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## SENSORY CHARACTERISATION AND CONSUMER PERSPECTIVES OF AUSTRALIAN CABERNET SAUVIGNON WINE TYPICITY

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### Abstract

**Aim:** To identify the sensory attributes responsible for the typicality of Cabernet Sauvignon wines from three Australian Geographical Indications (GIs) and to explore consumer purchase behaviour and preference with regard to regional wines.

**Methods and Results:** Descriptive analysis (DA) was applied to identify the sensory profiles of vintage 2015 Cabernet Sauvignon wines from Coonawarra (n = 24), Margaret River (n = 10), Yarra Valley (n = 13), and Bordeaux (n = 5). A trained panel (3 males and 7 females) rated 45 aroma, flavour, and mouthfeel attributes, of which 19 were found to be significantly different among the wine samples. Results from canonical variate analysis demonstrated that Bordeaux wines had a more distinct sensory profile compared to the Australian regions; within the Australian regions, wines from Margaret River had a closer profile to those from Yarra Valley than Coonawarra. Of the wines that underwent DA, two from each region were chosen for a study involving consumers (n = 112) that were divided into two groups. One group was informed of the regions prior to tasting each sample and the other group had no information about region. Consumers were surveyed about their wine purchase behaviour, knowledge of wine typicality, preference for the wines, and sensory profile of each wine using rate-all-that-apply methodology.

**Conclusions:** Bordeaux wines had a more distinct sensory profile compared to the Australian regions, and were associated with developed characters including 'savoury', 'tobacco', and 'earthy'. Wines from Margaret River were deemed to possess a fruit-forward profile along with 'floral' characters. With a similar profile to Margaret River, Yarra Valley wines were also found to have a greater incidence of 'red fruits' and 'cooked vegetables' attributes. Coonawarra wines were characterised by 'chocolate/vanilla', 'mint', and 'mallee leaf' attributes and were rated low in 'cooked vegetables'. When consumers were informed of the wine region of origin there was an apparent increase in their liking scores, with the effect seeming to be positively related to familiarity with the region.

**Significance and Impact of the Study:** Well-established for "Old World" wine producers, typicality is a concept that incorporates aspects of cultivar and terroir of a wine, and acts as a wine quality indicator. Australia also has a range of terroirs contributing to the characters of regional wines, and knowing more about the drivers of distinctiveness can help harness terroir in the promotion of fine Australian wines at an international level. This extends to understanding wine consumers' behaviours, and being able to attend to their expectations in an objective manner.

**Keywords:** Descriptive analysis, hedonics, typicality, regionality, consumer preference

## Introduction

Wine is a product that endures extensive effects during its entire production, from the environmental conditions during grape cultivation and origin of the raw materials through to different practices used in the vineyard and winery. The combination of these influences can drive the typicality of wine through their impacts on aromas and flavours. Put simply, typicality can be defined as the expression of a specific sensory profile that can be attributed to a delimited geographical area with influences from the grape variety and its terroir (Cadot *et al.*, 2012).

Provenance and typicality are prized characteristics that help a high quality wine to be recognisable in the market (Maitre *et al.*, 2010). These traits are also responsible for the consumers' quality expectation construct, and will eventually impact their purchase decision (Boncinelli *et al.*, 2016; Schamel, 2006). Studies indicate Australian consumers depend upon the origin indication presented on wine labels to make a choice and to define their concept of a fine wine (Kustos *et al.*, 2020). Furthermore, the Australian wine industry seeks to emphasise regional branding to promote Australian wines of provenance, with the aim of making provincial styles more recognisable domestically and internationally (Wine Australia, 2015).

Considering the needs of both consumers and the industry, this study aimed to characterise unique sensory profiles of Australian Cabernet Sauvignon wines and understand consumer perspectives and behaviours towards the concept of wine typicality with an emphasis on regional profiles.

