average rating was higher than any South Australian region does not imply that the landscapes of



1	Salt lakes	4	Gibber plains	7	Mt Lofty Ranges	10	Coast
2	Arid dunefields	5	Arid plains	8	Agriculture Region	11	Interstate
3	Arid ranges	6	Flinders Ranges	9	Murray valley		

Figure 10.31 Boxplot of Landscape Regions

South Australia are necessarily inferior to those interstate. A more representative set of interstate scenes would be necessary to compare one state against another.

Figure 10.31 provides a boxplot for all 10 regions plus the interstate scenes. The boxplot provides a visual representation of the regional distributions and their relationship. Region 1 [salt lakes] which comprised only one scene is represented by a single line. The gibber region [4] is clearly the lowest rated region but has also one of the largest boxes indicative of a wide range of opinion. The Flinders Ranges [6] and coastal region [10] are the highest rated regions in South Australia. The interstate scenes [11] however are rated higher.

Attached to this section are histograms and QQ plots for nine regions and interstate scenes [Figure 10.33]. Region 1 is not included. Regions 2 - 5 covering the arid regions had fewer scenes per region than the other regions and so the histograms show few columns. The QQ plots for these show only a few points and clearly are insufficient to indicate a normal distribution. However the Flinders Ranges and southern regions have sufficient scenes and indicate normality of the distributions.

The one-way ANOVA of the regional distributions indicates as would be expected significant differences between the groups [$F = 19.36$, df 10,149, $p < 0.000$].

Table 10.33 Average Ratings of Landscape Units

Landscape Region & Unit	Area [sq km]	Nos. Scenes	Mean	SD
Far North Arid Province				
1. Salt Lakes region	30380	1	6.43	-
2. Arid Dunefields region				
2.2 Central dunefields	46290	3	5.79	0.76
2.3 North east dunefields	146870	5	5.84	0.93
3. Arid ranges & uplands region				
3.1 North west ranges	6560	3	7.11	0.10
3.2 Central tablelands	50720	4	6.31	1.47
3.3 Gawler Ranges	13780	1	5.11	-
3,4 Olary Spur	15600	1	5.58	-
4. Gibber plains region	40230	4	3.90	1.30
5. Arid Plains region				
5.3 Northern plains	23890	1	3.98	-
5.4 Central plains	104265	2	6.48	0.25
5.5 Eastern plains	21570	1	4.80	-
6. Flinders Ranges region				
6.1 Main high ranges	5365	11	7.54	0.61
6.2 Lower ranges & outliers	16945	6	6.03	0.66
Southern Agricultural Province				
7. Mt Lofty Ranges region				
7.1 Main ranges & deep valleys	600	11	6.23	0.64
7.2 Lower ranges & escarpments	2080	12	5.13	0.73
7.3 Undulating, wide valleys & plains	2490	8	5.39	0.54
8. Agricultural region				
8.1 Hills & low ranges	8585	5	5.11	0.82
8.2 Parallel ridges or dunes	26665	19	4.83	0.42
8.3 Plains with random dunes	74395	10	4.17	0.98
8.4 Plains	30210	7	4.55*	1.71
9. Murray Valley region				
9.1 Riverland	1650	5	5.72	0.91
9.2 Trench	220	10	6.30	0.64
9.3 Lakes	1860	1	4.93	-
9.4 Coorong	300	3	5.68	0.67
10. Coastal region				
10.1 Rugged/cliffs		10	8.03	0.58
10.2 Beach with dunes		9	7.45	0.66
10.3 Beach, flat inland		2	5.04	1.57

* Mean & SD include scene of Blue Lake [7.95]. Exclusion of this changes mean of the plains unit to 3.98, SD 0.90

The differences between groups are slightly greater than the differences within the groups [Table 10.34].

Table 10.34 ANOVA of Regional Distributions

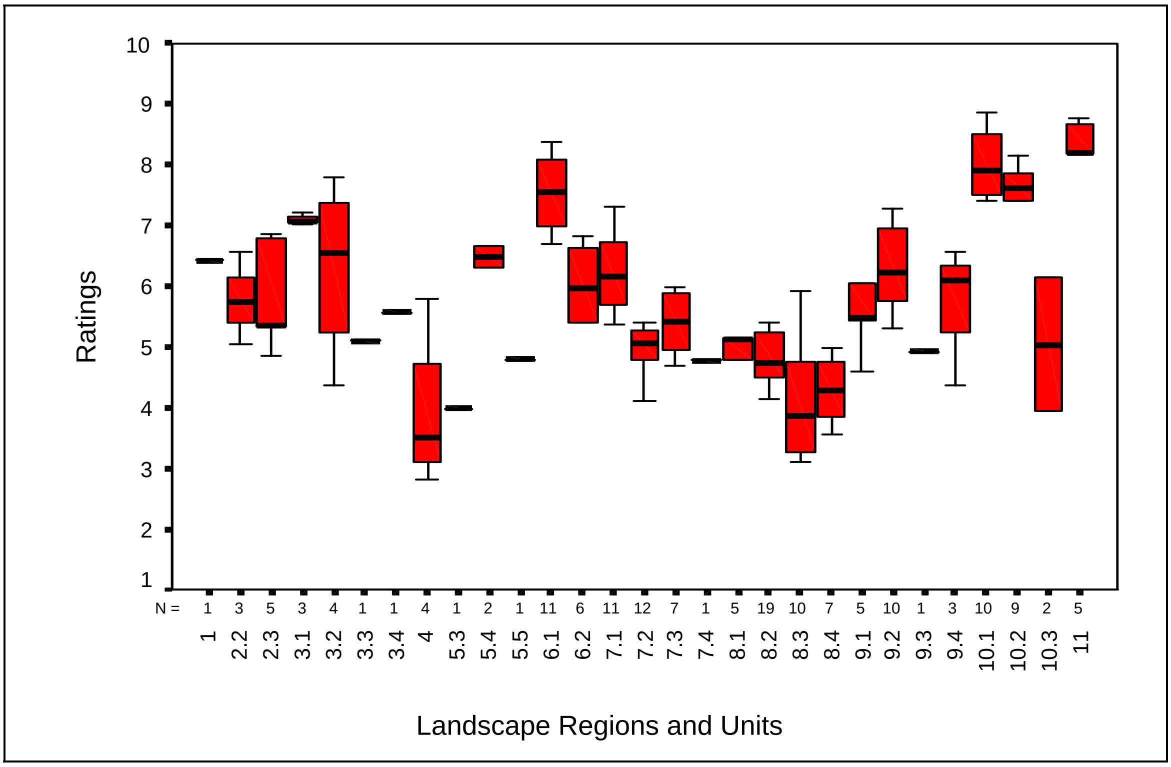
	SS	df	MS	F	Sig.
Between groups	179.90	10	179.90	19.36	.000
Within groups	138.49	149	0.93		
Total	378.39	159			

(2) Landscape Units

Each of the landscape regions were divided into landscape units [Chapter 9]. Table 10.33 indicates the total area of each landscape unit and the number of scenes used in the survey.

Figure 10.32 indicates the boxplots for the individual landscape units. A horizontal; line indicates where the unit was represented by only one scene. The boxes which show the interquartile range vary widely with the central tablelands [3.2], gibber plains [4] and coastal beaches [10.3] displaying the widest range of ratings. By contrast, the central arid plains [5.4], the hills and plains in the agricultural region [8.1] and beaches with dunes [10.2] display narrow range of ratings. However because of the small number of scenes in some units, these percentiles are not a good indicator of the range of ratings. The standard deviations [Table 10.33] provide a better indicator of the spread of ratings. The representation is a function of the number of scenes in the landscape region, the area of the region and, importantly, the level of variety present in the region.

How can adequacy of representation be determined? Armed with the information of the means of landscape regions and units in Tables 10.31 and 10.33, one is better placed to determine the number of scenes of each area needed. Not having this information at the outset however when selecting the scenes for the rating sessions, judgement was required in making the selection of scenes. It is to be expected, however that with studies of this kind in which the rating of differing landscape regions and units can be determined, that a more representative set of scenes could be selected. It is evident, for example that salt lakes should have been better represented and that the representation of the vast northern arid region could have been improved. Fewer scenes of the agricultural region are required.



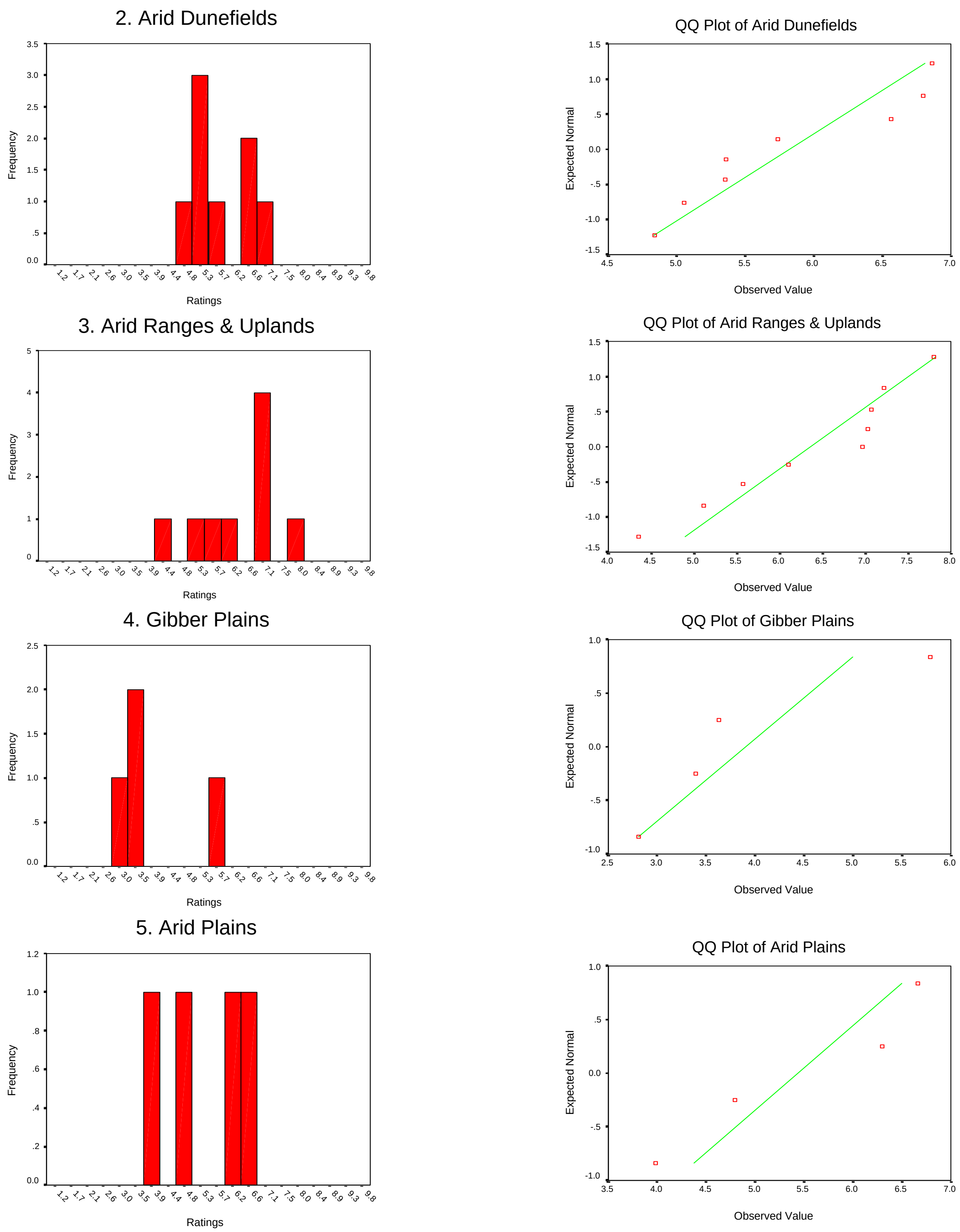
Note: Region 11 comprises interstate scenes

Figure 10.32 Boxplot for Landscape Regions and Units

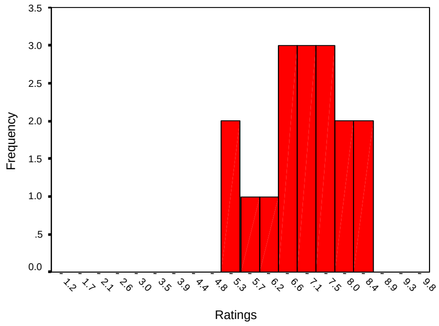
The largest landscape region, arid dunefields which covers 44% of the state, is represented by eight scenes whereas the Mt Lofty Ranges, one of the smallest regions, is represented by 31 scenes.

Apart from the arid mountainous regions, the arid plains, gibbers and salt lakes of the northern areas are generally of lower landscape quality. Across vast areas the variation in landscape quality is not large for much of the far northern province and can be represented fairly adequately by relatively few scenes. The southern agricultural province however has much greater variety within a far smaller area and accordingly needs more scenes to represent it. As in statistical sampling of populations, the key determinant of the sample size is the heterogeneity of the population, so it is with landscapes - the more diverse they are the more scenes are needed to provide sufficient representation.

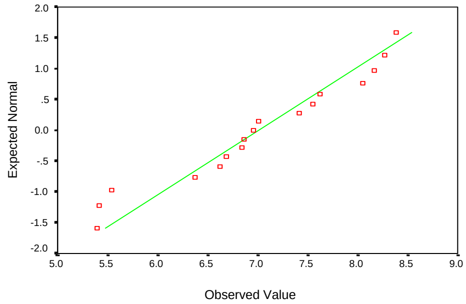
Figure 10.33 Distributions and QQ Plots of Landscape Regions & Interstate Scenes



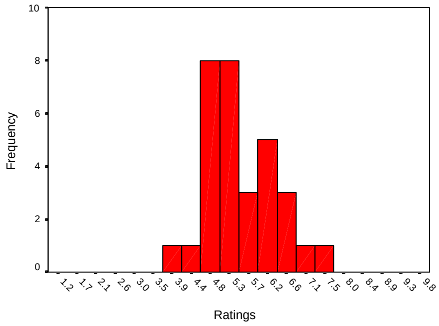
6. Flinders Ranges



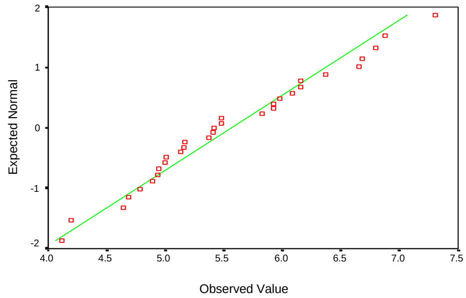
QQ Plot of Flinders Ranges



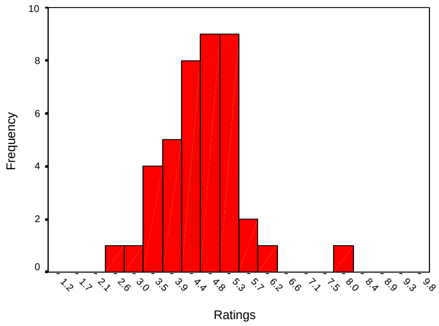
7. Mt Lofty Ranges



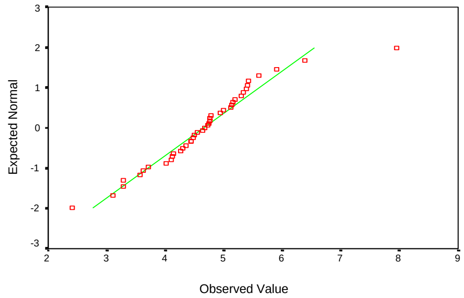
QQ Plot of Mt Lofty Ranges



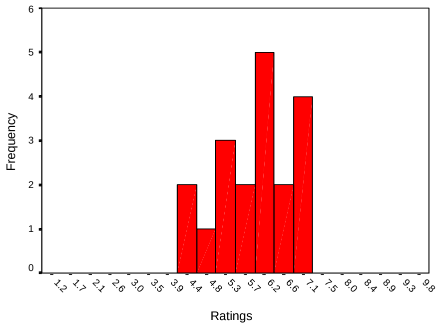
8. Agricultural Region



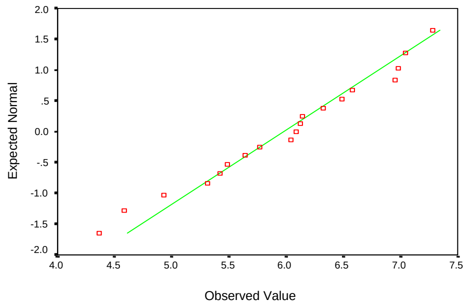
QQ Plot of Agricultural Region



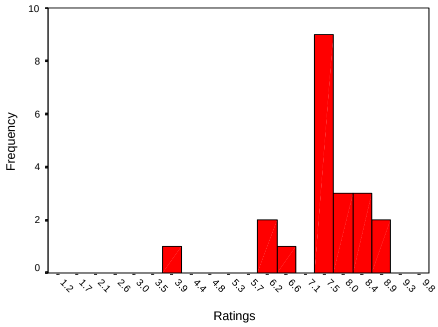
9. Murray valley region



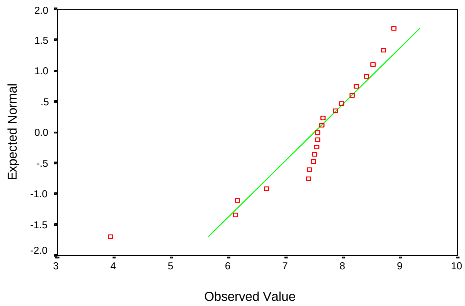
QQ Plot of Murray Valley

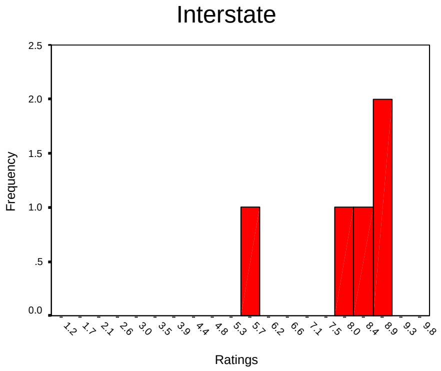


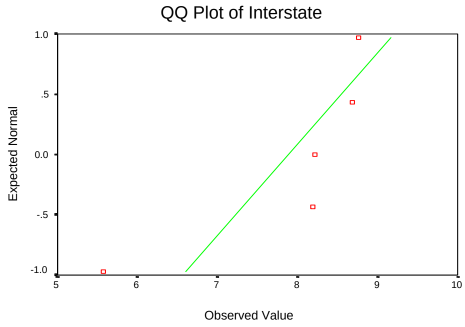
10. Coastal region



QQ Plot of Coastal Region







ANALYSIS OF PREFERENCES PART B

10.6 ANALYSIS BY LANDSCAPE TYPES

(1) Approach to Analysis

Existing studies were examined to identify the components of scenes that were subject to analysis. Appendix 9.6 summarises these components which were used in subsequent analysis of their influence on preferences. The characteristics which were identified in these studies as contributing positively to landscape preferences are summarised in Table 10.35. This Table indicates the importance of landform, land use, land cover and water as the key attributes and also identifies several other attributes.

Based on this and through familiarity with the scenes in the analysis, the analysis covers the following factors:

- Land form
- Land cover
- Land use
- Water
- Diversity
- Naturalism
- Cloud cover

The analysis of landscape types cover only the South Australian scenes and excludes the five interstate scenes. As these were highly rated scenes it was considered that they could distort the findings which are intended to relate solely to the South Australian landscape.

Table 10.35 Positive Characteristics Identified in Studies

Landscape Type	Positive Characteristics
Landform	Relative relief, slope, ruggedness number, spatial definition index, contrasts of height, unique physical features, steepness of terrain, linear length of ridge line, rolling plateau, angle [tangent] of line of sight to highest visible point, elevation of most prominent point in scene above photo, height of valley walls, height of valley divided by width, visible distant landforms, hills
Land use	Land use compatibility, land use diversity & type, arable land, land use complexity, wide elevated views of mixed natural & agricultural & scattered buildings
Land Cover	Percentage tree cover, deciduous broadleafed woodland, % hedgerows, vegetation diversity & type, area in tree trunks, total area of vegetation, average dbh [diameter breast height], wood-lawn, % native forest, % alpine land cover, foreground vegetation, undisturbed forest, perimeter of immediate vegetation/intermediate vegetation & distant vegetation, area of intermediate vegetation, area of water, area of non-vegetation.
Water	Water edge density, water area density, lakes & reservoirs, stream, waterfall, lake, water depth, river channel stability, water colour, calmness of water, moving water, % water, confinement of river by overhanging vegetation, natural debris, bottom material, height of streambank vegetation, distance between streambank vegetation
Artistic	Prominence of focal point, variety in colour, variety in line, variety in form, variety in texture, overall variety, contrast, vividness
Naturalism	Naturalism index
Rocks	Rocks & ledges
View	Area of view, length of view
Atmosphere	Cloud cover index, atmosphere clarity index
Psychological	Awe, arousal
Perception	Smoothness
Colours	Blue colours

Moreover the overall aim is to report on the South Australian landscape and on this basis the interstate scenes needed to excluded. The South Australian scenes total 155 with an overall mean of 5.83 and standard deviation of 0.93.

In conducting the analysis it was necessary to classify the various attributes being considered so that the effect of these attributes on the scenic preferences could be assessed. This involved classifying the attributes in a variety of ways, for example, land form was classified into flats, hills and mountains. While in some cases these simple classifications were adequate, in other situations, a more complex scoring of the attribute was necessary, for example classifying the height or density of vegetative cover, or the degree of diversity present in the scene. These classifications were undertaken by scoring the particular attribute on a 1 to 5 scale.

The author undertook the first type of simple classification as they entailed objective appraisal of attributes and did not involve evaluating gradations of attributes. Thirteen such classifications were undertaken:

Land form	• Flats, hills, mountains
	• Elevation
	• Coastal landforms
	• Murray Valley landforms
Land cover	• Types of vegetation
Land use	• Classification of land uses
	• Crops & pastures - presence of ridges vs flat land - crop height - crop colour
	• Hills & pastures - colour
Water	• Size of dams
	• Colour of inland water
Clouds	• Cloudiness of scenes

The second type of classification involved differentiating attributes across a range of possible values, from lesser to more, small to large, low to high etc. The factors were scored[85] out of five [from 1 being low through to 5 being high], to distinguish from the 1 - 10 used in rating of landscape quality and also because a five class scoring was considered likely to provide sufficient discrimination of the particular attribute. For example in scenes of crops and pastures the significance of the presence of trees was scored, with 1 representing very few or insignificant trees and 5 representing many trees or very significant trees. Other examples were the area of water in a scene or the degree of movement of water in scenes of the sea.

Assessment of each of the attributes was on the basis of their score relative to the scene that provided the context. For example, in scoring the height of trees in scenes, their relative height within the scene was scored, not their absolute height as it would be in actuality. Thus a small tree positioned in the foreground may be scored high whereas larger trees further away in the scene may attract a lower score.

It was considered desirable that the scores be derived from a small group of respondents rather than a sole scoring by the author. A group of between six and ten adult persons was involved in viewing the relevant scenes to provide the scores. A balance of genders was achieved in all classifications.

Sessions with respondents to classify the scenes involved firstly selecting the relevant scenes and then briefing the respondents on the nature of scoring required. An assessment sheet was provided for each respondent. The respondents were initially shown a few scenes to familiarise them with the particular attributes to be scored and instructions given. They then viewed the slides at their own pace. A small electric back lit hand viewer was used for this purpose [Agfascope 200] with a screen measuring 6.5 cm by 4 cm. For the diversity, naturalism and colour factors, the slides were screened and the entire group rated them concurrently. A series of sessions were held to score the various groups of scenes.

The following lists the attributes that were scored.

Land form	- exposed rock face
Land cover	- presence of trees
	height of vegetation
	- density of vegetation
Land use	- significance of ridges
	- trees in crops & pastures
	- trees in hills & pastures, mixed uses, vines
	- terrain in Mt Lofty Ranges
Water	
- Coast	- area of water
	- length of edge of water
	- movement of water
	- psychological rating
- Murray Valley	area of water

85. Throughout this chapter, "ratings" refer to the overall preference ratings for scenes on a 1 - 10 scale while "scores" refer to the assessment of attributes on a 1 - 5 scale.

	- length of edge of water
	- psychological rating
- Inland water	- area of water
	- length of edge of water
	- psychological rating
Diversity	
Naturalism	
Colour	

The process of analysis was iterative and was not necessarily performed in the order shown here.

10.7 LAND FORM

Although South Australia largely comprises flat terrain, there are upland and mountainous areas including the Flinders Ranges and the Musgraves and Mann Ranges of the far north west. Other significant ranges, albeit lower in elevation, are the Gawler Ranges west of Port Augusta and the Olary Spur extending towards Broken Hill. The central uplands comprise series of breakaways, i.e. escarpments and mesa-like structures around the edge of the Lake Eyre drainage basin.

Unlike interstate ranges that are much higher, the South Australian ranges are of relatively small elevation. The highest mountain in the State, Mt Woodroofe in the Musgraves, is 1435 m while the highest peaks in the Flinders Ranges are about 900 m. The Gawler Ranges and Olary Spur are in the 300 - 500 m range, while Mount Lofty, east of Adelaide, is about 600 m.

Added to these, the coast has many dunes, bays and rock platforms and, together with the River Murray, has extensive cliff formations.

This section examines firstly, landforms using a coarse classification of flats, hills and mountains. It then assesses various landforms in the landscape regions including for example, coastal landforms and rockfaces in mountain ranges. The influence that elevation has on preferences is then examined, using measures of heights, distances and angles of view.

(1) Flats, hills and mountains

The influence of terrain on preferences was assessed by classifying the scenes on the basis of whether they comprised essentially flats, hills or mountains. Most of the Flinders Ranges and arid ranges scenes were classified mountains, scenes in the Mt Lofty Ranges and some agricultural scenes with prominent ridges were classified hills, and the remainder were classified as flats. The classification excluded coastal scenes along with scenes of the River Murray, Lakes and Coorong and inland waters. There were 46 scenes of flats, 48 of hills and 17 of mountains, a total of 111 scenes.

Table 10.36 summarises the key statistics for the three classes.

Table 10.36 Key Statistics for Flats, Hills and Mountain Scenes

Statistic	Flats	Hills	Mountains
Mean	4.69	5.34	7.05
SE of mean	5.989E-02	5.922E-02	6.041E-02
SD	1.07	1.06	1.08
Range	1.78 – 8.26	2.27 – 8.13	2.88 – 9.29
IQ range	1.35	1.46	1.47
Skew	0.28	-0.16	-0.39

The means clearly indicate increasing preferences across the three classes; the preferences for hills are 13.9% higher than for flats while preferences for mountains are 50.3% higher than flats. The standard deviations and the interquartile ranges across the classes are surprisingly consistent. The negative skew increases across the classes as would be expected, the mountain scenes being strongly skewed to the higher ratings. Figure 10.34 provides a boxplot of the ratings.

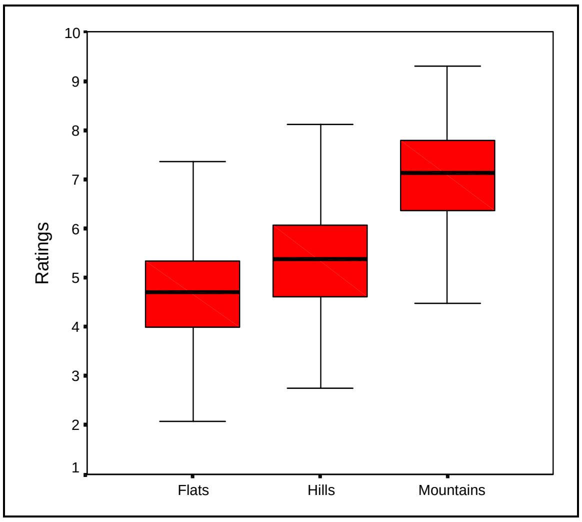


Figure 10.34 Boxplot of Flats, Hills and Mountains

The ANOVA for the classes of terrain indicates significant differences across these classes [Table 10.37] with the differences between groups being far more important than the differences within the groups. Figures 10.35, 10.36 and 10.37 indicate the distribution of ratings for the three classes and clearly shows the increasing skew across the three groups.

Table 10.37 ANOVA – Flats, Hills and Mountains

	SS	df	MS	F	Sig.
Between groups	889.53	1	889.53	1811.33	0.000
Within groups	156.17	318	0.49		
Total	1045.70	319			

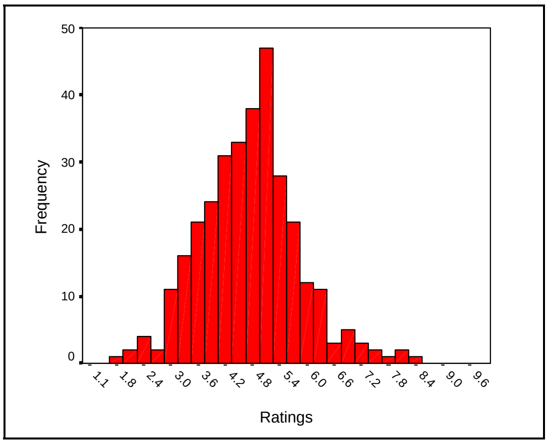


Figure 10.35 Distribution of ratings - Flats

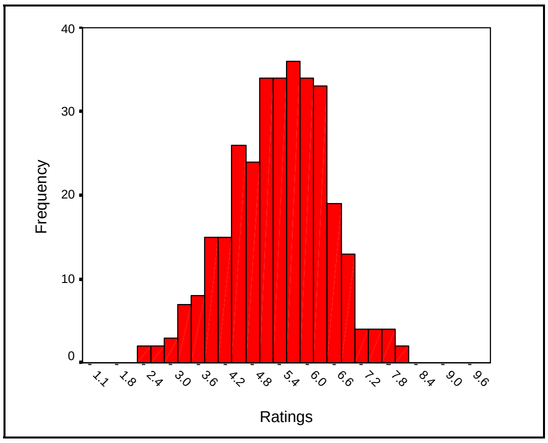


Figure 10.36 Distribution of ratings - Hills

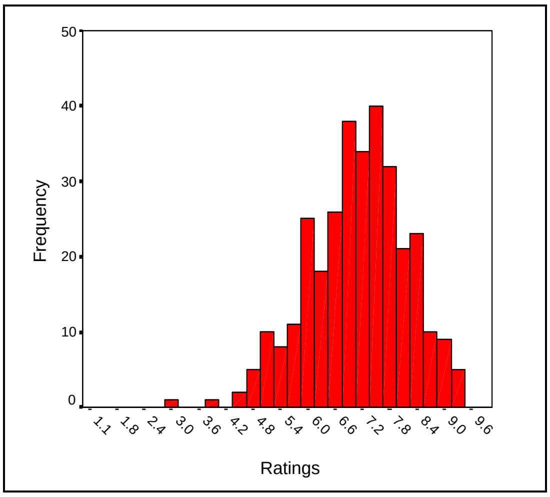


Figure 10.37 Distribution of ratings – Mountains

(2) Coastal landforms

The South Australian coast has a variety of landforms and an assessment was undertaken of their influence on preferences. Classification of the landforms was undertaken by dividing the coast into two sections, the interface with the water, and the inland section [Table 10.38]. Six different combinations of the two sections were identified [Table 10.39]. Cliffs either rise directly from the water [e.g. Nullarbor cliffs] or are separated from the sea by a beach or by rocks. The description of scenes is in Appendix 10.2.

Table 10.38 Coastal landform classification

Sea/land interface	Immediate hinterland
sandy beaches	flat hinterland
rocks	dunes
cliffs	cliffs

Table 10.39 Coastal Landform Scenes

Landform	Slides
1. Cliffs	80, 120
2. Beaches and dunes	5, 106, 124, 137, 141, 152
3. Beaches and cliffs	18, 91, 113
4. Beaches and flat hinterland	49
5. Rocks and cliff	47, 157
6. Beach, rocks and cliffs [including headlands]	35, 97, 108, 128

The key statistics for the landform scenes reinforce the high rating that coastal scenes elicit, the lowest mean rating was 6.66 [Table 10.40 and Figure 10.38]. Cliffs are present in the three highest rated landforms. The fourth group with cliffs [mean = 7.52] included one scene with low cliffs and the other with low headlands. Interestingly landform 4 of a beach


Cliffs #120


Rocks & cliff #157


Beaches & dunes #5


Beach, rocks & cliffs #128


Beaches & cliffs #113


Beaches & flat hinterland #49

and flat hinterland [#49] was in the Victor Harbour area, a popular holiday destination near Adelaide, and included the beach and the Bluff, a prominent land form. It is surprising that such a familiar holiday locality, well known to most South Australians, did not rate higher.

Table 10.40 Key Statistics for Coastal Landform Scenes in Descending Order

Landform	Mean	SD
Cliffs	8.56	1.50
Beach, rocks and cliffs	8.04	1.11
Beaches and cliffs	8.03	1.29
Beaches and dunes	7.68	1.36
Rocks and cliff	7.52	1.45
Beaches and flat hinterland	6.66	1.64

The ratings shown in Table 10.41 indicates that the top rated scenes were 28.5% higher than the lowest rated.

Table 10.41 Comparison of Ratings of Categories of Coastal Scenes

Category	Ratings	% difference
Beach, flat hinterland	6.66	0
Rocks, cliffs	7.52	12.9
Beaches, dunes	7.68	15.3
Beaches, cliffs	8.03	20.6
Beaches, rocks, cliffs	8.04	20.7
Cliffs	8.56	28.5

The nature of the cliffs present in the scenes is summarised in Table 10.42. The height and steepness of the cliffs appears to yield high preferences but the distance the cliffs are away from the viewer is also important - those nearby [e.g. scenes 80, 120] being rated higher than distant cliffs [e.g. 35].

Table 10.42 Description of Highly Rated Scenes

Scene	Description	Mean
Cliffs [mean 8.56]		
80	High cliffs [Nullarbor]	8.71
120	From cliff top, tall sheer indented cliffs [Cape Spencer]	8.41
Beaches and cliffs [8.04]		
18	Low cliffs, islands, sea with foam on reef [Pondalowie Bay]	8.52
91	Sandy beach backed by steep slope, distant cliff headland	8.16
113	From headland, beach backed by steep vegetated slopes	7.41
Beach, rocks and cliffs [8.03]		
35	Low bare headlands and cliffs [Petrel Cove]	7.51
97	From cliff across beach & sea to steep cliffs & headland	8.23
108	Bare steep rocky escarpment dropping to coast [Rapid Bay]	7.55
128	Wide bay, low rocky cliff shoreline & sandy bays, to steep high cliffs across bay [Pennington Bay]	8.88

Table 10.43 ANOVA of Coastal Landforms

	SS	df	MS	F	Sig.
Between groups	90.25	1	90.25	182.02	0.000
Within groups	157.46	318	0.50		
Total	247.71	319			

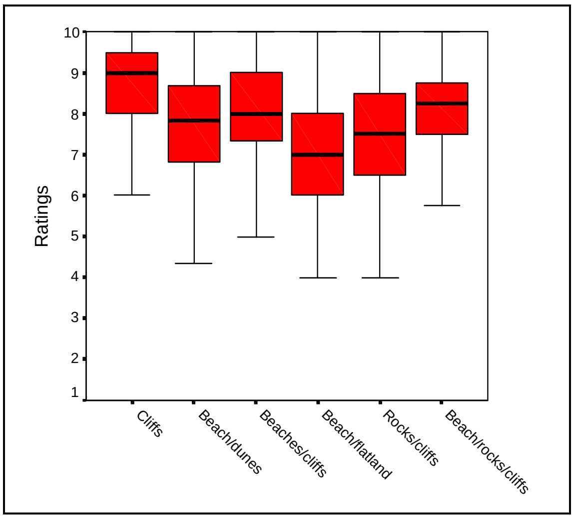


Figure 10.38 Boxplot of Coastal Landform Ratings

The ANOVA test indicates that the differences between these classes are significant although the major differences are within the groups [Table 10.43].

In summary [Figure 10.38], scenes with cliffs or steep land near the sea tended to be rated higher than flatter or lower hinterland. Steep high cliffs near the viewer are rated particularly high.

(3) River Murray landforms

Cliffs are a key landform of the River Murray that line the trench section of the river's length. These link the river flats to the surrounding flat mallee land through which the river meanders. The cliffs are of two types, sloping or sheer. These landforms are examined in six scenes [Table 10.44].

Table 10.44 River Murray Landform Scenes

Scene	Description	Mean
Sloping Cliffs		
51	From sloping clifftop along river length [Chowilla]	7.04
53	Low cliffs, lower Murray dairy flats, wide river	5.64
62	Down grassy slopes to bare flats, backwater	5.42
Steep Cliffs		
4	From clifftop along cliffs & across river, back lagoon [Wongulla]	6.49
44	Across river to steep cliffs [Overland Corner]	6.98
58	From clifftop along cliffs, across river and back lagoon [Big Bend]	6.95

It is clear from the statistics of these two landforms that the scenes with steep cliffs are rated much higher than those with sloping cliffs [Table 10.45]. The scenes with steep cliffs were

Sloping cliffs #62

Steep cliffs #58

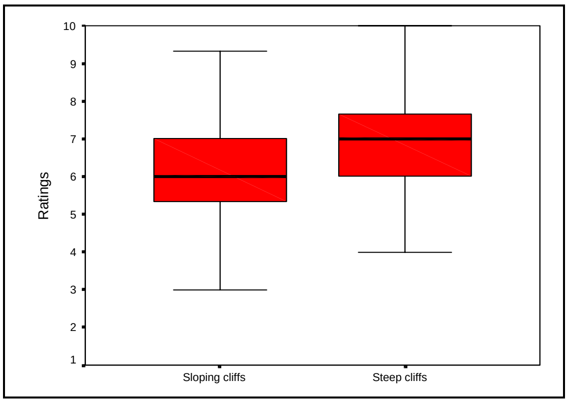


Figure 10.39 Boxplot of River Murray Landforms

Table 10.45 Comparative statistics of River Murray Landforms

Landform	Mean	SD
Sloping cliffs	6.04	1.48
Steep cliffs	6.81	1.31

rated 12.7% higher than those with sloping cliffs, again reinforcing the importance of steep cliffs. The difference is illustrated by the boxplot in Figure 10.38. It is noteworthy that the cliffs along the River Murray rated lower than coastal cliff scenes: coastal cliffs 8.15, River Murray cliffs 6.42. The difference may be due to the brown colour and lack of movement in the River Murray water.

The difference between the two landforms was shown by a t test to be significant: $t = -13.327$, $df = 318$, $p < 0.000$.

In summary, preferences are 12.7% higher for river scenes with steep cliffs than with sloping cliffs and the difference is statistically significant.

(4) Exposed rock faces

Although relatively low in elevation, the appearance of some of the ranges in inland South Australia, is the more impressive because of extensive rock faces or slopes. Some of the peaks in the Flinders Ranges have high, near vertical cliffs while in the granitic Musgraves the mountains comprise exposed rock sheets with little vegetation [eg scene #43].

Rock faces #104

Rock faces #43

Scenes in the Flinders Ranges, Gawler Ranges, Olary Ridge, the Musgraves and Mann Ranges were assessed. There were 16 scenes in the Flinders Ranges and a further seven scenes in the other arid uplands and ranges, making 23 scenes in all.

The significance of the rock faces in the scenes was assessed based on the extent of the rock faces and the steepness of the slope. The significance of the rock faces was rated out of five, 1 being absent or not present, through to 5 that were rock faces of considerable extent and steepness.

Table 10.46 summarises the scenes, their rating statistics and the average scoring by six respondents of the significance of rock faces.

Table 10.47 summarises the statistics for the scoring of the significance of rock faces and indicates clearly that the ratings increase with the scores.

Table 10.46 Flinders Ranges and Arid Ranges Scenes - Rock face Scores

Description	Slide	Rating	SD	Score
Flinders Ranges				
Aroona Valley & Heysen Range; high ranges and treed valley	6	7.42	1.78	3.00
Edeowie Gorge, rugged vertical rock faces, 2 waterfalls	23	8.16	1.85	4.83
Moralana valley, Wilpena Pound ramparts	32	8.27	1.54	2.33
Mt Freeling station, stony hill, spinifex and low spindly trees	39	5.41	1.77	1.00
Steep rounded mesa	60	5.40	1.97	2.50
Mt Freeling Station, spinifex, treed slope, vegetated valley, hills	72	6.84	1.80	1.00
Across native pines & eucalypts to high steep vegetated hill	74	5.55	1.72	1.00
Beltana Station, shrubby plain, series of steep peaky hills	88	6.38	1.93	2.17
Edeowie Gorge, through eucalypt to sheer cliff faces	104	8.38	1.55	4.67
Mambray Ck, vegetated valley to high vegetated ridgeline	107	8.05	1.49	1.33
Mt Barbara, steep rocky mountain, native pines	109	6.96	1.72	2.83
Mt Painter, steep rocky mountain, native pines	126	6.68	1.89	3.33
Armchair; thickly vegetated valley to three steep rocky mtns,	136	7.62	1.70	3.00
McKinley Bluff, tree studded slope to high rock face mountain	147	7.01	1.83	4.67
Dutchmans Stern; bare conical hill, steep ranges, shrubs	151	6.87	1.80	2.00
Old Warrawena, native pine valley, bare steep peak & hills	160	6.62	1.76	2.17
Arid Ranges				
Musgraves; boulders, shrubby plain, high round mountains	9	7.03	1.76	2.67
Mann Ranges; Euc. studded plain, high spur, distant ranges	43	7.07	1.98	2.17
Musgraves; boulder-strewn valley, smooth rounded mountain	140	7.22	1.85	2.50
Arckaringa Hill; shrubs, steep bare mesa, dark capping	78	6.97	1.71	3.17
Breakaways; bare ground, steep sloped flat mesas	103	6.11	2.26	2.67
Olary Ridge; chenopod plain, low rounded bare range of hills	21	5.58	1.66	1.17
Gawler Ranges; stony, chenopod plain, low rounded bare hills	38	5.11	1.82	1.00

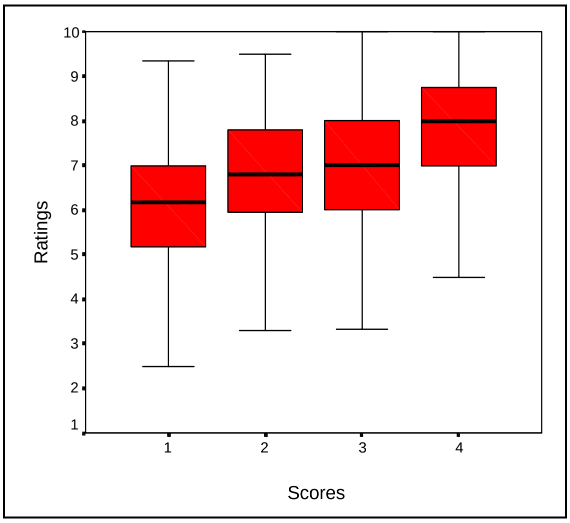


Figure 10.40 Boxplot of Scores of Rock Face Significance

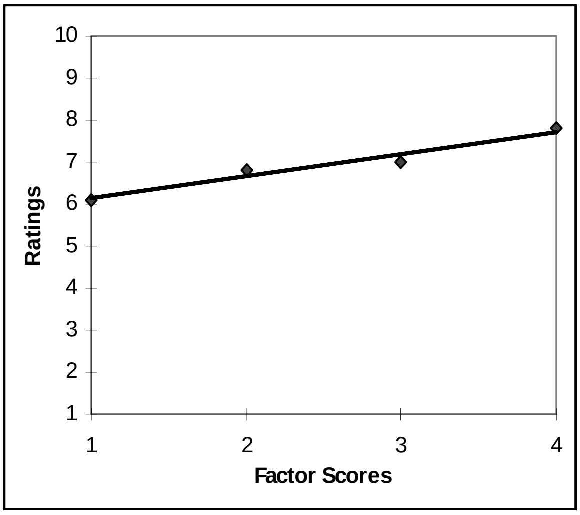


Figure 10.41 Scoring vs Rating of Rock Face Significance

Table 10.47 Rating of Rock Face Scores

	Scoring of Rock Faces			
	1	2	3	4
Mean	6.09	6.79	7.02	7.79
SD	1.28	1.32	1.40	1.38

This is illustrated by the boxplot [Figure 10.40] and the trendline [Figure 10.41]. The high scores may also be a function of the striking orange colours of the rockfaces. There is an almost perfect linear relationship between the factor scores and ratings: $y = 0.53x + 5.59$; $r^2 = 0.96$. This indicates that there is a 26.0% increase in rating over the four scores[86.]

86. The increase across the scoring range was calculated based on the equation where x is the score, e.g. for $y = 0.53x + 5.59$, for a score of 1,

The ANOVA indicates that the differences are significant [Table 10.48] with approximately two-thirds of the differences being between groups.

Table 10.48 ANOVA - Significance of Rock Faces

	SS	df	MS	F	Sig.
Between groups	455.46	1	455.46	692.01	0.000
Within groups	209.30	318	.66		
Total	664.76	319			

In summary, the preferences for mountain scenes increase by up to 26% depending on the extent and steepness of rock faces present.

(5) Elevation

The classification of terrain into the various classes of landforms is a relatively crude differentiation and a more accurate measure was developed. Measures of the height differences and distances between the viewer and the top of the prevailing terrain, along with measures of the angles of view provide a more objective measure.

Elevation was a common characteristic measured in many studies and was measured using appropriate maps. Anderson *et al*, 1976 used measures of relative relief, absolute relative relief, and mean elevation. Gobster & Chenoweth, 1989 measured the steepness of the terrain and distance of view. In New Zealand, Mosley, 1989 assessed the angle [tangent] of line of sight to highest visible point, the angle of line of sight to the most prominent point, and the angle of line of sight to the most remote visible point; of these only the first factor was significant. He also found the elevation of the most prominent point above the photograph was significant.

Measurement of Elevation

Measurement of elevation in the scenes was undertaken. Maps of a scale of 1:50,000 were used for scenes located in the Mt Lofty Ranges, the mid north, Murray Valley, Kangaroo Island and the main ranges of the Flinders Ranges. Elsewhere maps of 1:250,000 scale were used. The contour interval of the 1:50,000 maps was 10 metres while that in 1:250,000 maps was a 50 metre interval.

The following attributes were derived for each scene:

- Height of the position from where the photograph was taken.
- Height of the lowest point in the scene, for example where the sea was included this would be height zero.
- Height of the highest point in the scene. Where there were several high points, for example, a range of hills, an average was derived. In a few cases where there were several distinctive high points at varying distances, for example a close mountain peak and a distant one, heights of both points were derived.
- The distance to the highest point was derived, measured in kilometres or parts thereof. Where there were several high points, the distances were derived for each of these [Figure 10.42].

The angle of view to the highest point was calculated thus:

$$\text{tangent } \alpha^\circ = \text{height/distance}$$

where α° is the angle measured above the horizontal. In many instances the viewpoint was across a lower point before rising to the highest point, for example across a valley to a distant ridgeline. In these cases, as well as calculating α°, the angle from the lowest point to the highest point was also calculated. This is angle β°. In summary:

Angle α° is the angle from the horizontal to the highest point Angle β° is the angle from the lowest point to the highest point

While the majority of scenes viewed upwards towards a high point, in 26 scenes the view was down across the landscape [Figure 10.43]. The angle of view, α°, was measured in the same way as in Figure 10.42, the only difference being that was it measured downwards to the high point. Again, β° measured the angle between the high point and the low point.

In the majority of cases, estimates were derived based on the maps, however for 10 slides, all in the far north region, either the maps lacked

y = 6.12, for a score of 4, y = 7.71; the percentage change between the two scores is (100 * 7.71/6.12) 125.98; i.e. score 4 is 26% above score 1.

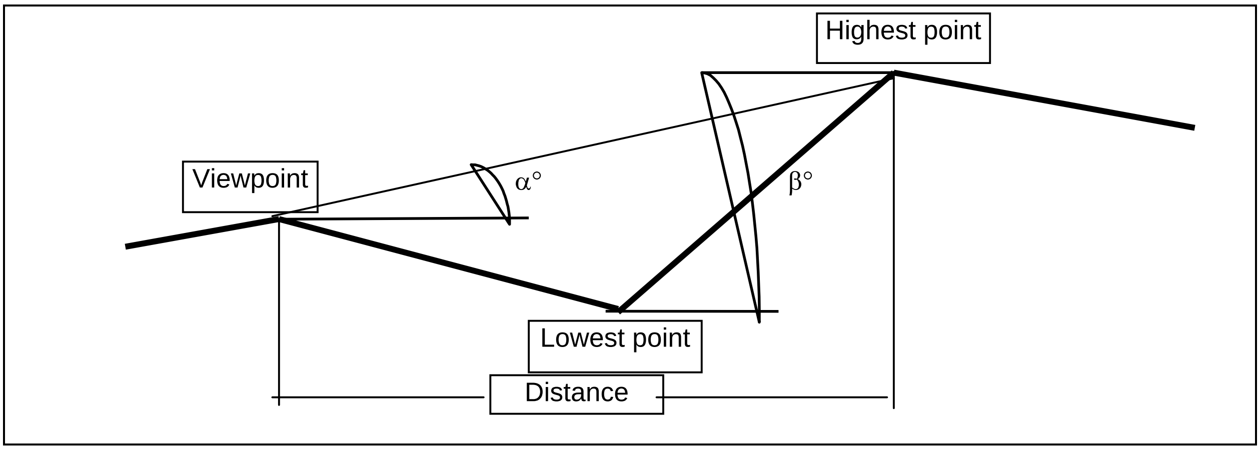


Figure 10.42 Derivation of Angles of Elevation

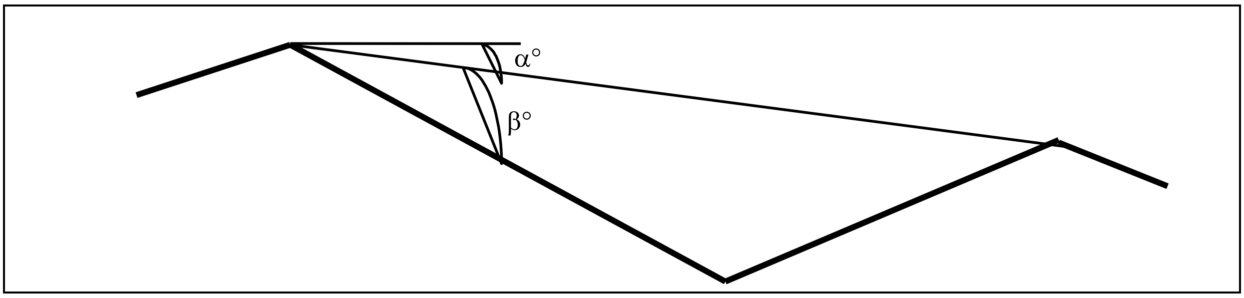


Figure 10.43 Derivation of Angles for Lower Landscapes

Example of view up (Gawler Ranges, #38)

Example of view down and then up (Marble Hill, #14)

height data or the exact location of the scene was uncertain. In these cases, an estimate was made from the slide of the heights and distance. The results of the analysis of angles of elevation are summarised by Table 10.49.

Table 10.49 Number of Angles of Elevation Measured from Scenes

Angle	All scenes[1] α°	All scenes[1] β°
0	38	
< 0.5°	10	3
0.5° - 1°	15	6
1° - 2°	27	11
2° - 3°	12	3
3° - 4°	8	2
4° - 5°	6	3
5° - 6°	3	2
6° - 7°	1	
7° - 8°		
8° - 9°	2	1
9° - 10°	3	2
10° - 11°		
11° - 12°	2	
12° - 13°	1	
13° - 14°	1	
> 14°	2	
Total	131	33

Note: 1 = all scenes excludes interstate scenes [5] and scenes with negative heights - i.e. downward views. Some scenes included two α° to cover a near ridge and a distant range. The scenes with 0° means that the high point was at the same level as the viewpoint. The > 14°category were 15°, 24° and 37°.

The detailed data on elevations and angles for all slides are summarised in Appendix 10.3.

It is apparent from Table 10.49 that a characteristic of the South Australian landscape is its flatness. Over a quarter [29%] were zero degrees, and further 49% were between zero and 3°. A one degree angle is the equivalent of a rise of 18 metres over one kilometre [i.e. 1000 m]. The high angles occurred where the high feature was close to the viewpoint - e.g. within Edeowie Gorge, scene #104 [37°], or in front of McKinley Bluff in the Gammon Ranges, scene #147 [24°].

All Scenes
[excluding interstate scenes and downward viewing scenes]

The elevations of all scenes were assessed based on the following attributes.

- The distance to the furthest point.
- The height difference, generally the difference between the horizon and the highest point. For downward views it is the difference between the lowest and highest point. This factor is called 'height'.
- The angle of view, as for height difference, the largest angle was selected.

Table 10.50 Elevation Classes

Class	Distance	Height Difference	Angle
1	0 - 99 km	0 - 99 m	0 - 2.99°
2	1 - 1.99	100 - 199	3 - 5.99°
3	2 - 2.99	200 - 299	6 - 8.99°
4	3 - 3.99	300 - 399	9 - 11.99°
5	4 - 4.99	400 - 499	>12°
6	> 5	> 500	

Table 10.51 All Scenes* – Number of Scenes

Class	Distance	Height Difference	Angle
1	15	44	63
2	17	21	17
3	12	9	3
4	10	7	5
5	9	4	4
6	28	5	
Total	91	90	92

* Excluding interstate scenes and scenes with negative heights

Table 10.52 All Scenes - Ratings of Attributes

	Attribute Classes					
	1	**2**	**3**	**4**	**5**	**6**
Distance						
Mean	6.59	5.84	6.00	6.26	5.84	5.66
SD	1.02	1.01	1.00	1.04	1.02	0.98
Height Difference						
Mean	5.92	5.61	5.93	5.55	6.00	7.19
SD	0.97	1.00	1.05	1.09	1.17	1.20
Angles						
Mean	5.74	5.68	7.02	7.03	6.72	
SD	0.97	1.03	1.47	1.38	1.21	

Each of these were aggregated into classes [Table 10.50]. Table 10.51 summarises number of scenes per attribute class, Table 10.52 indicates the statistics of each of the classes for the three attributes and Figures 10.44, 10.45 and 10.46 of boxplots indicates the relationship between attribute scores and ratings.

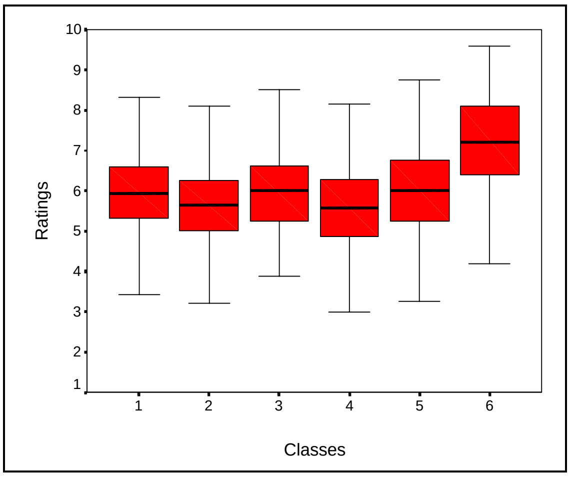


Figure 10.44 Boxplot of Height vs Ratings

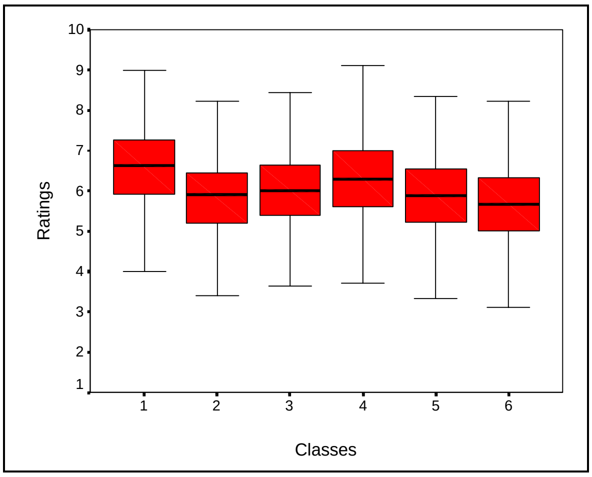


Figure 10.45 Boxplot of Distance vs Ratings

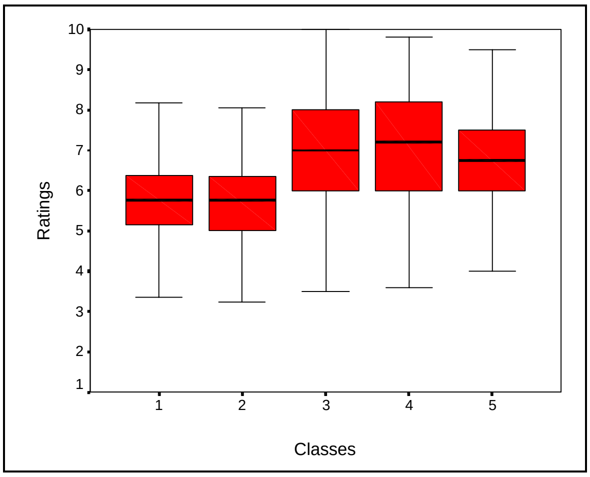


Figure 10.46 Boxplot of Angles vs Ratings

Figure 10.47 shows the influence of the elevation parameters and preferences from which the following equations were derived:

Distance	$y = -0.13x + 6.47; r^2 = 0.48$
Height difference	$y = 0.20x + 5.32; r^2 = 0.41$
Angles	$y = 0.33x + 5.44; r^2 = 0.60$

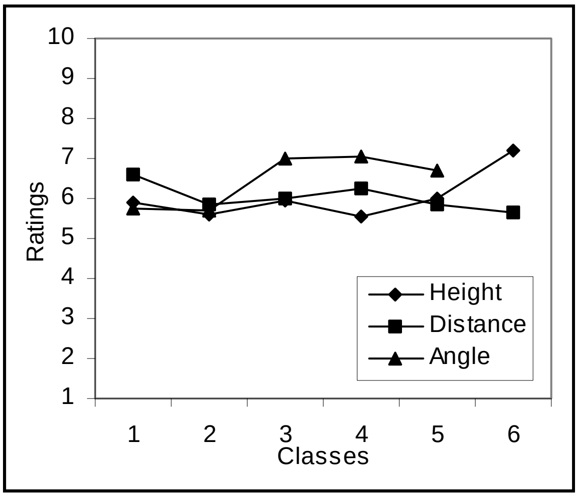


Figure 10.47 Influence of Elevation on Preferences - All Scenes

These indicate that preferences increase with the difference in heights between the viewpoint and the top of the landform and also increase with the angle of view. Preferences decrease with the distance of the view. Based on these algorithms, the increases in ratings over the score classes are:

- distance - 10.25%
- height difference 14.60%
- angles 22.88%

ANOVAs indicate that in each case the relationships are significant:

distance $F = 239.77$, df 1, 318, $p < 0.000$
height difference $F = 432.15$, df 1, 318, $p < 0.000$
angles $F = 481.80$, df 1, 318, $p < 0.000$

Downward Viewing Scenes

Table 10.53 Downward Viewing Scenes – Number of Scenes

Class	Distance	Height Difference	Angle
1	16	7	15
2	4	3	
3	3	6	4
4		1	2
5		1	
6		3	
Total	21	21	21

The scenes which view downwards across a scene were analysed separately. Table 10.53 summarises the number of scenes per attribute class. Table 10.54 indicates the statistics for each of the classes of the three attributes and Figure 10.48 indicates the relationship between attribute scores and ratings.

Table 10.54 Downward Viewing Scenes – Ratings of Attributes

	Attribute Classes					
	1	**2**	**3**	**4**	**5**	**6**
Distance						
Mean	7.05	7.55	6.22	5.01	5.98	6.57
SD	1.15	1.20	1.26	1.52	1.57	1.18
Height Difference						
Mean	6.79			6.49	6.14	
SD	0.96			1.44	1.42	
Angles						
Mean	6.67	6.80	4.78			
SD	1.04	1.19	1.79			

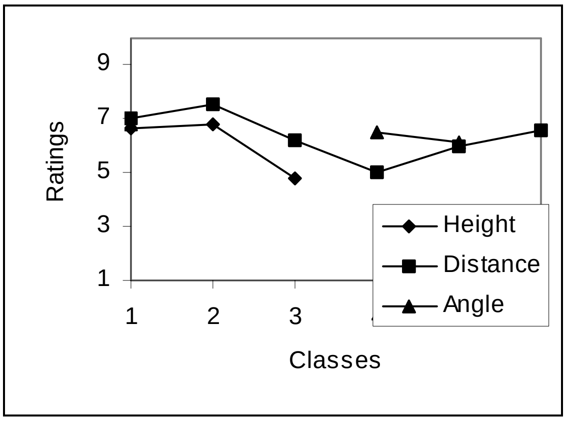


Figure 10.48 Influence of Downward Views on Preferences

The small number of scenes in many of the classes and their lack of continuity make it difficult to derive trend lines for these data. For the one factor for which data were available covering the entire range, the influence of distance, the equation: $y = -0.24x + 7.23$; $r^2 = 0.25$ indicates that preferences decreased with distance, a finding identical with that for the scenes which viewed upwards.

Preferences decreased by 17.17% over the six classes. The indication given by the data in Table 10.54 and by Figure 10.48 is that preferences are reduced by both the height difference and the angle of view for downward viewed scenes. However it is not possible to be definitive on this point on the available data.

ANOVAs indicate that in each case the relationships are significant:

distance	$F = 297.02$, df 1, 318, $p < 0.000$
height difference	$F = 364.10$, df 1, 318, $p < 0.000$
angles	$F = 99.27$, df 1, 318, $p < 0.000$

Flinders Ranges and North West Ranges

The regions with the greatest elevation in South Australia are the Flinders Ranges and the ranges in the north west - the Musgraves and Mann Ranges. The data on elevation were analysed for scenes in these regions, omitting again the scenes with negative heights.

Table 10.55 Flinders Ranges and NW Ranges – Number of Scenes

Class	Distance	Height Difference	Angle
1	2	1	1
2	3	2	5
3	3	2	2
4	2	3	3
5	2	2	4
6	3	5	
Total	15	15	15

The number of scenes for each of the attribute classes is summarised by Table 10.55. Table 10.56 and Figure 10.49 indicates the influence of height, distance and angle of view on preferences. The relatively small number of scenes in each class is reflected by the large standard deviations.

Table 10.56 Flinders Ranges and NW Ranges – Ratings of Attributes

	Attribute Classes					
	1	2	3	4	5	6
Distance						
Mean	5.55	6.50	7.56	7.11	7.21	7.18
SD	1.72	1.62	1.48	1.45	1.50	1.17
Height Difference						
Mean	6.85	6.86	7.56	6.72	7.22	6.83
SD	1.41	1.51	1.49	1.73	1.47	1.21
Angles						
Mean	6.38	6.61	7.02	7.44	7.38	
SD	1.93	1.11	1.47	1.45	1.45	

Based on these the following equations were derived:

Distance	$y = 0.004x + 6.99$; $r^2 = 0.0005$
Height difference	$y = 0.28x + 5.87$; $r^2 = 0.53$
Angles	$y = 0.28x + 6.12$; $r^2 = 0.92$

It is evident on the basis of these that distance had a negligible effect on preferences, the rating of a distant view will be almost identical to a nearby view. However this is a change from the negative influence that distance had on preferences in the ‘all scenes’ and ‘downward scenes’ cases.

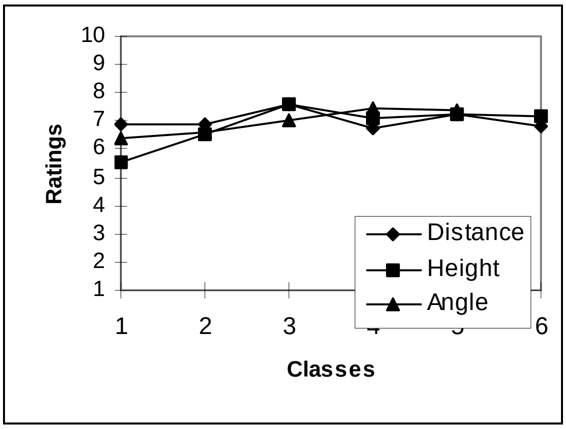


Figure 10.49 Influence of Elevation on Preferences - Flinders Ranges & NW ranges

Table 10.57 Summary of Findings of Influence of Elevation on Preferences

Attribute	All Scenes	Downward View Scenes	Flinders/NW Ranges
Distance	$y = -0.13x + 6.47$; $r^2 = 0.48$ -10.25%	$y = -0.24x + 7.23$; $r^2 = 0.25$; -17.17%	$y = 0.004x + 6.99$; $r^2 = 0.0005$; 0.29%
Height difference	$y = 0.20x + 5.32$; $r^2 = 0.41$ 14.60%		$y = 0.28x + 5.87$; $r^2 = 0.53$ 22.76%
Angle of view	$y = 0.33x + 5.44$; $r^2 = 0.60$ 22.88%		$y = 0.28x + 6.12$; $r^2 = 0.92$ 17.50%

Based on these algorithms, the increase in ratings over the score classes is:

- distance 0.29%
- height difference 22.76%
- angles 17.50%

Compared with the 'all scenes' case, in scenes of the Flinders Ranges and NW ranges, distance has a stronger influence, nearly 23% over the six classes compared with 14.6%, while the angle of view has a lesser influence, 17.5% compared with nearly 23%.

ANOVAs indicate that the relationship is not significant for the distance factor but the other relationships are significant:

distance	$F = 0.031$, df 1, 318, $p = 0.86$
height difference	$F = 329.79$, df 1, 318, $p < 0.000$
angles	$F = 211.16$, df 1, 318, $p < 0.000$

In summary, Table 10.57 shows the equations and influence on ratings for the three attributes for the various cases.

Distance to the farthest point has a negative influence on preferences for 'all scenes' and 'downward view scenes' and is neutral for the scenes of the Flinders and NW Ranges. The difference in height between the viewer and the highest point in the scene has a positive influence, particularly in the Flinders and NW Ranges. Similarly the angle of view to the highest point in the scene also has a positive influence.

These results complement and reinforce the earlier findings regarding coastal and River Murray scenes and rockfaces in the Flinders and NW Ranges.

(6) Summary of land forms

South Australia is predominantly of flat terrain though there are relatively small hilly and mountainous areas. Preferences for hilly areas are 13.9% above the average for flat areas, and preferences for mountainous areas are 50.3% above flat areas.

In coastal areas six landform groupings were defined and the highest rated were cliffs [8.56], followed by beaches/rocks/cliffs [8.04], beaches/cliffs [8.03], beaches/ dunes [7.68], rocks/cliffs [7.52] and beaches/flat hinterland [6.66]. Clearly the steeper the terrain the higher the rating. The presence of cliffs lifts ratings as do dunes in a scene.

Along the trench section of the River Murray, the cliffs either slope from the surrounding plains or are sheer. Again the scenes with steep cliffs were rated higher [6.81] than those with sloping cliffs [6.04], a difference of 12.7%.

The Flinders Ranges and the arid ranges of the outback have impressive rock faces or slopes. The extent and steepness of rock faces were assessed into four classes and the ratings increased linearly by 26.1% over these classes.

The elevation of scenes was assessed by measuring three attributes: the distance to the farthest point in the scene, the difference in height between the viewer and the highest point in the scene; and the angle of view to the highest point. This was assessed for all scenes except interstate and downward viewing scenes, for downward viewing scenes separately, and for scenes in the Flinders Ranges and north west ranges.

Distance was found to have a negative or at best neutral influence on preferences, i.e. the preferences of distant scenes was either identical or lower than for nearby scenes, suggesting a general preference for nearby scenes. Both height difference and the angle of view had a positive influence on preferences, increasing preferences by up to 23% depending on the difference in height between the viewer and the highest point, and by a similar amount depending on the angle of view of these components.

10.8 LAND COVER

Land cover essentially means vegetative cover. It focuses on the presence of differing forms of vegetation. The land cover attribute was examined through assessing the influence on preferences of the:

- presence of trees
- height of vegetation
- density of vegetation
- types of vegetation
- origin of vegetation (i.e. introduced vs indigenous)

(1) Presence of trees

An assessment was undertaken of the extent to which the presence of trees in scenes ratings. This identified scenes that contained trees, being vegetation with a tree form, and included low sparse trees in arid areas through to tall, thick eucalypts in moister areas. There was a total of 116 scenes with trees.

Significance of trees - score 2 [#43]

Significance of trees - score 4 [#143]

The significance of the trees in the scenes was assessed on a 1 - 5 scale, 1 being insignificant and 5 being very significant. This was assessed by viewing the scene as a whole and assessing the dominance or prominence of the trees, for example a few nearby trees in an otherwise barren landscape may be as significant as many more distant trees. A judgement is thus involved and six respondents undertook the assessment. Their scores are summarised in Appendix 10.4.

Table 10.58 Distribution of Scores of Tree Significance

Score	Number
1 - 1.99	42
2 - 2.99	36
3 - 3.99	28
4 - 4.99	10
Total	116

These scores were grouped into four classes [Table 10.58].

Table 10.59 summarises the mean and standard deviation of average ratings for the four scores of significance of trees in scenes. These are illustrated by the Figure 10.50 and 10.51. The ratings increase with the scoring of the significance of trees as described by the following algorithm: $y = 0.40x + 4.70$; $r^2 = 0.81$.

Table 10.59 Significance of Trees in Scenes

Score	Mean	SD
1 - 1.99	4.89	1.07
2 - 2.99	5.71	0.98
3 - 3.99	6.15	0.99
4 - 4.99	6.09	1.10

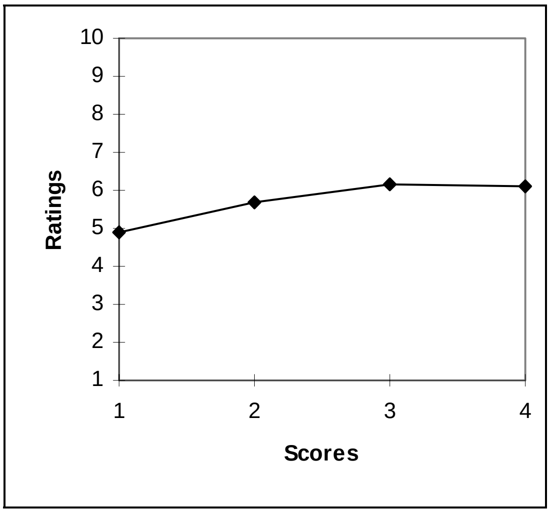


Figure 10.50 Significance of Trees - Scores vs Ratings

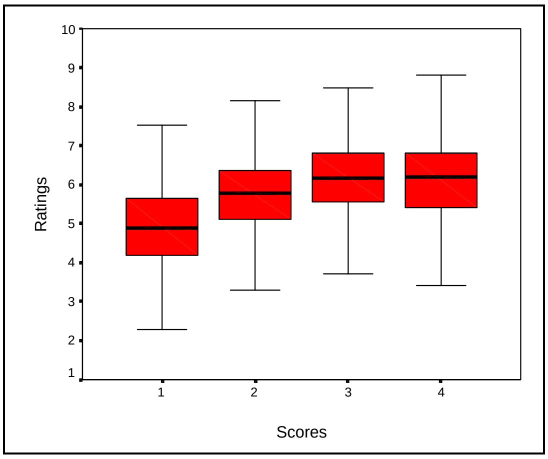


Figure 10.51 Boxplot of Scoring of Significance of Trees

The results indicate clearly that the presence of trees influences preferences. On the basis of the scoring of the significance of trees in scenes, the increase over the four classes is 23.5% above the lowest score. The ANOVA [Table 10.60] indicates that the differences between the groups are significant with two thirds of the differences being between groups.

Table 10.60 ANOVA - Significance of Trees in Scenes

	SS	df	MS	F	Sig.
Between groups	260.45	1	260.45	626.87	.000
Within groups	132.12	318	0.42		
Total	392.57	319			

The foregoing covers all scenes and therefore mixes scenes from differing regions and of very different contents. To gain a more accurate assessment of the effect of trees on preferences it is desirable to examine it for a particular type of scene, e.g. cropping scenes, thus holding constant factors such as land use and, to some extent land form. The significance of tree cover covering crops and pasture scenes and scenes of hills & pastures, mixed uses, and vines are examined in Sections 5.4.2 and 5.4.3. The significance of trees in influencing preferences is shown by the following algorithms [including all scenes for comparison]:

<u>Trees in all scenes</u>
$y = 0.40x + 4.70$; $r^2 = 0.81$
23.5% increase in means
<u>Trees in crops & pasture scenes</u>
$y = 0.27x + 3.93$; $r^2 = 0.99$
12.9% increase in means
<u>Trees in hills & pastures, mixed uses and vines</u>
$y = 0.405x + 4.41$; $r^2 = 0.99$
16.8% increase in means

All of these indicate that trees have a positive influence on preferences and, particularly in scenes containing a variety of land forms and land uses, the effect of the trees is quite substantial.

(2) Height and density of vegetation

To seek further explanation of the role that vegetation plays in influencing preferences, all scenes were analysed regarding the height and density of vegetation. This covered all forms of vegetation, not just trees, so included low coastal and chenopod vegetation along with tall eucalypts and pines. The height and density of vegetation were assessed separately on a 1 - 5 scale, with 1 being low height/very scattered vegetation through to 5 being very high/dense vegetation.

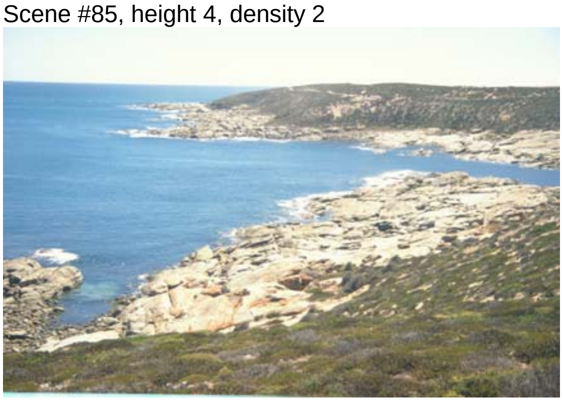
As many scenes contained a variety of vegetation, such as scattered tall trees and dense low bushes, it would be pointless deriving averages as the vegetation is often bipolar in its form and distribution. Therefore the height and density were assessed independently of each other. The vegetation with, respectively, the highest height and the greatest density, was used as the basis of the scoring. This approach was based on the assumption that it would be highest and densest forms of vegetation that would have the greater influence on preferences than the lowest and least dense forms of vegetation. The previous results indicate that the assumption is likely to be correct in relation to the height of vegetation.


Scene #12, height 2, density 2

The scoring ignored grass cover and crop cover. In landscapes these have an appearance as carpets - they are largely unnoticed and unremarkable. The low preference ratings found for crops suggest that crop cover has minimal influence on preferences and the same was assumed for grass.


Scene #14, height 4, density 4

Scene #85, height 4, density 2



Coastal vegetation #157, height 1, density 3

The scores for the scenes of vegetation are shown in Appendix 10.5. Table 10.61 summarises the distribution of the height and density classes. It indicates that while much of the vegetation is low, it is of moderate to high density.

Table 10.61 Distribution of Vegetation Height and Density Scores

Score	Height	Density
1 - 1.99	52	28
2 - 2.99	57	71
3 - 3.99	26	47
4 - 4.99	20	9
Total	155	155

Table 10.62 summarises the average ratings across the four classes for vegetation height and density.

Table 10.62 Ratings of all Scenes by Scores of Vegetation Height and Density

	Scores			
	1 - 1.99	**2 - 2.99**	**3 - 3.99**	**4 - 4.99**
Height				
Mean	5.88	5.50	6.01	6.36
SD	1.01	0.97	1.00	1.04
Density				
Height	5.42	5.81	5.98	6.23
SD	1.05	0.98	0.96	1.14

The ANOVAs indicate that the differences between classes for both vegetation height and density are significant [Tables 10.63, 10.64], and in both cases the differences within the groups are greater than between the groups.

Table 10.63 ANOVA - Vegetation Height, All Scenes

	SS	df	MS	F	Sig.
Between groups	60.44	1	60.44	193.33	.000
Within groups	99.42	318	0.31		
Total	159.86	319			

Table 10.64 ANOVA - Vegetation Density, All Scenes

	SS	df	MS	F	Sig.
Between groups	107.88	1	107.88	202.76	.000
Within groups	169.20	318	0.53		
Total	277.08	319			

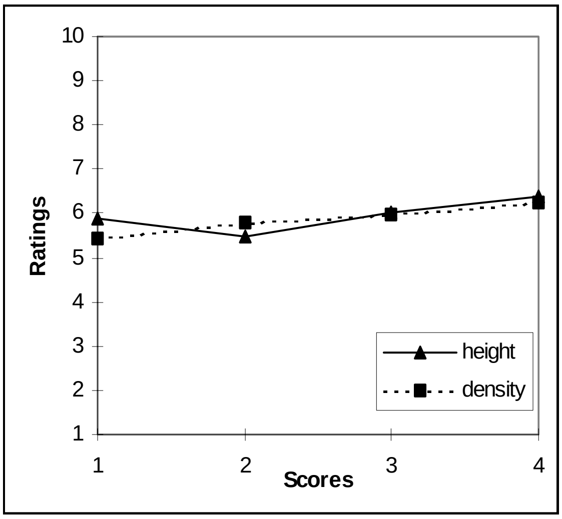


Figure 10.52 Relationship of Ratings with Scores of Vegetation Height and Density

The means shown in Table 10.62 and illustrated in Figure 10.52 and the boxplots in Figures 10.53 and 10.54 indicate that a clear trend is evident between the scores and ratings for either vegetation height or density. The relevant algorithms are:

Vegetation height: $y = 0.195x + 5.45; r^2 = 0.50$
Vegetation density: $y = 0.26x + 5.21; r^2 = 0.97$

These algorithms indicate that preferences increase by up to 10.36% over the four score classes of vegetation height and by up to 14.26% for vegetation density.

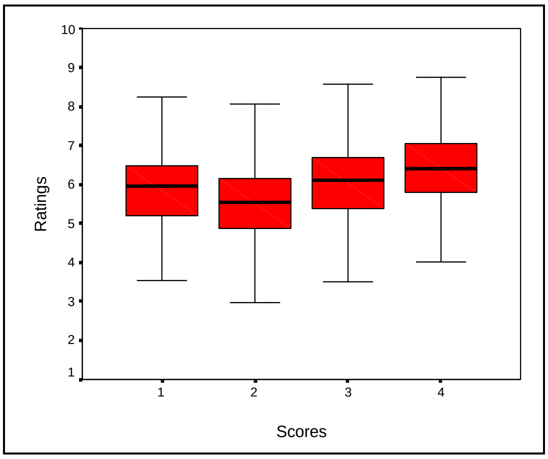


Figure 10.53 Boxplot of Vegetation Height Ratings

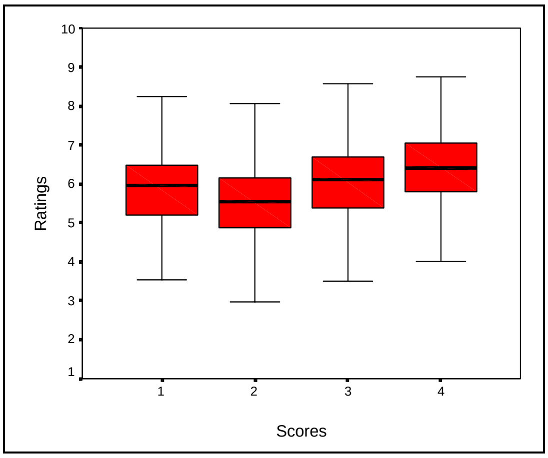


Figure 10.54 Boxplot of Vegetation Density Ratings

These results are based on all the scenes [excluding interstate scenes] and includes coastal scenes which are generally highly rated but in which the vegetation is often very low though dense. There were a total of 20 coastal scenes but two contained no vegetation whatsoever. Of the remaining 18 coastal scenes, most were rated as 1 in terms of height while 11 of the scenes rated 4 or 5 in terms of density. Removal of these scenes provides a more consistent set of scenes by which the influence of vegetation height and density may be assessed. Consideration was given to also excluding scenes of inland water with vegetation. While the vegetation near the coast tends to be low but dense, vegetation near inland freshwater is often tall and also quite dense. Although associated with water, there appears to be no good reason for excluding this vegetation.

The analysis was therefore undertaken for all South Australian scenes without the coastal scenes.

Table 10.65 Distribution of Vegetation Height & Density Scores Excluding Coastal Scenes

Score	Height	Density
1 - 1.99	37	24
2 - 2.99	53	58
3 - 3.99	26	45
4 - 4.99	20	8
Total	135	135

Table 10.65 indicates the distribution of scores for these scenes. Compared with the previous analysis, this has many fewer ‘1’ height scores [37 compared with 52 previously] and slightly fewer ‘2’ scores [53 cf 57]. Of the density scores the ‘2’ scores reduced substantially [58 cf 71]. The effect of these on the ratings is apparent in Table 10.66.

Table 10.66 Ratings of all Scenes by Scores of Vegetation Height and Density - without coastal scenes

	Scores			
	1 - 1.99	**2 - 2.99**	**3 - 3.99**	**4 - 4.99**
Height				
Mean	4.98	5.35	6.01	6.38
SD	1.10	0.99	1.01	1.02
Density				
Height	5.01	5.37	5.91	6.09
SD	1.11	0.99	0.96	1.13

Table 10.67 ANOVA - Vegetation Height, All Scenes - less coastal scenes

	SS	df	MS	F	Sig.
Between groups	380.62	1	380.62	929.87	.000
Within groups	130.16	318	0.41		
Total	510.78	319			

Table 10.68 ANOVA - Vegetation Density, All Scenes - less coastal scenes

	SS	df	MS	F	Sig.
Between groups	228.02	1	228.02	393.37	.000
Within groups	184.34	318	0.58		
Total	412.36	319			

The ANOVAs indicate that the differences between classes for both vegetation height and density are significant [Tables 10.67, 10.68] and the F values are considerably greater than for the previous analyses with coastal scenes.

In contrast to the previous ANOVA, the differences between groups now exceed the within-group differences.

Compared with the earlier rating of all scenes [Table 10.62], the score 1 height has changed from 6 to 5.05 and the score 1 density from 5.05 to 4.57. These together with other changes in the scores produce clearer relationships between scores and ratings and steeper trend [Figure 10.55].

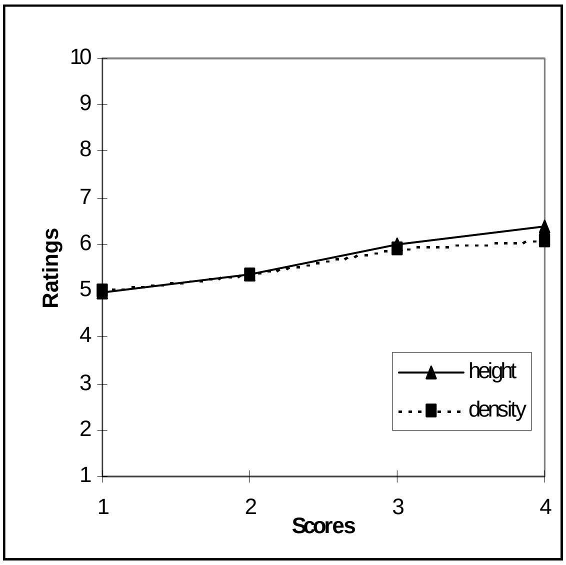


Figure 10.55 Relationship of Ratings with Scores of Vegetation Height & Density without coastal scenes

The relationships are:

Height y = 0.49x + 4.47; r^2 = 0.99
Density y = 0.38x + 4.65; r^2 = 0.97

Compared with the previous algorithms, these have steeper slopes and the r^2 of vegetation height is much stronger. Based on these algorithms, preferences increased by 29.6% over the four score classes of vegetation height and by 22.7% for vegetation density. The increases are considerably higher than previously [10.4% and 14.3% respectively]. These indicate that height and density of vegetation, other than in coastal areas, influences preference ratings. The relationship is further illustrated by Figures 10.56 and 10.57.

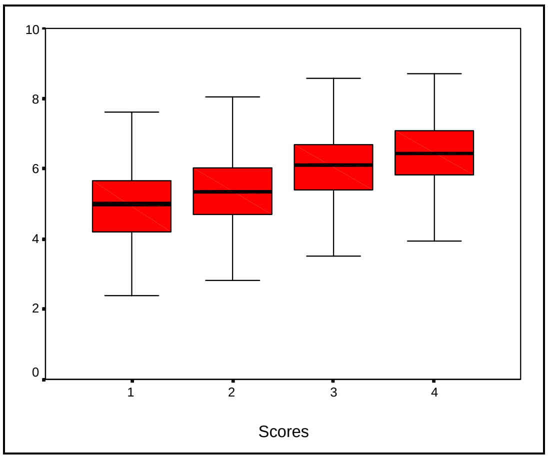


Figure 10.56 Boxplot of Vegetation Height Ratings without coast

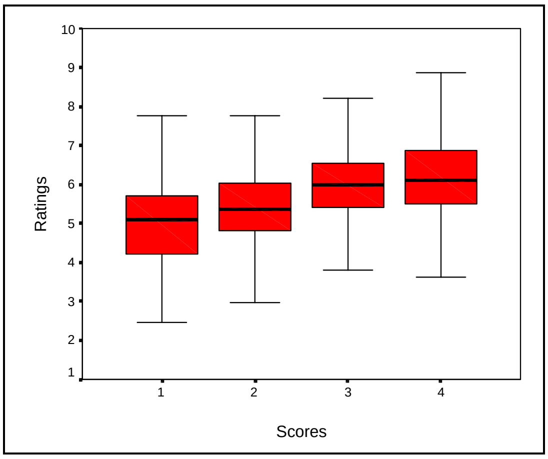


Figure 10.57 Boxplot of Vegetation Density Ratings without coast

Table 10.69 Summary of Algorithms for Scenes with Vegetation

	All scenes	All scenes without coast
Height	y = 0.19x + 5.45 r^2 = 0.50 10.4% increase	y = 0.49x + 4.47 r^2 = 0.99 29.6% increase
Density	y = 0.26x + 5.21 r^2 = 0.97 14.3% increase	y = 0.38x + 4.65 r^2 = 0.97 22.7% increase

The two sets of algorithms are summarised in Table 10.69. Adopting the second set as more representative of terrestrial vegetation, the preferences increased by up to 30% according to the height and up to 23% according to the density of the vegetation.

(3) Types of Vegetation

The search for explanatory factors in the influence of land cover on preferences lead to

Table 10.70 Structure of South Australian Vegetation [after Carnahan]

	Foliage cover			
Growth form	**> 70%**	**30 - 70%**	**10 - 30%**	**< 10%**
Tall trees > 30 m				
Medium trees 10 - 30 m	lower South East	high Mt Lofty R.	sth Flinders R.	Mt Lofty R.
Low trees < 10 m			Naracoorte area sth & west Kangaroo Island	Flinders R. lower South East east Burra Gawler Ranges west Victoria Desert
Tall shrubs > 2 m			Yellabinna - Yumbarra black oak n. R. Murray central Eyre Pen	nw. Ranges Simpson Desert Victoria Desert Ngarkat mallee
Low shrubs < 2 m			nw. Olary south Lake Torrens El Alamein	central/southern Breakaways Coongie lakes Olary spur e. & w. Flinders R.
Hummock grasses			Musgraves Ranges	
Tussock grasses		east Jamestown east Elliston se. Loxton	Warburton Ck east Lyndhurst	south Birdsville
Other herbaceous grasses		agricultural areas		

an examination the types of vegetation. The vegetation shown in the scenes included spinifex [*Triodia irritans*], saltbush [*Chenopodiacae*], native pines [*Callitris* spp], samphires [i.e. salt marsh] and mangroves [*Avicennia marina* var *resinifera*], willows [*Salix spp*], gums [*Eucalyptus*] of various species and forms, and introduced pines [*Pinus radiata*].

Australia's present vegetation has been classified by the botanist, J.A. Carnahan (1989) on the basis of its growth form and the density of foliage cover for the tallest stratum and lower stratum. Table 10.70 summarises the distribution of vegetation types in South Australia on the basis of Carnahan's map.

It is apparent from Table 10.70 that South Australia's vegetation comprises medium to low trees and shrubs of low density, it has no extensive areas of tall trees and the medium size trees are confined to the wetter areas. However Carnahan's map does not cover medium size trees such as *Eucalypts* in micro areas such as occur along creeks and the River Murray. The classification is too coarse to provide a basis for examining the vegetation types used in the survey.

Appendix 10.6 lists 101 scenes that contain vegetation. It groups the indigenous vegetation into 16 categories ranging from arid grasses through various forms of shrubs and trees to tall dense vegetation. It also includes three forms of introduced and cultural vegetation.

It is important to appreciate that the ratings derive from the entire set of attributes contained in the scenes, not just the vegetation. For example coastal scenes are the highest rated of all scenes in South Australia but the previous section's finding of the influence of vegetation height on preferences suggests that this is unlikely to be due to the low ground-hugging vegetation which characterise the coast. The average ratings for each vegetation type are summarised in Table 10.71 and Figure 10.58.

Pastoral scenes of isolated large trees and grass, beloved of landscape theorists as similar to the savanna landscape in which humans are theorised to have evolved, were only of middle ranking scores [5.38]. The eight scenes provided a range of pastoral elements and their relatively modest ranking does not provide convincing support for the savanna theories. In contrast, however to many pastoral scenes in temperate countries with well shaped, deciduous trees or African acacia trees [Orians, 1986, Heerwagen & Orians, 1993], Australian eucalypts are decidedly non-symmetrical and this may detract from their pastoral-like appearance.

Table 10.71 Ratings of Vegetation Types

Vegetation Type	Scenes	Mean	SD
Indigenous Vegetation			
Arid grass & spinifex	3	4.82	1.52
Arid trees & shrubs	2	5.18	1.68
Arid mountains & vegetation	6	7.30	1.39
Chenopods	8	5.56	1.47
Creek-side trees	3	6.09	1.38
Native pines	5	6.96	1.18
Arid dunes	2	6.83	1.67
Coastal vegetation	9	7.60	1.32
Littoral vegetation	3	5.55	1.45
Dead trees	2	5.04	1.92
River Murray vegetation - eucalypts, lignum	10	6.45	1.19
Mallee	4	5.94	1.55
Pastoral	10	5.33	1.19
Hills, fields & trees (scattered eucalypts) in Mt Lofty R.	16	5.09	1.23
Dense eucalyptus woodlands	8	6.59	1.12
Vegetation adjacent to other inland waters	4	7.19	1.23
Introduced and Cultural Vegetation			
Pines	2	4.62	1.75
Willows	2	5.48	1.52
Orchards	2	5.76	1.40

Notes: 1. Mainly in Mt Lofty Ranges
2. i.e. inland waters

An interesting finding is the reasonably high rating of stands of mallee [5.94] sometimes regarded as monotonous and boring. However several of the scenes were relatively close-up in which the diversity of colour and form of individual mallee trees were evident. The types of vegetation in the lower part of Figure 10.58 - creek-side trees and below - are generally situated with water present or amidst mountainous terrain and it is difficult to separate the positive influence that these attributes have on preferences from the vegetation itself. As stated earlier, the highest ranked vegetation type, coastal vegetation occurs with the highest ranked landscape region and as the vegetation is generally low and nondescript visually, the high ratings are unlikely to be attributable to the vegetation.

Similarly the native pines are found in scenes of the Flinders Ranges, another highly rated region.

Thus the context of the vegetation often has a major influence on its ranking. In some situations, the vegetation is more important than the land form or land use while in other cases it is less important than the terrain or presence of water.

The type of vegetation appears however to have some influence on preferences, e.g. the discrimination of pines, which indicates that the content of the scene is important and that respondents do not treat all vegetation equally and judge them simply in terms of say height or density.

The pines, willows and orchard trees are introduced types of vegetation in contrast to the remainder which are indigenous to Australia.

Table 10.72 Rating of Indigenous and Introduced Vegetation Types

	Mean	SD
Indigenous Vegetation	6.11	0.95
Introduced Vegetation	5.29	1.25

The average ratings for these two groups are summarised in Table 10.72 which indicates that overall, the indigenous vegetation types are rated 15.5% higher than the introduced vegetation types [Figure 10.59]. The ANOVA indicates that the difference between the groups is significant [Table 10.73].

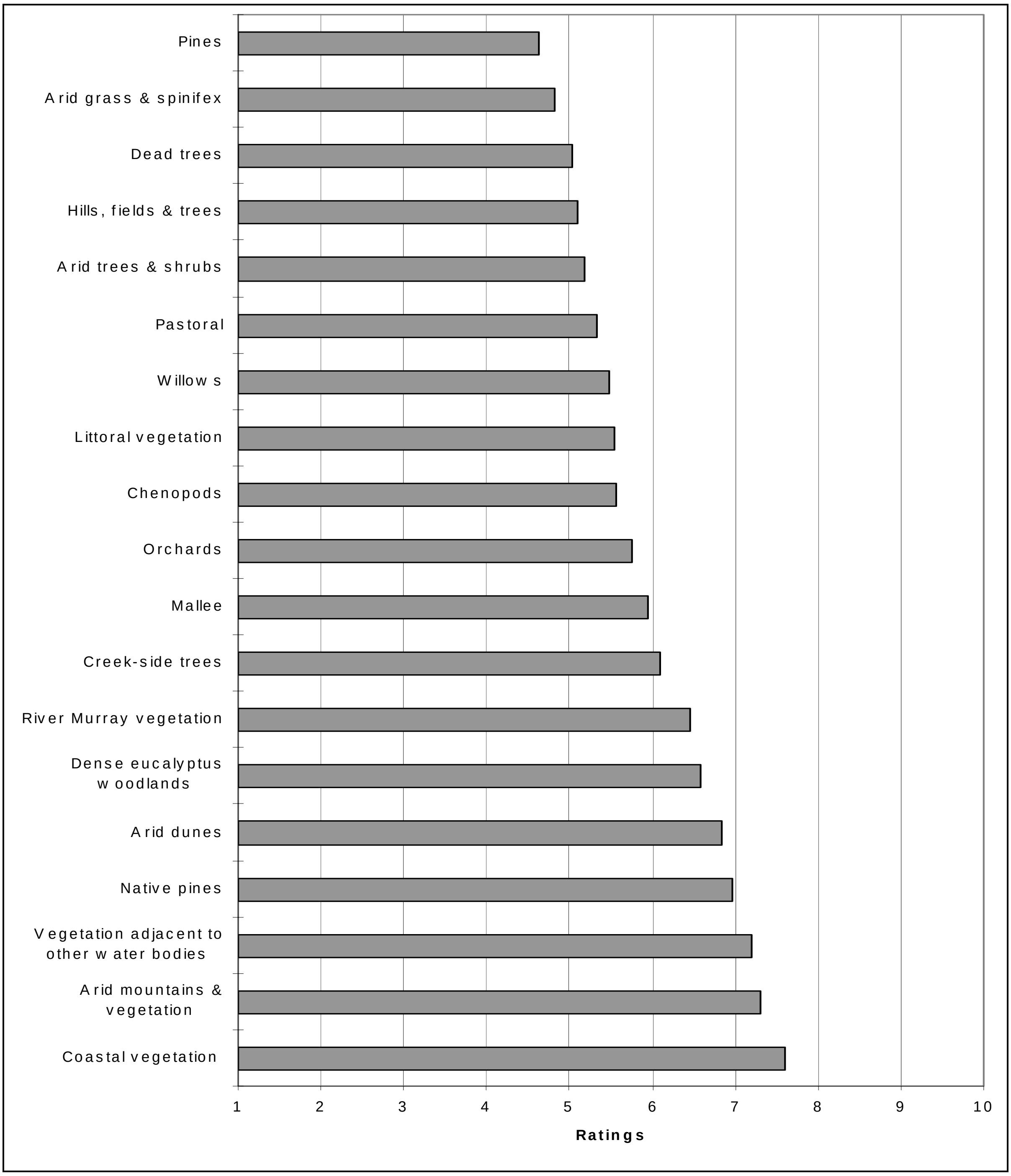


Figure 10.58 Ratings of Vegetation Types - in order of ratings

Table 10.73 ANOVA - Indigenous & Introduced Vegetation

	SS	df	MS	F	Sig.
Between groups	106.97	1	106.97	235.75	.000
Within groups	144.29	318	0.45		
Total	251.26	319			

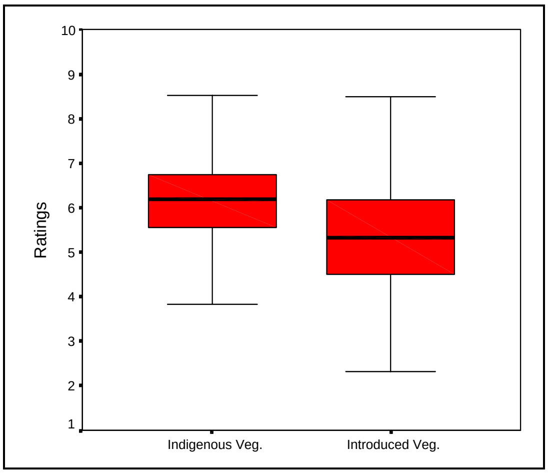


Figure 10.59 Boxplot of Indigenous and Introduced Vegetation

(4) Summary of land cover

In summary, the presence of trees in a scene enhances preferences, increasing by 23.5% over four classes of tree significance. This finding is reinforced by the presence of trees in scenes of crops and pastures which increased ratings by 12.9%, and by the presence of trees in scenes of hills & pastures, mixed uses and vines where a 16.8% increase was found.

The height and density of vegetation present in scenes enhanced ratings, height moreso than density. Two analyses were undertaken, firstly of all scenes, and secondly of all non-coastal scenes. The algorithms derived are shown in Table 10.74.

Table 10.74 Algorithms of Influence of Height and Density of Vegetation on Preferences

Analyses	Height of vegetation	Density of vegetation
All scenes	$y = 0.195x + 5.45$ $r^2 = 0.50$ 10.4% increase	$y = 0.26x + 5.21$ $r^2 = 0.97$ 14.3% increase
Non coastal scenes	$y = 0.49x + 4.47$ $r^2 = 0.99$ 29.6% increase	$y = 0.38x + 4.65$ $r^2 = 0.97$ 22.7% increase

Excluding the coast from the set of scenes yields a stronger relationship between preferences and vegetation height and vegetation density. Ratings increased by up to 30% depending on the vegetation height and up to 23% depending on the vegetation density.

It is difficult to be definitive about the influence of vegetation types on preferences as the context of the vegetation, particularly mountainous terrain or the presence of water, has a stronger influence on preferences in some cases than the vegetation itself. It is evident however that indigenous vegetation is preferred over introduced vegetation, the difference being 15.5%.

Pastoral scenes of large scattered trees with grass were middle ranking, thus not providing strong support for the landscape theorists of savanna type landscapes. However the asymmetrical shape of Australian eucalypts may be an important detraction from their savanna quality.

The type of vegetation appears however to have some influence on preferences, e.g. the discrimination of introduced pines, which indicates that the type of vegetation is important and that respondents do not treat all vegetation equally, nor judge them simply in terms of say height or density.

10.9 LAND USE

The human influence of land use can have a significant influence on landscape preferences, for example, areas planted to introduced pines can cloak a barren scene and the clearance of native vegetation for cropping also changes the original landscape.

(1) Preferences for Categories of Land Use

The major land uses in landscape terms are generally either agricultural or natural. Agricultural land uses include cropping and pasture, mixed uses of orchards and vegetables, and vineyards and pine plantations. Natural uses include most of the far north landscape province which, though subject to extensive grazing, in landscape terms may be regarded as essentially natural in appearance. Within the southern landscape province, the coast, River Murray and other inland water scenes, together with stands of native vegetation, are natural scenes. The scenes were classified into ten land use categories. Appendix 10.7 lists the allocation of scenes in each of these.

Table 10.75 Key Statistics of Land Use Categories

Land use	Mean	SD	No. of Scenes
Agricultural			
Cropping	4.28	1.27	29
Pasture	5.38	1.14	21
Mixed	5.67	1.42	3
Vines	4.92	1.45	8
Pines	4.62	1.75	2
Average	4.97	1.41	63
Natural			
Far north	6.17	1.20	39
Natural - southern	5.92	1.15	11
R. Murray, Lakes & Coorong	6.16	1.15	17
Coast	7.67	1.14	20
Inland waters	6.81	1.21	5
Average	6.55	1.17	92
Total [excluding interstate scenes]			155

Table 10.75 and Figure 10.60 clearly indicate that there are substantial differences in preferences for differing land uses. Overall, the natural uses score higher than the agricultural land uses. The mean of the natural land uses is 6.55, which is 31.8% higher than the agricultural land uses of 4.97.

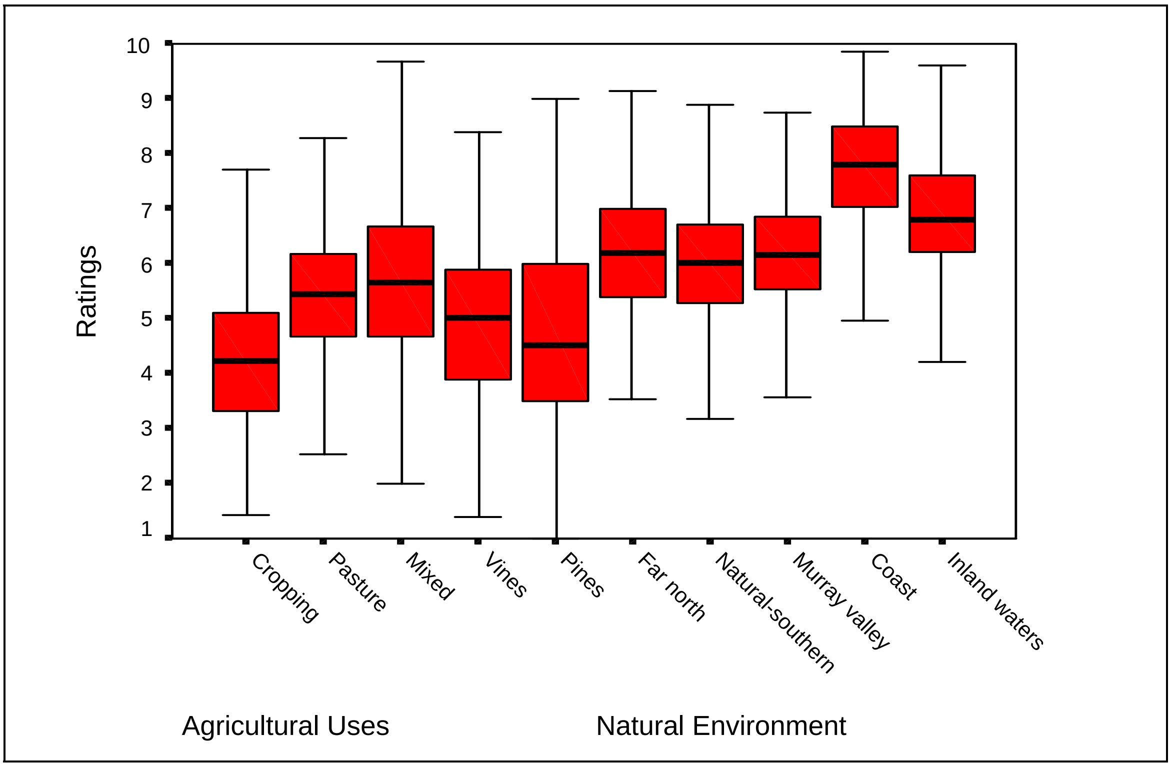
Table 10.76 ANOVA - Preferences for Land Uses

	SS	df	MS	F	Sig.
Between groups	2034.6	1	2034.6	939.61	.000
Within groups	688.60	318	2.16		
Total	2723.2	319			

The ANOVA indicates that the differences between the land uses are significant with the major differences being between the two groups [Table 10.76].

(2) Agriculture

Agriculture is the key land use throughout the southern agricultural province. It includes cropping and pasture land, vineyards, and agricultural uses. In the Mt Lofty Ranges, it includes mixed horticultural uses and hilly pasture land.



Note: Columns 1 - 5 are agricultural, columns 6 - 10 are natural

Figure 10.60 Boxplot of Land Use Categories

Over 70 scenes were of agricultural land uses and included scenes in the Mount Lofty Ranges, the Murray Valley as well as in the agricultural region.

This section examines firstly the scenes of cereals and pasture followed by scenes of vines scenes in the Mount Lofty Ranges are examined in the next section. The agricultural scenes included several sets of twin scenes showing essentially the same scene in different seasons to discriminate the influence of seasonal colour and lushness on preferences.


Crops and pastures Scene #133

Crops and Pastures

A total of 29 scenes of cereal growing and pasture were included among the scenes. The large number was adopted to examine the use of generic scenes which could be used to assess the extent by which single scenes could be representative of a landscape type.


Crops and pastures Scene #70

Table 10.77 Scenes of Crops and Pastures - in descending order of means

Description	Scene Number	Mean	SD
Across tall crop, flat, bare, low ridgeline capped with vegetation	12	5.39	1.91
Flat pasture plains to low bare ridge	70	5.19	1.94
Mature crop, tree-lined creek, rising to high Marble Range	71	5.13	1.71
Mature crop, flat treeless field, high hills with scattered trees	155	4.99	1.79
Across reaped crops on plain to vegetated high sth Flinders Ranges	66	4.99	1.76
Tall crop, flat, low tree-capped ridge in distance = scene 96	20	4.93	1.88
Across flat reaped fields, large straw stacks, some distant trees	17	4.79	1.86
Reaped dry crop, few large trees, flat, low treed ridge behind	1	4.76	1.68
Low crop, sloping up to low rounded hills with scattered trees	118	4.75	1.64
Mature crop, tree studded, rising to low tree capped ridge	28	4.74	1.60
Low pasture, few tall trees, flat hillslope, scattered trees on ridge	112	4.73	1.62
Reaped dry crop, scattered trees mid distance, high bare ridge	22	4.67	1.75
Tall crop, scattered trees mid distance, to high bare hills	99	4.50	1.64
Pasture fields through gully to wide valley/fields & low bare ridge	75	4.47	1.80
Low crop, flat, strip of trees, to low bare ridge	73	4.43	1.67
Mature crop, scattered trees, rising to low tree-capped hills	86	4.43	1.59
Low crop, flat, bare ridge in distance	26	4.35	1.67
Tall crop, flat, low sandy rise capped with trees	129	4.20	1.67
Bare pasture, gently undulating, scattered trees, low distant hills	102	4.13	1.66
Low crop, flat plain, lines of trees across ~=144	101	4.12	1.65
Low crop, flat, line of trees in distance	79	4.11	1.87
Tall crop, flat, low ridge with scattered trees	133	4.11	1.72
Low crop, flat plain, clump of scattered trees in mid distance	87	4.01	1.73
Mature crop, flat, line of trees, low bare hills in distance	92	3.71	1.72
Reaped crop, flat plain, lines of trees across, overcast ~=101	144	3.62	1.57
Reaped dry crop, flat, vegetation in distance	54	3.57	1.62
Reaped crop to scattered low trees, flat	131	3.28	1.64
Mature crop, flat treeless field	150	3.28	1.96
Reaped crop, flat, distant low tree-capped ridge, overcast, =20	96	3.11	1.69

Note: Tall or low crop = green; mature or reaped crop = yellow & ready for harvest; =numbers are twins

The 29 scenes of cereals and pastures are described in Table 10.77 in descending order of ratings.

Crops and pastures were chosen to test the concept of generic scenes because they represent landscapes with minimal variation of land use, land cover, land form and other attributes compared with other landscapes examined. While scenes of arid plains or gibber plains could have provided an alternative basis for evaluation, insufficient scenes of these were available. Also there was considered to be merit in using scenes with which many respondents would have at least some familiarity, i.e. farming areas, rather than outback areas with which they generally have lower familiarity and which could contain a greater novelty factor.

Figure 10.61 displays the means of the 29 scenes of crops and pastures by the respondents as summarised by Table 10.77. Relevant statistics are shown by Table 10.78. Based on the means, the 29 scenes have a very narrow range of 2.28 rating units, lending credence to the concept of generic scenes. The adoption of, say a 4.4 rating for scenes, +/- 1.2, for crops covers 95% of scenes [i.e. 2 SDs].

Table 10.78 Key Statistics of Distributions of Crops and Pastures

Statistic	Means of Scenes
Mean	4.36
SE of mean	0.11
Standard deviation	0.61
Range	3.11 - 5.39
Interquartile range	0.72
Skew	- 0.46

Common factors among these scenes that may affect the preference ratings are:

- presence of distant ridges vs flat terrain
- nature of the crop: tall or low
- colour of crops
- presence of trees

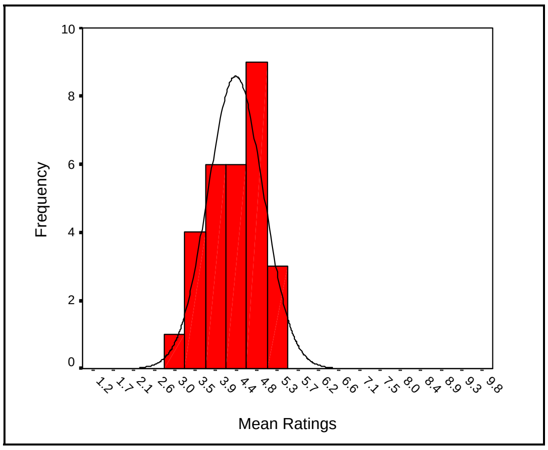


Figure 10.61 Distribution of Means of 29 Scenes of Crops & Pastures

Each of these were analysed in turn and their key statistics are summarised by Table 10.79. These figures suggest that elevation has some effect on preferences as the rating of scenes with ridges is higher than for flat terrain. Similarly tall crops appear favoured slightly over low crops. Interestingly green growing crops are slightly preferred over mature golden-yellow crops.

Ridges increase ratings by 14.1% compared with flat land, the rating of tall crops are 5.4% higher than low crops, and the ratings of green crops are 1.6% higher than yellow crops. The standard errors throughout are very small indicating that the sample provides a reasonable representation of the population. The interquartile ranges are also similar. The standard deviations for all of these categories are similar.

Table 10.80 ANOVA - Presence of Ridges vs Flat Land in Cropping & Pasture Scenes

	SS	df	MS	F	Sig.
Between groups	50.01	1	50.01	412.74	.000
Within groups	38.53	318	.12		
Total	88.54	319			

Table 10.79 Key Statistics of Scenes of Crops & Pastures

Statistic	Terrain		Crop height		Crop colour	
	Ridges	Flat	Tall	Low	Yellow	Green
Mean	4.53	3.97	4.49	4.26	4.43	4.50
SE of mean	7.027E-02	7.704 E-02	7.434E-02	7.086E-02	6.746 E-02	7.801 E-02
SD	1.26	1.38	1.33	1.27	1.20	1.39
Range	1.55 - 8.10	1.22 - 7.78	1.36 - 8.27	1.47 - 7.82	1.43 - 7.93	1.20 - 8.13
IQ range	1.75	2.00	1.73	1.82	1.64	1.80
Skew	0.07	0.36	0.12	0.23	0.13	0.12

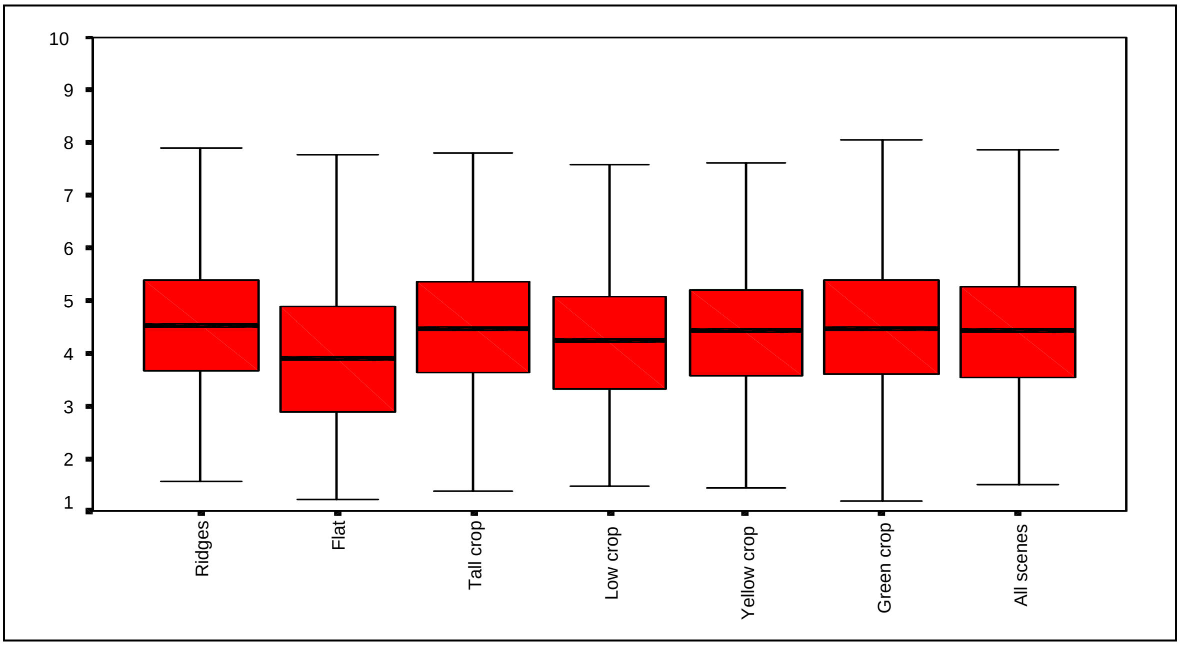


Figure 10.62 Boxplot of Factors in Crop & Pasture Scenes

Table 10.81 ANOVA - Tall Crops vs Low Crops

	SS	df	MS	F	Sig.
Between groups	8.32	1	8.32	90.46	.000
Within groups	29.23	318	9191E-02		
Total	37.54	319			

Table 10.82 ANOVA - Crop Colour, Yellow vs Green

	SS	df	MS	F	Sig.
Between groups	0.83	1	0.83	3.11	.000
Within groups	84.91	318	0.27		
Total	85.74	319			

Figure 10.62 provides a boxplot for each of the factors among the scenes of crops and pastures analysed. The boxplot for all 29 scenes is shown at the far right. The similarity of factors is apparent with the sole exception of flat terrain that is noticeably lower. However the interquartile ranges and the location of the medians in each are similar. The ANOVAs for each of these factors are summarised by Tables 10.80, 10.81 and 10.82.

These results indicate that the presence of ridges in a cropping scene and also the height of crops are both significant influences on preferences but the colour of crops is just outside the 0.05 level of significance. While the between-group differences are greater than the within-group differences in the first ANOVA [Table 10.80] for both of the others, the within-groups greatly exceed the between group differences.

The strong result for the presence of ridges led to a more detailed analysis of this attribute. The significance of the ridges in the scenes was assessed and rated on a 1 - 5 scale, 1 being insignificant and 5 being very significant. The height of the ridge and its prominence in the scene was considered in making this assessment. The height was relative in terms of the scene so that a distant ridge that may be high in absolute terms but is insignificant in the scene would be ranked relatively low. By contrast, a low ridge nearby may be judged quite significant. Three scenes[87.] that included high ranges in the background were omitted as these were non-representative of the typical ridges in agricultural land.

Ridges Scene #20 score 1

87.Slide 66 with the southern Flinders Ranges, slide 71 with the Marble Range, and slide 155 with the Barossa Ranges in the background.

Ridges Scene #22, score 3

Table 10.83 summarises the scores given each scene and Table 10.84 indicates the mean scores for each unit score. Figure 10.63 indicates the trend.

Table 10.83 Average Scores of Ridges Crop and Pasture Scenes

Slide	Score	Slide	Score	Slide	Score
1	1.33	73	2.17	102	2.00
12	2.00	75	2.00	112	3.17
17	1.17	79	1.67	118	3.67
20	1.33	86	2.50	129	2.50
22	3.00	87	1.17	131	1.33
26	3.00	92	1.83	133	1.50
28	2.67	96	1.83	144	1.33
54	1.00	99	2.50	150	1.33
70	2.17	101	1.67		

Table 10.84 Classification of Ratings Ridges in Scenes of Crops & Pastures

	Scoring of Ridges		
	1 - 1.99	**2 - 2.99**	**3 - 3.99**
Mean	3.93	4.61	4.63
SD	1.34	1.34	1.30

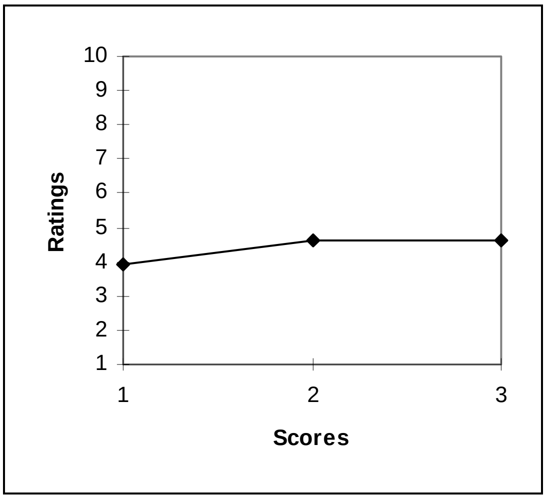


Figure 10.63 Influence of Ridges on Crops & Pasture Scenes

The algorithm for this relationship is y = 0.35x + 3.69; r^2 = 0.77 The ratings increase by 17.3% over three classes. The ANOVA indicates that the differences between the classes are significant.

Table 10.85 ANOVA - Ridges in Cropping and Pasture Scenes

	SS	df	MS	F	Sig.
Between groups	75.75	1	75.75	286.38	.000
Within groups	84.11	318	.26		
Total	159.86	319			

The influence of the presence of trees in scenes was also assessed. The significance of their presence in the scenes was rated out of 5, 1 being low or absent and 5 being a very significant presence [Table10.86].

Table 10.86 Average Rating of Presence of Trees - Crop & Pasture Scenes

Slide	Score	Slide	Score	Slide	Score
1	3.33	73	1.83	102	1.33
12	1.17	75	1.17	112	3.67
17	1.00	79	1.17	118	2.83
20	1.00	86	2.50	129	1.75
22	1.17	87	1.00	131	1.67
26	1.00	92	1.67	133	1.50
28	2.33	96	1.00	144	1.88
54	1.33	99	1.67	150	1.00
70	1.13	101	2.50		

Table 10.87 summarises the average ratings of the presence of trees in the cropping and pasture scenes and the ratings are illustrated by Figure 10.65.

Table 10.87 Classification of Ratings - Presence of Trees

	Attribute Scores		
	1 - 1.99	**2 - 2.99**	**3 - 3.99**
Mean	4.19	4.51	4.74
SD	1.34	1.35	1.47

Table 10.88 ANOVA - Presence of Trees in Scenes of Crops and Pastures

	SS	df	MS	F	Sig.
Between groups	47.95	1	47.95	63.72	.000
Within groups	239.29	318	0.75		
Total	287.24	319			

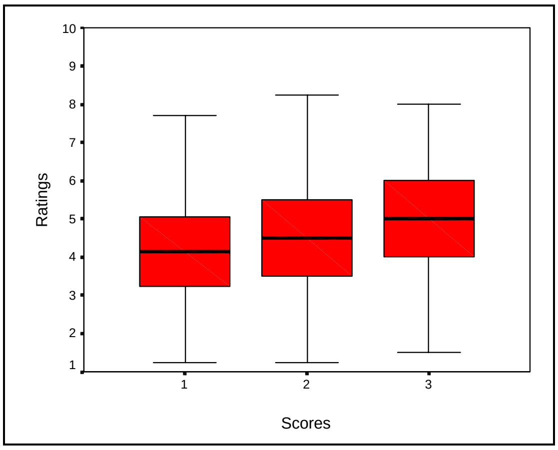


Figure 10.64 Boxplot of Ratings of Tree Presence Classes

The means increase across the three classes as indicated by Table 10.87 and Figure 10.65. The algorithm for this relationship is $y = 0.27x + 3.93$; $r^2 = 0.99$. There is a 12.9% increase in ratings between the first and third scores, i.e. cropping scenes with fairly abundant trees are rated about 13% higher than barren scenes. The ANOVA indicates that the differences between the groups are significant [Table10.88], however the within-group differences are much greater than between groups.

In summary, cropping and pasture scenes score relatively low ratings. Their mean ratings are tightly distributed, lending credence to the concept of generic scenes. Among the factors analysed to explain the differences in ratings:

- the presence of ridges in the scenes increases ratings by 14% compared with flat land; it was also shown that ratings increased by 18% over four classes of ridges in scenes
- the height of crops - a tall crop increases ratings by 5.4% over low crops
- the colour of crops - green crops are 1.6% higher than yellow crops
- the presence of trees in cropping scenes - cropping scenes with fairly abundant trees are rated about 13% higher than scenes with nil or few trees

Although these factors, presence of low ridges, height and colour of crops, and presence of trees influences preferences, their influence is not sufficient to increase the ratings of cropping and pasture land above the 4 to 4.99 rating.

Vines

Table 10.89 summarises the eight scenes with vines. The scenes include a set of twins [scenes 145 and 158], essentially the same scene taken in different seasons. The difference in ratings for these is slight - bare vines 4.27, vines in leaf 4.64, a difference of 8.7%. The t test indicates however that the difference is significant: $t = -5.148$, df 318, $p < 0.000$.

Vines Scene #82

The test was extended to the full set - three of the scenes have bare vines and five have vines in leaf. Table 10.90 summarises their key statistics. The difference in means between vines with and without leaf is 7.7%. The t test indicates that the difference is significant: $t = -8.138$, df 318, $p < 0.000$.

Table 10.90 Key Statistics of Scenes with Vines

Statistic	Vines with leaf	Bare vines	All vines
Mean	5.06	4.70	4.92
SD	1.49	1.50	1.45

Table 10.89 Summary of Preferences for Vines - in descending order of means

Description of scenes with vines	Scene	Mean	SD
Young vine canes & vines in leaf in valley with tree capped hills [Mt Lofty Ranges]	95	5.48	1.89
Across vines in leaf, tree-capped ridge [Clare]	82	5.33	1.82
Across bare vines to fields and vegetated ridge [Clare]	52	5.29	1.79
Vines in leaf, Barossa Ranges background [Barossa Valley]	68	5.16	1.84
Vines in leaf, line of trees on horizon [Langhorne Ck]	56	4.69	1.75
Across vine in leaf, low tree-studded hills [Clare] =145	158	4.64	1.72
Across bare vine canes, low tree-studded hills [Clare]	37	4.54	1.85
Across bare vine canes, low tree-studded hills [Clare] =158	145	4.27	1.68

The range of ratings across the eight scenes of vines extends over more than one rating unit [1.21]. However it is more meaningful to differentiate scenes of vines in leaf from bare vines: the range for vines in leaf was 0.84 and for bare vines was 1.02. This means that a generic mean could be used of 5.00 +/- 0.4 for vines in leaf and 4.70 +/- 0.5 for bare vines.

(3) Mt Lofty Ranges

Scenes in the Mt Lofty Ranges were divided into scenes of mixed uses, and scenes of hills and pasture, which are termed mixed uses.

Mixed Uses

In the Mount Lofty Ranges, three scenes were of orchards and market gardens [Table 10.91].

Table 10.91 Mixed Use Scenes, Mt Lofty Ranges

Description	Slide No	Mean	SD
Market gardens on hill slopes, tree-capped	30	6.16	1.71
Across Piccadilly valley market gardens towards Mt Lofty	46	5.48	1.84
Across dense orchards, wide valley, tree-capped	138	5.37	1.73
Average		5.67	1.76

There is an insufficient number of scenes and variation between them to assess any contributing factors to the preferences and they are combined with the hills and pastures for analysis.

Mixed uses Scene #46

Hills and pastures

Hills and pastures Scene #85

A total of 15 scenes were analysed showing hills and pastures, many with scattered trees, typical of the Mt Lofty Ranges [Table 10.92].

Table 10.92 Summary of Scenes of Hills & Pastures, Mt Lofty Ranges - in descending order

Description	Slide No	Mean	SD
Across valley, dry grass & dam, clumps trees, to vegetated ridge	2	6.37	1.61
Down across tall dry grass, dam, scattered trees, to bare round hills & sea [Second Valley]	115	6.15	1.83
Tree studded gentle slopes, small dam, trees along creek	85*	5.98	1.58
Down gully & dam across wide valley to tree studded ridge	45	5.92	1.49
Large dam in shallow valley, lush pasture, large trees behind	55	5.83	1.72
Down into lush green long valley with clump of trees, long slopes rising the vegetated ridgeline [Bull Creek]	156	5.41	1.90
Across green grass, low tree capped hill, distant vegetated hills =11	40	5.41	1.55
Into wide tree-studded valley to bare round spurs	135	5.16	1.83
Across pasture, clumps low trees & yackas to bare ridge partly capped by pines	119	5.15	1.59
Down across large bare fields, clumps of trees in valleys, vegetated escarpment slopes [Inman Valley]	90	5.13	1.66
Down through tree studded pasture to distant rolling hills	149	5.01	1.52
Across bare rounded spurs to distant ridges, partly vegetated	16	4.94	1.93
Across dry grass, low tree capped hill, distant vegetated hills =40	11	4.89	1.66
Down bare rounded spurs [Palmer] to Murray plains	27	4.78	1.79
Across bare spurs with clumps of trees to distant vegetated ridge	139	4.64	1.58

* Also in vegetation scenes

Table 10.93 summarises the key statistics for mixed use scenes, the hills and pastures scenes, and a total for all of these scenes.

Table 10.93 Key Statistics for Hills & Pastures, and Mixed Use Scenes, Mt Lofty Ranges

Statistic	Mixed use	Hills & Pasture	Total
Mean	5.67	5.39	5.43
SD	1.42	1.16	1.14

The total mean of 5.43 is 7% lower than the mean [5.83] for all the scenes of South Australia and this is surprisingly low given the popularity of the Mt Lofty Ranges for Sunday driving. The quality of the area's landscapes is generally acknowledged to be attractive in tourism literature and it has been subject to several landscape studies in the past [see Lothian, 1984]. An advantage of a State-wide assessment is that it enables the relative significance of particular landscape areas to be set in their State-wide context.

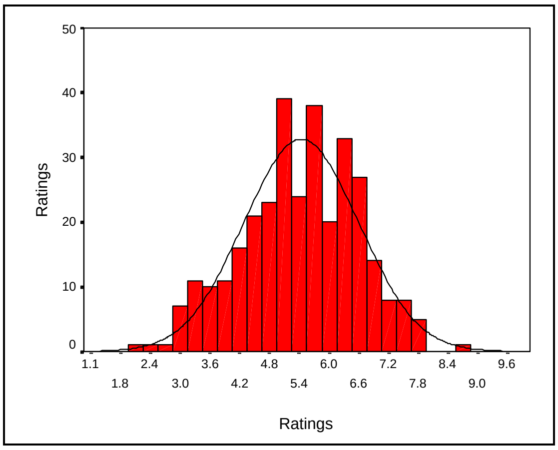


Figure 10.65 Distribution of Ratings, Hills & Pastures, Mt Lofty Ranges

The distribution of ratings has a negative skew towards the higher ratings [Figure 10.65].

The scenes included a set of twin scenes [11 and 40] taken in different seasons as indicated by the different colours. Their means differed by 10.6%:

- Summer [yellow] 4.89
- Winter [green] 5.41

A paired samples t test indicates that the difference of half a rating unit is significant: t = -5.928, df 1, 318, p < 0.000. The difference may be explainable by the condition and colour of the grass and led to the analysis being extended to all 14 scenes [Table 10.94].

Table 10.94 Key Statistics of Colour of Scenes Hills & Pastures, and Mixed Uses

Statistic	Straw colour	Green colour
Mean	5.28	5.72
SD	1.18	1.24

As found in the twin scenes, the green coloured scenes rated higher [8.3%] than the straw coloured scenes [Figure 10.66]. This is higher than that found in the scenes of cropping and pastures [1.6%]. The ANOVA of the influence of colour on preferences found that the difference in colour was significant [Table 10.95].

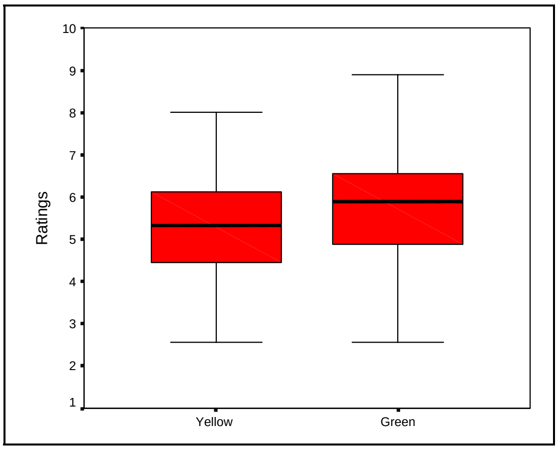


Figure 10.66 Boxplot of Scene Colours Hills & Pastures & Mixed Uses

Table 10.95 ANOVA - Colour of Scenes of Hills and Pastures & Mixed Uses, Mt Lofty Ranges

	SS	df	MS	F	Sig.
Between groups	30.92	1	30.92	105.45	.000
Within groups	93.23	318	0.293		
Total	124.15	319			

Table 10.96 Scores of Significance of Trees - Vines, Mixed uses, Hills & Pastures

Slide	Score	Slide	Score	Slide	Score
Vines		**Mixed Uses**		45	3.67
37	1.88	30	2.88	55	3.83
52	2.00	46	3.00	85	3.88
56	1.67	138	3.33	90	3.00
68	1.88	**Hills &**	**Pasture**	115	2.17
82	2.50	2	3.83	119	3.17
95	3.17	11	2.83	135	2.50
145	2.50	16	1.83	139	2.75
158	2.17	27	1.17	149	3.25
		40	2.75	156	1.83

The influence of the presence of trees was analysed in the scenes of hills and pastures, together also with the scenes of mixed uses and vineyards. Table 10.96 summarises the average scoring of the significance of trees.

Table 10.97 indicates the ratings for the range of scores and Figures 10.67 and 10.68 indicate the relationship between the scoring of the significance of trees and the rating of the scenes. Table 10.97 indicate that preferences increase with the significance of trees. The algorithm for this is $y = 0.37x + 4.46$; $r^2 = 1.00$. The means increase across the three classes by 15.3%. The ANOVA indicates that the differences between the classes are significant [Table10.98].

Table 10.97 Rating of Trees, Hills & Pastures, Mixed Uses, & Vines

	Attribute Scores		
	1 - 1.99	**2 - 2.99**	**3 - 3.99**
Mean	4.83	5.20	5.57
SD	1.42	1.22	1.22

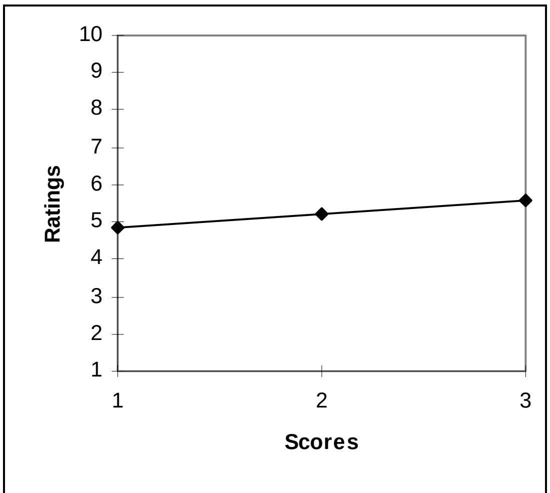


Figure 10.67 Significance of Trees, Rating vs Scores - Hills & Pastures, Mixed Uses, & Vines

Table 10.98 ANOVA - Presence of Trees in Hills & Pastures, Mixed Uses, & Vines

	SS	df	MS	F	Sig.
Between groups	87.74	1	87.74	180.27	.000
Within groups	154.78	318	0.49		
Total	242.52	319			

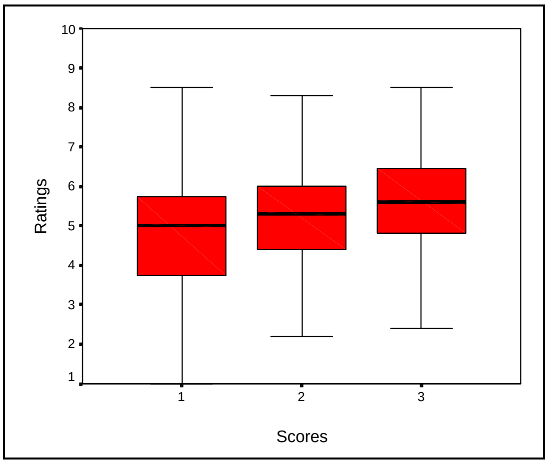


Figure 10.68 Boxplot of Scoring of Tree Presence in Hills & Pastures, Mixed Uses, & Vines

The influence of the presence of trees in scenes only with vines was assessed. Table 10.99 summarises the preference ratings for each score. The algorithm is $y = 0.34x + 4.37$; $r^2 = 0.84$ and ratings increase by 7.2% over the three classes of trees. The differences between groups are significant: $F = 64.68$, df 1, 318, $p < 0.000$.

Table 10.99 Rating of Scenes Vines with Trees

	Attribute Scores		
	1 - 1.99	**2 - 2.99**	**3 - 3.99**
Mean	4.80	4.88	5.48
SD	1.57	1.48	1.89

The influence of terrain in scenes of the hills & pastures, mixed uses and vines[88.] was assessed by rating the significance of the terrain on a 1 - 5 scale, 1 being flat or low through to 5 being high or steep [Table 10.100].

Table 10.100 Frequency of Scores for Scenes With and Without Vines

Score	All scenes	All scenes less vines
	Number	**Number**
1 - 1.99	6	4
2 - 2.99	14	4
3 - 3.99	5	0

88.Only one of the scenes of vines was located in the Mt Lofty Ranges, although five were located in hilly terrain at Clare, and two on flat land in the Barossa Valley and at Langhorne Creek.

Table 10.101 indicates the scoring for all scenes and Table 10.102 indicates the scoring for all scenes without the scenes of vines.

Table 10.101 Scoring of Terrain, Hills & Pastures, Mixed Uses & Vines Scenes

	Attribute Scores		
	1 - 1.99	**2 - 2.99**	**3 - 3.99**
Mean	5.07	5.41	5.21
SD	1.35	1.23	1.23

Table 10.102 Scoring of Terrain, Hills & Pastures & Mixed Uses Scenes

	Attribute Scores		
	1 - 1.99	**2 - 2.99**	**3 - 3.99**
Mean	5.62	5.55	5.21
SD	1.44	1.18	1.25

As indicated in Figure 10.69, terrain has only a slight influence of 2.7% in the "all scenes" group [$y = 0.07x + 5.09$; $r^2 = 0.17$] but a negative influence of -7.42% in the scenes without the vines [$y = -0.205x + 5.87$; $r^2 = 0.87$].

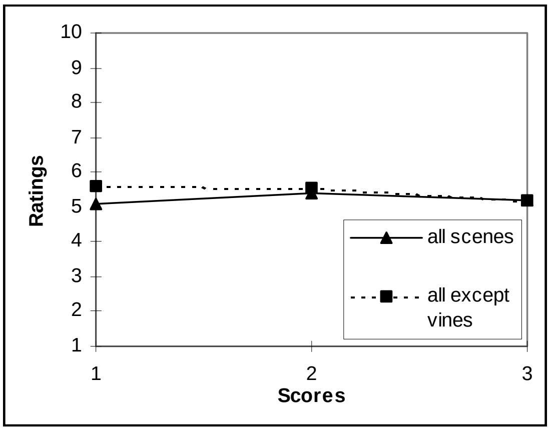


Figure 10.69 Influence of Terrain on Ratings of Hills & Pastures, Mixed Uses & Vines.

To analyse this further, the influence of terrain in scenes of vines only was examined [Table 10.103]. Although only two classes were used, the algorithm is $y = 0.27x + 4.52$; $r2 = 1.00$ and the differences are significant [$t = -6.05$, df 1, 318, $p < 0.000$]. The scores increased by 5.6%.

Table 10.103 Scoring of Terrain on Vines

	Attribute Scores	
	1 - 1.99	**2 - 2.99**
Mean	4.79	5.06
SD	1.48	1.52

(4) Summary of land use

Consistent with the earlier finding regarding the preferences for naturalism, the scenes of natural land uses such as rangelands in the far north and native vegetation in the southern areas rate higher than agricultural land uses. The difference in preference ratings, 31.8%, is marked.

Agriculture is the main land use examined and comprises cropping and pasture scenes, vines and in the Mt Lofty Ranges, scenes of hills and pastures, and mixed uses of orchards and market gardens.

Cropping and pastures are rated relatively low, an average of 4.36. Their mean ratings are tightly distributed, lending credence to the concept of generic scenes. Tall crops rated 5.4% higher than low crops suggesting a positive influence of apparent rural abundance. Growing crops are green in colour but as they mature they turn straw-yellow. The ratings of the green are 1.6% higher than the yellow but the difference is not significant. The presence of ridges in scenes increases the ratings up to 17% compared with scenes with no ridges. Although many of the cropping and pasture scenes were relatively bare of trees, those with trees rated higher than the barren scenes. The increase is up to 13%.

Scenes of vines rated slightly higher than cropping scenes, vines 4.92 *cf* crops 4.36. This is lower than expected, given the prominence that scenes of vines play in tourist promotional material for the wine producing regions. Vines in leaf were slightly higher [5.06] than bare vines [4.70], a difference of 7.7%.

The Mt Lofty Ranges which lie near Adelaide are a popular destination for Sunday driving and sightseeing, picnicking and walking and it is therefore surprising that scenes of mixed uses [i.e. market gardens, orchards] averaged only 5.67. This is below the overall average of 5.83 for all State-wide scenes. Scenes of hills and pastures with clumps of trees, typical scenery in the region, scored lower at 5.41.

Although the visitation behaviour appears to be contrary to the relatively mediocre landscape quality of the region, this illustrates the advantage of a State-wide appraisal. The area has the advantage of proximity to a large population and one would need to travel far greater distances in order to experience the higher quality landscapes.

Taking the mixed use scenes and the scenes of hills and pastures together, the effect of colour of pasture was found to have a slight effect on ratings with the green pastures rated 5.9% higher than the straw coloured pasture. The difference was higher than for cropping scenes [1.6%].

The presence of trees in scenes of vines, mixed uses, and hills and pastures was found to increase ratings by up to 16.8%. Amongst scenes of vines, trees increased ratings by up to 7.2%.

Increasing height and steepness of terrain in these scenes was found to increase ratings by only 2.7% among the scenes of vines, mixed uses, and hills and pastures. Amongst the scenes of mixed uses and hills and pastures terrain had a negative influence of -7.4%. However the influence of terrain on scenes of vines was positive, up to 5.6%.

10.10 WATER

As discussed in Chapter 8, *Findings of Studies*, water generally has a positive influence on preferences. It was found that scenic value increased with:

- water edge
- water area
- channel stability
- a derived sense of serenity and tranquillity contrasting with awe and arousal

Attributes that decreased scenic value of water included pollution and water-logging, water colour, litter, erosion, water quality and structures.

There are five types of water bodies present among the slides:

- 20 views of the ocean as a backdrop or incidental to the coastal view
- 17 scenes of the River Murray, lakes and the Coorong
- 4 scenes of mound springs and waterholes in the far north
- 7 scenes of dams and a reservoir in the Mt Lofty Ranges
- 1 scene of the Blue Lake

These total 49 scenes with water features.

(1) Overall Influence of Water on Preferences

The ratings of all 155 scenes in the survey was 5.83 [SD 0.93]. However this includes scenes with water as well as scenes without water. Water includes coastal scenes with the sea visible, scenes of the River Murray, Lakes and Coorong, scenes of dams in the Mt Lofty Ranges, and inland water scenes of outback mound springs, creeks, and the Blue Lake in the South East of the State. Table 10.104 compares the scenes with water with those without water.

Table 10.104 Statistics of Scenes with and without water

	Scenes with water	Scenes without water	All scenes
Mean	6.82	5.31	5.83
SD	1.01	0.97	0.93

It is apparent from the comparison that the scenes with water are rated considerably higher than the scenes without water. The difference is 28.4%. The paired samples t test indicates that the difference is significant: t = -39.195, df = 318, p < 0.000.

The average rating for the water scenes in South Australia, excluding the coastal scenes, was 6.23 [SD 1.06] which is 14.3% above the average.

Figures 10.70 and 10.71 show the distribution for all scenes with and without water and clearly indicate the skew to the higher ratings of the scenes with water.

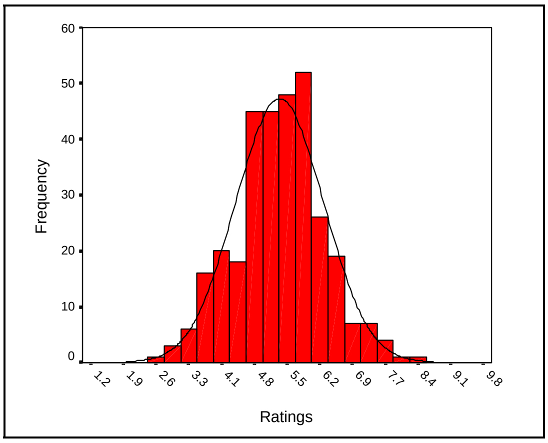


Figure 10.70 Scenes without water features

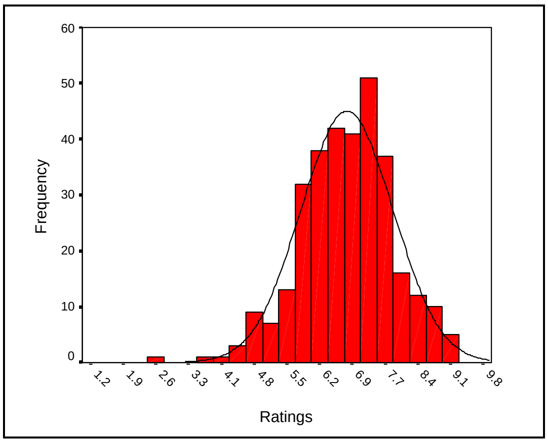


Figure 10.71 Scenes with water features

The boxplot [Figure10.72] illustrates the ratings of scenes with and without water.

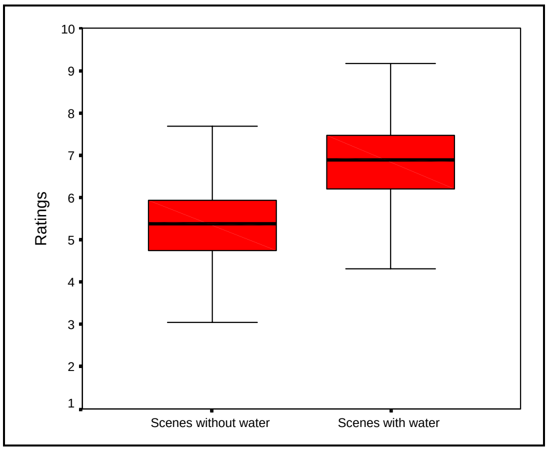


Figure 10.72 Boxplot Comparison of Scenes with and without water features

(2) Coastal Scenes

There were 20 coastal scenes that included views of the sea. These are summarised by Appendix 10.8. Key statistics are shown in Table 10.105.

Table 10.105 Key Statistics for Coastal Scenes

Statistic	Coast
Mean	7.67
SE of mean	6.371E-02
SD	1.14
Range	3.50 – 9.85
IQ range	1.50
Skew	-0.493

The coastal scenes are the highest rated of all South Australian regions, 31.6% above the mean for all scenes [5.83] or 23.1% above the mean [6.23] for all non-coastal scenes.

Figure 10.73 of the distribution of ratings for the coast indicates that they are strongly skewed towards the higher ratings. Figure 10.74 indicates an inverse relationship between means and SDs, that as quality increases, the standard distributions reduce [y = -4.13 + 14.22, r^2 = 0.70], suggesting again greater consistency of opinion regarding the higher rated scenes.

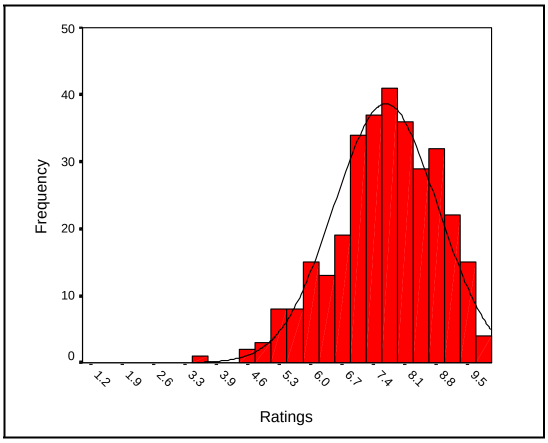


Figure 10.73 Distribution of Ratings, Coast

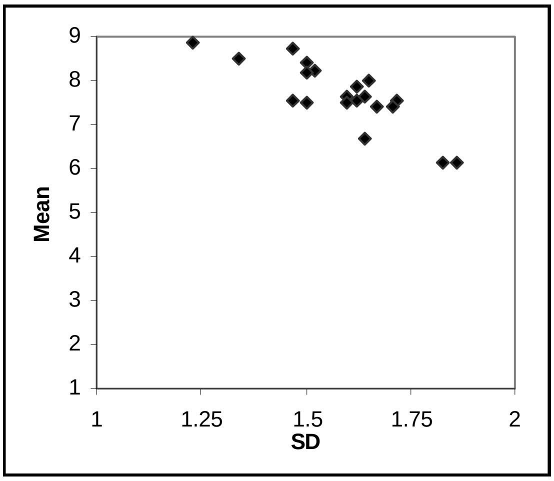


Figure 10.74 Coastal Scenes - Means vs SDs

Each of the scenes was scored on a 5 grade scale on the basis of the following attributes:

- Significance of the area of the water
- Colour of the water: blue and brown
- Length of the water edge: short to long
- Movement of water: still to considerable movement
- Rating of the psychological impact of the scene: serene/placid to high level of arousing/awe


Water area, score 2, scene #106


Water area, score 4, scene #18

The significance of the area of water assessed the prominence of the sea within the scene. This was based largely on the extent of the sea as a proportion of the non-sky portion of the scene. The length of water edge was assessed on the basis of the length of the interface of land and water in bays and beaches, cliffs and rocks - scenes with several shorelines [e.g. with islands] or a heavily indented coast have longer edges than say a uniform curving beach.


Water edge, score 3, scene #113

The colour of the sea in all the scenes was blue, in some cases a deep blue and occasionally aqua blue [e.g. slide 137]. Because the sea was blue in all slides, colour was dropped from further analysis. White foam from breakers and cliffs was present in many scenes but this was not identified separately. However it influenced the scoring of movement


Water movement, score 3, scene #141


Serene/arousal, score 3, scene #35

of the water. The presence of breakers was the main attribute considered in scoring the water movement.

The rating of psychological attributes was based on the entire scene - the land component and thus covered the perceived relationship between sea and land. High cliffs with rough sea and breakers for example may invoke a sense of high arousal and awe compared with a gently sloping beach and calm bay without any waves that may be rated as serene or placid. The selection of this scale was based on Gobster & Chenoweth, 1989; Herzog & Bosely, 1992; and Schroeder, 1991.

Table 10.106 Scoring of Coastal Scenes by Attributes

Attributes		**Factor Classes**			
		1 - 1.99	**2 - 2.99**	**3 - 3.99**	**4 - 4.99**
Water area	Mean	7.04	7.25	7.79	8.07
	SD	1.32	1.23	1.25	1.09
Edge	Mean	6.57	7.47	7.95	-
	SD	1.28	1.25	1.17	-
Movement	Mean	7.30	8.38	8.02	-
	SD	1.18	1.20	1.18	-
Serene-Arousing	Mean	7.23	7.34	8.21	-
	SD	1.44	1.20	1.11	-

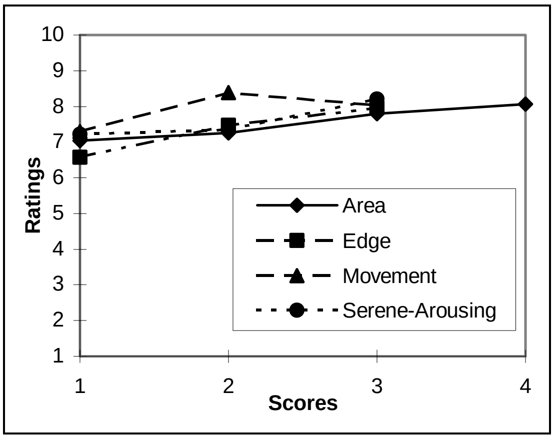


Figure 10.75 Coastal Scenes - Relationship of Attributes and Ratings

Table 10.106 groups these into a maximum of five classes for each attributes and indicates the mean and standard deviation for each.

Figure 10.75 indicates the relationship between the four attributes assessed and the average ratings for the coastal scenes. This is summarised in the following equations of the relationships.

- Significance of water: $y = 0.38x + 6.69$; $r^2 = 0.91$
- Edge of water: $y = 0.46x + 6.31$; $r^2 = 0.96$
- Movement of water: $y = 0.21x + 7.42$; $r^2 = 0.35$
- Serene/arousing scale: $y = 0.49x + 6.61$; $r^2 = 0.83$

Ratings generally increase with the attribute class:

- significance of water increase of 15.3% over 4 classes
- edge of water increase of 15.5% over 3 classes
- movement of water increase of 8.3% over 3 classes
- serene/arousing increase of 13.8% over 3 classes

ANOVAs were carried out on each of the attributes and all were significant:

Water Area	$F = 906.23$, $df = 1, 318$, $p < .000$
Water Edge	$F = 393.92$, $df = 1, 318$, $p < .000$
Sea Movement	$F = 227.32$, $df = 1, 318$, $p < .000$
Serene/Arousing	$F = 419.01$, $df = 1, 318$, $p < .000$

(3) Murray Valley

Seventeen scenes covered the Murray Valley and include the River Murray proper, the Lakes and the Coorong. Twelve were of the River Murray, three of lakes [i.e. Lake Bonney, Lake Alexandrina and Ramco Lagoon] and two scenes were of the Coorong. These are summarised by Table 10.107.

Overall the mean rating of the Murray Valley scenes was 6.15 which is 5.5% above the average for all 155 scenes or 15.8% above the average for scenes which did not contain water. The distribution of ratings is illustrated by Figure 10.76.

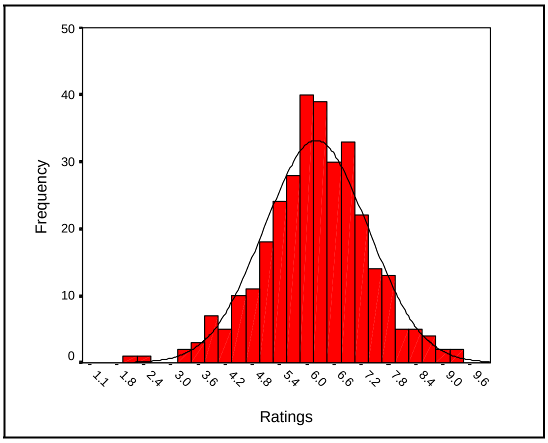


Figure 10.76 Distribution of ratings, Murray Valley Scenes

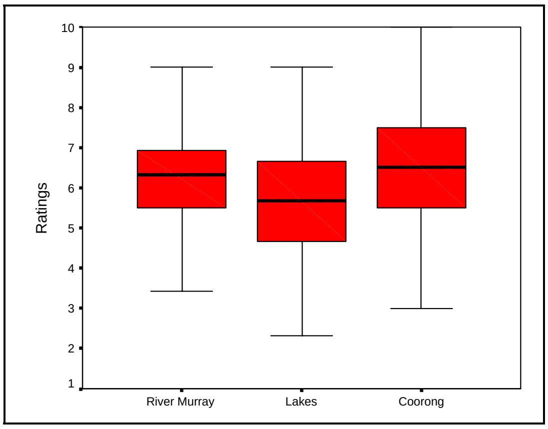


Figure 10.77 Boxplot of Murray Valley Ratings

Table 10.107 Summary of Scenes of Murray Valley in descending order

Description	Slide	Mean	SD
River Murray			
Murray backwater, red gums, river flats	114	7.29	1.56
Chowilla, From sloping clifftop along river length, thick forested flats	51	7.04	1.70
Overland Corner, Across river to steep cliffs, trees along river	44	6.98	1.55
Big Bend, from clifftop, along cliffs across river & back lagoon	58	6.95	1.81
Wongulla, From clifftop along cliffs & across river, back lagoon	4	6.49	1.59
Big Bend, From clifftop across river to river flats with trees and lagoon	148	6.33	1.64
Lower Murray dairy flats, narrow view of river, green flats	50	6.14	1.72
Murray shoreline, reed thickets, eucalypts, single willow	127	5.77	1.79
Lower Murray dairy flats, wide river lined by willows, green flats	53	5.64	1.76
Dead eucalypts in water, vegetation on distant opposite bank	123	5.49	2.30
Grassy slopes, bare flats & back water, dead trees, thick vegetation	62	5.42	1.79
Large willow spreading over river. Eucalypts on distant shore	130	5.31	1.94
Lakes			
Ramco lagoon; From highland across circular lagoon to tree flats	36	6.13	1.80
Lake Bonney, Across lawn, jetty and lake to distant vegetated shore	81	6.04	1.74
Lake Alexandrina, From shore across wide lake to sloping land	125	4.93	1.77
Coorong			
Low thick vegetation, sandy shore, narrow Coorong, vegetated dunes	154	6.58	1.84
From shore across Coorong to high dunes, pockets of vegetation	57	6.08	1.89

Table 10.108 Key Statistics for Scenes of Murray Valley

Statistic	River Murray	Lakes	Coorong	Total
Mean	6.24	5.70	6.33	6.15
SE of mean	6.626E-02	7.627E-02	8.957E-02	6.434E-02
SD	1.18	1.36	1.60	1.15
Range	2.17 - 9.25	1.33 - 9.00	1.00 - 10.00	2.12 - 9.24
IQ range	1.42	2.00	2.00	1.47
Skew	-0.18	-0.10	-0.32	-0.19

Table 10.109 Components in Scenes of Murray Valley

Scene	Water Edge	Water Area	Serene/ Arousing
R. Murray			
114	2.50	2.88	2.17
51	3.67	3.25	2.00
44	2.50	2.88	1.67
58	4.17	3.50	2.67
4	3.83	3.50	1.83
148	2.83	3.00	1.83
50	1.50	1.88	2.00
127	2.50	2.88	2.00
53	3.17	3.38	2.83
123	2.67	3.75	2.67
62	1.67	1.88	2.33
130	1.50	1.63	2.33
Lakes			
36	2.33	3.00	2.17
81	2.83	3.50	2.17
125	2.50	4.5	2.00
Coorong			
154	1.50	2.00	2.00
57	2.67	3.88	2.33

Key statistics for the Murray Valley scenes are summarised by Table 10.108. It is noteworthy that on the basis of the scenes used, the mean rating for the River Murray is slightly lower [1.4%] than for the Coorong and the Lakes are 10% lower than the Coorong. The boxplot [Figure 10.77] indicates that the interquartile ranges of the Lakes and Coorong are identical but are slightly smaller in the River Murray scenes which is probably due to its larger sample and hence smaller SD.

Murray Valley, water edge, scene #58, score 4

Murray Valley, water area, scene #123, score 3

Murray Valley, serene/arousing, scene #53, score 2

The scenes were analysed using three of the attributes as the coastal scenes, but water movement was omitted as it is negligible in the Murray Valley [Table 10.109].

Table 10.110 Ratings of Scenes by Attribute Classes - Murray Valley

Attributes		Attribute Classes			
		1 - 1.99	2 -2.99	3 - 3.99	4 - 4.99
Water	Mean	5.62	6.65	6.24	4.93
area	SD	1.33	1.29	1.20	1.77
Edge	Mean	5.86	6.19	6.39	6.95
	SD	1.24	1.20	1.36	1.81
Serene-Arousing	Mean	6.60	6.09	-	-
	SD	1.25	1.19	-	-

As for the coastal attributes, Table 10.110 groups these into up to five classes for each attribute and indicates the mean and standard deviation for each. It should be noted that in some classes (particularly 4 - 4.99) there were only one or two scores for inclusion hence the large SDs. The means are shown plotted in Figure 10.78.

Figure 10.78 indicates the relationship between the attribute scores and ratings. The algorithms are as follows:

Area of water $y = -0.25x + 6.48$; $r^2 = 0.18$
-12% over 4 classes

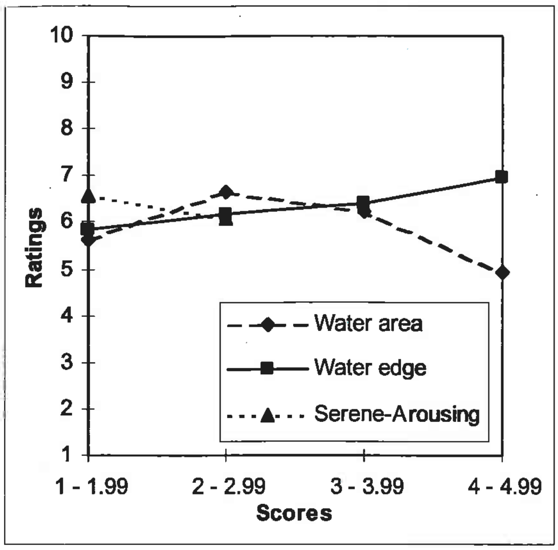


Figure 10.78 Murray Valley Scenes - Relationship of Scores to Ratings

Edge of water $y = 0.35x + 5.48$; $r^2 = 0.96$
18.0% over 5 classes
Serene-Arousing $y = -0.51x + 7.11$; $r^2 = 1.00$
-7.7% over 2 classes

The ratings for the water edge attribute increased by 18.% over the five classes, while that for the water area decreased by 12%. The psychological scale, in contrast to the findings for coastal scenes, is negative, decreasing by nearly 8% over two classes. The two negative slopes for water area and serene-arousing scales indicate that with increasing scores, the rating of scenes decreases. The decrease for water area suggests that the appearance of the River Murray, lakes and Coorong has a slightly negative influence in the landscape. The psychological attribute is based on only two scores, hence its perfect correlation. With only two scores, the negative slope may be an aberration.

ANOVA tests were carried out on each of the factors and all were significant:

Water Area $F = 91.09$, df = 1, 318, $p < .000$
Water Edge $F = 164.80$, df = 1, 318, $p < .000$
Serene-arousing $t = 11.56$, df 318, $p < 0.000$

An analysis was performed only on the scenes of the River Murray of the water area and edge attributes [Table10.111]. The results are not dissimilar to those of the River Murray, Lakes and Coorong taken in aggregate.

Table 10.111 Ratings of Scenes by Attribute Classes - River Murray

Attributes		Factor Classes			
		1 - 1.99	2 - 2.99	3 - 3.99	4 - 4.99
Water	Mean	5.62	6.68	6.32	-
area	SD	1.33	1.32	1.27	-
Edge	Mean	5.62	6.37	6.39	6.95
	SD	1.33	1.29	1.36	1.81

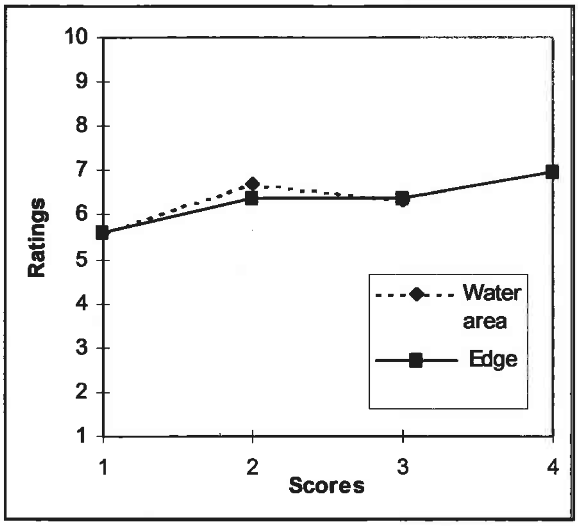


Figure 10.79 River Murray Scenes - Scores vs Ratings

Figure 10.79 indicates the relationship between the attribute scores and ratings. The algorithms are as follows:

Area of water $y = 0.35x + 5.51$; $r^2 = 0.42$
12% over 3 classes
Edge of water $y = 0.40x + 5.33$; $r^2 = 0.90$
20.9% over 4 classes

The algorithm for the water area is now positive and results in a 12% increase in ratings over the scoring classes instead of a 12% decrease. This indicates that the scenes for the Lakes and Coorong reduce the overall result. The influence of the water edge is similar to previously, a 21% increase compared with 18%.

In summary, scenes of the River Murray, Lakes and the Coorong rated above average, with the Coorong rated slightly above the River Murray and both well above the Lakes. Analysis of the influence of water area, length of water edge and serene - arousing scale for all areas found that only the water edge has a positive influence [18% over 5 classes] and the other two decrease preferences over the scoring classes [area of water -12% over 4 classes, psychological factor - 8% over 2 classes].
However analysis of these factors solely for the scenes in the River Murray found that the area of water has a positive influence, a 12% increase over three classes suggesting that the water area in the scenes of the Lakes and Coorong produce the previous negative result. The influence of water edge was similar to previously, an increase of 21% over four classes.

(4) Water bodies – dams

A comparison was undertaken of the possible influence on preferences of the presence of dams in the agricultural scenes. Seven of the 17 scenes in the Mt Lofty Ranges contained dams, some small and others large. Table 10.112 summarises the scenes with dams present and provides scores of the visual significance of the water in the scene.

Table 10.112 Scenes with Farm Dams, Mt Lofty Ranges - in descending order of means

Description	Slide No	Mean	Significance*
Reservoir	121	6.68	5
Small dam	2	6.37	2
Small dam	115	6.15	1
Small dam	85	5.98	1
Large dam	45	5.92	3
Large dam	55	5.83	4
Small dam	95	5.48	1

* significance rating based on area of water and its prominence in the scene

Small dam, scene #2

Large dam, scene #55

Scenes in the Mt Lofty Ranges with dams rated 11.2% above the average for all non-water scenes. A comparison was undertaken of scenes of the Mt Lofty Ranges with and without dams. The scenes of mixed uses and hills and pastures [Tables 10.92] without dams were compared with the scenes with dams [Table 10.112]. Table 10.113 compares the two groups. Scenes with dams were 16.3% higher than scenes without dams [Figure10.80].

Table 10.113 Mt Lofty Ranges Scenes with and without dams

	Scenes without dams	Scenes with dams
Nos. of Scenes	12	7
Mean	5.21	6.06
SD	1.19	1.20

Table 10.114 ANOVA - Scenes with and without dams, Mt Lofty Ranges

	SS	df	MS	F	Sig.
Between groups	114.83	1	114.83	433.84	.000
Within groups	84.17	318	0.265		
Total	199.00	319			

The ANOVA indicates that the difference is significant [Table 10.114] and is based mainly on the between group differences.

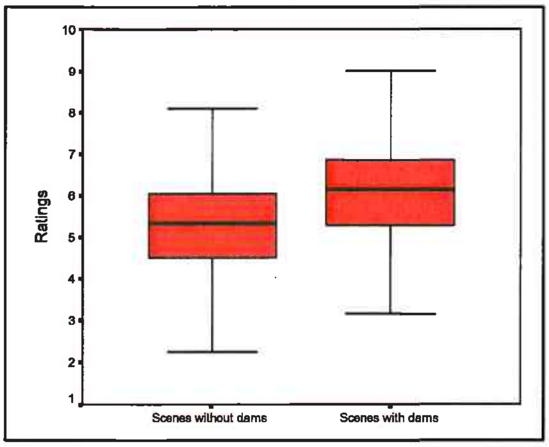


Figure 10.80 Boxplot of Scenes without and with Dams

Table 10.115 Key Statistics, Small and Large Dams, Mt Lofty Ranges

Statistic	Small Dams	Large Dams	All Dams
Mean	6.00	6.14	6.06
SD	1.29	1.27	1.20

Table 10.115 indicates that the mean rating for scenes with small dams was 6.00 whereas for scenes with large dams it was 6.14, a relatively small difference [2.3%]. Nevertheless, a t test indicates that the difference is significant: t = -2.853, df = 318, p = 0.005.

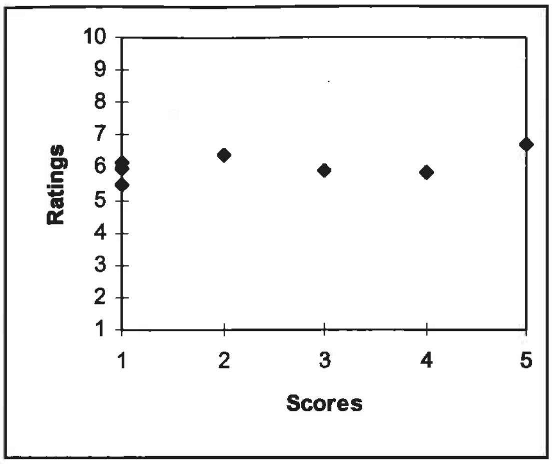


Figure 10.81 Preferences vs Visual Significance of Water in Dam

Figure 10.81 examines the relationship between preferences and the visual significance of the water in the dam in each scene [Table 10.112]. It indicates a very weak relationship [$y = 0.12x + 5.78$, $r^2 = 0.24$] with ratings increasing by 7.92% over the five score classes. Thus although there is an increase in ratings with the significance of water, the difference is relatively small.

In summary, scenes with dams were found to rate 16% higher than scenes without dams and the difference was significant. It is not therefore surprising that it was found that large dams rated higher than small dams, however the difference was small [2%] and again the difference was significant.

(5) Inland waters

The set of slides included a further five scenes of inland waters:

- 2 - mound springs in the far north
- 2 - waterholes in the far north
- 1 - Blue Lake, South East

These are summarised by Table 10.116.

Dalhousie mound springs, scene #31

Blue Lake, scene #134

Algebuckina waterhole, scene #142

Table 10.116 Summary of Inland Water Scenes

Description	Slide	Mean	SD
Dalhousie springs, Across reflecting pool to fringing trees	31	7.81	1.60
Hermit Hill mound springs, Overflow, grasses & rushes, low bare hill	100	6.66	1.88
Algebuckina waterhole, Along lagoon lined by lignum & low trees	142	6.30	1.69
Bradys waterhole, muddy water, low bank with overhanging trees	146	5.35	1.78
Blue Lake, From lookout to lake surface fringed by tall vegetated slopes	134	7.95	1.63

Key statistics for the scenes are shown in Table 10.117, their attribute scores in Table 10.118 and the ratings for the score classes in Table 10.119.

Table 10.117 Key Statistics for Inland Waters Scenes

Statistic	Mound Springs	Waterhole	Blue Lake
Mean	7.23	5.83	7.95
SD	1.39	1.55	1.63

Table 10.118 Attribute Scores for Inland Waters Scenes

Slide	Water edge	Water area	Serene -arousing
31	3.83	4.25	2.17
100	3.17	3.13	2.17
142	3.17	3.88	2.00
146	3.33	3.38	1.67
134	3.50	4.50	3.66*

* Rated by three respondents

Table 10.119 Attribute Classes for Inland Water Scenes

Attributes		Factor Classes			
		1 - 1.99	2 - 2.99	3 - 3.99	4 - 4.99
Water area	Mean	-	-	6.10	7.88
	SD	-	-	1.41	1.37
Edge	Mean	-	6.66	6.49	-
	SD	-	1.88	1.33	-
Serene-Arousing scale	Mean	5.35	6.92	7.95	-
	SD	1.78	1.27	1.63	-

The mound springs were 17.3% above the average of all non-water scenes, while the waterholes were 7% above. The scenes were assessed in a similar manner as previously for the same four factors.

Because only five scenes were involved there were only two or three classes of scores for each factor and the results should therefore be treated with caution.

Both the water area and psychological factors show an increase of ratings with the factor scores, while the water edge factor indicates a slight decrease [Figure 10.82]. Statistical tests indicated that the differences between groups in the water area and psychological factors are significant, but the water edge attribute is just outside the 0.05 level of significance.

Water area t = -22.35, df = 1, 318, $p < 0.000$
Water edge t = 1.73, df = 1, 318, $p = 0.084$
Psychological scale F= 518.3, df = 1, 318, $p < 0.00$

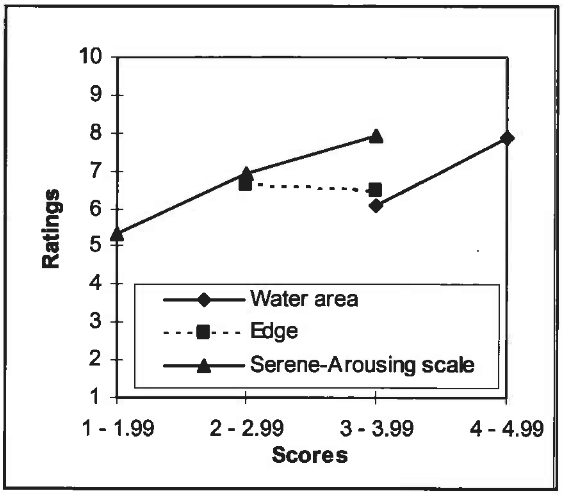


Figure 10.82 Inland Water Scenes - Relationship of Scores to Ratings

(6) Colour of water

A possible explanatory factor to the differences in ratings is the colour of the water. Examination of the scenes indicated that moving water is mainly light brown or tan in colour, whereas still water in lakes and dams is blue. Thus scenes of the River Murray are mainly tan while most dams in the Mt Lofty Ranges together with scenes of the lakes, Coorong, and inland waters are blue. Table 10.120 summarises the colours of scenes.

There were 12 scenes with tan colours and 17 scenes with blue colours. Table 10.121 summarises the statistics for scenes with and without the Mt Lofty dams. Excluding the Mt Lofty dams, the rating of blue water is about 0.6% higher than tan water. The difference for all scenes is 1.9%.

For scenes without the Mt Lofty dams the difference in colours is significant but it is not significant for all scenes including the dams.
Scenes without
Mt Lofty dams: t = -3.099, df 318, $p = 0.00$

All scenes: t = -0.998, df 318, $p = 0.319$

Table 10.120 Colour of Water in Scenes

Scene	Light Tan	Blue
Mt Lofty Ranges dams		
Scene 115	✓	
Scenes 2, 45, 55, 85, 95, 121		✓
River Murray		
Scenes 4, 50, 51, 53, 58, 114, 123, 127, 130, 148	✓	
Scenes 36, 44, 62		✓
Lakes Scenes 81, 125		✓
Coorong Scenes 57, 154		✓
Mound Springs Scenes 31, 100		✓
Waterhole Scene 142		✓
Scene 146	✓	
Blue Lake 134		✓

Table 10.121 Key Statistics for Colour of Water

	All Scenes		Scenes without Mt Lofty Ranges dams	
	Tan water	Blue water	Tan water	Blue water
Mean	6.16	6.28	6.16	6.20
SD	1.20	1.13	1.18	1.02

Taking only the scenes without the Mt Lofty dams, the brownish colour of water bodies such as the River Murray clearly has a slight depressing effect on landscape quality. For these water bodies the difference is about 0.6%. Figure 10.83 shows a boxplot of the regions and groups of scenes that contain water and their statistics are summarised in Table 10.122. The boxplot provides a visual comparison of the distribution of rating for scenes. Note that although the Blue Lake [7.95] is the highest rated scene, the coastal group includes eight scenes that were rated higher than this, including one which rated the highest [8.88] of all the 155 scenes of South Australia.

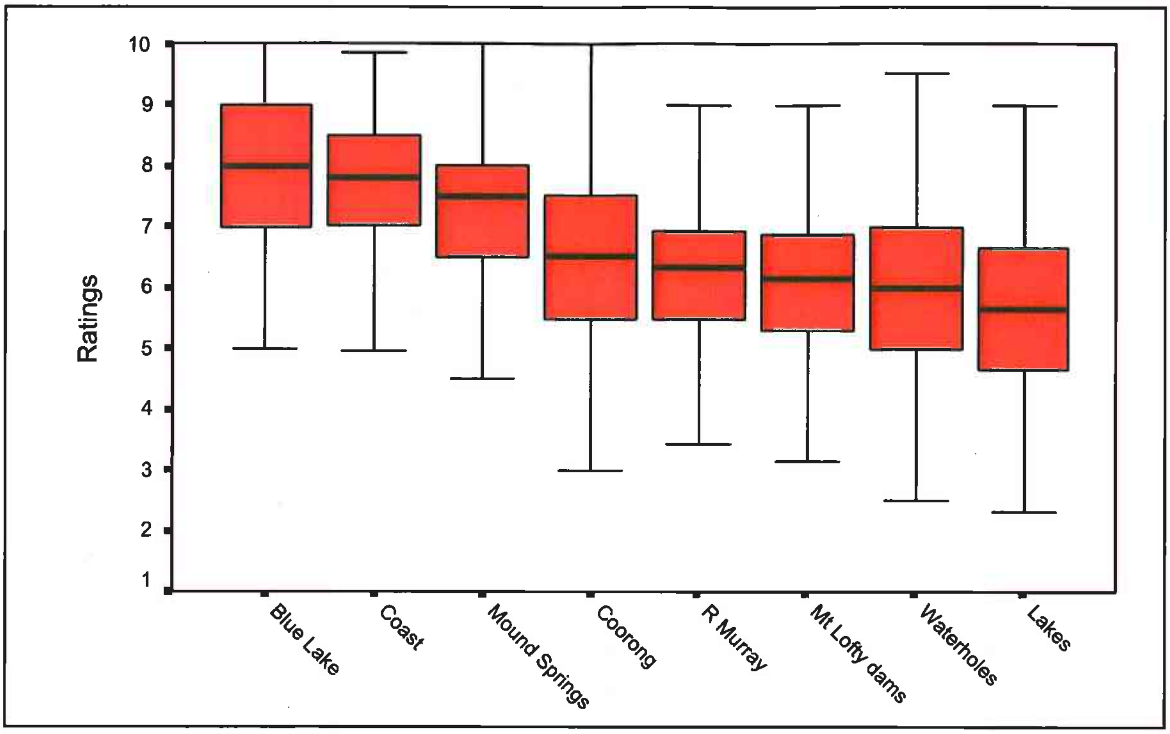


Figure 10.83 Boxplot of Scenes with Water - in descending order

(7) Overall ratings of water scenes

Table 10.122 Summary of Statistics for Scenes with Water

	Mean	SD
Coast	7.67	1.14
Mt Lofty dams	6.06	1.20
R Murray	6.24	1.18
Lakes	5.70	1.36
Coorong	6.33	1.60
Mound Springs	7.23	1.39
Waterholes	5.83	1.55
Blue Lake	7.95	1.63

The coastal scenes rated higher than all the inland water regions and groups, with the sole exception of the scene of the Blue Lake.

(8) Summary of influence of water on preferences

The analysis examined 49 scenes that contained water features and found that water has a positive and significant influence on preferences. Scenes with water averaged 6.82 compared with 5.31 for scenes without water, a difference of 28.4%.

The highest rated group of water scenes was the coast [mean 7.67] followed by the inland mound springs [7.23], the Coorong [6.33], River Murray [6.24], dams in the Mt Lofty Ranges [6.06], inland waterholes [5.83] and lakes in the Murray valley [5.70].

The coastal scenes were the most highly rated of all scenes in South Australia, 31.6% above all state scenes and 23.1% above non-coastal scenes. Four attributes of the scenes were examined - significance of water area, length of water edge, movement of water, and a psychological scale of whether the scene induced feelings of serenity or was arousing. Each of these was scored out of five classes from low to high. The analysis found that the ratings of scenes increased over the classes as follows: significance of water area up to 15.3%, water edge 15.5%, serene/arousing 13.8% and water movement 8.3%.

The scenes of the Murray Valley [including River Murray, Lakes and Coorong] averaged 6.15 which is 5.5% above the average for state scenes and 15.8% above all non-water scenes. Three attributes were examined: significance of water area, length of water edge and the psychological scale. In contrast to the coastal scenes however, the area of water along with the psychological scale actually decreased ratings as the factor increased, -12% for water area and -8% for the psychological scale. Only water edge had a positive influence, up to 18% higher

Scenes in the Mt Lofty Ranges with dams rated 11.2% above the average for non-water scenes in the Ranges. Scenes with dams in the area were rated higher than scenes without dams, a difference of 16.3%, and scenes with large dams were rated slightly higher than small dams, a difference of 2.3%.

Other scenes of inland water were of mound springs, inland waterholes and the Blue Lake in the south east. The small number of scenes necessitates treating the results with caution. The mound springs are quite high rating, 17.3% above the average for non-water scenes while the waterholes were 7% above. Although based on a limited number of scenes, preferences increased with the water area and psychological scale attributes but decreased with water edge.

The colour of the water was examined to assess whether it could help explain the difference in ratings. Moving water was mainly light tan in colour, whereas still water in lakes and dams was blue. Thus scenes of the River Murray were mainly tan while most dams in the Mt Lofty Ranges together with scenes of the lakes, Coorong, and inland waters were blue. The scenes with blue water rated 1.9% higher than those with tan water.

Overall water has a significant and positive influence on preferences. Examination of various attributes suggest that the length of the edge of the interface between water and land is an important factor in influencing preferences and the significance of the area of water is also important, particularly in coastal areas.

10.11 DIVERSITY

Diversity or variety in a scene is often regarded as a factor in influencing preferences and enhancing landscape quality. However in the review of findings of landscape preference studies [Chapter 8] none of the surveys covered diversity although Brown and Itami [1982] identified spatial diversity as a component in the Kaplans' complexity component in their information processing model. Berlyne found that attractiveness of a scene increases with its complexity up to a point beyond which increased complexity is viewed as less pleasant [See section 4.5]. The inverted U describes the relationship.

Diversity, like landscape quality, is a derived quality of the scene. In contrast to the reductionist factors of land form, land use, land cover and water, it is an holistic quality which is the sum total of all its elements. As a function of all of the elements in a scene, one approach to the measurement of diversity is to measure the contribution of each attribute. For example, land form can be regarded as forming a continuum from flat featureless plains of low diversity through hilly landscapes of medium diversity to rugged mountainous landscape with high diversity. However the relationship between the level of diversity and the land form may not be linear as suggested here. Similarly, land cover ranges from a few trees through to many, a single species of vegetation ranging through to many species, a single height and form through to many heights and forms. Diversity of vegetation is clearly not simply a function of the number of trees; many other factors relating to the forms, heights, types, colours, textures etc of the trees are involved.

Examination of the scenes using a reductionist approach was trialed but it was quickly found that the results were of doubtful validity. There are many factors to be considered in each element and they proved very difficult to classify on a range. More fundamentally, equality between the elements cannot be assumed. Scoring of land form, land cover etc separately by whatever criteria and adding the results assumes an equality in the importance in each of them in terms of their contribution to diversity. This assumption is not necessarily true. The results can be nonsensical, for example, a scene with a variety of land uses, trees on hilly terrain scoring high on each but the results not equating with one's intuitive assessment of its overall diversity.

The issue is not dissimilar to that of assessing landscape *per se*. If landscape quality had been arbitrarily determined as a function of land form, land cover, land use etc and each were rated and the results combined, the ratings are unlikely to correspond with those derived from a rating of the overall scene.

Therefore the diversity factor was assessed by examination of the whole scene. While the attributes of land form, land cover, land use, water and colour helped inform the judgement, it was found that describing diversity in terms of the "busyness" of the scene - the presence of differing objects, textures, forms, colours etc assisted in its evaluation. Scenes lacking in diversity were characterised by monotony - for example extensive crops with few trees or land forms to relieve them. Pine plantations, another monoculture also lacks diversity - indeed the relationship, monoculture = monotony, expresses it well.

Diversity, scene #24, score 2

Diversity, scene #32 , score 4

The diversity scores for each of the scenes are listed in Appendix 10.9. There were no '5' scores of diversity. Table 10.123 summarises the scores of diversity for the 155 scenes [excluding 5 interstate scenes]. The scores indicate that with 56% of scenes scoring only 1 or 2 on the diversity scale, the South Australian landscape is low in diversity and this accords with experience.

Table 10.123 Diversity: Number of Scores

Score	No. of Scenes	%
1	23	14.8
2	64	41.3
3	60	38.7
4	8	5.2
Total	155	100.0

Table 10.124 summarises the ratings for each of the scores and this is illustrated by Figure 10.84 and 10.85.

Table 10.124 Scoring of Diversity

	Scores			
	1	2	3	4
Mean	4.05	5.47	6.74	7.00
SD	1.24	0.98	0.98	1.00

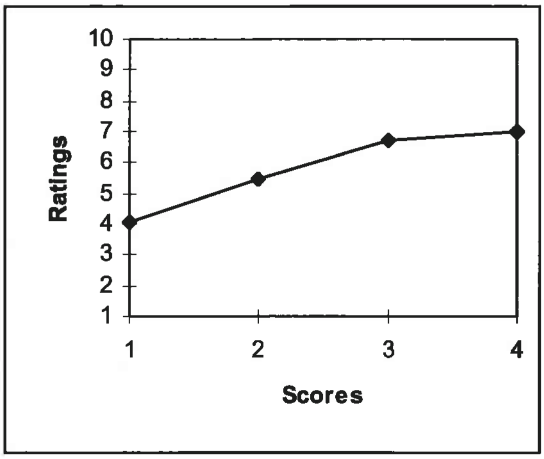


Figure 10.84 Ratings vs scores - Diversity

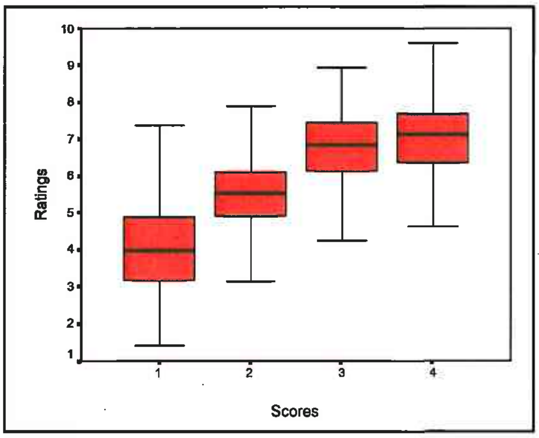


Figure 10.85 Boxplot of Rating of Diversity Scores

The ANOVA indicates that the differences between scores are significant [Table 10.125] with the differences between groups being the principal difference.

Table 10.125 ANOVA of Diversity Scores

	SS	df	MS	F	Sig.
Between groups	1637.46	1	1637.46	1918.63	0.000
Within groups	271.40	318	0.85		
Total	1908.86	319			

The largest increase occurs between scores 1 and 2 suggesting that the injection of some diversifying elements in an otherwise monotonous landscape have a powerful effect. An example of this is the presence of some trees in otherwise barren tracts of crops in which the trees create points of interest which otherwise do not exist. Although the results do not appear to produce the inverted U as Berlyne found [section 4.5], a decline in the 4^{th} score did occur. If diversity had been scored across the full five scores, the inverted U may have occurred.

The results [$y = 1.01x + 3.28$; $r^2 = 0.93$] indicate that diversity has a strong influence on preferences, with ratings increasing by 70.6% over the four classes of scores.

10.12 NATURALISM

Naturalism denotes the extent to which the scene exhibits a natural appearance with the imprint of human presence not being apparent. Naturalism is a relative concept. There is probably no place on earth that has not been affected however slightly by human presence on the planet - for example by the presence of artificial chemicals in remote areas transported there by winds or litter along remote beaches transported there by ocean currents. However naturalism here refers to the visually apparent degree of naturalism as evident in the scenes.

Chapter 7 noted that of all the landscape characteristics analysed, naturalism or the natural character of landscape was the most dominant theme. Like diversity, naturalism is an holistic or derived factor based on the content of the scene. Chapter 7 examined the manner of assessing naturalism by various studies and summarised their findings. The methods used to assess naturalism include the following:

- Anderson *et al*, 1976 included a naturalism index as a factor in the land use category. The Q-sort method was used, placing photos of scenes into one of nine piles ranging from least natural to most natural. The naturalism index was derived by multiplying the percentage of area occupied by each land use type by the naturalism rating. They also measured naturalism contrast that is the difference in the naturalness of dominant aspects of adjacent land use types.

- Kane [1976, 1980] using two rating systems on 46 scenes of the South Australian landscape showed the strong influence of naturalism on preferences [see Sec. 8.5(5)].

- Kaplan *et al*, 1989 included naturalism in their assessment of landcover. They defined naturalism as the "absence of direct human influence" which was assessed on a binary basis, simply its presence or absence.

- Lamb and Purcell, 1990 asked respondents to rate slides for naturalism using a horizontal line 130 mm long with the words "not at all natural" at one end and "completely natural" at the other. No units were shown on the scale. Respondents rated slides against this scale.

- Palmer & Zube, 1976 used factor analysis to derive two factors, naturalism contrast and naturalism index.

Three of these methods relied on respondents assessing naturalism. As shown in Chapter 8 many of the studies found that naturalism emerged as a key factor from the assessment of individual attributes. These commonly found that scenes containing signs of human influence were rated lower than scenes of apparent naturalness. However, what passes for natural and what is perceived as such by respondents may actually be unnatural. Lamb and Purcell, 1990, distinguished between ecological naturalness and the perception of naturalness and showed that while preference is related to naturalness, aberrations occur.

The assessment of naturalism requires a greater amount of objective assessment of the scene than does diversity. It was scored on a 1 - 5 scale based on the degree of human influence and presence being apparent. Close inspection of the scenes was necessary to determine this. The presence of tracks, fences, structures, even the footprints of humans or of stock in scenes diminish the naturalness of the scene.

It was found in scoring the scenes, that scenes in the far north province including the Flinders Ranges, the coast and to some extent the Murray Valley were largely natural in appearance and '4' scores were the most numerous.

In the southern agricultural province the hand of human influence was apparent in all of the agricultural scenes and in the Mount Lofty Ranges. The assessment was straightforward when the scenes contained introduced trees [e.g. orchards, pines] or extensive cropping but scenes in which scattered trees and pasture were present could be ambiguous as they could appear natural but were actually strongly human influenced. Most respondents rated these relatively low in terms of naturalism.

The naturalism scores for each of the scenes are listed in Appendix 10.10. Table 10.126 summarises the scores of diversity for the 155 scenes [excluding 5 interstate scenes].

Table 10.126 Naturalism - Number of Scores

Score	No. of Scenes	%
1	43	22.7
2	24	15.5
3	22	14.2
4	58	37.4
5	8	5.2
Total	155	100.0


Naturalism, scene #135, score 2


Naturalism, score #104, score 5

With relatively few '3' scores, the distribution tends to be bi-polar with most scenes in the low naturalism or high naturalism scores reflecting respectively the southern agricultural province and the northern arid province. The high scored scenes include low landscape quality rated scenes of samphires, gibber plains and arid chenopod vegetation as well as the more spectacular scenes of arid ranges and Flinders Ranges and the coast.

The rating of the naturalism scores are shown by Table 10.127 and Figures 10.86 and 10.87.

Table 10.127 Scoring of Naturalism

	Scores				
	1	2	3	4	5
Mean	4.60	5.44	5.77	6.58	8.19
SD	1.21	1.08	1.04	1.09	1.11

The results indicate that naturalism has a substantial influence on preferences. The algorithm for the relationship, $y = 0.83x + 3.62$; $r^2 = 0.94$, indicates that the trend line increase over five classes is 74.6% which is very substantial. The ANOVA indicates that the differences between the scores are significant and the major differences are between groups [Table 10.128].

Table 10.128 ANOVA for Naturalism Scores

	SS	df	MS	F	Sig.
Between groups	2208.39	1	2208.39	15786.7	0.000
Within groups	442.60	318	1.39		
Total	2650.99	319			

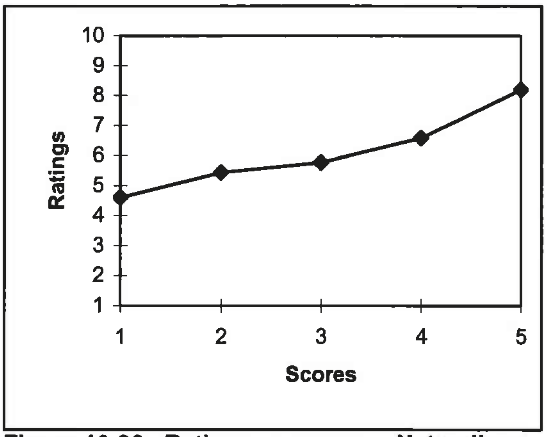


Figure 10.86 Ratings vs scores – Naturalism

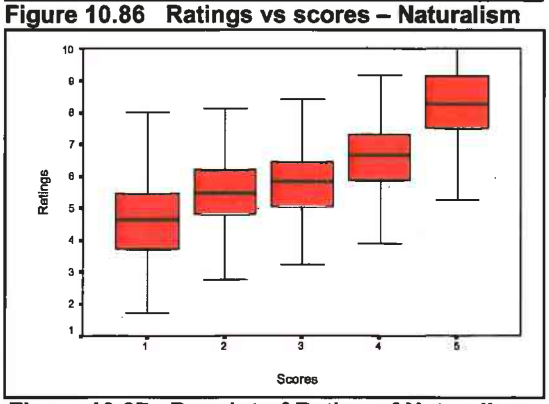


Figure 10.87 Boxplot of Rating of Naturalism Scores

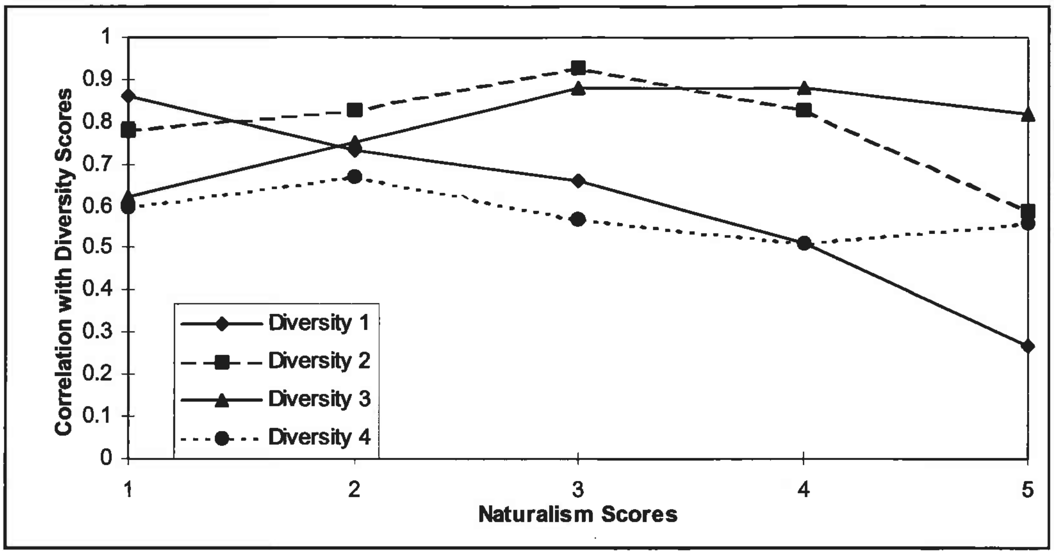


Figure 10.88 Correlations between Naturalism Scores [X axis] and Diversity Scores [lines]

The possible correlation between the scores of naturalism and diversity was investigated to assess whether, for example, high naturalism scores correlate with high diversity scores [Table 10.129, Figure 10.88]. The results indicate generally a high degree of correlation between naturalism and diversity although this tends to be lower at the highest scores of each attribute.

Table 10.129 Correlations between Naturalism and Diversity Scores

Diversity	Natural				
	1	2	3	4	5
1	0.86	0.73	0.66	0.51	0.27
2	0.78	0.83	0.93	0.83	0.59
3	0.62	0.75	0.88	0.88	0.82
4	0.60	0.67	0.57	0.51	0.56

10.13 COLOUR

Colour has already been found to influence preferences in some scenes:

- green crops were slightly preferred to straw coloured crops
- vines in leaf [green] were preferred over bare vines [brown]
- green pastures were preferred over dry straw coloured pasture
- blue water was preferred to light tan water

Even the preferences for mountains with rock faces may reflect influence of colour as the rock faces tend to be bright orange and red in colour.

In Chapter 4, *Perception and Colour*, the influence of colour on preferences was examined. It found that the highest preferences from many surveys are red, blue and green, with saturated hues scoring higher than low saturated hues.

(1) Assessment of Colour

Examining scenes for colour is difficult because of a number of factors:

- Scenes generally comprise more than one colour; the theoretical minimum is two [brown ground and blue sky] but generally the minimum is three as there are usually some green trees or shrubs present. However most scenes comprise more than three colours. Which colour or colours should be analysed for their influence on preferences?

- Quantifying the colours in terms of their wavelengths directly off the slides may be the most desirable but was not achievable because of difficulty in obtaining and operating such equipment. There are practical problems of measuring multiple colours in a scene using a colour meter.

- The combinations of colours may be as important as the particular hues. Complementary colours such as purple and orange, red and green, create tensions between colours. A scene with many subtle shifts in a single hue may be strongly preferred. How can these combinations and subtleties be measured?

The measurement and quantification of the colours present was achieved through the use of two instruments. A Plustek™ Optic Pro 9636T scanner was used which had the capacity to scan slides. This was used to scan all slides into the JPEG digital format for use on a computer. Secondly Paint Shop Pro™ graphics software [Jasc software] was employed to analyse the colours present in the scenes.

The scanned scenes provided an accurate portrayal of the content of scenes. However the rendition of their colours could only be regarded as fair with a loss of brightness and sometimes a faint yellow tinge. There were three scenes [#6, 22 and 160] in which the colour was quite different, #6 and 22 had green tinges and lost the red colours present, while #160 had a yellow tinge which lost the red and straw ground colours and changed the blue sky to yellow. All three scenes were rescanned but the deficiencies remained. Estimates were substituted for the dominant colours for analysis.

Apart from these three scenes, the hues in the remainder of scenes were fair. They were generally duller, less bright than the slides. This meant that the contrasts between colours or between sunlit areas and shade areas were less marked. It also caused the loss of features such as clouds in some scenes. These changes were not however considered to be significant and the scans generally provided a convenient basis for colour analysis.

The software program enabled each scene to be shown on the screen and, using a cursor to point at localities on the scene, the colour details were displayed. The details were hue, saturation and lightness. These are described as follows:

<u>Hue</u> is the attribute of colour that distinguishes red from green, purple from yellow, etc. Hue covered the spectrum of colours: red, orange, yellow, green, blue, indigo and violet. The software employed a scale 1 - 255 to analyse hues and these can be assigned to the colours as shown by Table 10.130. There is not an equality of scale units between hues, for example blue/light blue covered 73 scale units, orange 15 and purple 17.

The number of colours identified in each scene ranged from two to eight [Table 10.131, Figure 10.89] with the average between 4 and 5 colours [SD 1.2]. Each of these colours represents a range of hues and so this is a somewhat arbitrary classification but it will suffice for the purposes of simplifying the data for analysis.

Table 10.130 Scale of Hues

	Scale Range	Number of Units
Red[89.]	1 -10, 230 - 255	35
Orange	10.25	15
Yellow	25 - 50	25
Green	50 - 120	70
Light blue	120 - 140	20
Blue	140 - 193	53
Indigo blue	193 - 210	17
Pink	210 - 230	20

<u>Saturation</u> is the richness of colour, and is determined by the extent to which it is chromatic [i.e. comprises essentially hues such as purple, red and yellow] rather than achromatic [i.e. comprising black, white or grey]. Mixture of the achromatic reduces the saturation. Zero saturation is completely grey. Saturation is measured on a 0 - 255 scale with 255 representing maximum saturation

<u>Lightness</u> is the brightness of light intensity in the scene. It is also measured on a 0 - 255 scale, with 255 being maximum brightness.

Each scene comprised literally tens of thousands of colours. The software is able to analyse each pixel[90.] and identify the subtlest of differences between hues as well as their saturation and lightness. Typically the number of colours present ranged from 20,000 to 45,000 but there were scenes with over 70,000 colours [e.g. #120 of Cape Spencer].

As an example, moving the cursor across a field of cereals which appears to be of a uniform colour identifies a dozen or more different hues. For straw cereals these may extend over 25 to 35 on the range, for green cereals, from 65 to 85. These are the simplest of hues to measure and an average of the measures could be taken.

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89. The scale comprised a circular wheel with red spread over the beginning and the end.
90. Each scene comprises about 400,000 pixels.

More difficult is measuring colours which clearly differ across a scene, for example the colours of the ground surface, of water, and of vegetation, each of which can include many colours. Where the hues change markedly and an average would not reflect the variation sufficiently, a range of values was therefore recorded. It was impractical however to seek to define the full range of values of a given hue, this would be an exhaustive process involving hundreds of measurements for each. The range of values therefore should be taken to representing a sample of the range, not necessarily the full range of values. In some instances the range represents two distinct hues within a particular colour, e.g. light and dark green.

The quantified measures of hues need therefore to be taken as approximations, generally representing a figure within the range of hues present. It would be pointless, for example to compare hue 65 with hue 66; the data are not sufficiently discriminatory to allow such analysis. However it is feasible to compare hue 55 [light green] with say hue 110 [deep green].

The 160 scenes were analysed for hue, saturation and lightness. Appendix 10.11 presents the results of the analysis. For each feature, the figures for hue, saturation and lightness are shown in that order. While the hue is considered the key attribute, the figures for saturation and lightness are included for completeness. The analysis may not reach into the full richness of the data available.

The data are examined firstly to analyse the colour content of the scenes and to gain an understanding of the nature of this content. Secondly the influence of colour upon preferences is examined.

(2) Colour content of scenes

The colour of scenes was examined by classifying within each scene the colours for each type of feature [Table 10.131, Figure 10.89] For example, the colours registered for dry pastures and straw crops were grouped and listed next to their scenes in which these features occur. Appendix 10.12 compares the features of each scene.

Typically the scenes comprised the ground colour [either straw or green depending on season], the greens of trees and shrubs or of other vegetation, a light blue of distant vegetation, and the blues of the sky. Scenes near the coast or river or with other water features will include the colour of water. Scenes in mountains, on the coast or along the River Murray may include orange or straw coloured rockfaces.

Table 10.131 Frequency of Colours in Scenes[91].

No. of colours	No. of scenes
2	3
3	29
4	47
5	45
6	26
7	2
8	3

Where a range of colours are shown for a particular feature [e.g. hues 67 - 85], both figures have been included as they represent samples of the colours present. The alternative of taking only the mean value would lose some of the richness of the data and would be misleading for a dichotomous distribution.

Example of scene with many colours, scene #137

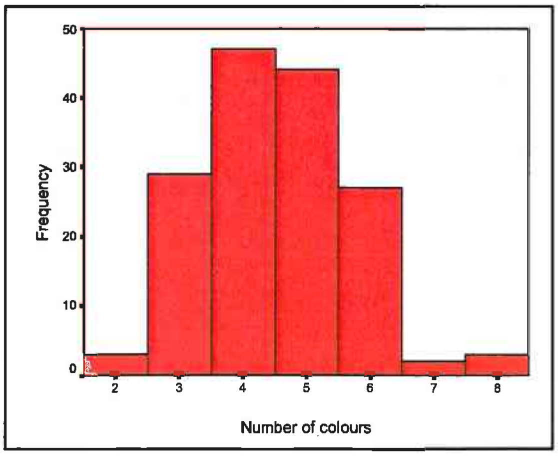

Figure 10.89 Frequency of Colours in Scenes

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91. The number of colours discriminated by the computer numbers tens of thousands. The colours summarised here are simplified into the major colours that the eye might discriminate.

There were three scenes with only two colours, basically the ground and sky. Two were gibber plains: #42 and #116 and one, #150, was of cereals. At the other end of the scale, there were two scenes [#50, 115] with seven colours and three scenes with eight colours [#32, 137, 151]. Many of the colours in these scenes were dichotomous [i.e. dark and light] of colours both of which would therefore be counted. The scenes are summarised in Table 10.132.

Colours which are largely absent are at the extremes of the colour spectrum: red-pink [hues 1 - 10; 210 - 255] and the indigo-violet [hues 193 - 210]. Even scenes of the outback, which include the reddish colour of all ground surfaces and rocks, were rarely analysed as red hues. For example, scenes of the north west ranges [#9, 43 and 140] were analysed as orange rather than red [hues 30, 22, and 21 - 41 respectively]. The single reddish hue detected, 12 was the dry ground in the scene of mesas [#60] while the ground in two of the gibber scenes [#8, 42] was orange [hues 20, 21]. The features analysed in the scenes were as follows:

Dry landscapes	⇒ dry pasture, crops or straw
	⇒ beach, sand, dunes
	⇒ cliffs, rocks
Trees and shrubs near viewer	
Green landscapes	⇒ green crops, pastures, or grass
	⇒ green ground
	⇒ vines
	⇒ other green
	⇒ chenopods [salt bush, blue bush]
Distant features	⇒ distant vegetation
	⇒ distant hills
Water	⇒ inland water
	⇒ sea
	⇒ surf
Sky	⇒ sky
	⇒ clouds
Other	⇒ features in shadow
	⇒ flowers
	⇒ spinifex
	⇒ other

These are examined in groups. The colour chart is included for reference [Table 10.133]. Table 10.134 shows the relevant statistics of scenes, Figure 10.91 shows the means.

The table and figure indicates the following:

- The arid dunes [hue 28.7] were yellow but closer to the red-orange end of the spectrum than beach sand and dunes [hue 45], which were far more yellow.
- Sea scenes [hue 128] were light blue but bluer than other water bodies [Murray Valley, dams, mound springs] which at 110 were rated as green.
- There is a marked contrast between the straw and green coloured crops and pastures - respectively hues 30 and 77. A similar contrast exists between the straw dry ground [hue 31] and green ground [hue 75.5].
- Hills and vegetation in the distant [respectively hues 108.5 and 108] were virtually identical. Vegetation in the foreground and middle ground of a scene [hue 91.5]. become more distinctly bluer in the distance [hue 108], a characteristic of the Australian landscape.

Table 10.132 Scenes with Largest Number of Colours

7 colours	**Description**	**Colour content**
# 50	Dairy flats along the lower River Murray	dry straw foreground, green shrubs and trees, dark green pasture, light blue water, light blue distant hills, light blue sky
# 115	Second Valley and sea	dry straw crops and pastures, distant dark green trees, distant straw hills, green water in dam, blue sea, blue sky
8 colours		
#32	Arkaba & Wilpena	green ground, dark green trees, light blue distant vegetation, blue distant hills, sky ranging from blue to white [0].
#137	Formby Bay and dunes	yellow beach and dunes, vegetation of light and dark green hues, sea of aqua blue inshore and dark blue offshore, blue sky
#151	Mt Arden	dark green ground and shrubs, shaded green hills, light blue distant hills, light blue sky

Table 10.133 Colour Spectrum Chart

Hue	Red	Orange	Yellow	Green	Light blue	Blue	ndigo-violet	Pink
Range	1-10, 230-255	10 - 25	25 - 50	50 - 120	120 - 140	140 - 193	193 - 210	210 - 230

Table 10.134 Summary of Statistics for the Average Colour of Features

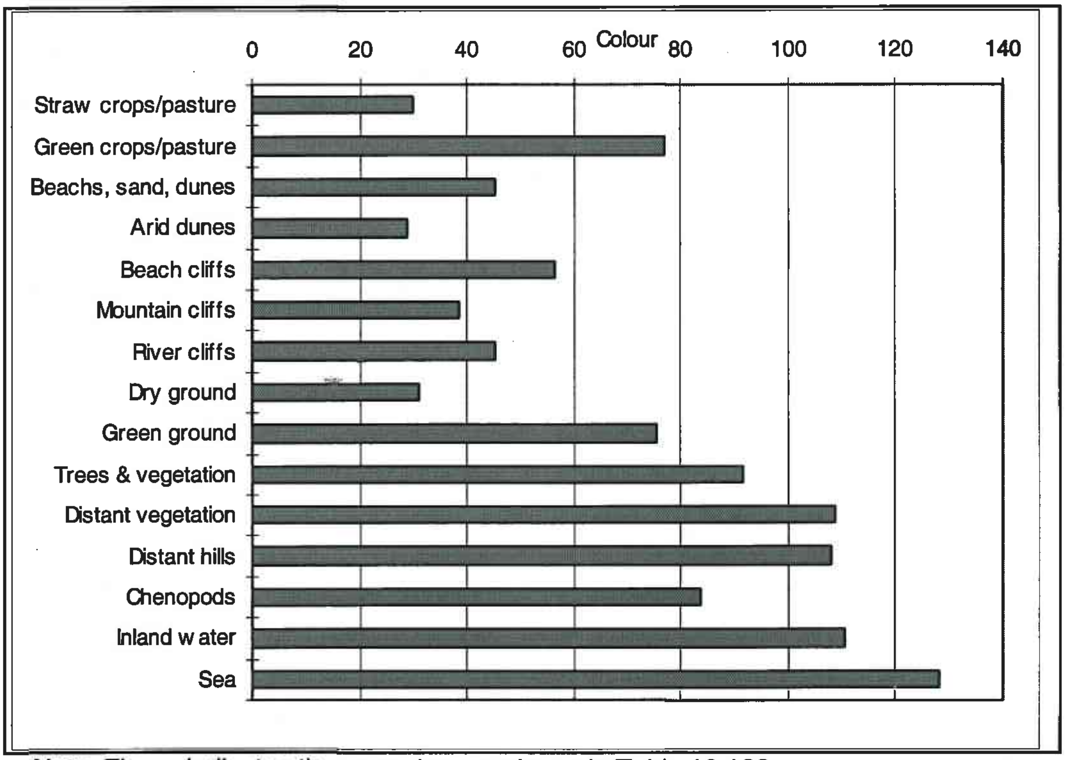
Feature	Nos. Scenes	Mean Hue	SD Hue	Min. value	Max. value
Straw crops & pasture	41	29.95	9.48	12	49
Green crops & pasture	32	76.97	16.44	38	101
Beaches, sand & dunes	20	45.25	28.64	17	19
Arid dunes	3	28.67	10.11	17	35
Beach cliffs	8	56.25	45.89	21	147
Mountain cliffs	13	38.31	20.07	21	100
River cliffs	4	45.25	38.68	22	103
Dry ground	47	31.11	14.64	7	77
Green ground	27	75.48	21.35	33	117
Trees & vegetation	129	91.51	22.28	5	133
Distant vegetation	41	108.54	24.12	32	153
Distant hills	32	107.97	44.87	15	163
Chenopods	5	83.60	31.26	29	107
Water	26	110.50	35.75	46	146
Sea	23	127.91	29.81	30	148

Note: The number of scenes includes some scenes where two hues were measured

- The chenopod vegetation [i.e. salt bush and blue bush] of arid areas is generally quite dense and its greenness [hue 83.6] provides a marked contrast to the generally orange and straw coloured ground.

The sky hues were not included in the above summary. The sky colours are not directly related to the landscapes beneath and are also transitory, changing markedly with the time of day, the season and the presence of clouds.

Of the scenes, 13 registered no colour in the sky. A feature of skies is that there is often a gradation apparent in the colour. It is deep blue high in the sky but lightens towards the horizon. Thus 13 scenes included a range from blue through to zero at the horizon. A further 33 scenes ranged from deep blue high in the sky to light blue at the horizon. Generally the difference was not large - it averaged 15.6 [SD 13.3], the range from blue to light blue. In the



Note: Figure indicates the mean hue as shown in Table 10.133

Figure 10.90 Spectrum Scale of Major Hues for each Feature

remaining 93 scenes a single hue was apparent. These averaged 132.3 [SD 21.9].

(3) Colour Preferences

At the outset of this section it was stated that the analysis of colour preferences is made difficult by there being more than one colour in a scene, and also by the question as to whether it is the colours themselves or their combinations which influence preferences. The analysis attempts to grapple with these two difficulties.

The scenes were assessed for their dominant colour or colours. The analysis of colours undertaken earlier did not measure the area of each colour. The area could provide a basis for determining the dominant colour on the assumption that the larger the area the more dominant it is. However the determination of dominance is unlikely to be so simple and is more likely to be a function of several factors including area, brightness and saturation.

In assessing dominance, the influence of the sky was ignored on the basis that it is present in each scene and although its hues vary slightly, it can be taken as a constant - like wall paper on which the landscape is hung. The presence of clouds can affect this but providing care was taken to avoid visually striking scenes, should not present a difficulty.

A group of eleven respondents evaluated the scenes for their dominant colour. The evaluation sheets listed the slides down the page while across the sheet was listed the spectrum of colours: red, orange, yellow, green, blue and indigo/violet. A selection of scenes was shown initially with instructions to identify the dominant colour in each. Each slide was shown for approximately 7 seconds.

The dominant colour in a few scenes was other than the spectrum colours, specifically brown, grey and white. Most participants therefore wrote these on the sheet at the appropriate scene although in terms of consistency it would have been preferable for these colours to have been included.

The results of the evaluation were tabulated and the dominant colours derived [summarised in Appendix 10.13]. This involved inspection of the colours identified for a given scene and the selection of the dominant colour. The number of colours identified as dominant are summarised by Table 10.135 and indicates that for over one third of scenes, there was only one dominant colour. In most scenes there was a clear dominant colour, for example in the scenes of crops it was the colour of the cereals, whether straw or green. In coastal scenes it was often the beach or cliff. The unbroken extent of a given colour was an important determinant, it was not just the area but also its continuity which was found to be important.

Table 10.135 Number Dominant Hues Identified

Nos of Colours	Nos of Scenes	%
1	55	35.5
2	43	27.7
3	28	18.1
4	18	11.6
5	11	7.1
Total	155	100.0%

A total of 63% had either one of two colours. Where three, four or five colours are indicated, generally only one or two respondents chose these. For example, for scene 21, one person chose red, five chose orange, 1 chose yellow, two chose green and two chose grey. The dominant colour in that case was orange. In many instances the other colours were of a similar hue, for example red and orange, or orange and yellow.

The author carried out a further inspection of the scenes in selecting the dominant colour for each scene based on the assessment of respondents. This was mainly directed to ensure that un-nominated colours - brown, white and grey, were considered, as some respondents did not indicate these.

The number of scenes represented by each hue is summarised by Table 10.136. The yellow and green hues were the most dominant, together accounting for 63% of the total. This partly reflects the large proportion of agricultural scenes, specifically the cereal growing scenes of straw or green colours.

Table 10.136 Frequency of Dominant Hues

Colour	Nos of Scenes	%
Red	11	7.1
Orange	13	8.4
Yellow	37	23.9
Green	60	38.7
Blue	26	16.8
Indigo/Violet	3	1.9
Brown	4	2.6
Grey	1	0.6


Red dominant, scene #147


Orange dominant, scene #19


Yellow dominant, scene #16


Green dominant, scene #145


Blue dominant, scene #18


Indigo dominant, scene #88

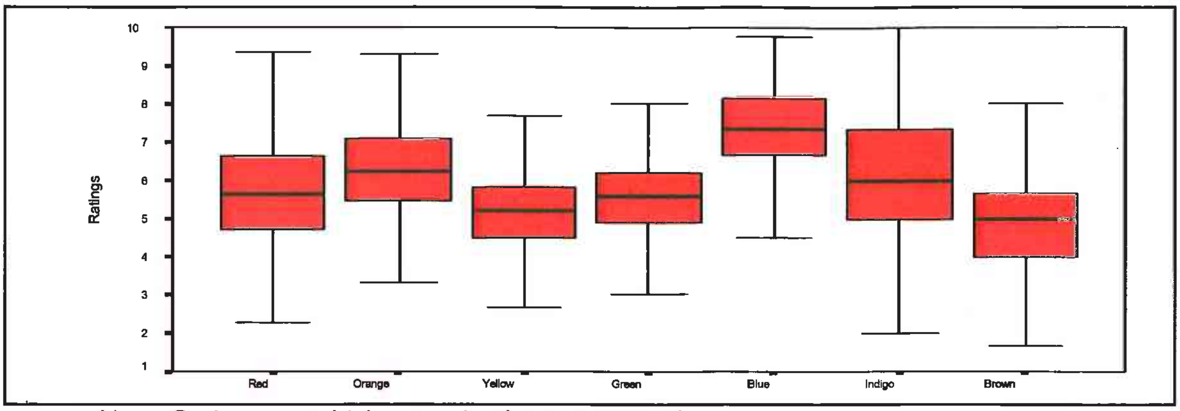

Brown dominant, scene #146

Table 10.137 and Figure 10.91 show the average ratings for scenes on the basis of their dominant colours.

Table 10.137 Av. Ratings of Dominant Hues

Colour	Rating	SD
Red	5.71	1.38
Orange	6.23	1.78
Yellow	5.55	1.03
Green	5.55	1.01
Blue	7.31	1.09
Indigo/Violet	6.13	1.57
Brown	4.97	1.31
Grey	5.49	2.30

The colour preferences are, in descending order, blue, orange, indigo/violet, red, green, grey, yellow, and lastly brown. This order is shown by Figure 10.92 where the percentage



Note: Omits grey, which comprised one scene only.

Figure 10.91 Boxplot of Ratings of Dominant Hues

increase for each colour is compared with the benchmark of 100% for the brown hue.

The ratings of scenes in which blue is the dominant colour are 49% above those with brown as dominant[92].

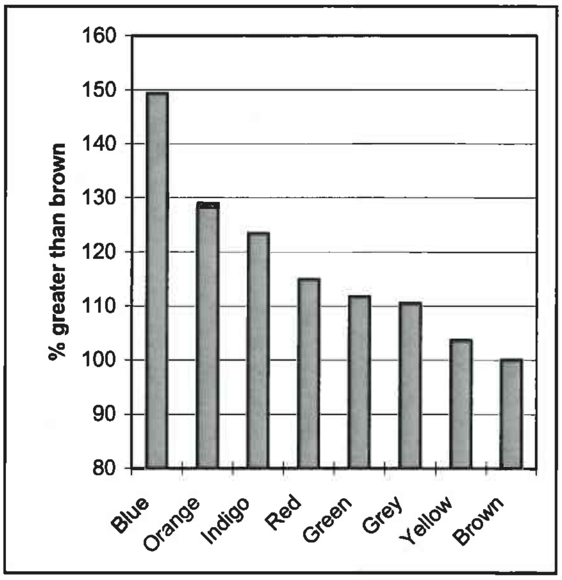


Figure 10.92 Hues in Order of Preference

Table 10.138 ANOVA - Significance of Dominant Hues

	SS	df	MS	F	Sig
Between groups	18.06	1	18.06	9.89	0.002
Within groups	580.77	318	1.83		
Total	604.08	319			

92. The relativities are: brown 100, yellow 104, grey 110, green 112, red 115, indigo 123, orange 129, blue 149.

The ANOVA indicates that the differences between the colours are significant and the differences are mainly within groups [Table 10.138].

The reason for the blue scenes being the most preferred is not hard to find as all but one of the 26 scenes include significant areas of water including of the coast, Murray Valley or inland waters. The sole exception is scene #110 of blue bush [chenopods]. Sixteen of the scenes are of the coast, which is the most highly rated area in South Australia, and a further nine are of inland waters.

Thus the question is whether the preference for the blue colour reinforces the preference for water environments, i.e. is a lead factor, or whether the content of the scene follows and the colour is the more important. Given the evidence, the first hypothesis is the more likely, that the colour does not determine the preference but serves to reinforce the preferences for water.

Of the 13 scenes of orange, the next most preferred colour, six were of arid ranges and a further four of other arid areas [gibber, chenopods, dunes]. The high rating of arid ranges is reflected in the high rating of this hue. The relatively low ranking of scenes with dominant red hues is surprising given the usually high rating of red. Six of the eleven scenes were of arid ranges, which were highly rated but the remaining five include gibber and arid plains, which are among the lowest rated scenes.

The low rating of the scenes with yellow and green as the dominant hues reflects their preponderance in scenes of cereals and pasture, which are generally low, rated. The bottom rated scenes in which brown is the dominant hue included samphires, vineyard, dairy flats and a waterhole, all low rated. The reason for brown being so disliked may be due to its association with death, e.g. brown crops, dead leaves.

(4) Frequency of Hues

The number of colours identified as dominant colours provides an estimate of the number of significant colours in each scene. The number of colours per scene was summarised in Table 10.134. Table 10.139 summarises the preference ratings according to the number of hues.

Table 10.139 Ratings of the Frequency of Dominant Hues

Colour	Mean	SD
1	5.41	1.06
2	6.00	0.95
3	6.15	1.04
4	6.01	1.05
5	5.92	1.12

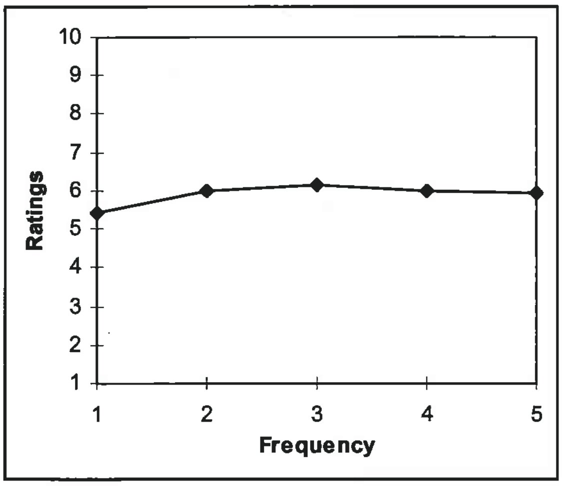


Figure 10.93 Ratings of Frequency of Dominant Colours

Figures 10.93 and 10.94 indicate a slight parabolic relationship between the number of significant colours in a scene and the ratings, suggesting that three is about the optimum and less or more than this results in lower preferences. However as the sky colour has been omitted from the analysis of colours the optimum, including the sky, is four.

The ANOVA indicates that the differences are significant [Table 10.140] with the differences within groups being more dominant than differences between groups.

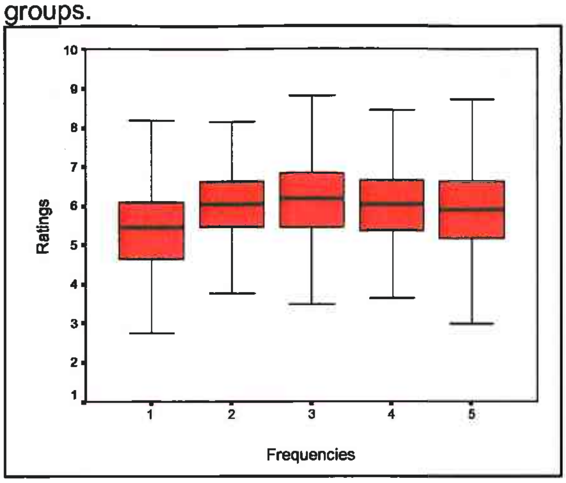


Figure 10.94 Boxplot of Frequencies of Dominant Colours

Table 10.140 ANOVA - Number of Significant Hues

	SS	df	MS	F	Sig
Between groups	33.45	1	33.45	56.40	0.000
Within groups	188.60	318	0.59		
Total	222.05	319			

The linear trend line for the relationship has a slight upward trend: $y = 0.10x + 5.59$; $r^2 = 0.33$; however the correlation coefficient is not high and the trend line simply provides an average of the parabola. A more accurate trend line is a two order polynomial which arches close to the parabola of the relationship: $y = -0.12x^2 + 0.81x + 4.76$; $r^2 = 0.92$ which has a much more respectable correlation coefficient.

(5) Saturation and Lightness

The influence of the saturation and lightness of the hues was assessed by identifying for the dominant colour of each scene the respective figures that had been measured by the computer program. Saturation, the richness of colour, is measured on a 0 - 255 scale with 255 being the maximum saturation. Lightness, the brightness of light intensity in the scene, is also measured on the same scale with 255 being maximum brightness.

The figures derived for saturation and lightness were allocated to five categories, 1 - 49, 50 - 99, 100 - 149, 150 - 199, 200 - 255. The number of scenes in each category is summarised in Table 10.141.

The entire results are shown in Appendix 10.14.

Table 10.141 Frequency of Scenes per Category

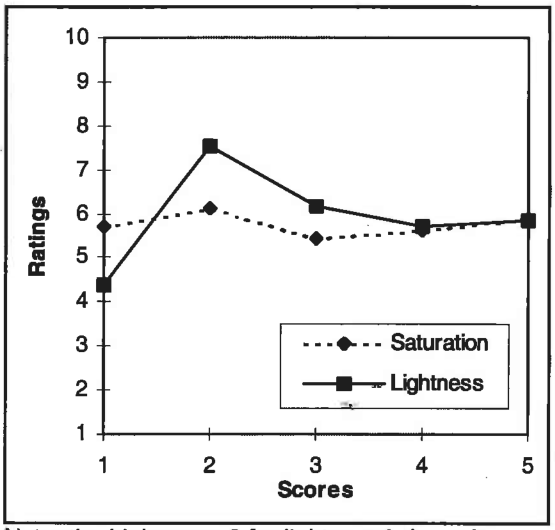
Category	Saturation	Lightness
1 - 49	50	1
50 - 99	56	1
100 - 149	25	31
150 - 199	8	86
200 - 255	16	36
Total	155	155

While the majority of the scenes have relatively low levels of saturation, the majority also has high levels of brightness. Analysis of the preferences based on the categories for saturation and lightness produced the results shown in Table 10.142 and Figure 10.95.

Table 10.142 Preferences Based on Scene Saturation and Lightness

	Saturation		Lightness	
Category	Mean	SD	Mean	SD
1 - 49 [1]	5.70	0.95	4.37*	1.63
50 - 99 [2]	6.12	0.95	7.55*	1.62
100 - 149 [3]	5.43	1.01	6.15	0.92
150 - 199 [4]	5.61	1.08	5.68	0.95
200 - 255 [5]	5.89	0.998	5.82	0.98

* Based on only one scene each



Note: the high score 2 for lightness is based on a single scene

Figure 10.95 Preferences based on Scene Saturation and Lightness

The results indicate clearly that neither colour saturation nor brightness has any significant influence on preferences. The equations for the trend lines for each data reinforces this conclusion:

Saturation $y = -0.009x + 5.78; r^2 = 0.003$
Lightness $y = 0.11x + 5.59; r^2 = 0.02$

Although the second equation indicates a slight rise with increasing brightness, the correlation coefficient is too low for it to be meaningful. The cause of this may be due to inadequacies of the scanning equipment and possibly the computer program used to analyse colour. Thus the finding that neither saturation nor lightness appears to influence preferences is based on the measurement instruments used; a more accurate scanner may produce a slightly different result.

(6) Colour Summary

The scenes were scanned and their colours analysed by a computer program. This analysed for hue, saturation and lightness. The number of colours per scene averaged 4.5 [SD 1.2], with a range from two to eight. Colours which were largely absent were the reds and the indigo/violet, at opposite ends of the colour spectrum. Analysis was undertaken of the colours of scenic features, e.g. river cliffs, trees & vegetation. Among the findings were that arid dunes were redder than the yellow/white coastal dunes, sea scenes were light blue, and vegetation in the distance took on a blue tinge - a characteristic of the Australian landscape.

Analysis of colour preferences was based on an assessment of the dominant colour in each scene. This found that the colours were preferred in the following order of preference from highest to lowest: blue, orange, indigo/violet, red, green, grey, yellow, and lastly brown. The ratings of the scenes in which blue was the dominant colour were 49% higher than those with brown scenes, the lowest rated colour.

Preferences increase with the number of significant colours in a scene. There is an optimum of about four with lower preferences for less or more colours.

Based on the measurement of colour saturation and lightness, neither has any discernible effect on preferences, a result which may reflect inadequacies in their measurement rather than reality.

10.14 CLOUD COVER

Although efforts were made during the photography of scenes to use sunny bright lit days and to avoid clouds, inevitably this was not always possible. In addition, among the slides selected from other photographers, some were with clouds. The selection of scenes for inclusion in the set of 160 slides could have adopted a very strict rule and excluded any scenes with clouds, however this would have resulted in the under-representation or non-representation of some types of landscape simply because there were no other slides to select from. Therefore some of the scenes contained cloud cover of varying degrees.

To ascertain whether the presence of clouds may have influenced preference ratings, a rating of the cloud cover was undertaken. The 1 - 5 score was used [Appendix 10.15], as follows:

1. Complete cloud cover and scene in shadow
2. Complete cloud cover but scene in sun
3. Significant cloud cover due to its extent, distinctive shape or contrast to sky
4. Some cloud present but insignificant
5. No clouds present

Cloud cover, scene #144, score 2

The author performed the scoring as clouds are an ephemeral quality and do not comprise part of the landscape *per se*. Based on the above criteria, the scoring was essentially an objective process. Table 10.143 summarises the number of scenes for each score and indicates that none scored 1 and only a handful scored 2. Nearly two thirds were classified as being cloud-free and over 80% scored either 4 or 5.

Cloud cover, scene #8, score 4

Table 10.143 Scoring of Clouds in Scenes

Score	Nos of Scenes	%
1	0	0
2	6	3.9
3	24	15.5
4	28	18.1
5	97	62.6
Total	155	100.0

Note: Interstate scenes excluded

Table 10.144 Scoring of Cloudiness

	Scores			
	2	3	4	5
Mean	4.78	5.34	6.01	5.94
SD	1.21	1.01	0.97	0.92

Note: no score 1's

Table 10.144 summarises the ratings for each of the scores [there was no score 1] and this is illustrated by Figures 10.96 and 10.97. The algorithm for the scores is $y = 0.415x + 4.48$; $r^2 = 0.86$. This indicates that preferences increase by 33.9% over the four score classes from nearly complete cloud cover to cloud-free conditions. Cloud cover can lower prefereence ratings by up to 1.2 rating units. The ANOVA indicates that the differences between the scores are significant [Table 10.145].

Table 10.145 ANOVA - Cloudiness of Scenes

	SS	df	MS	F	Sig.
Between groups	274.67	1	274.67	1063.53	0.000
Within groups	82.13	318	0.26		
Total	356.80	319			

The ratings decrease with increasing cloudiness. However preferences peak at the score 4, i.e. some clouds present, and then taper off slightly at score 5, the cloud-free score. Based on the trend line, the algorithm predicts that score 5 would be

6.55, which is 10% higher than that which occurred. The reduction in score 5 ratings suggests that respondents prefer the presence of at least a few clouds in scenes as this might provide better perspective to the scene, or for the form of the clouds themselves. Whatever the reason, the findings indicate that while the cloud-free scenes rate high, a few clouds in the scene actually enhances preferences.

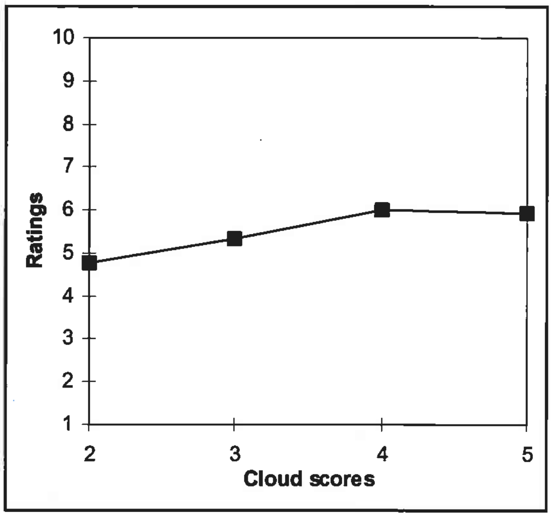


Figure 10.96 Ratings vs scores - Clouds

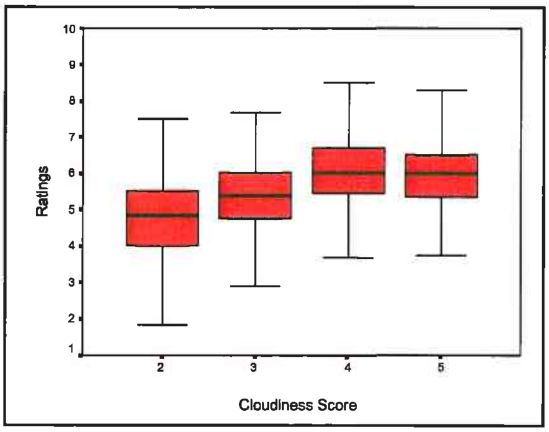


Figure 10.97 Boxplot of Rating of Cloudiness Scores

Overall the findings vindicate the aim to select slides which are as cloud-free as possible but they also vindicate not being strict on this point and using some scenes with clouds where necessary.

10.15 FACTOR ANALYSIS

Factor analysis was undertaken of scenes on a regional basis to assess whether underlying factors could be identified. Factor analysis provides a means of simplifying the data so as to reduce the number of variables and to detect underlying relationships between variables. Principal components extraction was used throughout with the Varimax rotation with Kaiser Normalisation.

The factor loading indicates the amount of variance in the variable that is accounted for by the item[93]. A factor loading of ≥ 0.6 was adopted as the cut-off level for the dominant factor, which is sufficient to explain 36% of the variance. A lower factor loading could have been selected but examination of the data indicated that a 0.6 level would capture most of the relationships.

(1) River Murray

Factor analysis of the twelve River Murray scenes identified two components. Component 1 explained 36.5% of the variance and Component 2 explained 18.9%, a total of 55.4%. Nine scenes scored high on these two components. The factor loadings are summarised by Table 10.146.

Table 10.146 Factor Loadings River Murray Scenes

	Factor Loadings on Component	
Slide	**1**	**2**
4	**.62**	9.77E-02
44	**.60**	.39
50	.57	.22
51	**.80**	.15
53	**.76**	.33
58	**.80**	.12
62	.57	.44
114	.49	.52
123	1.28E-02	**.88**
127	.55	.51
130	.23	.58
148	**.73**	.29

Note: dominant factor for each slide shown in bold

All of the scenes which scored > 0.6 in Component 1 contained views of the river. The component increases with the angle of view over the river. Clifftop views down across the river achieved scores of 0.76 - 0.80 [Scenes 51, 53, 58, 148] while views from the river bank achieved lower scores of 0.60 - 0.62 [#4, #44]. This component is thus proposed to be *river view*.

93. For example, a factor loading of 0.5 means that $(0.5)^2$ or 25% of the variance in the variable is explained.

The single scene in Component 2 which >0.6 was a scene of the river, #123, with tall dead tree trunks. Scenes which scored lower than the 0.6 score cut off were examined as they may assist in identifying the character of the factor involved[94]. Scene 130 is just below 0.6 and comprises a large leafy willow tree occupying half the scene. Two other scenes scored moderately high on Component 2: #114 which has tall trees along a backwater, and #127 which has tall willows alongside the river. The component is thus proposed to be *tall trees with river.*

The factor analysis thus identified two components, the dominant being *river views*, with scenes scoring highest according to the extent of the view, and the sub-dominant being *tall trees with river.*

(2) Coast

Factor analysis of the 21 coastal scenes identified three components. These components explained, respectively, 34%, 16.8% and 13.1% of the variance, a total of 63.8%. Fifteen scenes scored high on these components. The results are summarised by Table 10.147.

Eleven scenes scored high on Component 1: scenes 91, 106, 108, 113, 120, 124, 128, 137, 141, 152 and 157. These include rocky and sandy coasts, some with waves and foam, others calm. A common feature is that they are backed by higher land including cliffs, dunes and headlands. The component is thus proposed to be *coast backed by high land.*

Two scenes scored high on Component 2: scenes 5 and 18. Scene 5 is of a sandy beach backed by vegetated dunes, and a calm sea; 18 is of Pondalowie Bay from clifftops, extensive water, vegetated dunes, and some foam from waves. Two scenes lay just below 0.6 loading, #35 is of Petrel Cove with a rocky indented coast backed by sloping hills, and foam from waves; and #47 is of Troubridge Point with a low flat cliff, rocky beach, foam from waves, and a small sea area. No unique component can be identified and the factor was therefore called *general coastal.*

Table 10.147 Factor Loadings Coastal Scenes

Slide	Factor Loadings on Component 1	2	3
5	.24	**.72**	.23
18	.30	**.75**	.13
34	.22	.11	.51
35	.18	.58	.47
47	.36	.55	.31
49	.26	.39	**.70**
80	.55	.51	1.41E-02
91	**.68**	.40	.30
97	.56	.43	.22
106	**.74**	.26	.34
108	**.65**	.20	.40
113	**.77**	.29	.33
115	.19	7.54E-02	**.68**
120	**.70**	.29	2.84E-02
124	**.72**	.17	.37
128	**.65**	.43	1.16E-02
137	**.74**	.23	.32
141	**.77**	.26	.26
152	**.80**	.20	.29
157	**.70**	.28	.31

Two scenes scored high on Component 3: scenes 49 and 115, both were among the lower rated coastal scenes in the 6 - 6.99 scale. The scenes differed from each other: #49 is of the beach and Bluff at Victor Harbor and #115 is a view of Second Valley and sea from the surrounding hills. A common feature is that each has extensive foreground of brown vegetation that is lacking in the other scenes. Little sea is visible in these scenes. The component is thus proposed to be *brown vegetation.*

The factor analysis thus identified three components, the dominant being *coast backed by high land*, the second is *general coastal*, and the third is *brown vegetation.*

(3) Flinders Ranges

Factor analysis of the 16 scenes of the Flinders Ranges identified three components. These components explained, respectively, 25.7%, 19.6%, and 15.5% of the variance, a total of 60.9%. The results are summarised by Table 10.148.

94. In this example, only one scene scored high on component 2 and the factor could be assumed to be *tall dead trees.* Examination of the other scenes with reasonably high loadings indicated that the description *tall trees with river* would be a more accurate description.

Table 10.148 Factor Loadings Flinders Ranges

Slide	1	2	3
6	.32	7.81E-02	.51
23	4.14E-02	.25	**.74**
32	.20	4.89E-02	**.65**
39	.32	**.67**	5.68E-02
60	**.78**	.21	-3.88E-02
72	.20	**.82**	.23
74	.23	**.70**	5.04E-02
88	**.73**	.30	.13
104	.31	.44	.57
107	.20	**.64**	.34
109	.50	.50	.36
126	**.71**	.34	.34
136	**.60**	.45	.35
147	**.70**	.25	.40
151	**.64**	.17	.30
160	**.69**	.21	.32

Seven scenes scored high on component 1: scenes 60, 88, 109, 126, 136, 147, 151, and 160. Most of these were rated in the 6 - 6.99 range. These were scenes with rocky mountains or hills, generally with scattered trees. The common factor is that their red-orange colour reflecting the typical Flinders colour. The component is thus proposed to be *red-orange ranges and hills.*

Four scenes scored high on component 2: scenes 39, 72, 74, and 107. Each of these contained prominent trees in the scene. The component is thus proposed to be *ranges with trees.*

Two scenes scored high on component 3: scenes 23 and 32, both among the top rated scenes [8 - 8.99] and the highest rated area in South Australia apart from the coast. Scene 32 was across the Arkaba country towards the Wilpena ramparts, while scene 23 was of the rugged Edeowie gorge. Scene 104, which was just below the 0.60 cut-off, also comprised rugged cliffs. Steep and extensive rockfaces was a common feature. The component is thus proposed to be *steep extensive rockfaces.*

The factor analysis thus identified three components, the dominant being *red-orange ranges and hills,* the second *ranges with trees,* and the third *steep extensive rockfaces.*

(5) Mt Lofty Ranges

Factor analysis of the 15 hills and pastures scenes in the Mt Lofty Ranges identified three components. These components explained, respectively, 32.5%, 18.3% and 13.0% of the variance, a total of 63.8%. The results are summarised by Table 10.149.

Table 10.149 Factor Loadings Hills and Pastures

Slide	1	2	3
2	5.65E-02	**.69**	.17
11	.15	**.64**	.50
16	.24	.12	**.85**
27	.30	.30	**.61**
40	.33	**.67**	.27
45	**.60**	.50	8.79-02
55	.49	**.69**	-8.86E-02
85	**.71**	.48	-1.63E-02
90	**.75**	.18	.26
115	**.66**	.14	.15
119	**.64**	.39	.20
135	**.70**	-7.91E-02	.45
139	**.77**	.14	.29
149	**.71**	.22	.18
156	**.70**	.29	.20

Nine scenes scored high on component 1: 45, 85, 90, 115, 119, 135, 139, 149 and 156. These scenes comprised hilly fields with scattered trees, mostly in the distance. The component is thus proposed to be *hills with scattered distant trees.*

Four scenes scored high on component 2: 2, 11, 40 and 55. Scenes 2 and 55 contain dams of water but scenes 11 and 40 are the identical scene in different seasons but contained no water. Each of the scenes comprised hilly fields with large trees. The component is thus proposed to be *hilly fields with large trees.*

Two scenes scored high on component 3 - #16 and #27. Both of these scenes comprised views over hilly bare spurs. The component is thus proposed to be *hilly bare spurs.*

The factor analysis thus identified three components, the dominant being *hills with scattered distant trees,* the second being *hilly fields with large trees,* and the third being *hilly bare spurs.*

(6) Crops and Pastures

Factor analysis of the 29 cropping and pasture scenes identified four components. These components explained, respectively, 23.9%, 21.7%, 14.5% and 13.2% of the variance, a total of 73.2%.

Twenty-one scenes scored high on one of these components. The results are summarised by Table 10.150.

Table 10.150 Factor Loadings Crops and Pastures

Slide	1	2	3	4
1	.19	7.46E-02	.53	.27
12	.21	**.75**	.42	-9.27E-02
17	.20	.38	**.68**	.26
20	.24	**.72**	.45	-8.86E-02
22	.24	.18	**.74**	.22
26	.36	.59	.57	3.18E-02
28	.29	.24	**.74**	.29
54	.46	.28	.55	.32
66	.26	.10	.29	**.63**
70	3.79E-02	**.78**	.12	.33
71	.19	.30	.36	**.70**
73	.44	**.63**	.26	.37
75	.33	**.61**	2.92E-02	.46
79	.57	**.64**	.18	.18
86	.48	.26	.33	.57
87	.51	**.60**	.21	.32
92	**.75**	.31	.30	.26
96	**.78**	.22	.32	.14
99	.49	**.60**	.18	.34
101	**.62**	.58	.23	.27
102	.54	.54	.19	.41
112	.58	.11	.26	.44
118	.47	.52	.18	.47
129	**.63**	.52	.28	.25
133	**.67**	.47	.17	.26
131	**.79**	.17	.30	.22
144	**.67**	.25	.34	.34
150	.51	.40	.17	.31
155	.43	.18	.31	**.63**

Seven scenes scored high on component 1, scenes 92, 96, 101, 129, 131, 133 and 144, all of which were low rated crop and pasture scenes [ratings 4.2 - 3.11]. The scenes with the highest factor loadings were across straw or brown coloured crops with trees near the horizon. The remaining few scenes included low green crops or pastures. The component is thus proposed to be *treeless bare fields.*

Eight scenes scored high on component 2, scenes 12, 20, 70, 73, 75 79, 87 and 99. Scenes 12 and 70 were the highest rating crop and pasture scenes. All of these were views across green crops, some with a few trees in the far distance and low ridges. The component is thus proposed to be *green crops.*

Three scenes scored high on component 3, scenes 17, 22 and 28. Each of these comprised flat land with straw coloured crops or pastures with low ridges in the background and a few distant trees. The component is thus proposed to be *brown fields with distant ridges.*

Three scenes scored high on component 4, scenes 66, 71, and 155, each of which was a view over straw crops to high ranges. The component is thus proposed to be *straw crops with high ranges.*

The factor analysis thus identified four components, the first being *treeless bare fields*, the second *green crops*, the third *brown fields with distant ridges*, and the fourth *straw crops with high ranges*.

(7) Vineyards

Factor analysis of scenes of vineyards identified only one factor. No rotation was possible and only the single component was extracted [Table 10.151].

Table 10.151 Factor Loadings – Vineyards

Slide	1
37	**.76**
52	**.84**
56	**.82**
68	**.83**
82	**.85**
95	**.77**
145	**.78**
158	**.78**

The common factor in each of these scenes is obviously the presence of vine so the component is *vines.*

(8) Summary of Factor Analysis

Table 10.152 summarises the components identified by the factor analysis. The number of factors relates to the number of scenes. In 29 scenes, four factors were identified in crops and pastures whereas only one factor was identified for the eight scenes of vineyards.

The analysis reinforces the key landscapes identified earlier: the importance of views over the River Murray, the positive influence that cliffs and high land have on coastal preferences, the influence of the reds and oranges in the scenes of the Flinders Ranges, the combination of hills and trees in Mt Lofty Ranges scenes, and the treeless character of the agricultural lands.

The use of factor analysis at the outset of the analysis of preferences could assist in identifying the likely factors influencing preferences. However having performed it at the end of the analysis, it substantiates the findings and, importantly, indicates that it is unlikely that any significant factors have been omitted from the earlier analysis.

Table 10.152 Summary of Factors Identified

Factors				
1	2	3	4	Variance Explained
River Murray				
River views	Tall trees with river			55.4%
Coast				
Coast backed with high land	General coastal	Brown vegetation		63.8%
Flinders Ranges				
Red-orange ranges & hills	Ranges with trees	Steep extensive rockfaces		60.9%
Mt Lofty Ranges hills & pastures				
Hills with scattered distant trees	Hilly fields with large trees	Hilly bare spurs		63.8%
Crops and pastures				
Treeless bare fields	Green crops	Brown fields with distant ridges	Straw crops with high ranges	73.2%
Vineyards				
Vines				

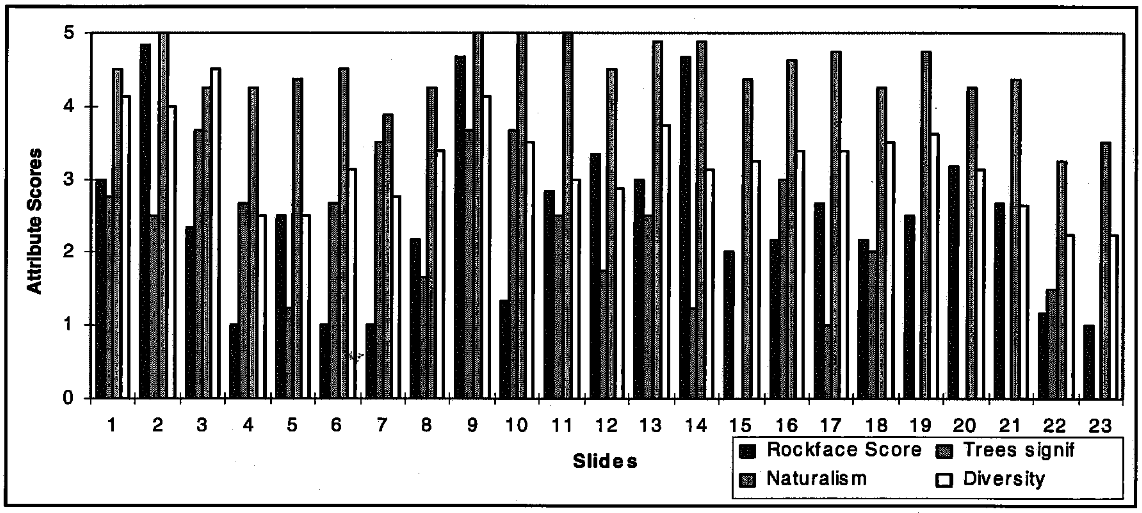


Figure 10.98 Comparison of Scores for Rockface Scores

10.16 CONFOUNDING EFFECT

Measurement of a given attribute can be confounded[96] by the contribution of other attributes. The influence of a single attribute, e.g. trees, may be weak but interaction with other attributes, e.g. colour or naturalism, may increase the apparent strength of the attribute.

As an example, some of the scenes of rockfaces also contained trees or red-orange colours and the qualities of naturalism or diversity are strong. Each of these attributes may reinforce the preferences obtained for these scenes.

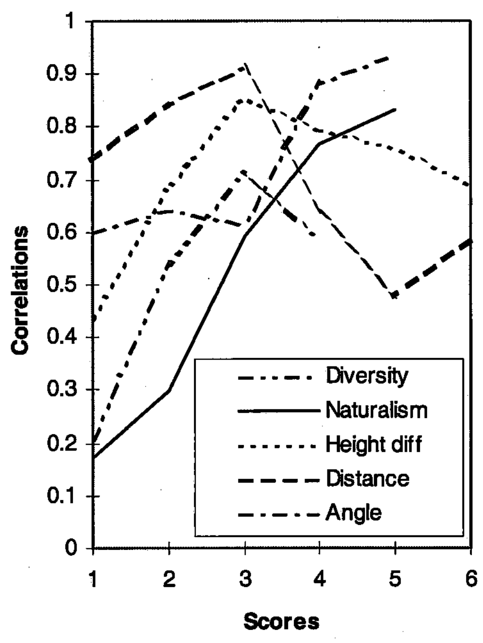
Table 10.153 Comparison of Scores for Rockface Scores

Slide	Rockface	Trees	Naturalism	Diversity
Flinders Ranges				
6	3	2.75	4.5	4.13
23	4.83	2.5	5	4
32	2.33	3.66	4.25	4.5
39	1	2.66	4.25	2.5
60	2.5	1.25	4.38	2.5
72	1	2.66	4.5	3.13
74	1	3.5	3.88	2.75
88	2.17	1.66	4.25	3.38
104	4.67	3.66	5	4.13
107	1.33	3.66	5	3.5
109	2.83	2.5	5	3
126	3.33	1.75	4.5	2.88
136	3	2.5	4.88	3.75
147	4.67	1.25	4.88	3.13
151	2	0	4.38	3.25
160	2.17	3	4.63	3.38
Musgrave & Mann Ranges				
9	2.67	1	4.75	3.38
43	2.17	2	4.25	3.5
140	2.5	0	4.75	3.63
78	3.17	0	4.25	3.13
103	2.67	0	4.38	2.63
21	1.17	1.5	3.25	2.25
38	1	0	3.5	2.25

Analyses were therefore undertaken over various combinations of attributes to examine the strength of the confounding effect.

Table 10.153 summarises the scores for the 23 rockface scenes and these are illustrated by Figure 10.98. It is apparent that for most scenes, the scores are wide ranging which does not indicate that they reinforce the rock face ratings. The scores are closest to the rockface score for slides 2, 9 and 12 in Figure 10.98 [respectively scenes 23, 104 and 126 in Table 10.153].

To examine this further, the correlations of the attributes with rockface attribute were measured. Correlations provide a simple basis for assessing the confounding effect with high correlations indicating a likelihood of confounding between attributes.



Note: Pearson correlations; all significant at 0.01
Figure 10.99 Correlations [r] of Attributes with the Rockface#4 Score

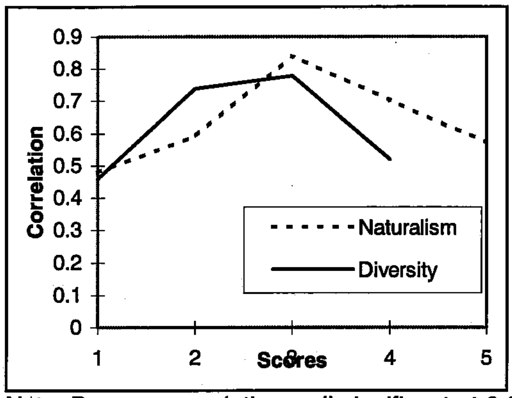
Figure 10.99 summarises the correlations of various attributes [diversity, naturalism, hight difference, distance and angle of view] with rockfaces. Rockface#4 score was used for analysis as the highest score of a given attribute is more likely than lower scores to reflect the confounding influence of other attributes. This was compared with the different scores of other attributes, for example, scores 1, 2, 3, 4 and 5 of naturalism. The correlations between

96. One of the meanings of *confound* is "to mix up so that the elements become difficult to distinguish" [Shorter Oxford English Dictionary] or "to mingle so that the elements cannot be distinguished or separated" [Macquarie Australian Dictionary]. This is the meaning intended in this section.

rockface#4 and these scores for each attribute are displayed by Figure 10.99.

The correlations of naturalism and the angle of view increase across all scores of these attributes against rockface#4. This suggests that these attributes reinforce the scoring of the rockface score. However for the other attributes; diversity, height difference, and distance, the correlations generally peak around the score 3 and then decline. This indicates that these attributes offer little support to the rockface score. The strongest correlations of rockface#4 with colours was with red [$r = 0.677$, i.e. $r^2 = 0.46$], orange [0.791, i.e. $r^2 = 0.63$] and indigo [0.675, i.e. $r^2 = 0.45$], suggesting that these colours also provide support of the rockface score.

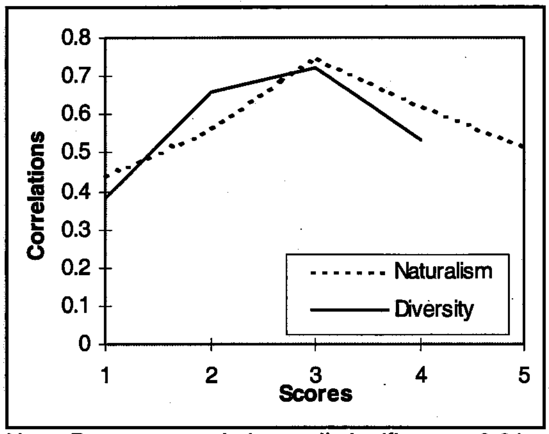
The issue of colour was examined in relation to the coastal scenes. The strongest correlations were with the colour blue, ranging from 0.67 to 0.89 [i.e. $r^2 = 0.44 – 0.79$] This gives some support for the hypothesis that the high score for the blue hue corresponds with the high preferences for coasts with a blue sea.



Note: Pearson correlations; all significant at 0.01 level

Figure 10.100 Correlations [r] of R Murray Area Score #4 with Naturalism and Diversity

Figures 10.100 and 10.101 illustrate the correlations of naturalism and diversity with attributes of River Murray scenes, namely the area of water score #4 and the edge of the water/land interface score #4. Both of these decline above score 3 for the respective attributes, indicating that while they offer some support for the lower scores of naturalism and diversity, this is not the case for the upper scores.



Note: Pearson correlations; all significant at 0.01

Figure 10.101 Correlations of R Murray Edge Score #4 with Naturalism and Diversity

From these examples it is concluded that the confounding effect, while present, does not appear to consistently reinforce the higher scores of attributes.

10.17 SUMMARY

The key quantitative findings are summarised in this section. It indicates the average ratings for differing classifications of scenes and compares these with benchmarks.

The overall benchmark is the mean of all scenes in South Australia, which was 5.83.

The algorithms are shown with only the slope component as this indicates the key relationship between the groups of scenes and the attribute examined. These algorithms are predictive equations, which can be used to estimate the likely rating depending on the particular attribute present.

The increase in ratings over the scores is shown together with the increase over one score so that the different results may be compared on a comparable basis.

LAND FORM

Flats, hills and mountains

Category	Flats	Hills	Mountains
Mean	4.69	5.34	7.05
% difference	0%	13.9%	50.3%

Coastal landforms

Category	Beach, flat hinterland	Rocks, cliffs	Beaches, dunes	Beaches, cliffs	Beaches, rocks, cliffs	Cliffs
Ratings	6.66	7.52	7.68	8.03	8.04	8.56
% difference	0%	12.9%	15.3%	20.6%	20.7%	28.5%

River Murray landforms

Category	Sloping cliffs	Sheer cliffs
Mean	6.04	6.81
% difference	0%	12.7%

Exposed rock faces Extent and steepness
$y = 0.53x + 5.59$ $r^2 = 0.96$ increase of 26.1% over 4 classes 6.5%/class

Elevation
All scenes except interstate and downward views
Distance $y = -0.13x + 6.47$ $r^2 = 0.48$ -10.25% over 6 classes -1.7%/class
Height $y = 0.20x + 5.32$ $r^2 = 0.41$ 14.60% over 6 classes 2.4%/class
Angle $y = 0.33x + 5.44$ $r^2 = 0.60$ 22.88% over 5 classes 4.6%/class

Downward view scenes
Distance $y = -0.24x + 7.23$ $r^2 = 0.25$ -17.17% over 6 classes -2.86%/class

Flinders Ranges & north west ranges
Distance $y = 0.004x + 6.99$ $r^2 = 0.0005$ 0.29% over 6 classes 0.05%/class
Height $y = 0.28x + 5.87$ $r^2 = 0.53$ 22.76% over 6 classes 3.8%/class
Angle $y = 0.28x + 6.12$ $r^2 = 0.92$ 17.50% over 5 classes 3.5%/class

LAND COVER

Significance of trees
$y = 0.40x + 4.70$ $r^2 = 0.81$ 23.5% over 4 classes 5.9%/class

Trees in crops/pastures
$y = 0.27x + 3.93$ $r^2 = 0.99$ 12.9% over 4 classes 4.3%/class

Trees in hills/pastures, mixed uses & vines [Mt Lofty Ranges]
$y = 0.405x + 4.41$ $r^2 = 0.99$ 16.8% over 4 classes 4.2%/class

Height and density of vegetation
All scenes
Height $y = 0.195x + 5.45$ $r^2 = 0.50$ 10.4% over 4 classes 2.6%/class
Density $y = 0.26x + 5.21$ $r^2 = 0.97$ 14.3% over 4 classes 3.6%/class
All scenes without coast
Height $y = 0.49x + 4.47$ $r^2 = 0.90$ 29.6% over 4 classes 7.4%/class
Density $y = 0.38x + 4.65$ $r^2 = 0.97$ 22.7% over 4 classes 5.7%/class

Type of vegetation

Category	Introduced	Indigenous
Mean	5.29	6.11
% difference	0%	15.5%

LAND USE

Category	Agricultural scenes	Natural scenes
Mean	4.97	6.55
% difference	0%	31.8%

Crops and pastures
Cropping and pasture scenes

Category	Flat land	With ridges
Mean	3.97	4.53
% difference	0%	14.1%

Category	Low crop	Tall crop
Mean	4.26	4.49
% difference	0%	5.4%

Category	Yellow crop	Green crop
Mean	4.43	4.50
% difference	0%	1.6%

Ridges $y = 0.35x + 3.69$ $r^2 = 0.77$ 17.3 % over 3 classes 5.8%/class

Trees in crops/pastures
$y = 0.27x + 3.93$ $r^2 = 0.99$ 12.9% over 4 classes 4.3%/class

Vines

Category	Bare leaf	Vines in leaf
Mean	4.70	5.06
% difference	0%	7.7%

Trees in scenes of vines
$y = 0.34x + 4.37$ $r^2 = 0.84$ 7.2% over 3 classes 2.4%/class

Mount Lofty Ranges
Mixed uses 5.67; Hills & pastures 5.39

Category	Yellow colour	Green colour
Mean	5.28	5.72
% difference	0%	8.3%

cf 1.6% difference for crops

Terrain - all scenes $y = 0.07x + 5.09$ $r^2 = 0.17$ 2.7% 3 classes 0.9%/class
Terrain - vines only $y = 0.27x + 4.52$ $r^2 = 1.00$ 5.6% 2 classes 2.8%/class

Trees in hills/pastures, mixed uses & vines
$y = 0.405x + 4.41$ $r^2 = 0.99$ 16.8% over 4 classes 4.2%/class

WATER

Category	Without water	With water
Mean	5.31	6.82
% difference	0%	28.4%

Coast
Average 7.67 31.6% above all state scenes 44.1% above all non-coastal scenes

Category	Non-coastal scenes	Coastal scenes
Mean	6.23	7.67
% difference	0%	23.1%

Coastal attributes

Water area	$y = 0.38x + 6.69$	$r^2 = 0.91$	15.3% over 4 classes	3.8%/class
Water edge	$y = 0.46x + 6.31$	$r^2 = 0.96$	15.5% over 3 classes	5.2%/class
Water movement	$y = 0.21x + 7.42$	$r^2 = 0.35$	8.3% over 3 classes	2.8%/class
Serene/arousing	$y = 0.49x + 6.61$	$r^2 = 0.83$	13.8% over 3 classes	4.6%/class

Murray Valley

Average 6.15 5.5% above average for all state scenes 15.8% above all non-water scenes

Category	Lakes	R Murray	Coorong
Mean	5.70	6.24	6.33
% difference	0%	9.5%	11.1%

Murray Valley attributes

Water area	$y = -0.25x + 6.48$	$r^2 = 0.18$	-12% over 4 classes	-3%/class
Water edge	$y = 0.35x + 5.48$	$r^2 = 0.96$	18.0% over 5 classes	3.6%/class
Serene/arousing	$y = -0.51x + 7.11$	$r^2 = 1.0$	-7.7% over 2 classes	–3.8%/class

Mt Lofty dams with water

Average 6.06 3.9% above all state scenes, 14.1% above all non-water scenes

Category	Scenes without dams	Scenes with dams
Mean	5.21	6.06
% difference	0%	16.3%

Category	Small dams	Large dams
Mean	6.00	6.14
% difference	0%	2.3%

Water area $y = 0.12x + 5.78$ $r^2 = 0.24$ 7.9% 5 classes 1.6%/class

Inland water [i.e. non-coastal]

Category	Mound Springs	Waterholes	Blue Lake
Mean	7.23	5.83	7.95

% difference compared with non-water scenes: mound springs 17.3% above, waterholes 7% above.

Colour of inland water

Category	Tan colour	Blue colour
Mean	6.16	6.28
% difference	0%	1.9%

DIVERSITY $y = 1.01x + 3.28$ $r^2 = 0.93$ 70.6% over 4 classes 17.7%/class

NATURALISM $y = 0.83x + 3.62$ $r^2 = 0.94$ 74.6% over 5 classes 14.9%/class

COLOUR

Dominant colours ratings

Colour	**Rating**	% Difference
Blue	7.42	149%
Orange	6.41	129
Indigo/violet	6.13	123
Red	5.71	115
Green	5.55	112
Grey	5.49	110
Yellow	5.15	104
Brown	4.97	100

CLOUDS $y = 0.415x + 4.48$ $r^2 = 0.86$ 33.9% over 4 classes 8.5%/class

The most significant findings are as follows.

Land form

- Mountains rate 50% higher than flat land
- Coastal scenes with cliffs generally rate higher than scenes without cliffs - up to 28.5% higher than scenes with flat land; dunes however raise the ratings of otherwise flat scenes
- On the River Murray, scenes with sheer cliffs rate 13% higher than those with sloping cliffs
- In Mt Lofty scenes, ratings increase by up to 3% depending on the terrain
- In mountainous scenes, the presence of rock faces increases ratings by up to 26% depending on their steepness and extent
- Elevation increase ratings by up to 23% depending on angle of view and up to 15% depending on difference in height to the high point; while distance to the farthest point had a negative influence, reducing preferences by up to 10%.
- In scenes of the Flinders Ranges and north west ranges, the influence of distance on preferences was neutral. The difference in height increased preferences by up to 23% and the angle of view increased them by up to 17.5%.

Land cover

- The presence of trees increases ratings by up to 24% depending on their significance
- In cropping and pasture scenes, trees increased ratings by up to 13% depending on their significance
- In Mt Lofty Ranges scenes, trees can increase ratings by up to 17%
- In non-coastal areas scenes with vegetation can increase ratings by up to 30% depending on the height and by up to 23% depending on the density of the vegetation
- Indigenous vegetation rates 15.5% higher than introduced vegetation

Land use

- Natural scenes rate 32% higher than scenes of agriculture
- In cropping and pasture scenes, the presence of ridges increase ratings by up to 18%
- Tall cereal crops rated up to 5% higher than low crops
- Green coloured crops rated up to 2% higher than dry straw coloured crops while in the Mt Lofty Ranges, green pastures rated up to 6% higher than dry pastures
- Vines in leaf rate 8% higher than bare vines

Water

- Scenes with water present rate up to 28% higher than scenes without water
- Coastal scenes rate 23% higher than non-coastal coasts
- For coastal scenes, ratings increase by up to 15% depending on the water area, by up to 15.5% depending on the length of the water/land edge and by up to 8% depending on the movement of water
- Compared with scenes of lakes, the River Murray rate 9.5% higher and the Coorong rate 11%
- Ratings of Murray Valley scenes decrease by 12% depending on the area of the water and increased by up to 18% depending on the length of the water/land edge.
- The psychological scale of serene/arousing increased ratings by 14% in coastal areas but decreased ratings in the Murray Valley by 8% [though based on only two scores].
- The presence of dams with water in the Mt Lofty Ranges increase ratings by up to 16% compared with scenes without dams
- Scenes with blue water rated up to 2% higher than scenes with light brown water

Diversity

- Diverse scenes rate up to 71% higher than monotonous scenes

Naturalism

- Highly natural scenes rated up to 75% higher than scenes with strong human presence

Colour

- Compared with scenes in which brown was the dominant colour, scenes with the dominant colour of blue rated 49% higher, orange 29% higher, indigo 23% higher, red 15% higher, green 12% higher, grey 20% higher and yellow 4% higher.

Clouds

- Cloud-free scenes rated up to 34% higher than cloud covered scenes
- Scenes with a few clouds rated 10% higher than completely cloud-free scenes

Table 10.154 summarises the slopes of the equations derived from the relationship of attributes with ratings. The slopes of the algorithms are compared in descending order in Figure 10.105.

Table 10.154 Summary of Algorithms for Attributes

Attribute	Equation slope	r^2	%/class
Land form			
Rock faces	0.53	0.96	6.5
Elevation [all scenes] - distance	-0.13	0.48	-1.7
- height	0.20	0.41	2.4
- angle	0.33	0.60	4.6
Elevation [arid ranges] - distance	0.004	0.0005	0.05
- height	0.28	0.53	3.8
- angle	0.25	0.92	3.5
Land cover			
Presence of trees	0.40	0.81	5.9
Trees in crops & pastures	0.27	0.99	4.3
Trees in Mt Lofty scenes	0.41	0.99	6.4
Height of vegetation - non coastal	0.49	0.90	7.4
Density of vegetation - non coastal	0.38	0.97	5.7
Land use			
Ridges in cropping & pasture scenes	0.35	0.77	5.8
Terrain in Mt Lofty Ranges scenes	0.27	0.10	0.28
Water			
Coast - Water area	0.38	0.91	3.8
- Water edge	0.46	0.96	5.2
- Water movement	0.21	0.35	2.8
- Serene/arousing	0.49	0.83	4.6
Murray Valley - Water area	-0.25	0.18	-3.0
- Water edge	0.35	0.96	3.6
- Serene/arousing	-0.51	1.00*	-3.8
Mt Lofty dams - Water area	0.12	0.24	1.6
Diversity	1.01	0.93	17.7
Naturalism	0.83	0.94	14.9
Clouds	0.42	0.86	8.5

* 2 points only

The strongest relationships identified on the basis of the slopes by Table 10.154 are:

- Diversity 1.01
- Naturalism 0.83
- Rock faces 0.53
- **Height of vegetation 0.49**
- Coastal - serene/arousing 0.49
- Coastal - water edge 0.46
- Clouds 0.42

Figure 10.106 summarises the percentage change per scoring class for each of the attributes, arranged in ascending order.

The results are, as would be expected similar to Figure 10.105 of algorithm slopes. Both diversity and naturalism are the topmost factors. The influence of clouds is stronger, moving from seventh position to third. The height of vegetation rather than its density is important. The coastal water edge and psychological factors [i.e. serene - arousing] are again both important.

The analysis reinforces the key landscapes identified earlier: the importance of views over the River Murray, the positive influence that cliffs and high land have on coastal preferences, the influence of the reds and oranges in the scenes of the Flinders Ranges, the combination of hills and trees in Mt Lofty Ranges scenes, and the treeless character of the agricultural lands.

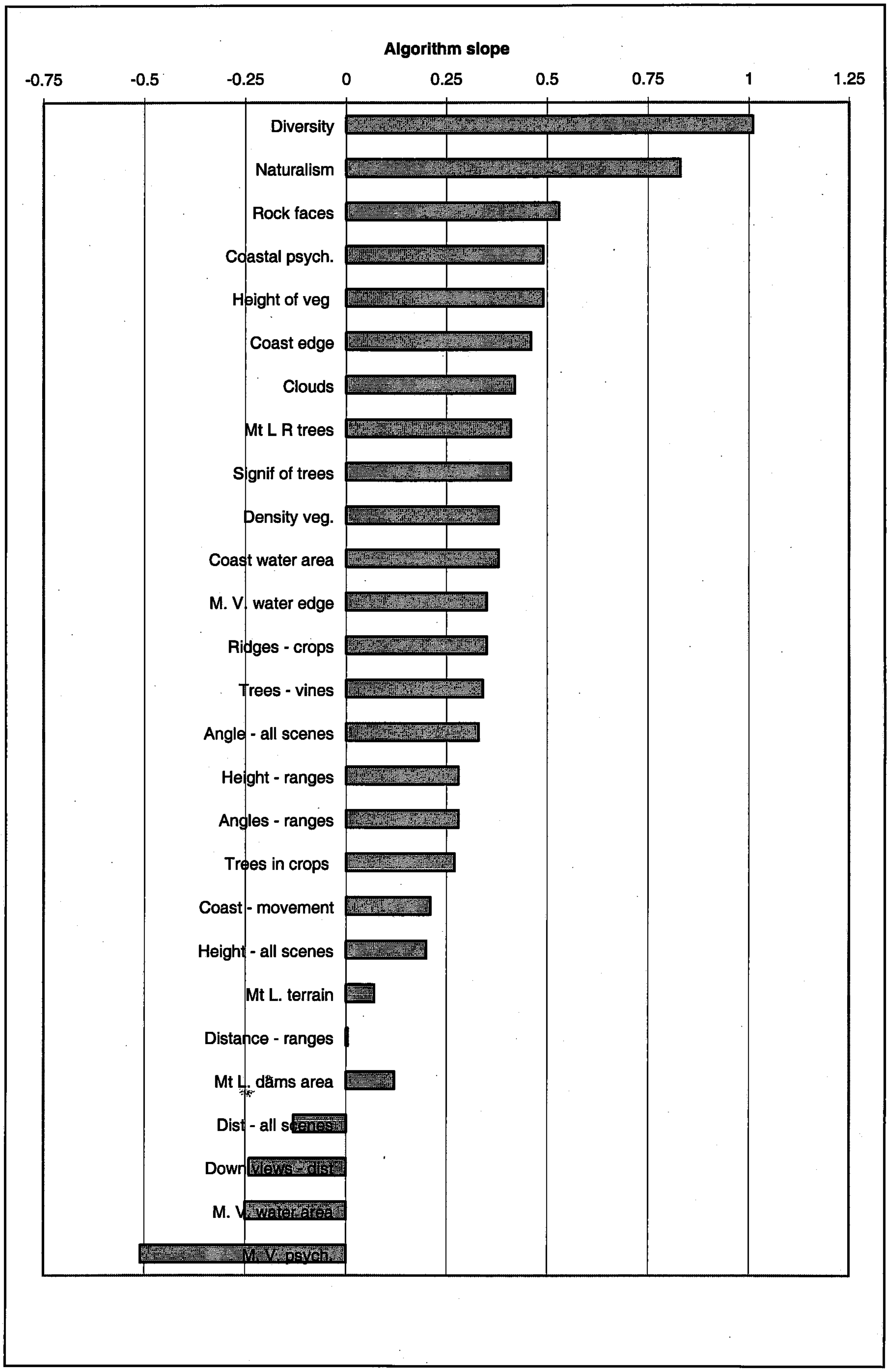


Figure 10.102 Comparison of Slopes of Algorithms - in descending order

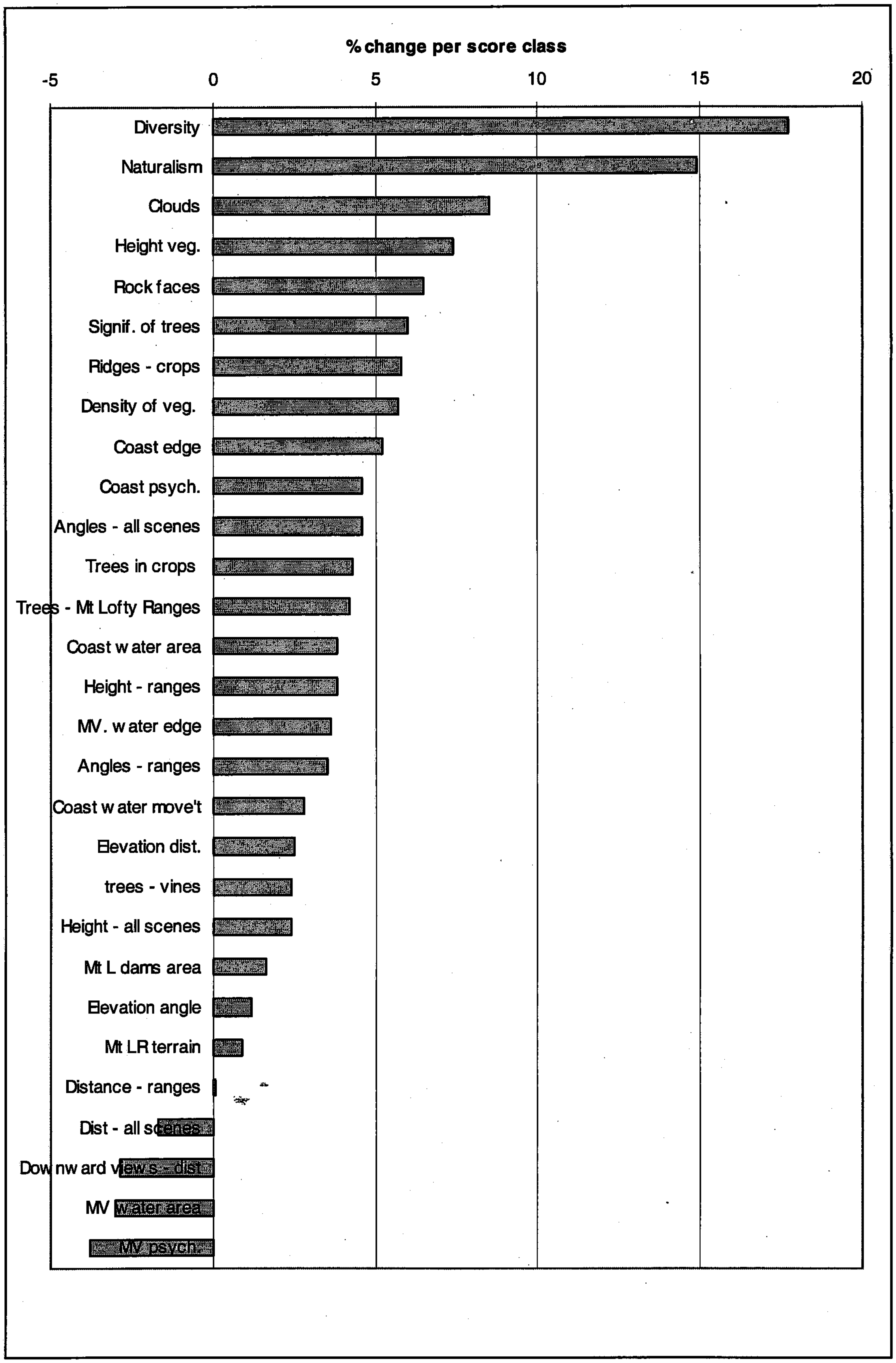


Figure 10.103 Percentage Change per Score Class in Attributes - in order

10.16 METHODOLOGICAL REFLECTIONS

(1) Rating Scale

Based on previous studies the 1 - 10 rating scale was chosen as the basic instrument for measuring preferences. The numbers are a surrogate for the preferences, they are a measure of the quality of the scene itself. The individual viewing a scene condenses all that they see into an appraisal of its landscape worth and expresses this in the form of a number. This was not found to be a difficult process and no respondent indicated that it was unreasonable or impossible. Rather they accepted that the numbers were merely an indication of their appraisal of its worth. Some respondents indeed sought to introduce half ratings which is an indicator that they could be sufficiently discriminatory in their judgements to separate quality into less than a unit basis.

The 1 - 10 scale proved an excellent scale both in rating and in analysis. For rating purposes, a scale with less than ten rating units would not have provided sufficient discrimination between scenes of varying quality. A 1 - 5 scale, for example, would have yielded far coarser results with the probability of many 2s, 3s and 4s and the avoidance of 1s and 5s as extreme values. However the 1 - 10 scale resulted in a much fuller use of the entire range, and it was clear that respondents quickly established the requisite frames of reference to judge intuitively whether a scene was a 6 or a 7, a 3 or a 4.

Prior consideration had been given to the use of a scale greater than 10, say 20, 25 or even 100. In hindsight it is considered that the success of the 1 - 10 scale rests partly in its familiarity, it is a scale commonly used whereas other larger scales would lack familiarity of use and this would impair the results. In theory a scale of 1 - 100 would provide considerable discrimination between scenes. However, experience from the rating sessions suggest that respondents would have found it frustrating to have to make choices between say 63 and 64 and that mental fatigue would have set in quite early and affect the results. There is no evidence from the literature of use of such a large scale and it would have been untested territory to use it here.

The 1 - 10 scale theoretically comprises ordinal numbers, however in practice it approximates the interval scale. Ordinal numbers imply a relative ranking - one scene is better than another [see Appendix 7.3], but do not assume equality in the intervals. Interval numbers by contrast have equality of intervals and an arbitrarily assigned baseline.

On the first criterion, equality of intervals, it is evident that respondents treated the scale as representing a set of equal spaces into which they assigned a particular scene. The attempts at providing half scores reinforce the point as they indicate that the respondents felt sufficiently comfortable about the scale to further divide it into its constituent parts. They could only do this if equality of interval was assumed.

In an ordinal scale without equality of intervals it is not possible to state that a 10-rated scene is perceived to be twice as good, in landscape quality terms, as a scene rated 5. However one is able to say that a 6 rated scene is considered better than a 5 rated scene, a 7 rated scene is better again and an 8 scene is even better and so on. It is this discrimination over a narrow range of choices on the scale for a given scene that the scale takes on interval type characteristic of the scale ratings representing approximately equal steps. In rating scenes, respondents were easily able to decide that a scene was a 5, a 6, a 7 or an 8. There were very few changed numbers once assigned (and the viewing period would have enabled this). Therefore it could be assumed that respondents treated the scale as representing a set of equal steps and they applied it accordingly. This does not mean that they were necessarily consistent but rather that it could be assumed the steps *approximate* equal steps and to a reasonable degree approach that specification of interval-type numbers.

The second characteristic of ordinal numbers is having an arbitrarily assigned baseline. The 1 rating was used in preference to the zero because it was considered that zero may be confusing to respondents as implying a complete absence of landscape quality [see footnote 61]. The 1 rating was thus used as the baseline to avoid this presumption.

The 1 rating is set at one end of the 1 - 10 rating scale and its position is thus fixed relative to the other numbers. It seems a reasonable assumption that the step between 1 and 2 could be taken to approximate the same step as between all the other numbers; it does not represent an outlier positioned at a distance from the rest of the scale. This would have been nonsensical for the respondents. In the same way the 10 rating represented the topmost point on the scale and was positioned as the natural progression of 6, 7, 8, and 9 with equality of spaced steps assumed. It was not positioned in some stratospheric position beyond the rest of the scale.

On the basis of Kant's dictum that beauty has no ideal, that it may be impossible to represent the ideal, then perhaps there should not be any cap to the scale [Lothian, 1999]. However this would render analysis impractical so an upper limit to the scale is necessary. In theoretical terms this may mean compressing all the scenes of highest quality to the 10-rating unit, however no other course is open.

Thus the scale as used is assumed to have provided approximately equal units and a basepoint to the scale which is not arbitrarily assigned in that it forms part of the scale and its natural progression at the lower end. On this basis the scale may be assumed to have interval type qualities which assume a ranking between classes and an equal spacing between them. The bottom of the scale is arbitrarily assigned in the sense that it does not represent an absence of the quality being measured. Temperature is measured in a similar way, zero representing the freezing point of water, not the absence of temperature in the way that absolute zero does. Of the two characteristics, equal intervals and baseline, for the purposes here the equality of intervals is by far the more important as it is on this basis that statistical analyses may be performed on the results. If for example equality of intervals cannot be assumed, then one may equally have used letters such as a, b, c, ... i, j to represent the 1 - 10 scale. But no numerical analyses could have been performed on such an ordinal scale.

Thus the 1 - 10 scale can be assumed to approximate the interval type numbers to a sufficient degree of confidence that its results can be analysed. It is not a complete interval scale in that the equality of steps cannot be assumed to be precise. While adjacent or nearby ratings [e.g. 3, 4, 5, 6] could be summed to represent a reasonable level of equality, it may be stretching this assumption to state that 9 is three times better quality than 3. However with this proviso, the rating scale has been assumed to represent the interval type numbers and is therefore useful for analysis.

(2) Representativeness of slides

In Section 4.2 the regional representativeness of the slides is discussed. With the benefit of hindsight it is recognised that both under representation and over representation of some regions occurred. The representativeness of the northern arid province could have been improved, particularly salt lakes and the arid dunefield regions.

It is also evident that parts of the southern agricultural province were over-represented. The 41 scenes of the agricultural region which included 29 scenes of crops and pastures was over represented, even if to test the concept of generic scenes. Similarly having eight scenes of vines, while still not capturing the full range of scenes with vines, is often somewhat over-represented for a single land use. Thus at the macro level, some over-representation and under-representation occurred. Use of a much larger set than 160 slides would have assisted in overcoming these deficiencies although to some extent they could have been resolved by greater consideration of the selection of scenes used.

Based on the analyses undertaken, several groups of scenes were under-represented to permit proper statistical analysis. These groups were:

- coastal scenes of beaches and flat hinterland [only 1 included]
- mixed uses of orchards and market gardening in the Mount Lofty Ranges [3]

In addition, the water section was deficient in lacking any scenes of creeks and watercourses other than the River Murray, and few of wetlands.

Inevitably in a survey of this nature, the resulting preferences reflect the scenes selected. If these are atypical of the types of landscapes they represent, then the preferences, which are derived, can not be confidently applied to other scenes of this type. If for example the scenes of the River Murray were not an adequate reflection of the range of typical scenes present in that landscape type, and then they would be deficient.

One test of this would be to include additional scenes in the set of a particular landscape type, if the addition is representative then the overall mean of the set should not change significantly. If however the addition of further representative scenes results in significant change to the mean, then the assumption that the original set is representative would need to be examined. This test has not been applied in this survey but could be applied in future such surveys.

It had been found that the deletion of the interstate scenes in the sets of landscape types changed the means. For example the 21 coastal scenes which included the interstate scene of Wilsons Promontory in Victoria had a mean of 7.72 but without this scene it changed to 7.67. This is a change of only 0.05 but if the set comprised say only 5 scenes the deletion of this scene would have had a much larger effect on the overall mean.

(3) Representativeness of Groups

As well as the representativeness of scenes selected, the other key determinant in the representativeness of the results lies in the selection of the groups of respondents who provided preference ratings of the scenes. The ratings of the scenes by the nine groups is discussed in Section 10.3 and it was determined that the ratings of one group [Adelaide Bushwalkers Club] were appreciably lower than other groups. The overall effect of the inclusion of this group was to lower the overall mean by 1.7%.

This group could have been omitted from the analysis on the basis that their ratings were somewhat extreme compared with the average. However this course was not taken, as there was no evidence that they were not representative members of the community. Inclusion of this group may have depressed the results slightly but the relative ratings of landscape types are unlikely to have been affected. The relative comparison of scenes is as important as their absolute ratings.

CHAPTER 11

APPLICATION OF THE RESULTS

11.1 INTRODUCTION

In this chapter, four applications of the results of the preference ratings are presented. Firstly, a map of South Australia's landscape quality is derived. Secondly, the predictive power of the results is examined through several applications. Thirdly, the various landscape theories summarised in Chapters 7 and 8 are analysed to assess the extent to which they are supported by the results presented here. Fourthly, a protocol for the application of the methodology at a regional scale is presented.

11.2 MAPPING SOUTH AUSTRALIA'S LANDSCAPE QUALITY

(1) Methodology

The ratings that have been obtained for the 155 scenes of South Australia together with the analyses undertaken of the attributes of these scenes provide the basis for mapping landscape quality across the State.

The relevant findings of the data analyses are applied in each region of the South Australian landscape. In addition, the 155 scenes are used as a set of reference scenes arranged on a unit rating basis [e.g. 3 - 3.99, 4 - 4.99]. A broad description of each unit rating is derived and applied to the South Australian landscape.

The relevant scenes for each section are listed and a brief description of each scene is provided in Chapter 10.

In mapping landscape quality, consideration was given to the appropriate division within the 1 - 10 scale. Mapping could be at less than a unit interval [e.g. half a unit] or at a unit interval. Alternatively several rating units could be aggregated and the mapping group three rating units: 1 - 3, 3 - 6 and 6 - 9 [there are no scenes > 9]. The data were considered to be of sufficient quality however, to enable a finer classification than at intervals of two or three rating units.

A single rating unit is considered the appropriate interval for mapping at the State level. This classification results in the loss of some information, e.g. the difference between 7 and 7.5 and 7.5 to 8. A smaller interval of half rating units would, however, necessitate a very large increase in application effort and much greater difficulty in assigning areas to the appropriate category than would a single rating unit. A single rating unit is considered appropriate to the accuracy of the scale and the quality of the data.

(2) Data Sources

Maps of 1:250,000 scale which cover the state, a total of 68 maps, were used to provide a consistent source of information about the terrain, vegetation, watercourses and lakes, and other physical features. For the southern agricultural province and extending north into most of the Flinders Ranges, maps of 1:50,000 scale were also used. Photomaps [b/w] of 1:50,000 and 1:100,000 scale were also used in some areas.

An additional set of information used to map landscape quality was the set of reports, *Environments of South Australia* [Laut, *et al*, 1977] undertaken by the CSIRO Division of Land Use Research in the mid 1970s. The eight volumed report described in considerable detail the land forms, vegetation, land uses, and water features of every region of South Australia and mapped environmental associations of similar characteristics based on Landsat imagery.

Along the coast, a set of aerial oblique colour photographs covering the entire coast was used together with maps. The oblique photographs were the result of photographic flights by the Coastal Management Branch of the Department of Environment and Heritage during the 1980s and 1990s. For most of the coast, the photographs are of large format [200 mm X 300 mm] with excellent resolution as they were taken from a relatively low altitude and showed considerable detail of the features. Many hundreds of photographs were examined.

GIS-based data sets can also be used in mapping landscape quality, but the degree by which this can be achieved depends on the coverage, accuracy and currency of the data fields. Data sets covering elevation, vegetation type and distribution, land use, water bodies are the minimum required. Nicolson and

Channon [1996] describes environmental data sets available in South Australia.

The following describes the derivation of the map of landscape quality for the various regions of the State. The resulting ratings were entered onto a map of South Australia of 1:1,500,000 scale, a sheet approximately 80 cm wide by 90 cm high. The map included here [Figure 11.3] is a GIS version of that map.

(3) Coast

The relevant finding from the analysis of coastal scenes was that heavy indentation of the coastline by bays, reefs, headlands etc [i.e. maximum water edge] was an important influence of preferences. The region contains a variety of different combinations of landforms with beaches, cliffs, headlands, dunes and generally low coastal vegetation. The 20 coastal scenes cover many of these combinations [Table 11.1].

Table 11.1 Categories of Coastal Landscapes

Category	Description
8 Scenes 18, 80, 91, 97, 120, 128	High, sheer or very steep cliffs, frequently indented coast [maximum edge], reefs, islands, pronounced wave motion, beaches backed by steep cliffs or high land. Overall contains a high vertical element and strong awe inspiring effect
7 Scenes 5, 35, 47, 106, 108, 113, 124, 137, 141 152, 157	Headlands, long wide beaches, sloping cliffs, extensive dunes, wave motion, low rocky cliffs, reefs, some islands, smoother coastline - less indented. Overall a lower vertical element, sloping cliffs and low coastal indentation
6 Scenes 34, 49, 115	Beaches, low hinterland, no cliffs, islands, mangrove flats, low dunes, little wave motion. Overall very little vertical element
3	Samphire flats

As a region the coast averages 7.67. The ratings of the scenes ranged from 6.15 to 8.88. The scenes are allocated into three groups: 6, 7 and 8[96]. Table 11.1 summarises the three categories used in mapping landscape quality. The final category in Table 11.1 covers samphire flats (scene 3, mean 3.93] that is included as it is considered relevant to some parts of the coastline.

96.Reference to 6, 7 and 8 is a shorthand reference to the full ranges for each: i.e. 6 to 6.99, 7 to 7.99, and 8 to 8.99. This is used throughout this chapter.

These broad descriptions were applied to the entire South Australian coastline.


Coastal Landscape, scene #97, rating 8


Coastal landscape, scene #108, rating 7


Coastal landscape, scene #34 , rating 6

The overall results are:

- Rating 8 Outstanding coastal landscapes comprised the high sheer cliffs of the Nullarbor, southern Eyre and Yorke Peninsulas, and north -west Kangaroo Island.
- Rating 7 Extensive lengths of the western and southern Eyre Peninsulas, the western foot of Yorke Peninsula, Fleurieu Peninsula, the coast adjacent to the Coorong, much of the South East coast, and the northern coast of Kangaroo Island. These comprised mainly series of headlands and bays, cliffs [not as sheer or steep as the first category], or in the case of the coast adjacent to the Coorong, an extraordinary length of surf coast backed by high sand dunes. Generally these are high energy coastlines.

- Rating 6 These scenes comprise gentler coasts, lacking the cliffs and headlands and generally comprising much flatter landscapes. They are low energy coasts with little wave action. They include much of the eastern coast of Eyre Peninsula, the east and west coasts of Yorke Peninsula, and small segments of otherwise higher grade coasts.

The mangrove/samphire coasts, particularly in the northern Spencer Gulf, present a difficulty in rating. Typically the samphires [rated 3] lie on the landward side of the mangroves [rated 6], most of which extended into the sea. Adjacent to the Cultana area on the western side of the northern gulf they occur as scattered mangrove trees off shore. Generally however the mangroves comprise dense vegetative cover. The difficulty lies in choosing whether to rate the coast as 3 or 6, a considerable difference. Because of the positive effect that the sea has on preferences, the 6 rating was generally selected but where the samphires are extensive they are also shown on the adjacent land.

(4) Murray Valley

The Murray Valley comprises three distinct physiographic units: the River Murray from the State border to Wellington, the Lakes Alexandrina, Albert, and Bonney [in the Riverland], and the Coorong, a narrow long lagoon which stretches from the Murray Mouth south-east towards Kingston, a distance of 150 km.

The River Murray proper comprises three sections:

- from the border to Renmark it comprises a wide valley, lined on the east by cliffs
- between Renmark to Overland Corner it occupies a wide valley in which much irrigation occurs
- downstream from Overland Corner the River enters a trench section which is lined by high limestone cliffs about 40 m high; these gradually reduce in height until they peter out at Wellington where the river enters Lake Alexandrina.

The analysis found the River Murray scenes average 6.24, the lakes 5.70 and the Coorong, 6.33. The edge of the water/land interface has a positive influence on preferences in all three areas. The area of water has a positive influence in the scenes of the River Murray.

Cliff lined flats, Chowilla, scene #51

Trench section, Big Bend, scene #58

Lake Bonney, scene #81

Coorong, scene #57

River Murray
Rating 7 Scenes 51, 114
Rating 6 Scenes 4, 44, 50, 58, 148
Rating 5 Scenes 53, 62, 123, 127, 130

Lakes
Rating 4 Scene 125
Rating 6 Scenes 36, 81

Coorong
Rating 6 Scenes 57, 154

Most of the '6' rated River Murray scenes are from the clifftop looking down on the river whereas for the scenes rated '5', only one of the five scenes was from an elevated position. This suggests that the content is not as important as the viewpoint. It is difficult to identify the distinguishing feature of the two scenes rated '7'. One is of backwaters with large trees and the other an elevated view of the river and extensive vegetation on the flats and cliffs. It suggests that the presence of tree cover is significant as both scenes have more trees, particularly indigenous trees, than any of the other scenes. The presence of willows and dead trees, which are in all scenes that are rated '5', suggests that such trees lower ratings.

Two of the three scenes of lakes are rated '6' while one of Lake Alexandrina is rated 4.93, however this contained mainly water with a small section of land and this may have lowered the rating below the '5' level.

Table 11.2 Ratings of Murray Valley Landscapes

Section	Rating
Coorong	6
Lakes Alexandrina and Albert	5
River Murray from Wellington to approximately Mannum	5
River Murray from Mannum to Overland Corner	6
Lake Bonney	6
Riverland section from Overland Corner to Berri	5
Berri to Renmark	6
Renmark to State border	7

The two scenes of the Coorong are both in the '6' rating unit. The ratings of the Murray Valley are therefore as shown in Table 11.2.

(5) Other Water Bodies

The Blue Lake was rated at 7.95 so was mapped as 7. Other lakes in the South East are rated 6 based on the rating of a reservoir [6.68] and large dams [5.92/5.83].

Salt lakes are represented by only one scene [#98, 6.43] and the scene includes extensive foreground and a low range with the lake occupying a relatively small part of the scene. The rating can not be assumed to be necessarily typical of salt lakes. Rather than adopt a rating of say 5, the salt lakes are left blank.

(6) Agricultural Region

The agricultural region comprises mainly cropping and pasture land but also includes areas of vineyards, pine plantations, and areas of bushland.

Crops and Pastures

Crops and pastures occupy much of the southern agricultural province and at an average rating of 4.36 is the lowest ranking area with the exception of gibber plains in the arid province.

Rated 5 Scenes 12, 70, 71
Rated 4 Scenes 1, 17, 20, 22, 26, 28, 66, 73, 75, 79, 86, 87, 99, 101, 102, 112, 118, 129, 133, 155
Rated 3 Scenes 54, 92, 96, 131, 144, 150

Crops & pastures, scene #28

Most of the scenes are rated as '4'; 20 of the 29 scenes of crops and pastures rated '4' while only three rated '5' and six rated '3'. One of the '5' rated scenes included the Marble Range in the background while the other two scenes have low ridges. However these are indistinguishable from many of the scenes rated '4' which also included ridges, some much more prominent than those in the '5' rated scenes. None of the scenes rated '3' have ridges and all are of dry straw pasture or crops, none are green.

The analysis of crops and pastures found that although the presence of low ridges or trees or the colour of the crop increase ratings slightly, they remain in the 4 - 4.99 range. The crops and pastures area is therefore rated as '4' overall. High ranges and ridges are rated '5'. As the '3' rating was related to seasonal influence it has not been included.

Pastoral

Some parts of the agricultural region include areas of pasture with large scattered trees, mainly eucalypts, giving them a pastoral appearance. In the analysis of vegetation types, such pastoral scenes average 5.33. The pastoral scenes are:

Rating 6 Scene 63
Rating 5 Scenes 45, 77, 85, 90, 135, 149
Rating 4 Scene112

Pastoral, scene #77

Pastoral areas are therefore rated '5' throughout. Areas are mapped from aerial photomaps for parts of the Mt Lofty Ranges and the South East.

Vines

The average for vines in leaf is 5.06 while those without leaf averages 4.07. This is a seasonal effect. Of the eight scenes of vines, four are rated '5' and four are rated '4'. The scenes are:

Rating 5 Scenes 52, 68, 82, 95
Rating 4 Scenes 37, 56, 145, 158

The former included hilly terrain whereas the later are mainly flatter land. Vineyards occur in the Clare area, in the Barossa Valley, parts of the Mt Lofty Ranges and the Langhorne Creek area, and in parts of the South East.

Vineyards in hilly areas are rated '5' while those in the flat areas are rated '4'.

Mixed uses

Mixed uses comprise market gardens and orchards and are located in the Mt Lofty Ranges. They are of relatively small extent and are too small to be evident on a State-wide map. The '6' rated scene has steeper land. The overall average is 5.67. The scenes are:

Rating 6 Scene 30
Rating 5 Scene 46, 138

Market gardens and orchards on steep land are rated '6' and elsewhere are rated '5'.

Hills and Pastures

Hills and pastures is a generic term to cover areas in the Mt Lofty Ranges which are hilly and comprise grazing land. They often contain clumps of trees and dams. The scenes are:

Rating 6 Scenes 2, 115
Rating 5 Scenes 40, 45, 55, 85, 90, 119, 135, 156
Rating 4 Scenes 11, 16

Both of the '4' rated are nearly '5' [4.94 and 4.89]. Several of the '5' rated scenes included large dams of water. Interestingly two are of identical scenes, the one with green pasture rated '5' and the other with dry pasture rated '4'.

The presence of trees was found in the analysis to increase the ratings of hills and pastures from 4.8 to 5.6. As a region, the Mt Lofty Ranges averages 5.57. The main ranges and deep valleys averages 6.23, the lower ranges and escarpments 5.13 and undulating wide valleys and plains 5.39.

The hills and pastures are therefore rated '5' throughout with the steeper parts of the Mt Lofty Ranges rated '6'. The hilly treed area in the vicinity of Clare was rated 5.

Mallee

Extensive areas of mallee occur on Eyre Peninsula, the Murray Mallee and Kangaroo Island. The analysis of vegetation types found that mallee averages 5.94. The scenes are:

Rating 5 Scenes 84, 143, 153

The '5' rating was used throughout. The mallee occurs in areas of varying size across the agricultural region. The smaller individual areas are not shown on the State-wide map. Thus while the main rating for the agricultural region is 4, where areas of mallee occurs, these areas increase to 5.

Pines

The two scenes of pine plantations are rated 4 and averages 4.62 in the analysis of vegetation types. The scenes are:

Rating 4 Scenes 13, 117

There are extensive plantations in the southern Flinders Ranges, the Mt Lofty Ranges and Fleurieu Peninsula and in the South East. The '4' rating was used for these areas.

Dense Eucalypt Woodlands

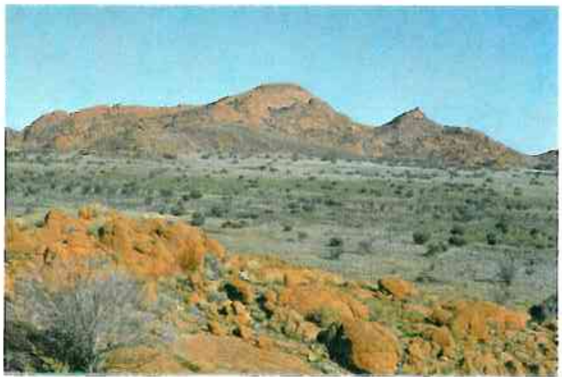
Within the Mt Lofty Ranges occur remnant areas of eucalypt woodlands. The scenes are:

Rating 7 Scenes 69
Rating 6 Scenes 14, 41, 61, 93, 121
Rating 5 Scene 111

Dense eucalypt woodlands, scene #41, rating 6

As a vegetation type, these averages 6.59. The '6' rating has been used for these areas. However these areas are far too small to be evident in the State-wide map.

(7) Arid Region



Arid region, scene #9, rating 7

Arid region, scene #78, rating 6

Arid region, scene #21, rating 5

The overall average for the far north as a natural region was 6.17. The regional analysis found the following averages [Table 11.3]:

Table 11.3 Ratings of Arid Region

Region and Unit	Mean Rating
Salt lakes	6.43
Arid dunefields	
Central dunefields	5.79
North east dunefields	5.84
Arid ranges & uplands	
North west ranges	7.11
Central tablelands	6.31
Gawler Ranges	5.11
Olary Spur	5.58
Gibber Plains	3.90
Arid Plains	
Northern plains	3.98
Central plains	6.48
Eastern plains	4.80

The analysis of landforms throughout South Australia found that mountain scenes in the arid region and Flinders Ranges average 7.05 while hills average 5.34. In scenes of the Flinders Ranges and arid ranges the analysis found that elevation increased ratings from 6.15 up to 7.55 depending on the relative height difference.

Analysis of vegetation types found the following average ratings, some of which reflected the terrain [e.g. arid mountains and vegetation] [Table 11.4].

Table 11.4 Ratings of Arid Vegetation Types

Vegetation Type	Mean Rating
Arid grass and spinifex	4.82
Arid trees and shrubs	5.18
Arid mountains & vegetation	7.30
Chenopods	5.56
Creek-side trees	6.09
Arid dunes	6.83

The rating of Dalhousie mound springs was 7.81 while for the Hermit Hill mound springs, a more typical example of mound springs, was 6.66. The rating of waterholes averages 5.83. Both the mound springs and waterholes are very small sites and are too small to map. The scenes of the arid region are:

Rating 7 Scenes 9, 31, 43, 140
Rating 6 Scenes 7, 19, 48, 78, 98, 100, 103
Rating 5 Scenes 21, 25, 29, 38, 60, 9, 105, 146
Rating 4 Scenes 59, 110
Rating 3 Scenes 8, 42, 83
Rating 2 Scenes 116

Based on the scenes and the analyses undertaken, the rating criteria shown in Table 11.5 were derived.

Table 11.5 Categories of Arid Landscapes

Category	Description
7	Major mountain ranges in the north west - Musgraves & Mann Ranges, Dalhousie springs
6	Breakaways, mesas, mound springs, bare dunes, major treed creek lines
5	Extensive chenopods & mallee, vegetated dunes, low arid ranges [Olary Spur, Gawler Ranges], spinifex
4	Chenopod vegetation without trees, arid grassland
3	Gibber plains

Although the rating of dunes differentiated between dunes with vegetation [5] and bare dunes [6], the latter tend to be scattered among the vegetated dunes, sometimes comprising the top ridges of the dunes. As it is impractical to map this at the small scale all the dunes have been allocated a '5' rating.

During mapping it was found that Laut *et al* assessed some dunes such as at Strzelecki to have been de-vegetated through grazing. With reduced grazing through improved management that has occurred over recent decades, the vegetation may be re-established on the dunes. This may have the effect of lowering landscape quality, from 6 to 5.

The '4' rating covering chenopod plains and '5' rating covering extensive areas of chenopods and arid trees and in particular dune systems provide, by their very extensiveness, the defining landscape quality for much of the South Australian landscape. These extensive areas of middle ranking landscapes are consistent with this, the average landscape quality for the State of 5.83.

(8) Flinders Ranges

The regional analysis showed that the main high ranges of the Flinders Ranges averages 7.54 while the lower ranges and outliers averages 6.03. Elevation increased ratings of the Flinders Ranges and arid ranges from 6.15 up to 7.55 depending on the relative height

Flinders Ranges, scene #23, rating 8

Flinders Ranges, scene #6, rating 7

Flinders Ranges, scene #126, rating 6


Flinders Ranges, scene #74, rating 5

difference. The analysis of vegetation types found that scenes containing native pines, common in the Flinders Ranges averages 6.96. However these scenes include mountains and valleys. Scenes containing trees along creeks averages 6.09.

The Flinders Ranges scenes are:

Rating 8 Scenes 23, 32, 104, 107
Rating 7 Scenes 6, 33, 136, 147
Rating 6 Scenes 72, 88, 109, 126, 151, 160
Rating 5 Scenes 39, 74
Rating 4 Scene 66

Based on the scenes and the analyses, rating criteria were derived [Table 11.6].

Table 11.6 Categories of Flinders Ranges Landscapes

Category	Description
8	High sheer cliffs [Edeowie Gorge], major ranges and valleys [Wilpena and Arkaba]
7	High rocky isolated peaks [McKinley Bluff, Armchair], high rocky ranges [Heysen Range], extensive wooded area [Mambray Ck - southern Flinders Ranges]
6	Rounded lower ranges and valleys - outliers of main ranges
5	Rocky hills and flats

The '5' rating provides the background rating of much of the Flinders Ranges region with progressively smaller areas of '6', '7' and '8'. The '8' rating is confined to the Wilpena/Arkaba/Elders area and the '7' to the Arkaroola, Mawson Plateau, Gammon Range and Heysen Range.

The higher points of the southern Flinders Ranges including Mt Brown, Mt Remarkable and Mambray Creek are rated '7' and the remainder of the mountain chain are rated '6'.

(9) Overall Ratings – Coast

The total length of the coast is approximately 3700 km and the relative lengths are illustrated by Figure 11.1. Eyre Peninsula and the west coast/Nullarbor region account for half of the State's coastline.

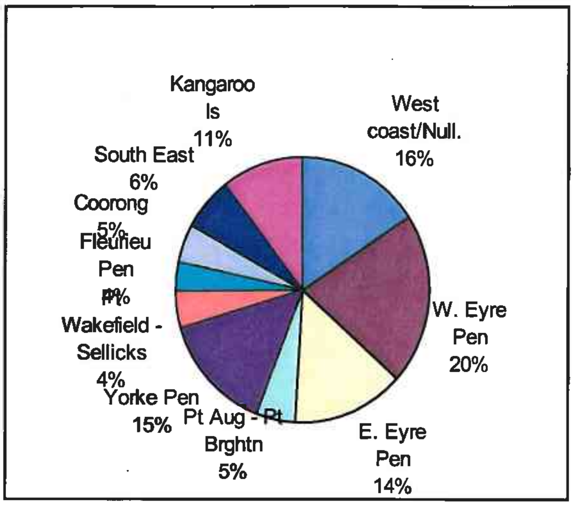


Figure 11.1 Relative Lengths of Coast by Region

The ratings for the coastal region are summarised by Table 11.7 and Figure 11.2.

In contrast to the rest of the State, the higher middle ratings are more extensive. The '6' and '7' ratings together accounted for 89.2% of the total length of coastline. Whereas the '7' rating covered only 0.5% of the State's area, on the coast it extends nearly 30%. The coast is thus one of South Australia's key regions in terms of landscape quality.

Table 11.7 Lengths of Landscape Quality Ratings Coast

Ratings	Length [Km]	%
3	72	1.94
4	18	0.50
5	17	0.45
6	2213	59.82
7	1088	29.41
8	292	7.88
Total	3700	100.00

Table 11.8 provides a more detailed breakdown of the lengths of coastline by region for each rating level. It indicates, for example that the west coast of Eyre Peninsula is of higher landscape quality than the east coast of the Peninsula. The highest rated areas [rating 8] of coast lie in the west coast/Nullarbor and the west coast of Eyre Peninsula. Other highly

Table 11.8 Lengths of Coastal Ratings by Region

Rating	West coast Nullarbor	W. Eyre Pen	E. Eyre Pen	Pt Aug. - Pt Brgtn.	Yorke Pen	Pt Wakefd - Sellicks	Fleurieu Pen	Coorong	South East	Kangaroo Island
3		5		30		35				
4										
5			10	20						
6	155	255	510	140	430	130	20	20	135	180
7	210	410			105		120	160	100	210
8	225	100								
Total	590	770	520	190	535	165	140	180	235	390

rated areas [rating 7] are at the base of Yorke Peninsula, along Fleurieu Peninsula, the Coorong and South East, and parts of the Kangaroo Island coast.

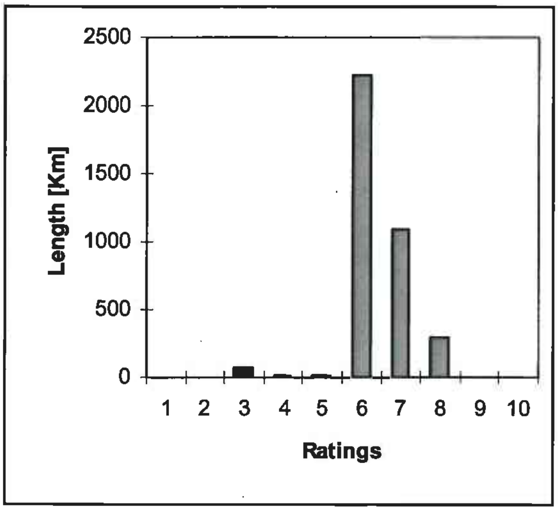


Figure 11.2 Length of Ratings of Coast [Km]

Coast, scene #80, rating 8

Coast, scene #106, rating 7

Coast, scene #115, rating 6

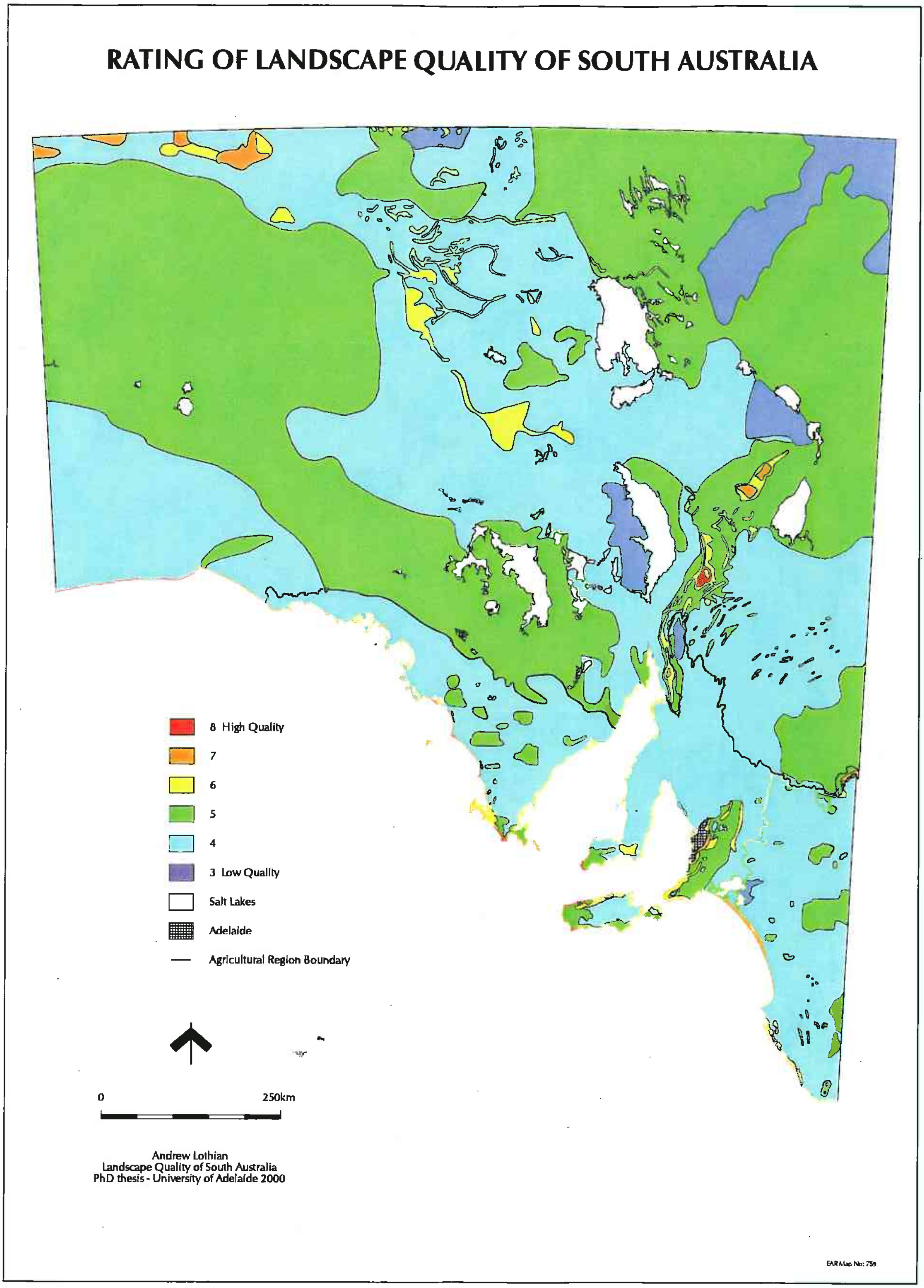


Figure 11.3 Map of South Australian Landscape Quality

(10) Map of South Australian Landscape Quality

The resulting map of South Australian landscape quality is shown by Figure 11.3. The '4' and '5' ratings dominate, '4' covering the agricultural region and about half of the arid region with '5' covering nearly the remaining half of the arid region. Ribbons of '6' mark the breakaways and major treed creek lines in the far north, the Flinders Ranges, the River Murray and parts of the coast. Areas of '7' and '8' are confined to the Flinders Ranges, the north-west ranges and the heavily treed Chowilla area of the River Murray. The '3' rating covers extensive gibber plains in the arid region and the barren Willochra Plain north of Quorn.

The areas of the ratings were calculated and are summarised by Table 11.9, 11.10 and Figure 11.4, 11.5 and 11.6

Table 11.9 Areas of Landscape Quality Ratings - South Australia [sq km] (Excluding coast)

Ratings	Southern Agricultural Province	Far North Arid Province	South Australia
1			
2			
3	1247	36289	37536
4	114755	337561	452316
5	16584	416206	432790
6	3084	18374	21458
7	425	4003	4428
8		310	310
9			
10			
na	2022	31479	33500
Total	138117	844222	982339

Note: na = not applicable, covers area of salt lakes [not rated] and Adelaide [761 sq km]

The results reinforce the dominance of the '4' and '5' ratings together accounting for 90% of the entire State. It is not that South Australia does not have areas of high landscape quality but rather that these are of relatively small areal extent and are in remote parts of the State. Countries that are well known for their attractive landscapes have very extensive areas of such landscapes and they are in greater proximity and accessibility to the population.

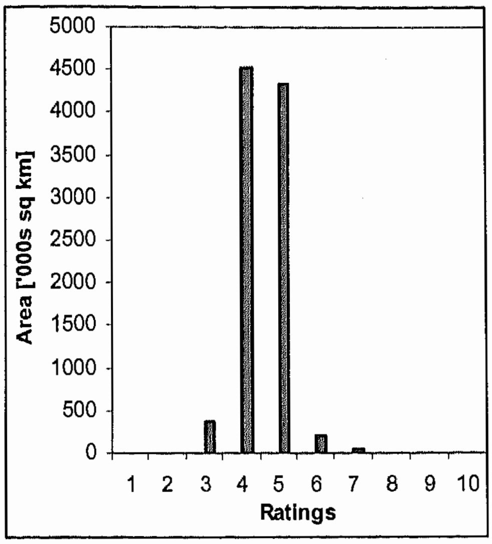


Figure 11.4 Area of Ratings - South Australia

Within the agricultural province, the '4' rating dominates and accounts for 83% due to the extensive cropping and pasture land [Figure 11.5].

Table 11.10 % of Landscape Quality Ratings - South Australia (Excluding coast)

Ratings	Southern Agricultural Province	Far North Arid Province	South Australia
1			
2			
3	0.90	4.30	3.82
4	83.09	39.98	46.04
5	12.01	49.30	44.06
6	2.23	2.18	2.18
7	0.31	0.47	0.45
8		0.04	0.03
9			
10			
na	1.46	3.73	3.41
Total	100.00	100.00	100.00

The arid province is dominated by the '4' rating, which accounts for 40%, and the '5' rating which covers a further 49% of the province [Figure 11.6].

The survey is state-wide in extent and one of the consequences of this is that it cannot cover the differences in landscape quality which occur at the micro level. For example, within the agricultural region that is rated '4' there are likely to be areas which rate higher than '4' due to the presence of certain quality enhancing features such as trees, water, or hills. On the other hand, there are also likely to be areas lower than '4'.

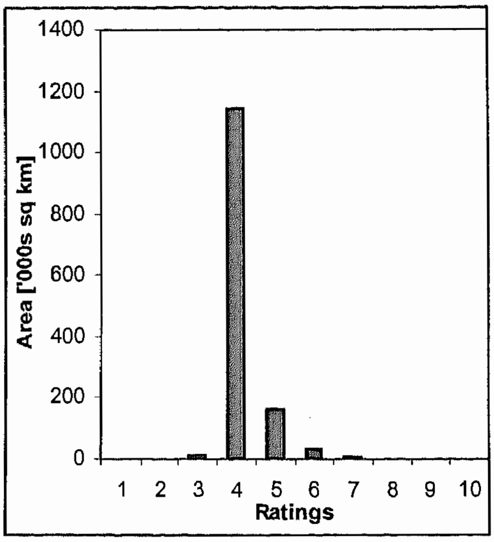


Figure 11.5 Area of Ratings - Agricultural Region

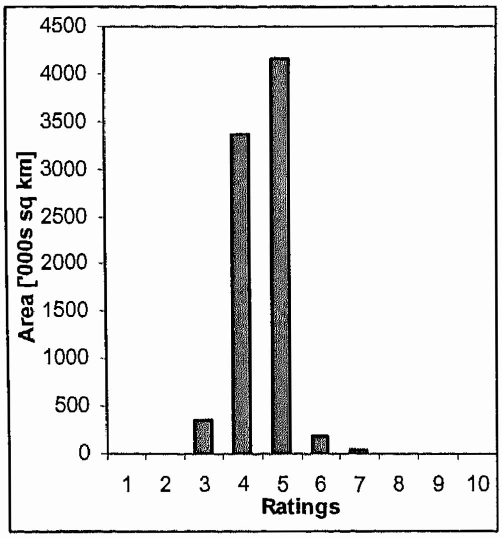


Figure 11.6 Area of Ratings - Far North Region

A further dimension is that of transient landscape quality due to ephemeral factors such as time of day, strong side lighting, striking cloud features, and seasonal colours in vegetation. Many of these will enhance the landscape quality but because they are ephemeral they cannot provide the basis of permanent landscape quality rating of the area.

It is to be expected that persons familiar with particular areas may be surprised to find that the rating of their favourite area is not as high as they would expect. This is due to their not seeing the state-wide range of landscape quality and judging their own area within a far narrower quality construct. To a person who has lived all their life in a given area, it can be "God's own country" to them; there is nothing better. But this encompasses the full range of human emotions and affiliations with the area, not merely its visual quality. Similarly walkers to areas such as the Flinders Ranges may be surprised that it does not rate higher, but again their perception of the area is an amalgam of many factors including social, wilderness, personal as well as landscape quality.

(11) Landscape Mapping: Summary and Conclusions

Based on the analysis of the attributes of the scenes and, together with the analysis of the 155 scenes by region, the landscape quality of South Australia has been mapped. The results show that much of the State is middle ranking in terms of landscape quality, 90% being rated '4' or '5'. Highly rated areas of '7' or '8' occupy less than 0.5% of South Australia. The State's coastline however has quite extensive lengths of highly rated quality, with '8' rating accounting for 9% and '7' rating a further 35% of its length.

Overall therefore South Australia does have high quality landscape regions, however they are of relatively small extent. South Australia's coastline and remote mountain areas are the key areas of high landscape quality.

11.3 APPLICATION OF RESULTS FOR PREDICTIVE PURPOSES

The algorithms derived from the analyses of scenes can be used in a predictive capacity. They can identify firstly, the likely changes to landscape quality as a result of developments and actions which change the content of the landscape, and secondly, identify the likely landscape quality rating which would apply in a given scene.

(1) Changes to Landscape Quality

An example of assessing the impact of changes on landscape quality is the effect of clearing trees for vineyard development, a process which is occurring in parts of the South East and other parts of South Australia. Much of this involves clearing areas containing scattered large remnant eucalypts.

These pastoral scenes comprise isolated large trees with grass ground cover and scored an average of 5.38 which is surprisingly low compared with the overall state-wide mean of all scenes of 5.83. Such vegetation is often subject to consideration by the Native Vegetation Council as clearance applications.

A set of nine scenes which contain scattered trees within the agricultural area are analysed to assess the impact of their clearance on landscape quality [Table 11.11].

Table 11.11 Ratings of Pastoral Scenes

Scene Number	Rating
28	4.74
45	5.92
63	6.38
77	5.40
85	5.98
90	5.13
112	4.73
135	5.16
149	5.01

The attributes of the trees considered are the significance of the trees in the scene, their height and their density. The data for the analysis are derived in Chapter 10.

Pastoral, scene #63

The relationship of ratings with the significance of the trees in the scenes is indicated by Figure 11.7.

Table 11.12 Changes in Ratings

Significance Score	Average Rating	% Change in Rating
1	4.06	-
2	4.63	14.0%
3	5.20	28.1%
4	5.77	42.1%
5	6.34	56.2%

The algorithm for the relationship is: $y = 0.57x + 3.49$; $r^2 = 0.51$. Table 11.12 indicates the percentage change in rating for clearance for each significance score. It indicates, for example, that clearance of class 4 vegetation would result in a 42% reduction in its landscape rating, from 5.77 to 4.06.

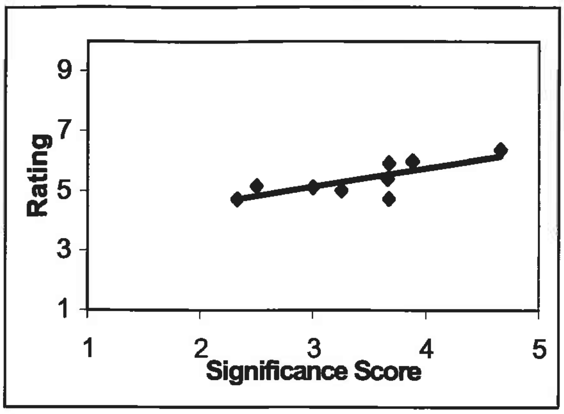


Figure 11.7 Pastoral Scenes – Ratings vs Significance of Trees

The relationships of height and density with ratings are weaker and the correlation coefficients are too low for the algorithms to be useful:

Significance:	$y = 0.57x + 3.49$; $r^2 = 0.51$
Height:	$y = 0.35x + 4.11$; $r^2 = 0.27$
Density:	$y = 0.35x + 4.37$; $r^2 = 0.03$

The significance score as used here however can provide a short cut to determining the likely effect on ratings of clearance.

This analysis has been used to inform the Native Vegetation Council of South Australia, a statutory body established to review applications for clearance of native vegetation. Under the Native Vegetation Act 1991, amenity is to be considered among the factors that it is to take into account in reviewing applications for clearance[97]. The Council was briefed on the results of this analysis and a methodology proposed to provide a more detailed assessment using areas that are subject to clearance applications.

Planting pine plantations in farming areas which have already been substantially cleared of their native vegetation is not likely to affect landscape quality significantly as both the cropping land and the pines are rated '4' [crops average 4.36, pines 4.62]. However clearance of dense native vegetation that averages 6.59 and its replacement by, say, pines would result in a noticeable change in landscape quality. Planting vines in cropping land is likely to enhance landscape quality marginally [crops 4.36, vines 4.92].

97. Applications must be considered on the basis of principles established under the Act. These include the following principle: "(the native vegetation) contributes significantly to the amenity of the area in which it is growing or is situated."

Extensive fires which occur from time to time in both the far north [from lightning strikes] and the agricultural areas [often from human causes] can have a major landscape impact, burning trees and crops and blackening the landscape. However the Australian biota is resilient of fire and recovers rapidly so the landscape impact is but for a few seasons. Nevertheless fire can be one of the major forms of human impact on landscape quality.

(2) Enhancing Landscape Quality

The extent to which human management of the landscape can significantly enhance its quality, at least at the regional level, is limited. The basic landform cannot be significantly changed and for much of the far north, the prevailing land cover is not amenable to change.

The relatively low landscape rating of agricultural areas is largely an unintended and unexpected result of the extensive over-clearance of much of the vegetation in these areas over the first 150 years of South Australia's development. The extensive, generally flat fields, devoid of trees or of other diversifying features result in mediocre landscape. Through the efforts of Landcare and of tree planting by farmers and groups, change is coming to many of these areas through planting of trees, establishment of land protection measures such as contour banks and the introduction of new crops such as the brilliant yellow canola. These changes are introducing greater variety into the agricultural region.

Such changes are at the macro scale. On a micro scale, at the level of an individual farming property, there is much that can be done to enhance landscape quality and the example of Capability Brown, Repton and others of 18th c England are testament. The judicious creation of water bodies, of clumps of trees and scattering of trees, and even the reforming of landforms can be used to enhance landscape quality. This is the province of the landscape architect and is beyond the scope of this thesis. However based on its findings, features which diversify the landscape and which enhance its perceived naturalness can be important [as in Capability Brown's creations].

Given the importance that water plays in enhancing landscape quality, overall increasing ratings by 28%, a case can be made for establishing water bodies as amenity resources and of managing existing water bodies such as dams and particular reservoirs to make their aesthetic contribution more apparent. In this way, the appeal of an area for residents as well as for tourists might be enhanced.

(3) Predicting Landscape Quality Rating

The algorithms derived can be used in landscapes to which they apply to assess the likely landscape quality rating of that landscape. A single algorithm can be derived and the relevant scores for each of the attributes entered. This would take the form of:

R = [(rockfaces) + (elevation distance) + (elevation height) + (elevation angle) + (tree significance) + ... (diversity) + (naturalness) + (clouds)]/n

where: R is the overall derived rating of the scene
Each of the components are algorithms of the form $y = ax + b$ where a is the slope, x is the score of the attribute, and b is the intercept on the y axis.
n is the number of equations

The thirty-odd equations could be combined and simplified by deriving a single intercept figure by adding the 'b's and dividing by the total number. For all 30 this would be 5.43. Thus the equation would be:

$$R = [(-0.13x_1) + 0.2x_2 + 0.33x_3 + 0.4x_4 + \dots 1.01x_{28} + 0.83x_{29} + 0.415\,x_{30}]/30 + 5.43$$

Where x_n is the score for each attribute

Because each x_n value represents a score of a particular attribute [e.g. rock faces, tree significance, diversity] they cannot be simply combined. Rather the scores need to be included for the particular scene and then the calculation performed.

In practice it would be unnecessary to use the entire set of equations - it would probably be far simpler to have respondents rate the aesthetic quality of the landscape rather than use the surrogates of scoring attributes. The use of algorithms is intended to short cut this, to provide a means whereby a few respondents could score the relevant attributes of a scene and, based on the algorithms, derive the landscape quality rating. Thus ideally one would seek one or two algorithms having universal characteristics which could be used for this purpose.

Two such algorithms are available - those derived for naturalism and diversity. Both are derived from the entire set of 155 scenes and apply therefore to the entire State. They are holistic attributes as they are derived from an assessment of the overall scene, rather than by a reductionist approach that focuses on a single attribute such as trees. The algorithms are:

- Diversity y = 1.01x + 3.28, r^2 = 0.93, 70.6% increase over 4 classes, 17.7%/class
- Naturalism y = 0.83x + 3.62, r^2 = 0.94, 74.6% increase over 5 classes, 14.9%/class

The high r^2 for these give confidence for their wider application. These may be used to derive the landscape rating for a given scene simply by scoring either diversity or naturalism on a 1 - 5 scale and applying the results in the algorithm. For instance, a diversity score of 3 yields a rating of 6.38. The ratings for the scores of diversity and naturalism are summarised by Table 11.13.

A relatively few scorers could score these and the results applied to the algorithms, which were derived from a large number of participants. This provides a pragmatic and effective means for deriving likely landscape quality ratings of an area.

Table 11.13 Landscape Quality Ratings for Diversity and Naturalism Scores

Score	Diversity	Naturalism
1	4.29	4.45
2	5.30	5.28
3	6.30	6.11
4	7.32	6.94
5	8.33*	7.77

*Note: the scoring of diversity for South Australian scense only reached a score of 4. However scenes with a 5 score are possible.

No other attribute is likely to be as suitable for universal applications as diversity and naturalism. The scoring of the presence of trees in scenes, which was derived from the full set of scenes provides one possible alternative. However it was found that in coastal scenes, the high ratings could not be attributed to the low ground-hugging vegetation. Similarly the scattered low vegetation in scenes of the Flinders Ranges is unlikely to yield the high ratings. Thus the use of trees as a surrogate measure of landscape quality rating is not likely to be effective.

The attributes of elevation offer a further alternative as in all scenes the distance, height difference and angle of view are calculated. In a flat landscape that characterises South Australia however, it is unlikely to provide sufficient variation to be useful other than in upland areas. It was found that in 29% of scenes the angle was zero and in a further 49% it was less than 3°, thus in only 22% of scenes would the angles be sufficient to provide discrimination of scenes. The limited exposure to water in scenes similarly suffers from applying far too few scenes to be a useful surrogate measure of ratings.

In summary, the use of the naturalism and diversity algorithms can be used generically to predict landscape quality.

11.4 TESTING OF THEORIES BASED ON PREFERENCE RESULTS

Chapter 7, *Findings from 20th century Landscape Studies,* summarised the theories applying to landscape aesthetics. The theories are summarised below.

Gordon Orian's habitat theory proposes that savanna landscapes be viewed as attractive because it is postulated that it was in that type of environment that humans developed in East Africa. While there is some evidence supporting the theory, this may simply reflect familiarity with such landscapes that are common in our parks and gardens and backyards.

Jay Appleton's prospect/refuge theory proposes that the landscape comprise *prospects* which are places where one can see while not being seen, and *refuges* where one can hide securely. Although intellectually appealing and widely quoted, the supporting evidence is not strong. While prospects have some appeal, which may reflect the appeal of mountains, refuges such as caves tend to be viewed negatively.

Stephen and Rachel Kaplan's information processing theory, the most sophisticated of the theories, proposes that humans seek to make sense of the environment and to be involved in it. Studies have provided considerable support for the theory although its predictor variables are difficult to apply to landscapes.

Arising from Chapter 3, *Gestalt Psychology and Aesthetics*, the principles of Gestalt - holism, Prägnanz ["good Gestalt"], and visual segregation [figure and ground], may provide a basis for evaluating landscape preferences.

Finally, in Chapter 5, the *Psychoanalysis of Aesthetics*, a model of landscape aesthetics was proposed based on the symbolic recognition of objects and the introjection of sublimated thoughts, feelings and phantasies.

The evaluation of the theories was based firstly, on identifying the attributes favoured by the theories, secondly, the strength of the attribute was scored in each of the scenes, and finally a statistical assessment of the ratings carried out. The relevant scenes were scored on a 1 to 5 scale, 1 being absent or minimal through to 5 being maximum.

Based on the five theories, 15 attributes were identified. Scoring of these involved viewing the same set of 155 scenes, or portions thereof, 15 times to score each attribute. A total of nearly 1500 slides were involved.

Scoring of these by a group of participants would require a minimum of three hours viewing time, however in practice at least a full day or several days would be required to provide adequate rest between viewings. Having space between viewings is essential to avoid confusion in scoring the attributes. In addition to the substantial time involved in carrying out the scorings, the participants would also require prior training about each attribute to ensure they understood what they were scoring.

For the purposes here it was not considered critical to undertake a full appraisal of the theories. Rather it is in the nature of a pilot appraisal to assess whether the preference results provide any support for the various theoretical constructs. The scorings were thus undertaken solely by the author rather than by a group of participants. A larger sample would naturally be required to provide a statistically valid appraisal, but a single evaluator is considered adequate to provide an initial appraisal of the theories.

The appraisal provides a closure to the examination of the theories in the earlier chapters.
The findings presented below do not necessarily prove or disprove the theories. Rather they indicate whether the ratings of 155 scenes of the South Australian landscape provide any support for them. Proof or otherwise for the theories would need to be based on a larger sample of evaluators, and a very large number of studies which demonstrate support and which do not detect failures in their application.

(1) Habitat theory

Orians' habitat theory is based on the significance in the landscape of certain trees similar to the *Acacia tortulis* found in East Africa. Based on the theory:

- trees with lower trunks should be more attractive than trees with high trunks
- trees with moderate canopy density should be more attractive than trees with low or high canopy density
- trees with a high degree of canopy layering should be more attractive than trees with low or moderate degrees of layering
- the broader the tree canopy relative to its height, the more attractive the tree should be

All of the trees in the scenes are eucalypts which lack the symmetry and form of the African acacias on which Orians' theory was based.

Only a small number of the 155 scenes included pastoral-like components. Nine savanna-like or pastoral scenes are analysed in Section 11.3 for the Native Vegetation Council. It would be pointless, for example, to evaluate the theory against scenes of the coast, the River Murray or parts of the Far North where trees are absent. Thus the theory is limited in the extent of its application.

Other scenes with trees, such as pines, dense eucalypts, mallee or arid vegetation could be examined but all lack the scattered distribution of trees considered central to the habitat theory.

Table 11.14 Habitat theory: Frequency of Scores

	Scores				
Attributes	**1**	**2**	**3**	**4**	**5**
Trunk height	-	1		4	4
Canopy density	-	4	2	3	-
Canopy layering	-	2	2	2	3
Canopy width	-	2	3	3	1

The analysis of the pastoral scenes undertaken covered the above factors identified by Orians. Table 11.14 summarises the frequency of scores for each of the attributes.
No nil scores are evident and the scenes gained high scores for their low trunk heights, and for canopy layering.

Table 11.15 Habitat theory: Ratings of Scores

	Scores				
Attributes	**1**	**2**	**3**	**4**	**5**
Trunk height	-	5.40	-	5.45	5.31
Canopy density	-	5.35	5.21	5.45	-
Canopy layering	-	5.33	4.95	5.05	5.92
Canopy breadth	-	5.69	5.27	4.96	6.38

Habitat theory, scene #28, scores: trunk height 4, canopy density 4, canopy layering 3, tree breadth 4

Habitat theory, scene #77, scores: trunk height 2, canopy density 3, canopy layering 5, tree breadth 2

Table 11.15 and Figure 11.8 summarise the ratings for the scores of the savanna scenes. The algorithms for the relationships are:

Tree trunk height $y = -0.02x + 5.48; r^2 = 0.23$
Canopy density $y = 0.05x + 5.19; r^2 = 0.17$
Canopy layering $y = 0.19x + 4.66; r^2 = 0.31$
Tree breadth $y = 0.18x + 4.96; r^2 = 0.14$

These attributes have a very low influence on preferences, the slopes are low and the r^2 are also low. The results give little support for Orians' theory but this may be due to the form of Australian eucalypts that lack the symmetry of the trees on the African savanna.

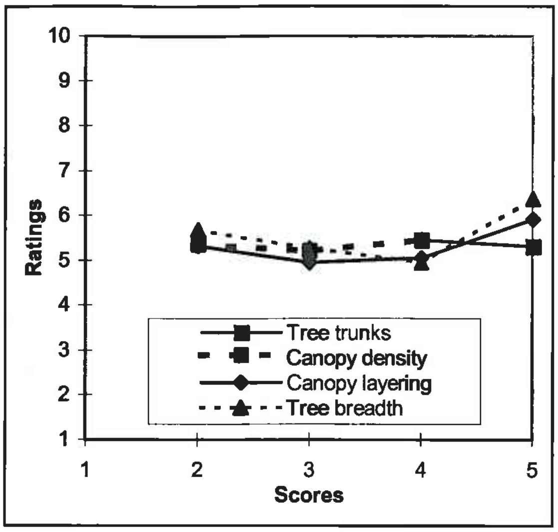


Figure 11.8 Scoring of Habitat theory

(2) Prospect - Refuge Theory

The prospect/refuge theory has two key components: prospects, which are places where one can see while not being seen, and refuges where one can hide securely.

Trees can offer both prospects - if climbable, and refuges if they provide sufficient cover. Low bushy vegetation can provide refuges. Open views without cover comprise prospects without refuges. Large water bodies offer wide prospects but nil refuge. Mountains and hills can offer both prospects and refuges. Gorges and deep valleys offer refuges and may offer prospects as well.

The author trialed the field evaluation of prospect and refuge in the north island of New Zealand[98]. Prospects were found to include peaks, volcanic cones, cliffs, ridges, spurs and promontories, tall trees, areas of open water [sea, lakes], beaches and lake shores, breakwaters, large rocks and islands. Refuges included deep gullies and valleys, dense vegetation, hedgerows, rocks, caves, houses, sheds, boats and boatsheds.

All 155 scenes are assessed against Appleton's theory as it was considered that the theory presumes that prospect and refuge are present throughout the entire landscape and should be therefore capable of being scored. Scoring involved careful inspection of each scene. Table 11.16 summarises the number of scenes for each score for the prospect and refuge attributes.

98. Lothian, J.A. 1992. Evaluation of New Zealand Landscape Assessment Trial, January, 1992.

Table 11.16 Prospect & Refuge: Frequency of Scores

Score	Prospect	Refuge
1	3	59
2	26	57
3	61	24
4	48	9
5	17	6
Total	155	155

Prospect/refuge, scene #54, prospect 5, refuge 1

Prospect/refuge, scene #93, prospect 1, refuge 5

Table 11.17 Prospect & Refuge: Ratings of Scores

Scores	1	2	3	4	5
Prospect	5.76	5.77	6.10	5.96	4.59
Refuge	5.19	6.03	6.41	6.73	6.21

The frequency of low scores for refuge is due to the lack of tree cover in much of the scenes of agriculture and in the far north. In many situations, the score for refuge was the converse of the score for prospect. Coastal scenes with open water and beaches score high in prospect but low in refuge. Gibber scenes comprise extensive prospect with absolutely no refuge, similar to the open sea.

Table 11.17 and Figure 11.9 summarise the ratings for the scores of prospect and refuge. The algorithms for the relationships are:

Prospect: $y = -0.215x + 6.28; r^2 = 0.32$
Refuge: $y = 0.27x + 5.29; r^2 = 0.56$

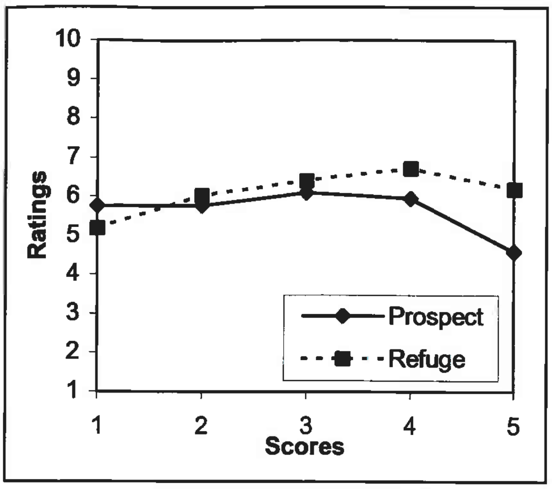


Figure 11.9 Scoring of Prospect and Refuge

Interestingly prospect is found to have a negative influence on ratings. Most of the '5' prospect scored scenes are of cropping and pasture and of arid scenes including gibber and other plains. These are all low rating and explain the low '5' score. Without these the algorithm for prospects would be: $y = 0.09x + 5.67; r^2 = 0.54$. This is now positive rather than negative and it has a higher r^2.

It is noteworthy that the relationship for refuge is positive given that the literature has indicated that refuge tends to be perceived negatively [see Chapter 8].

(3) Information Processing Theory

The Kaplans' four predictor variables are *coherence* and *legibility* which assist in understanding [making sense of] the environment, and *complexity* and *mystery* which encourage its exploration [involvement]. These are described below:

Coherence How well the landscape 'hangs together'; how orderly it is.
Legibility How easy is it to find one's way in the landscape, to find out where one is at any time, or to find the way back to a certain point.
Complexity How heterogeneous or intricate the landscape is; how many different elements it contains; how much is 'going on' in it; how much is there to look at.
Mystery A 'promise' of learning more by 'entering into' the landscape.

The scoring of the scenes for these attributes was reasonably complex and time consuming, as the attributes are not easy to apply to the physical landscape. For the complexity attribute the group scores for the diversity attribute are used, it being assumed that complexity and diversity are similar though not necessarily identical concepts. However for the purposes of assessing the theories on the basis of the South Australian landscape ratings, diversity was considered a reasonable equivalent.

Table 11.18 Information Processing: Frequency of Scores

Score	Coherence	Legibility	Mystery	Complexity*
1	2	13	35	23
2	24	75	54	64
3	75	37	44	60
4	43	24	15	8
5	11	6	7	-
Total	155	155	155	155

* the scores for Diversity are used.

Information processing, scene #39, coherence 1, legibility 2, mystery 2, complexity 2.5

Information processing, scene #140, coherence 5, legibility 4, mystery 4, complexity 3.63

Table 11.18 summarises the number of scenes for each score of the information processing attributes.

The majority of scenes scored in the lower half of scores with the exception of coherence, which was middle ranking. Table 11.19 and Figure 11.10 summarise the ratings for the information processing scores.

Table 11.19 Information Processing: Ratings of Scores

Scores	1	2	3	4	5
Coherence	5.04	5.95	5.25	6.41	7.26
Legibility	5.43	5.34	6.05	6.87	7.83
Mystery	4.32	5.87	6.37	6.65	7.60
Complexity	4.05	5.47	6.74	7.00	-

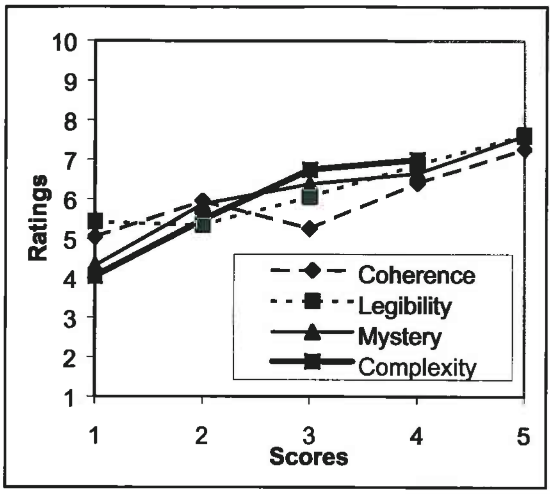


Figure 11.10 Information Processing: Scoring of Attributes

The algorithms for the relationships are:

Coherence: $y = 0.49x + 4.51$; $r^2 = 0.74$
Legibility: $y = 0.60x + 4.48$; $r^2 = 0.92$
Mystery: $y = 0.73x + 3.96$; $r^2 = 0.92$
Complexity $y = 1.01x + 3.28$; $r^2 = 0.93$

The overall influence of these attributes was assessed by adding the individual scores for each attribute for each scene. The maximum possible would thus be [4 attributes X 5 score =] 20. The topmost scene was #32 of the Arkaba - Wilpena Pound area that gained 19.5. At the lower end, scene #83 of arid grassland gained only 5.38. Interestingly the gibber scenes that scored well on the coherence attribute scored 8.

The results indicate that each of the Kaplans' predictor variables are positive and have a quite pronounced influence on preferences. The strongest is *complexity* followed by *mystery, legibility* and *coherence*. The strength of *mystery* corresponds with the findings from literature that this is the most consistent of the variables [see Chapter 8]. *Legibility* was found in the literature to be an inconsistent predictor but here it provides a strong indicator. Similarly *coherence*, although the weakest of the four variables, is of sufficient strength to provide a useful predictor variable. The literature found *coherence* to be a significant predictor. While *complexity* was found here [through the surrogate of diversity] to be strongest of the variables, the literature has found it to be the most unreliable of the variables.

(4) Gestalt

An evaluation of the scenes on the basis of Gestalt principles, [see Chapter 3] was undertaken. The key principles are holism, good Gestalt [Prägnanz] and visual segregation [figure and ground].

Holism is the extent to which an order is apparent in the whole: that the parts contribute to this order. Gestaltists believe that the whole is not determined by its constituent parts but rather the whole determine the characteristics of the parts - just as the design of a car door is conceived as part of the overall design of the vehicle.

Prägnanz, or good Gestalt, qualities are:

- comparative sharpness of outline
- large round forms - boulders, hills, bushes, round tree canopies
- conflict or parallelism between superimposed or juxtaposed forms, e.g. series of spurs or similar tree forms receding in distance
- isosceles triangle - e.g. pyramid or peak mountain forms, pines
- circles - e.g. round trees, boulders, river meanders
- symmetrical figures - e.g. mountains, hills, trees, bushes, boulders

Broadly the good Gestalt principle favours simple symmetrical forms over the highly complex and assymetrical.

Figure and ground, known as visual segregation, involves the separation of an object from its background, e.g. a tree against the sky. It applies throughout landscapes. The figure may comprise the ground in different views, in one view a tree is the figure, in another it provides the ground to a view of birds or a rock. Featureless scenes may comprise ground without a figure, or an interesting scene may have many figures with or without ground.

Each scene was assessed in terms of holism, good Gestalt and visual segregation. The frequency of scores is summarised by Table11.20 which indicates that the scores are largely in the lower half of the scale range and there are no '5' scores.

Table 11.20 Gestalt: Frequency of Scores

Score	Holism	Prägnanz	Figure/ground
1	12	55	76
2	72	58	59
3	55	35	2
4	16	7	-
5	-	-	-
Total	155	155	155

Gestalt, scene #32, holism 4, Prägnanz 4, figure/ground 3

Gestalt, scene #108, holism 4, Prägnanz 4, figure/ground 1

Table 11.21 Gestalt Scores

	1	2	3	4
Holism	5.27	5.19	6.30	7.35
Prägnanz	5.17	5.94	6.37	7.09
Figure/ground	5.85	5.55	6.35	-

Table 11.21 and Figure 11.11 summarise the ratings for the scores of the Gestalt attributes. The algorithms for the relationships are:

Holism $y = 0.735x + 4.19; r^2 = 0.87$
Prägnanz $y = 0.62x + 4.60; r^2 = 0.99$
Figure/ground $y = 0.25x + 5.42; r^2 = 0.38$

The results of the analysis provide good support for the Gestalt theory. The holism and Prägnanz attributes in particular have steep slopes indicating that preferences increase significantly with the greater presence of the attribute. The figure/ground attribute is the weakest, and has a lower r^2.

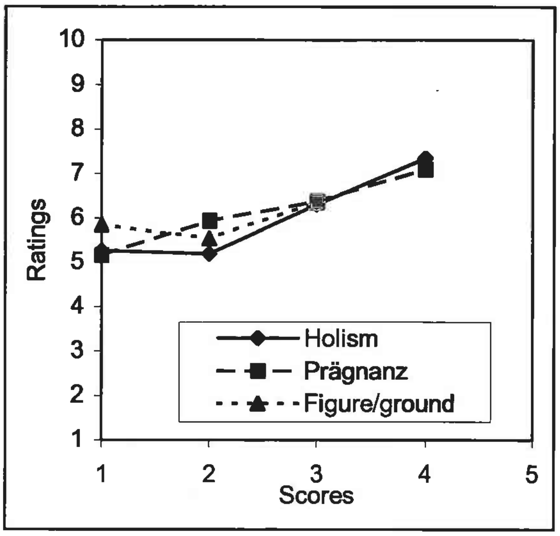


Figure 11.11 Gestalt: Scoring of Attributes

(5) Psychoanalytical attributes

Chapter 5, *Psychoanalysis of Aesthetics*, examined several models which placed aesthetics within a psychoanalytical framework. It is useful to summarise the key aspects of Freud's model of the individual psyche.

The model comprises the *id*, one's unconscious instincts; the *ego* which relates the individual to the real world; and the *superego* which is that part of a person concerned with moral ideals; together with the *unconscious* and its importance as the container of hidden contents and instincts. Various mechanisms connect the inner and outer worlds: *introjection*, the taking into the ego of things which can give pleasure; *projection*, the displacement externally of a psychological element, including the expelling from the ego of things which cause pain; *symbolism* in which external objects are accorded internal meaning; *phantasy* in the unconscious about external objects; and *sublimation* by which socially unacceptable thoughts and drives are given socially acceptable expression.

Based on this, and the psychoanalytical models of aesthetics, the author proposed a model of aesthetics as applied to landscape. Landscapes trigger symbolic recognition of objects, the introjection of sublimated thoughts, feelings and phantasies. The key triggering mechanisms are objects that can be associated with maternal characteristics as experience as an infant: softness, warmth, roundness, envelopment and closeness, love and nurture, fecundity, peace and serenity, and satiation, all subjective elements. Added to these are objects which can symbolise sexual members, specifically the phallus and uterus. Such objects are described in Chapter 5, *Psychoanalysis and Aesthetics*.

All scenes were evaluated for these two attributes, maternal characteristics, and sexual symbolism, and assessed whether the ratings of them give any support for the psychoanalytical model.

Only a small number of scenes are judged to contain either of these attributes and many of these scenes only contained one of the attributes. Most common maternal characteristics are round hills, trees and bushes. The scenes with sexual characteristics are mainly high peaks and tree trunks.

The frequency of scores is summarised by Table 11.22 that indicates that neither attribute achieved high scores. More scenes are scored with the sexual attribute than the maternal, and the scoring of this was slightly higher also.

Table 11.22 Psychoanalytical Attributes: Frequency of Scores

Score	Maternal	Sexual
1	13	12
2	15	12
3	1	13
Total	29	37

Psychoanalytical, scene #60, maternal 3, sexual3

Psychoanalytical, scene #44, sexual 3

Table 11.23 Psychoanalytical Attributes: Ratings of Scores

Scores	1	2	3
Maternal	5.92	5.72	5.40
Sexual	6.34	6.53	7.19

Table 11.23 and Figure 11.12 summarise the ratings for the scores of the maternal and sexual attributes. The algorithms for the relationships are:

Maternal $y = -0.26x + 6.2$; $r^2 = 0.98$
Sexual $y = 0.425x + 5.87$; $r^2 = 0.91$

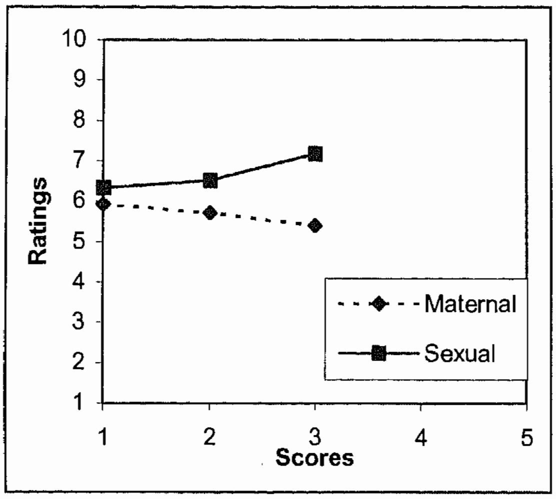


Figure 11.12 Psychoanalytical Attributes: Scoring

The results indicate that the maternal attribute has a slightly negative influence on preferences while the sexual attribute has a reasonably strong positive influence. However in both cases, the scores covered only 1 – 3 on the 5-point scale, indicating that neither attribute was considered to be strongly present in the South Australian landscape. This combined with the relatively small proportion of scenes, less than 24% of the total, which contained either of these characteristics suggest that these attributes are not very significant in the landscape.

(6) Summary

The algorithms for the various attributes are summarised below.

Information Processing
Coherence: $y = 0.49x + 4.51$; $r^2 = 0.74$
Legibility: $y = 0.60x + 4.48$; $r^2 = 0.92$
Mystery: $y = 0.73x + 3.96$; $r^2 = 0.92$
Complexity: $y = 1.01x + 3.28$; $r^2 = 0.93$

Prospect - Refuge
Prospect: $y = -0.215x + 6.28$; $r^2 = 0.32$
Refuge: $y = 0.27x + 5.29$; $r^2 = 0.56$

Gestalt
Holism: $y = 0.735x + 4.19$; $r^2 = 0.87$
Prägnanz: $y = 0.62x + 4.60$; $r^2 = 0.99$
Figure/ground: $y = 0.25x + 5.42$; $r^2 = 0.38$

Psychoanalytical
Maternal: $y = -0.26x + 6.2$; $r^2 = 0.98$
Sexual: $y = 0.425x + 5.87$; $r^2 = 0.91$

Habitat
Tree trunk height: $y = -0.02x + 5.48$; $r^2 = 0.23$
Canopy density: $y = 0.05x + 5.19$; $r^2 = 0.17$
Canopy layering: $y = 0.19x + 4.66$; $r^2 = 0.31$
Tree breadth: $y = 0.18x + 4.96$; $r^2 = 0.14$

Figure 11.13 summarises the slopes of each of the algorithms as this indicates the relative strength of their influence on preferences, - the higher the number the greater the influence. It is evident that of the theories, the habitat theory is the weakest in terms of influencing preferences as its three components are near the bottom of the chart.

Both the information processing theory of the Kaplans and the Gestalt theory appear the strongest, sharing the topmost six places in Figure 11.13. Complexity [i.e. through the surrogate of diversity] provides the single strongest influence on preferences with a slope of 1.01.

A further way of examining the overall influence of the theories on preferences is to aggregate the individual scores for each scene. The totals are the product of the total number of attributes [e.g. three for Gestalt] and the 1 - 5 scale. Thus for Gestalt the maximum score for any scene is 15. The preference ratings of each scene for each aggregated score were then analysed and the means summarised in Table 11.24. This combines the ratings for the aggregated score

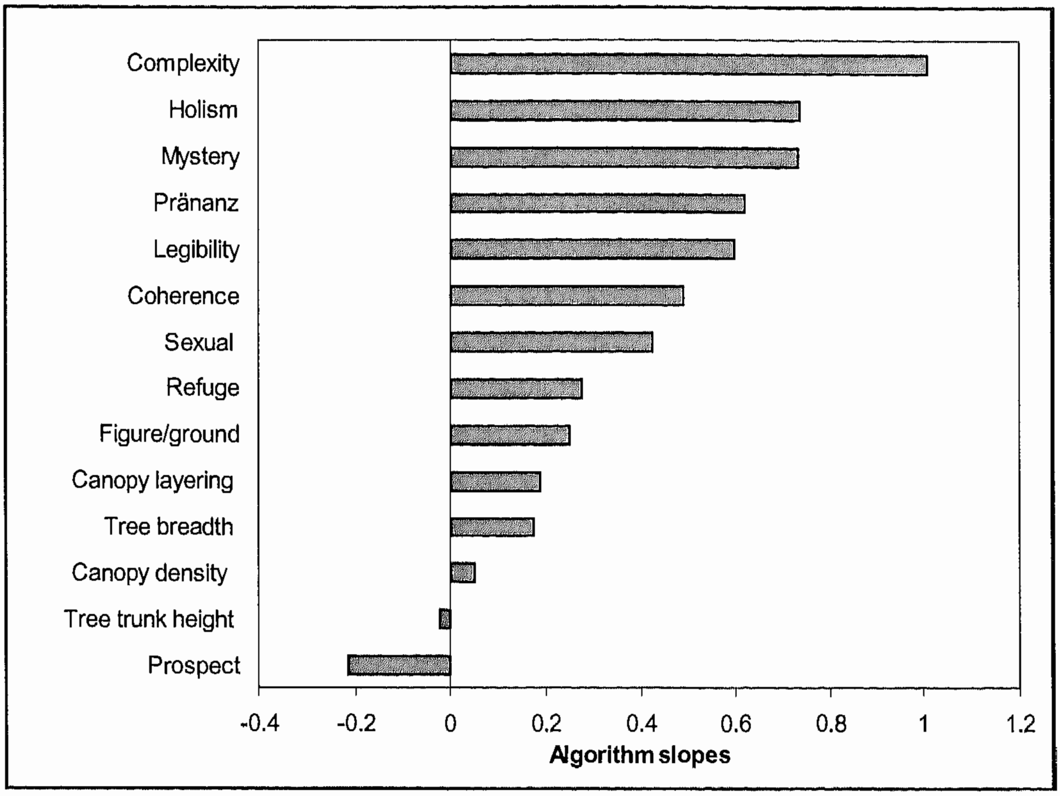


Figure 11.13 Summary of Algorithm Slopes In Descending Order

Table 11.24 Ratings per Aggregated Score for each Theory

Aggregated Scores	Information Processing	Prospect Refuge	Gestalt	Psychoanalytical	Habitat
1				6.18	
2				5.95	
3		4.84	4.19	7.32	
4		5.91	5.12	7.42	
5	3.98	5.65	5.59	6.68	
6	3.59	5.61	5.54	5.4	
7	4.33	7.25	6.33		
8	5.06	7.16	6.22		
9	5.09		6.97		
10	5.79		6.83		
11	6.14		7.26		
12	6.21				5.32
13	6.63				5.92
14	7.18				
15	7.63				5.28
16	7.56				5.01
17					6.38
18					
19	8.27				

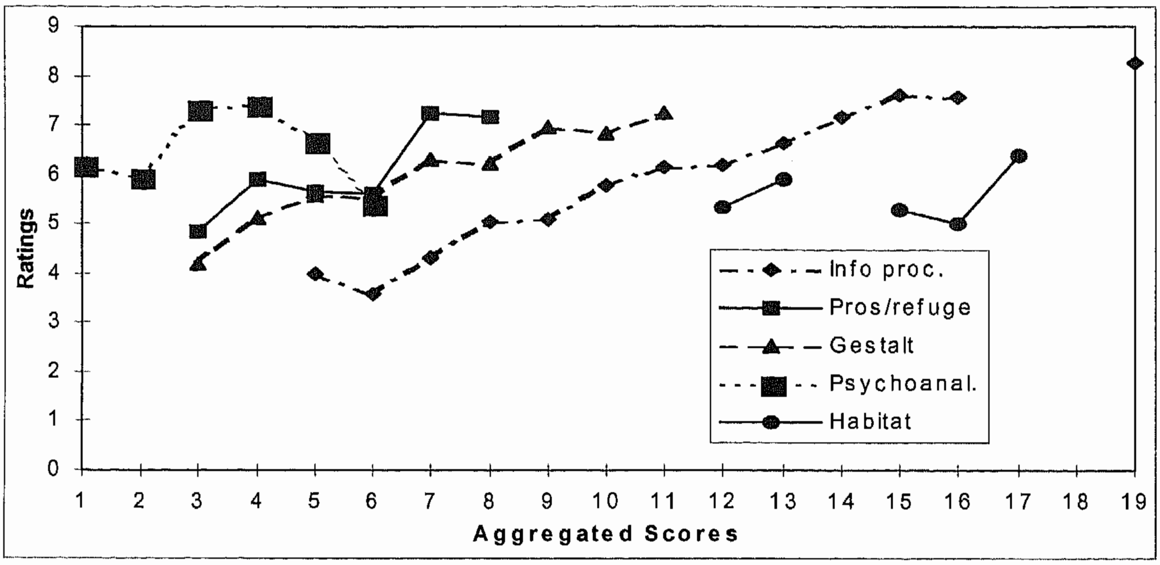


Figure 11.14 Ratings per Aggregated Score - all Theories

for each scene, shown under the appropriate theory. Figure 11.14 shows the relationships between aggregated scores and ratings for each theory.

The algorithms for the aggregated scores for each theory are as follows:

Information processing	$y = 0.35x + 2.06$; $r^2 = 0.97$
Prospect Refuge	$y = 0.45x + 4.51$; $r^2 = 0.77$
Gestalt	$y = 0.35x + 4.27$; $r^2 = 0.93$
Psychoanalytical	$y = -0.05x + 6.65$; $r^2 = 0.01$
Habitat	$y = 0.066x + 5.34$; $r^2 = 0.06$

The algorithm for the psychoanalytical model is negative but this is due to the distortion of scores 5 and 6 which comprise single scenes. Without their influence the algorithm is positive $y = 0.51x + 5.45$; $r^2 = 0.75$ which also has a much improved r^2.

The algorithms indicate that adjusted data for the psychoanalytical model [slope 0.51] and the prospect-refuge theory [0.45] have the strongest overall influence on preferences followed by information processing and Gestalt equally together. The habitat theory has the least power to influence preferences.

In summary, the preference ratings of scenes of the South Australian landscape provide support for the information processing theory of the Kaplans, the prospect-refuge theory of Appleton, the Gestalt theory and the psychoanalytical model. The analysis indicates little support for Orians' habitat theory in the South Australian context.

The findings suggest the need to seek an integration of the components of the various theories, to arrive at a single theory of landscape preferences. Figure 11.15 indicates

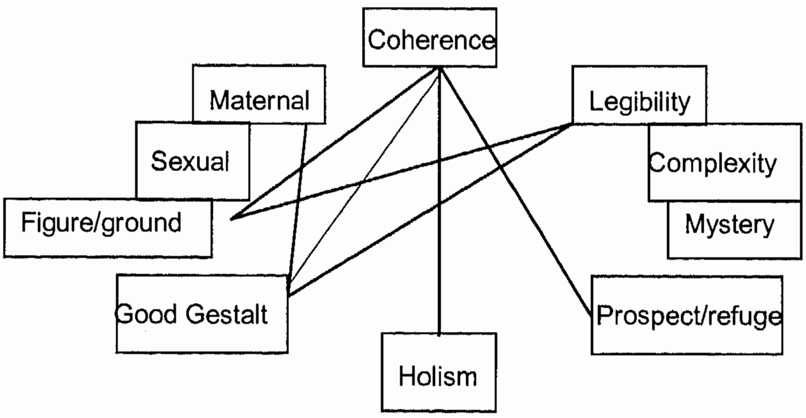


Figure 11.15 Components of Theories with Commonalities

possible commonalities between components. This suggests that there are substantial commonalities between the information processing and Gestalt theories.

These commonalities suggest a theory comprising elements of coherence/holism and coherence/legibility/good Gestalt/figure-ground; in sum a theory which emphasises the strength and unity of the whole scene and the strong forms, symmetries and contrasts which make it readily comprehensible. This would be a theory that combines elements of the information processing and Gestalt theories.

11.5 REGIONAL SCALE LANDSCAPE QUALITY ASSESSMENT PROTOCOL

The methodology that has been derived in this thesis to determine landscape quality within South Australia can be used in other similar regional settings. A ten-stage protocol is presented below which describes the objectives and tasks to be accomplished at each stage.

As a protocol, this serves as a guide. Within each stage there are often many options that can be considered and the choice will be determined by local circumstances and such factors as the availability of time, personnel, funds and equipment.

The ten stages are as follows:

1. Reference panel and steering group
2. Definition of region for landscape analysis
3. Definition of landscape regions
4. Obtain photographs of the region
5. Selection of scenes for analysis of preferences
6. Rating of scenes by participants
7. Managing and analysing the data
8. Measurement of attributes
9. Mapping landscape quality
10. Report of findings

These are described below.

Stage 1 Reference Panel and Steering Group

Objective: Establish a reference panel to help guide the project and a steering group to assume overall responsibility.

Action: The reference panel would be an expert group who would guide the development of the methodology and its implementation, review progress reports, review draft reports and analyses, and participate in rating and scoring sessions. Contacts by the group may facilitate the establishment of groups to assist in the rating and scoring of scenes.

The composition of the panel would be determined by the organisation contracting the research. It should be formed at the outset of the project and be involved in all stages.

It is not proposed to be an executive group or a group that would assume responsibility for the project, rather its purpose would be advisory. The contracting organisation may also choose to establish a small steering group that would have overall responsibility for the project.

Stage 2 Definition of Region for Landscape Analysis

Objective: To determine the areal extent of the region within which the landscape quality is to be determined.

Action: In defining the area to be analysed, consider:

- whether boundary is determined by State boundary or land systems
- whether islands are to be included
- exclusion of urban areas
- the degree of diversity present across the region which will help determine how large a region can be covered in the one survey - see stage 5.

Stage 3 Definition of Landscape Regions

Objective: To define the units of similar landscape characteristics to be represented in the survey.

Action: Collate existing classifications of the physical characteristics of the region and based on these define the major landscape provinces and regions and within the regions, the landscape units. These are units of essentially similar characteristics. A broad description of similar characteristics is necessary - otherwise the number of landscape units will be too large to be useful. The South Australian study defined two provinces, 10 regions, and 30 landscape units. The total set of units should probably not be greater than about 40 otherwise the total number of photographs required to represent them will be too large.

Stage 4 Obtain Photographs of the Region

Objective: To obtain a representative set of photographs that cover the region's characteristics.

Action: Photograph the region to be covered and/or supplement this by selections from existing photographic collections. The following guidelines serve to assist in photographing scenes in selecting photographs.

1) Use 50 mm lens - similar to human eye
2) Use colour film with excellent colour rendering - e.g. not tinged by blue or red
3) Use slide film if intending to show slides to respondents for rating
4) Use a conventional camera or digital camera depending on the processes to be utilised in their analysis.
5) Photograph at eye level, not elevated or depressed
6) Use horizontal [i.e. landscape] format
7) Ensure photograph provides good lateral and foreground context for scene
8) Avoid artistic composition of scenes; e.g. avoid placing trees on the side foreground to lead into the photograph
9) Aim for the photograph to cover a single landscape unit rather than several [e.g. avoid photographs across farmland to mountains as each are likely to be in different units]
10) Keep the photograph simple with one key feature so that the preferences which are derived relate clearly to that feature
11) Select scenes which typify the prevailing characteristics of the landscape, avoid the unusual which are not typical
12) Ensure the full range of photographs capture the diversity present; highly diverse landscapes will require greater coverage than more uniform areas
13) Avoid human artefacts in the scenes such as fences, powerlines, animals, cars, roads, excavations, houses, planes or the presence of people
14) Avoid photographs from the car window or roadside as these may include distracting roadside features such as trees, shrubs, fences and litter.
15) Ensure the view extends to horizon - i.e. not a confined close up view
16) Ideally use sunny well lit conditions - if cloudy, ensure scene is in sunlight. Clouds in scenes should be insignificant. Avoid heavy cloud which darkens the scene, or visually striking cloud formations. Avoid jet streams.
17) Ensure good exposure and atmospheric clarity [e.g. dust/smoke free], not strong side lighting [avoid early morning and late afternoon]
18) Take an accurate record of the location of photograph, ideally using a geographical positioning instrument and record film number and exposure number. A brief description of each helps recollection. It is useful to record the location of each scene on a map. Number photographs by film and exposure to aid their retrieval.
19) The main issue in using photographs from collections is to avoid those with artistic composition. Expect to reject the majority. Due to poor exposure, strong side lighting, cloud cover and other deficiencies only one third of photographs in a major South Australian collection were suitable.

Stage 5 Selection of Scenes for Analysis of Preferences

Objective: To select a set of scenes that adequately represent the range of landscape units for the purposes of rating of landscape quality and scoring of their attributes.

Action: Determine the number of landscape units to be represented and the diversity inherent in each that is to be represented. Allocate the available scenes to these and then select scenes that provide the best representation. Practical considerations are likely to limit the number of scenes that can be used in surveying respondents to a maximum of 200. If each landscape unit needs to be represented by say 5 scenes, then the number of landscape units is necessarily limited to 40. However if the diversity of units is also to be represented the number of units will be reduced accordingly. A national inventory would necessarily have to be accomplished, at least initially, at a fairly gross level that defined broad landscape regions and omits further differentiation into landscape units.

Considerable care and objectivity should be exercised in the selection of scenes as these scenes will determine the overall landscape preferences for the region - this is a critical step in the process.

Select 10 scenes that are representative of the range of landscape units and likely quality and place these at the commencement of the set of slides.

Finally the remaining scenes should be arranged in random order for showing to respondents. The randomisation may be achieved physically, by adequate mixing of the photographs, or mathematically by entering the total number into a random number generator. Each photograph should be marked with a consecutive number so that if they become misplaced [which happens] they can easily be placed in order again.

Stage 6 Rating of scenes by participants

Objective: To accurately reflect the preferences of the community in rating the scenes.

Action: Obtaining the preferences of participants involves devising a rating form, instructing participants, selecting participants, conducting rating sessions, obtaining participant characteristics data, and obtaining a sufficient number of participants. Each are discussed below.

Rating form The form comprises two sides of a single sheet. On side one, across the top display the rating scale from 1 to 10 with "very low" at 1 and "very high" at 10. Underneath includes: "Rate how much you like the scene shown in the slide. Rate from low scenic quality to high scenic quality. Use the whole range in the scale." The bulk of the page is taken up with the rating form: list the scene numbers down with adequate space adjacent for the rating to be entered. At least 160 can be covered on a single page. The numbers should not be smaller than 12 point to ensure they can be clearly seen in the darkened conditions of showing slides.

Side two of the sheet contains participant information covering:

1) Age: 15 - 19, 20 - 29, 30 - 39, 40 - 49, 50 - 59, 60 – 69, > 70.
2) Gender: Male Female
3) Education [Highest level attained]: Below year 10, year 10, year 12, Technical/trade qualification, degree or diploma, post graduate degree or diploma
4) Income: <$20,000 pa, $20 - 30,000, $30 - 40,000, $40 - 50,000, $50 - 60,000, >$60,000
5) Birthplace: country
6) Where did you grow up [0 - 10 years]?: in the country, in a city, both
7) How familiar are you with [name region]? Ring one for each:
8) list major landscape regions and indicate: very familiar, fairly familiar, not familiar

Instructions to Participants Read instructions to participants [same instructions for every session]. The following may be used for a slide session:

Instructions to Participants

Thank you for coming today.

Your participation is important because it will help [agency name] develop an understanding of what ... [e.g. South Australians] like and dislike about the landscape of the [region].

You will seeing a total of [160] slides. This may sound a lot but they will be shown in two lots with a shore break in between [to change carousels]. You will view each slide for 8 seconds so that all [160] can be seen in just over [20] minutes. In case you think 8 seconds is not long, you will find it quite long enough.

You are asked to rate the scenic attractiveness of each scene on a rating scale of 1 to 10, with 1 being very low and 10 being very high. Do not use zero or give half ratings - e.g. 5½. You are asked to use the entire range, don't sit in the middle. Think of yourself standing in the scene and asking yourself: "how much do I like this scene." It is not the quality of the photograph that you are rating but rather the scene itself.

Two further things. Firstly, rate the scene on what you think about it, not on what you think others would prefer. Secondly if you have life sciences training such as botany or biology put this aside. You are being asked to rate scenic quality, not the extent of overgrazing that might be present or the ecological significance.

As a start you will see ten slides which will show the range of landscape regions in [South Australia]. This will give you a feel for the range of scenic quality as well.

Before we start, are there any questions?

Conduct of Rating Sessions

1) Use a room which can be darkened so that the screen is dark but there is sufficient lighting otherwise for participants to enter ratings on the forms. Alternatively a Powerpoint presentation can be used.
2) Place projector level with the screen so that the scenes are not distorted.
3) Arrange seating to ensure each participant gains a clear view of the screen,
4) While participants enter and wait for the session to commence, ask them to fill out their personal details on the sheet. Check to ensure that they have all completed this before commencing the session.
5) Introduce the session using the standard instructions sheet. Respond to any questions.
6) Commence the session. Time 8 seconds by a watch or by counting silently. Some projectors have timing devices. At every 10 slides, identify its number. If Powerpoint is used, the number can be included on the scene.
7) Change carousels at 80 slides [or halfway] and give a minute's break.
8) Following completion of all slides, collect the sheets and thank participants. Respond to any comments or questions.
9) The total session should take no more than 30 minutes.

Selection of Participants

Prior to selecting participants, obtain population data from the Australian Bureau of Statistics covering the standard population characteristics and use this to guide selection of participants. The key requirements are that participants should be 18 years or older, preferably have no training in landscape design or the life sciences and broadly reflect the community in their characteristics. Aim for a balance of genders and a spread of ages. Neither education level or income level are important factors.

In seeking participants, key aspects to emphasise are:

- no experience or qualifications are needed
- the session will take only 30 minutes
- the results will be important in determining the landscape quality of the region

Participants may be sought from:

- tertiary institutions - university students parallel the characteristics of the population fairly well
- clubs, professional organisations and interest groups - but avoid single gender organisations, and single age groups [e.g. Probus Clubs] unless needed to fill out the coverage
- government departments, councils, any organisation with staff who may be interested and available to participate
- public sessions - good publicity is very important

The sessions need to be held at places and times convenient to potential participants. Lunchtime sessions are not very popular. The sessions should be in close proximity and require the minimum of effort to attend. Avoid days or times with competing activities - e.g. pay day or Friday lunchtime.

Consideration could also be given to the use of the Internet as a means of enabling more participation in rating of scenes. Wherrett [1997] has pioneered the use of the Web for landscape research. Disadvantages include:

- the lengthy time needed to load the graphics on the computer which can test the tolerance of the user
- the lack of control over the choice of raters [e.g. local versus international]
- the lack of control over the conduct of the rating session - e.g. an individual could post multiple ratings

Some of these disadvantages can be avoided - e.g. password protection of the site and issuing the address only to selected participants. Advantages include the avoidance of rating sessions and a high degree of automation in processing the replies. Several versions can be run simultaneously and changes can be made.

Number of Participants

The greater the number of participants the more confident one can be about the validity of the results and the ease by which statistical analyses can be undertaken. One should aim to have at least 300 participants as this number is considered optimal for statistical analysis. This size sample will yield a reasonable normal distribution of results whereas a sample of say 200 or particularly 100 or less will pose significant difficulties in analysis. Standard errors and standard deviations will be larger and the means may not be confidently taken as representing the community. Analysis of subgroups of the data will be difficult because of the lack of numbers.

To ensure the results stand up to scrutiny it is better to err on the larger than smaller sample size.

Stage 7 Managing and Analysing the Data

Objective: To secure the data, maintain its accuracy and to objectively and comprehensively analyse it to derive understanding of human preferences for landscape quality for the region.
Action: The preference data contained on the participant sheets is transferred to a spreadsheet with checks of the accuracy of entering the data. A statistical analysis package will be used for the data analysis [e.g. SPSS, Statview]. In carrying out analyses, it is critical that back up files be maintained in another location and that these be kept up to date. The following sequence of analysis may be followed:

1) Analysis of participant characteristics and their closeness to community characteristics
2) Overall results of ratings of scenes and ratings by participants
3) Analysis by groups of participants
4) Analysis by participant characteristics: age, gender, education, income, country of birth, childhood residence, familiarity
5) Analysis by landscape regions and landscape units
6) Analysis by landscape types covering land form, land cover, land use, water, diversity, naturalism, and any other attributes considered relevant.

The analysis of landscape types is by far the most extensive and time consuming.

Throughout the analysis of landscape types, certain attributes will be identified which will require additional scoring by participants to provide the data on the dependent variable. This is the subject of Stage 8.

Stage 8 Measurement of Attributes

Objective: To accurately and objectively assess the significance of landscape attributes and thereby contribute critically to the analysis and understanding of landscape quality.

Action: A 1 - 5 scale provides an appropriate scoring instrument and clearly differentiates it from the 1 - 10 rating instrument. A small number of participants will be required to undertake the scoring of the attributes. This should be a minimum of 6 and could be as large as 20. Many scorings of different attributes will be required and it would be most efficient if several panels were available. These would be convened as needed during the analysis of data in Stage 7.

Stage 9 Mapping Landscape Quality

Objective: To apply the ratings derived by the project to a map of landscape quality for the region.
Action: This is a key outcome of the project and must involve considerable care to accurately and objectively translate the findings into a map. The major inputs are the analysis of ratings for different regions, land forms, land uses etc together with the establishment of generic sets of scenes from which unit ratings [e.g. 4, 5, 6] may be derived. These sets can then be applied to the particular landscapes applicable.

The alternative of utilising data sets and a geographical information system should be assessed. If data sets of sufficient quality and coverage are available then this can provide a more accurate and rapid means for mapping landscape quality.

Stage 10 Report of Findings

Objective: To make the findings of the project widely available to the community.

Action: A comprehensive research report should be published and made available. Placing the report on the Internet and allowing it to be downloaded is an excellent way of making it widely available at little cost. A paper on the project and its findings should be prepared and submitted to an appropriate journal to allow its dissemination in the academic and research community.

Resources

The resources required to undertake landscape assessment of a region are as follows:

1) Camera and films
2) Vehicle – some areas may require a 4WD
3) Computer
4) Software - statistics, Powerpoint™, Excel™, word processing
5) Scanner of slides [e.g. Plustek™ Optic Pro]
6) Maps of region and satellite imagery
7) Groups to undertake ratings and scorings

Length of Project

Table 11.25 summarises the likely scale of time required to undertake a landscape assessment project at a State level or sub-state level.

Budget

An approximate cost estimate can be provided based on the two surveys. The major cost is the consultant's fee, say $500/day. Vehicle hire, travel and accommodation for the photographing of the area is a further significant cost: say $100/day hire, 50c/km travel, $100/day for accommodation and meals.

Based on the time estimates in Table 11.25, the likely costs are as shown in Table 11.26. Thus a State-wide assessment could be undertaken for approximately $133,000 and a regional assessment for about $83,000.

Table 11.25 Duration of Landscape Assessment Project

Component	State-wide	Region
1	4 weeks	2 weeks
2, 3	2	2
4	6	3
5	3	1
6	4	3
7	8	6
8	4	3
9	3	2
10	3	2
contingency	3	2
Total	40	26

Table 11.26 Estimated Project Budget

Item	State-wide	Region
Vehicle hire and fuel	$13000	$6500
Accommodation, meals etc	$3000	$1500
Consumables - film, paper, mail, photocopying etc	$1000	$500
Steering committee and Reference Panel	$4000	$2000
Consultant	$100,000	$65,000
10% contingencies	$12000	$7500
Total	$133,000	$83,000

The significant factor that would cause a variation in this is the size of the area to be assessed. The State-wide survey estimate is based on a State similar in size to South Australia [1 m sq km]. Smaller states such as Tasmania [68,000 sq km], Victoria [228,000 sq km], and NSW/ACT [0.8 m sq km] could possibly be undertaken for less than this but larger states, Queensland [1.27 m sq km] and Western Australia [2.5 m sq km] would require significantly more time in photography. This has cost implications for the vehicle and travel costs but particularly for the consultant's cost.

In summary, this section has summarised the steps necessary to undertake large-scale landscape assessment and provided an estimate of the resources, timing and budget necessary.

CHAPTER TWELVE

DISCUSSION AND CONCLUSIONS

12.1 VALUING THE LANDSCAPE

Landscape quality is an important environmental quality. Like wilderness, it derives from the physical characteristics such as rivers, mountains and trees, but is of the mind. Kant described beauty as purposiveness without purpose - a utilitarian-free zone, yet a quality that gives pleasure.

Unlike many other artefacts of human creation in which considerable effort is applied to enhance their beauty - e.g. human faces and forms, houses and gardens, unlike these, landscape quality is, as Kant discerned, a public rather than private quality. As such it is rarely subject to efforts to beautify it, or such efforts as are applied tend to be spasmodic and of limited application, e.g. President's Johnson's Beautify America campaign of the mid 1960s. There are all too few initiatives taken to manage landscape quality at larger than a property scale.

With society's emphasis on objectivity and on tangible resources, the recognition and measurement of subjective values may seem surprising. Yet values, about which one can become passionate, is a critical yet often neglected aspect of environmental management. Values help to differentiate us as individuals. Ignoring them is like a doctor treating a patient simply as a set of organs, of systems, of inputs and outputs and forgetting that these merely provide the means by which a person has life. The individual gain significance and worth through who they are and who they become, not by their sets of organs and systems.

So it is with landscape quality. This is a value that contributes to the community's sense of identity and well being. This value derives from, but is distinct from, the collective set of resources and systems which comprise the environment, just as a person is distinguished from their bodily systems and parts. Landscape quality helps to differentiate the environment and give it an identity, not as anthropomorphism but as a quality that distinguishes one area from another. It is the value that people who live in a particular area or who visit it often come to love and appreciate. It is not the nutrient cycling systems, the geological setting, the biomes present, or the watersheds that they feel an affinity for; rather it is the qualitative flavour, the visual quality of the landscape.

In a materialistic world, where the worth of most things is based on their utility value, and where something which lacks a market is often considered worthless, landscape quality is an artefact without an assigned value. Should landscape quality be valued? Does this represent a case of knowing the cost of everything and the value of nothing? Does quantifying landscape aesthetics destroy the ambiguous pleasure which can be derived from landscapes? Is it not analogous to rating the worth of paintings by the Old Masters?

The worth of Old Masters is, however, rated; the prices paid for them at auction and the rates of visitation to the galleries in which they hang are two indicators of the 'value' which the community puts on them. A similar indirect indicator of the value of landscapes is the cost of the vacations taken to visit them and the added value that views give to house prices. Part of the cost of these reflects the perceived attractiveness of these landscapes. Surrogates, including photographs, paintings, books, postcards and souvenirs, can provide a measure of the worth of landscapes. These indirect and surrogate means are indicators of the 'value' the community ascribe to landscapes.

The perceived value of the landscape, as reflected in their ratings, is the aggregate of all the components of the landscape. However this is no mere addition of these components – land form, land cover, land use, water, etc, rather, as described in Gestalt terms, the overall sum is *different* than the sum of its parts. No conventional addition of these components, however rated, would yield the landscape quality rating derived here. When a rating of diversity was attempted based on an analysis of its components [section 10.11], this method was found to be spurious and of no benefit.

Rating of landscape quality enhances, not diminishes, one's appreciation of landscape. Learning about painting techniques and artists can enhance the appreciation of their art. In the same manner, gaining an understanding of how the landscape triggers preferences can enhance one's appreciation of those landscapes.

12.2 FULFILLMENT OF HYPOTHESIS

The hypothesis defined in Chapter 1 was:

> *To provide, through a thorough analysis of human perception and interaction with aesthetics and landscape quality, a comprehensive basis on which to develop a credible methodology for the large-scale assessment of perceived landscape quality.*

The hypothesis thus involved a logical and integrated approach to comprehending fully the dimensions of aesthetics and landscape quality so as to provide the intellectual basis for development of the methodology to assess landscape quality.

The analysis of human perception and interaction with aesthetics and landscape quality was achieved through inquiring in depth into a range of theoretical constructs of aesthetics, through the eyes of philosophers, psychologists, psychoanalysts, and, at a cultural level, of society in general. The studies that have been undertaken of landscape quality, and the theoretical models that have been formulated, further developed this understanding. This was foundational to the development of a methodology to measure the perception of landscape quality at a large scale.

Based on the analysis of the philosophy of aesthetics in Chapter 2, the subjectivist paradigm, rather than the objectivist paradigm, was identified as the appropriate basis for understanding aesthetics. The distinction emerged over subsequent chapters as well. Kant's profound insights into the nature of beauty contrasts with the relatively shallow understanding of the subject evident in many of the landscape studies surveyed in Chapters 7 and 8.

Chapter 3 on Gestalt psychology described the principles of holism [unity with variety], Prägnanz [good Gestalt], and visual segregation [figure and ground]. While Gestalt psychology does not attempt to answer the 'why' question, its findings of what shapes, forms and patterns are favoured complement the findings of landscape preference studies reviewed in Chapter 8. Although Chapter 8 [Section 8.4] examined landscape preferences by reference to specific landscape elements [e.g. water, mountains, trees] rather than the abstract patterns and forms they represent, nevertheless underlying many of these, the Gestalt principles can be seen to operate. This influence was evaluated in Chapter 11 [Section 11.4] and found that the Gestalt components were among the strongest influences on preferences.

Chapter 4 reviewed theories of perception including the Kaplans' information processing model, and Berlyne's collative stimulus model. Berlyne found that as the complexity of a scene increases, so too does human preferences up to a point beyond which increased complexity results in a lowering of preferences [inverted U]. Beyond a threshold point, saturation seems to occur. In Chapter 11, traces of this characteristic were detected in the analysis of diversity where preference ratings increased up to score 3 and then diminished [Fig. 10.84]. The same pattern was evident also in the ratings of the significance of trees [Fig. 10.50], and in the area of water in the Murray valley [Fig 10.78].

The Kaplans' theory, described initially in the context of perception theories [Chapter 4] was further discussed as a leading theory of landscape perception [Sec. 8.2]. Its efficacy was evaluated in Chapter 11 where its components were found, along with Gestalt components, to be the strongest influences on preferences.

The influence of colour on preferences is not often examined in landscape studies other than as an adjunct to a landscape feature [e.g. brown ground, green trees]. However, just as Gestalt forms and the maternal and sexual forms of psychoanalytic theory influence preferences in their own right, so too does colour.

Chapter 4 found that the highest preferences were for red, blue and green hues. However this thesis found [Sec. 11.13] that the preferences for hues were, in descending order; blue, orange, indigo/violet, red, green, grey, yellow and, lastly, brown. The strength of the orange and violet colours reflects the unique colour qualities of the Australian landscape which are not common in the temperate landscape of north America or Europe where most of the colour preferences studies have been conducted.

Psychoanalysis reinforces the subjectivist paradigm as the appropriate model for the analysis of aesthetics [Chapter 5]. It provides profound insights into the influence of the underlying motivations on the human psyche and aesthetic preferences. The role of the unconscious in the recognition of objects from childhood or before, and their projection onto external objects as representative of these, are powerful concepts. The evaluation of theories [Chapter 11] found the scenes with sexual symbolism influenced preferences [Fig. 11.12].

The psychoanalytic construct indicates that there are elements in landscapes which, though are not readily apparent, influence preferences nonetheless. While these factors are readily identifiable by those who are aware of them, the community is generally oblivious of their presence in the landscape and of their influence on their perceptions. An illustration is the commonality of phallic-like war memorials without conscious recognition of their symbolism.

The further significance of the psycho-analytical model is that it offers an alternative explanation of landscape preferences to the evolutionary model. However, this may also be because it offers an explanation of how the mind internalises and expresses the evolutionary influence on attitudes and behaviour.

The literature has scarcely touched on the relevance and influence of the psycho-analytical model with respect of landscape preferences. Indeed, the assessment carried out here is the only such evaluation known to the author. Yet it offers considerable potential in landscape preference research and should be the subject of further assessment.

The inquiry into the influence of culture on landscape perceptions [Chapter 6] found that in respect of Western attitudes to mountain scenery, the inclusion of landscape in Western art, and even in the design of parks and gardens, that the objectivist paradigm had been replaced by the subjectivist [see Table 6.6].

It also found that culture has a quite significant influence and that nothing is constant; attitudes to mountains, the portrayal of landscapes in art, or the design of parks and gardens were the product of the society of the time and appear inherently changeable.

But this is at odds with the subsequent finding in Chapter 8 [Section 8.3] which found from landscape quality studies covering a range of cultures that perceptions are relatively constant, that the commonalities across cultures were greater than the differences, a finding borne out also in the findings in Chapter 10 [Sec. 10.4]. How can this apparent discrepancy be resolved?

The constancy of preferences is explainable by the evolutionary perspective. This provides the basic theoretical construct that what humans find attractive in landscapes is survival-enhancing. The various theories of landscape quality [Sec. 8.2] operationalise this through identifying specific attributes that contribute to preferences.

Supporting evidence in this context was found by this study which showed that the higher the rating of landscape quality, the narrower the range of opinion of respondents [Figures 10.2, 10.74]. In other words, there is strong commonality of views regarding what is preferred, but as landscape quality diminishes, the range of opinion widens. This close congruence between preferences and quality is supportive of the evolutionary perspective, but with scenes of lesser quality, other factors influence preferences.

The contrary findings of the influence of culture on preferences in Chapter 6 were based on a longitudinal view tracing the changing cultural attitudes and preferences over time. It is true that the attitudes towards mountains changed radically in the early 18th century but this change reflected the shift from the objectivist to the subjectivist position, it is not a change that contradicted the survival-enhancing basis of landscape theories.

In Chapters 7 and 8, further understanding was derived from a review of contemporary landscape studies. The characteristics of the studies including their research techniques and their findings were summarised. The knowledge gained of the research techniques and methodologies was essential for the development of the empirical study in this thesis.

These chapters may provide the basis for further papers [e.g. Lothian, 1999] that explore the issues raised. The distinction between the objectivist and subjectivist views of landscape, discussed in the chapters on philosophy of aesthetics [Chapter 2], culture and landscape [Chapter 6], and findings of landscape studies [Chapter 7] is an area for further research. The psychoanalytical explanation of human preferences for water, outlined in Chapter 8, may also be a fruitful area for further work.

The analysis of human perception of, and interaction with, aesthetics and landscape quality through these chapters was foundational to development of a credible methodology for the large-scale assessment of landscape quality.

Key elements that derived from these chapters which were important in the formulation of the empirical survey were the following:

- The survey needed to be subjectivist-based; it needed to reflect the perception of the community to landscape quality. It should not take the objectivist approach and attempt to measure the attributes of the physical landscape and then assume that these determined landscape quality independent of human perception.

- The survey needed to be large-scale in dimension to provide an overview of landscape quality within which more specific studies could be based. A small-scale survey without the perspective provided by the large-scale make it difficult to relate the findings to other areas. A large-scale assessment sets the findings within an adequate context and enables them to be compared with other comparable surveys.

- The survey needed to reflect the preferences of the community rather than any special group or "expert" respondents whose results may differ from that of the community [see Section 8.3]. Although it was also shown that preferences do not differ very much between groups, nevertheless it was considered important to the perceived credibility and acceptance of the results that it aim to be community-based.

- Although the Gestalt forms and patterns, along with the theoretical constructs of perception and psychoanalysis were considered important, the emphasis in the survey should be on "first order" analysis. This would be on the basis of landscape components such as land form, land use, presence of water, etc. Analysis based on these will relate the findings directly to landscape features and better ensure their relevance for landscape management. Gestalt forms and psycho-analytical constructs were considered in the evaluation in Section 11.4.

Based on the methodology that was developed for the large-scale assessment of landscape quality, a map of landscape quality of South Australia, an area of nearly one million square kilometres, has been produced. In addition, the results have been used for predictive purposes, to assess the effect of change on landscape values. The results have also been used to evaluate the efficacy of landscape theories. A detailed protocol for the application of the methodology for large-scale landscape quality assessment has been described.

The hypothesis specified six criteria that the methodology should fulfil:

1) be replicable, statistically rigorous and defensible
2) reflect the preferences of the community
3) identify the relative importance of components of landscapes for preferences
4) enable mapping of landscape quality at a State level
5) provide the basis for a methodology which could be applied nationally
6) be practicable

It is considered that each of these has been fulfilled. The methodology has been explicitly documented and described, allowing its repetition. Care has been taken to ensure the statistical validity of the survey and the analysis. The results are defensible; the example given in Section 11.3 of the impact of clearance of trees for development purposes illustrates this.

The results reflect the preferences of the community; Section 9.3 compared the characteristics of the sample of participants with that of the South Australian community and indicated that on most respects it compared reasonably well. It would be difficult to gain a sample that matches the community exactly but as noted there, preferences do not differ markedly across different participants so flexibility in the selection of the sample is acceptable.

The analysis of preferences in Chapter 10 fulfilled the third criterion of identifying the relative importance of components of landscapes for preferences. This chapter provided a comprehensive analysis of the influence of land form, land cover, land use, water, diversity, naturalism, colour and cloud cover on preferences.

The fourth criterion, the mapping of landscape quality at a State level, has been fulfilled.

Being State-wide in coverage, the map cannot be expected to provide a detailed assessment of landscape quality at the sub regional or local level. For example, the Mt. Lofty Ranges is a small area with considerable variation in its landscape. Mapping at a State-wide level has not fully captured this. However more detailed maps could be developed for this area and other regions based on the survey and the detailed analysis of attributes undertaken. The coast, Murray Valley, and particular regions such as the Clare valley could be mapped in greater detail based on the data acquired.

Section 11.5 defined a protocol for the application of the methodology. While it has been applied at a State level, there is no apparent reason why it should not be applicable at a national level. The results would probably not be as detailed as a State level as the survey would need to cover the full range of major landscape character regions of the nation. It would therefore be unlikely to separate these into sub-regions [as in Section 10.5].

Some changes would, however, be necessary in undertaking a national survey. For example, it may be too expensive in time and travel to obtain photographs directly, necessitating use of existing collections. This would be required in roadless parts, for example, the Australian Alps, south-western Tasmania, and parts of the arid inland. The sample of respondents could reflect the subtle variations in perceptions across the country, necessitating rating sessions in different parts of the nation. Use of Internet-based rating systems should be examined as an alternative, providing safeguards can be included to limit multiple entries and the age of participants [i.e. exclude children]. The overall cost of applying the methodology nationally is not simply a multiple of the cost at a State level as some efficiency and economies of scale should be possible.

The method requires not-insignificant resources; an assessment of a State of nearly one million square kilometres may take nearly a year and cost $130,000. This is around thirteen cents per square kilometre. Yet the potential benefits of this are considered to be substantial and to justify this level of expenditure. The importance of landscape quality in supporting tourism alone, a multi-billion dollar industry, suggests that assessment of landscape quality should be regarded as an investment. It is an investment in achieving an explicit understanding of the quality of a regional landscape and of identifying the attributes that are important in landscape quality. This investment may then provide a return through the management and protection of landscape quality so that it continues to provide benefits to the community.

The final criterion, that the methodology be practicable, is considered to be fulfilled. Practical considerations have influenced the development of the methodology throughout, For example, participants in rating sessions were selected on the basis of suitability and availability, slides of the landscapes were supplemented by existing collections, and scoring of the attributes of scenes was employed rather than the physical measurement of components of scenes from photographs. Practical considerations have not, however, been allowed to compromise the rigour and defensibility of the methodology.

It is recognised that there are parts of the methodology that could be improved. One area would be to use geographical information systems in the mapping of landscape character and the resulting map of landscape quality. Establishment of a panel of community representatives, reflective of the community's profile, could assist in the rating and scoring of scenes, both time consuming tasks. The statistical analysis could focus on the broad picture rather than on the minutiae of landscape types. Greater reliance could be placed on using existing photographic collections, thereby reducing the considerable time needed to obtain these through field work, including waiting for the right seasonal and lighting conditions.

12.3 ACHIEVEMENT OF THESIS

The progress achieved in this thesis in measuring landscape quality across a large region is believed to be without precedent in Australia and elsewhere in the world. It has provided an assessment of perceived landscape quality, based on community preferences, of an area of nearly one million square kilometres. Most previous studies, at least in Australia, are characterised as being confined in their areal extent, narrow and imprecise in their methodology, and lacking a product that can be applied predictively. Williamson and Chalmer's [1982] study in north-east Victoria is a notable exception in the Australian context. The method established and trialed here has application in other large regions and at a national level.

The very process of establishing a quantitative measure for an attribute immediately advances the standing and recognition of the attribute; prior to this it is an intangible and fuzzy quality, lacking clear definition. Defining and measuring landscape quality for a region transforms it into an attribute worthy of recognition, protection and management.

The understanding developed here of landscape quality does not go far in answering the question of why the preferences are as they are?; e.g. why does water enhance preferences?, why are high rock faces and cliffs favoured?, why are natural scenes favoured over those with evidence of human influence? The theoretical constructs that were reviewed appear to go only a slight way towards assisting in one's understanding.

The evaluation of the landscape theories based on the results indicated that the information processing, Gestalt and prospect-refuge theories appear to provide at least some explanation of landscape preferences. A challenge remains to integrate the common elements of these and produce a single theory of landscape quality that can provide a sound basis for its understanding.

The study demonstrates that it is possible to measure landscape quality. The shift from treating landscape quality as an attribute that is not amenable to objective measurement, to providing a practical and effective methodology by which this subjective quality can be measured, marks a significant achievement. The resulting recognition of the ability to treat landscape quality as part of the environment capable of being measured, managed and protected marks a paradigm shift.

12.4 EXTREME SCENES

Although the study did not find any landscapes that could be rated at the extremes of the rating scale, 1 or 10, it is interesting to speculate what these might comprise. This is on the assumption that the findings from South Australian landscapes have a universality that is applicable to other areas.

The gibber scenes averaged 3.90 but one scene [#116] scored 2.81. Although lacking any variation in land form [i.e. they were flat], land cover [i.e. barren] or land use, without any water and lacking any diversifying features, these scenes were generally red or orange in colour. Orange is the second highest scored colour after blue, and red is middle ranking. If the colour had been yellow or brown, which are the lowest scored colours, then the ratings of these gibber scenes would probably have been lower. However their naturalness is also a redeeming feature as this elevates ratings [Section 11.12]. Scarring of the scene such as by mining, excavations or wheel tracks of off-road vehicles would mar this naturalness and could depress the rating. Thus a brown, flat and featureless scene as gibber plain, or a scene with evidence of human activities could produce a scene that rates as 1. It is noteworthy that a flat barren brown ploughed field [#64] scored the lowest rating of all scenes of 2.40.

A 10-rated scene is likely to be one that exhibits to a high degree, each of the components found to enhance preferences. It is likely to be mountainous, with steep rock faces, tall dense trees, water bodies, largely natural in appearance, contain an extraordinary diversity of features, and have extensive blue and orange colouration. Scenes in the Swiss Alps such as the valley overlooked by the Eiger and Jungfrau may fulfil these criteria. The Italian Lakes, Canadian Rockies, New Zealand near Queenstown and other localities may also have scenes that achieve a 10 rating.

In areas such as Switzerland, the proportion of highly rated landscape, say 7 or 8, is likely to be very large, and thus the overall mean rating for the region will be high.

12.5 FURTHER APPLICATION

With further applications of the methodology, knowledge of landscape preferences will grow. Over time, it is expected that detailed understanding of preferences will develop. For example, the preferences of the Flinders Ranges, arid ranges and of the Mt. Lofty Ranges may be complemented by studies of other mountainous areas in Australia thus enabling a fuller picture to emerge of preferences for such features. The other dimension that may improve is in the detail as landscape preferences for smaller areas are derived. These may enable landscape preference mapping at the micro level, enabling for example, ratings to be derived valley by valley, mountain by mountain.

There are significant advantages in the adoption of a standard methodology. This would facilitate transfer of findings between studies and the development of understanding of preferences for similar landscapes. Over time a body of knowledge of landscapes may develop which would better enable their characteristics to be appreciated.

There are several areas of the methodology that should be identical:

- use of 1 – 10 scale
- use of representative scenes for the region
- use of colour photographs
- use of participants who are representative of the community in rating the scenes

There is however scope for considerable flexibility in how the studies are conducted, their scale of inquiry, their use of the Internet in gaining preferences, and in the analyses undertaken.

The undertaking of further studies using comparable methodology would also enable feature-specific analyses to be undertaken, For example, mountains, rockfaces, coastal features, waterfalls [Hudson, 2000], vegetation types [e.g. mallee, brigalow, alpine], rivers and lakes.

12.6 LANDSCAPE QUALITY MANAGEMENT

Although the extent that regional landscape enhancement can be modified is limited, nevertheless there is a place for landscape quality to be considered in programs such as Landcare and revegetation.
While biophysical features have long been subject to measurement and management, this has not been possible with landscape quality. The methodology for measuring landscape quality established here can provide the basis for its management. This can enable the impact of change on the landscape to be assessed in advance, of measures to be taken to enhance the quality of landscape, at least in the micro scale, and of guarding against measures which would diminish landscape quality.

A consequence of failing to measure landscape quality is that there is no gauge of its loss. South Australia has relatively small areas of landscape that are perceived as of high quality. Identifying these can help ensure that these are managed and protected; not identifying them means that the significance of actions which may affect these areas will not be appreciated.

For example, mineral exploration in the northern Flinders Ranges in the late 1960s resulted in the construction of access tracks across the mountainsides, with scarring and rock slides which are still visible today - this in an area rated 7 by this survey. In forested areas, such as Tasmania and south-eastern Australia where clear cutting occurs, the landscape quality can be significantly impacted. Assessing landscape quality of such areas could assist in minimising the impact through changes to management regimes and practices.

Understanding the contribution of various components to landscape quality provides the knowledge base for the management of landscape quality.

Management of landscape quality could include the requirement to assess the likely impact of activities and proposed changes, say, of land use on landscape quality. It could establish as a planning principle that landscape quality should be maintained, enhanced and protected. It could also define and describe specific measures that could be applied to guide activities so that adverse impacts on landscape quality could be minimised.

Decisions about the declaration of protected areas such as national parks have conventionally been made mainly on the basis of the quality of their biodiversity, landforms, and wilderness and the suitability for outdoor recreation. Scenic qualities are often referred to but only in general terms. The results of this survey will provide the basis, at a broad-scale, to evaluate proposals for protected areas on landscape quality grounds. Areas may be dedicated on the basis of the high quality landscapes that they contain. It could also influence the choice of boundaries of the areas.

The landscape quality present in an area may also influence decisions about developments and uses which may affect adversely the area. For example, a decision was taken by the South Australian Government in August 2000, to prohibit the establishment of a major magnesite mine in the Gammon Ranges in the northern Flinders Ranges. The decision was taken on biodiversity grounds, but given that it is an area of high landscape quality [7], use of the results of the landscape assessment would have provided added justification for the decision.

The management of landscape quality should not focus exclusively on high quality landscapes. It was noted earlier that although the Mt Lofty Ranges is only middle ranking in landscape quality terms when viewed on a State-wide context, nevertheless the area is of cultural significance due to its proximity to a large proportion of the population. The extreme example of gibber plains, which were rated the lowest of all scenes, nevertheless attracted several scores of 10 due to their starkness and unique qualities. Thus landscape quality management should be applied to landscapes quality of all calibres.

The development of the management measures is beyond the scope of this thesis. It should be noted however that landscape quality is never entirely lost, only changed, and that management should aim to ensure that the changes are for the better.

Through management, the contribution of landscape quality to human well-being may be better acknowledged and recognised.

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Note: These references are in alphabetical order. The enclosed CD shows the references arranged by thesis chapter.

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ATTACHED CD

The following are located in the CD enclosed with the thesis

Summary
An extensive 23 page summary of the thesis.

Appendixes

Chapter 7

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Appendix 10.12	Colour of Scenes - Hues only
Appendix 10.13	Dominant & Co-dominant Colours
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Appendix 10.15	Scoring of cloud cover

References
The references used in the preparation of the thesis are shown under their relevant chapter headings.

Reference set of scenes
The 160 scenes used in the thesis are shown in a Powerpoint file on the CD. This also displays the distribution graph of preferences for each scene, their means and SDs, locational information and descriptions of the scenes.

Overview
This Powerpoint presentation summarises the methodology and findings of the survey of landscape quality of South Australia.