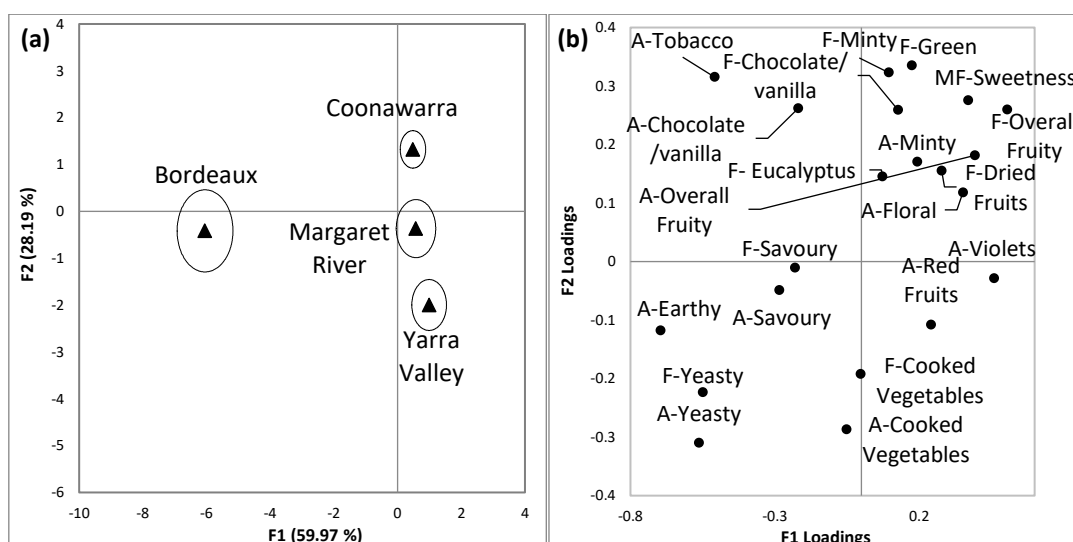
## Materials and Methods

The first sensory study involved descriptive analysis (DA) of 52 commercial Cabernet Sauvignon wines that followed the criteria established previously by Souza Gonzaga *et al.* (2019) and Souza Gonzaga *et al.* (2020). The samples were from Coonawarra (n = 24), Margaret River (n = 10), Yarra Valley (n = 13), and Bordeaux, France (n = 5). They were evaluated by a group of 10 panellists (3 males and 7 females) that were trained for 9 × 2 h sessions, following the methodology established by Lawless and Heymann (2010). After the significance of panellist by sample interaction was minimised, formal evaluation sessions were conducted in individual sensory booths. In total, 21 aroma, 23 flavour, and 3 mouthfeel attributes were assessed using a 100 mm line scale.

The second sensory study was conducted with a subset of the samples mentioned above (2 samples from each region) using a panel of 112 red wine consumers. The panel was divided into two groups: one group received prior information about the region of origin of each wine and the other group evaluated each sample in the same way but without the region information. The consumers were asked about their wine liking (using a 9-point hedonic scale) and purchase behaviour, and then assessed the sensory profile of the wines using rate-all-that-apply (RATA) methodology (Danner *et al.*, 2018). Statistical analyses were performed using XLSTAT (Addinsoft, New York, USA, version 2019.4.1) and sensory data was collected using Red Jade software (2016, Redwood City, USA).

## Results and Discussion

Of the 47 attributes evaluated by the DA panel, 21 were found to be significantly different (two-way ANOVA,  $\alpha = 0.1$ ) between the 52 wines. Canonical variate analysis (CVA) of the significant data showed that there was good separation between the Australian wines and the wines from Bordeaux (Figure 1a). For the wines from Australia, Margaret River had aspects that were similar to Coonawarra and Yarra Valley, whereas Coonawarra and Yarra Valley were less similar in sensory profile. Figure 1b displays how each region could be characterised based on the sensory attributes determined by the DA panel. This revealed that Bordeaux wines were more closely related with developed characters like 'savoury', 'earthy', and 'yeasty', whereas Coonawarra presented 'minty', 'green', 'chocolate and vanilla' characters. Margaret River was characterised by fruit-forward and floral attributes as well as higher sweetness, and Yarra Valley was related with 'red fruits' and 'cooked vegetables' traits. Along with the developed characteristics, Bordeaux wines presented a lower perception of 'floral' and fruity characters, potentially due to the 'savoury' traits suppressing the fruit-related ones (Botha, 2010).



**Figure 1:** Canonical variate analysis plots from the DA study showing (a) region centroids as triangles and sample range as circles, and (b) factor loadings of significantly different sensory attributes ( $\alpha = 0.1$ ); aroma (A); flavour (F); taste (T); mouthfeel (MF).

Similar regional profiling using a different approach was presented previously by Souza Gonzaga *et al.* (2019). In that work, Bordeaux wines were found to be related to ‘savory’ attributes, Margaret River was related with ‘floral’, Yarra Valley with ‘herbal’, and Coonawarra with ‘minty’ attributes.

Consumer preference trials on two wines from each of the four regions demonstrated that information on provenance had a significant impact (repeated measures ANOVA,  $\alpha = 0.05$ ) on preference scores (Table 1). When the consumer panellists were informed about the region of origin of the wine, they tended to ascribe a higher liking score, with a larger impact when familiarity with the region was significantly higher (Tukey’s HSD,  $\alpha = 0.05$ , data not shown). This was especially evident in the case of the Coonawarra region (Table 1). Importantly, as shown by Kustos *et al.* (2019), regionality is a concept that Australian consumers understand, and it can be an important purchase driver by indicating wine quality. In addition, the region familiarity impact in the present work appeared to reinforce the notion that perceived value can increase when wine is connected to its region of origin (Boncinelli *et al.*, 2016).

**Table 1:** Consumer liking mean scores and p-values for Cabernet Sauvignon wines from different regions evaluated with or without region of origin information. Bolded values are significantly different between the two conditions (Tukey’s HSD,  $\alpha = 0.05$ ).

Sample	Liking (Informed, n = 56)	Liking (Uninformed, n = 56)	p-value
Bordeaux 1	<b>6.1</b>	<b>5.4</b>	<b>0.024</b>
Bordeaux 2	6.2	6.0	0.393
Coonawarra 1	<b>7.0</b>	<b>6.3</b>	<b>0.012</b>
Coonawarra 2	<b>6.8</b>	<b>6.1</b>	<b>0.028</b>
Margaret River 1	6.0	5.9	0.589
Margaret River 2	<b>6.5</b>	<b>5.5</b>	<b>0.004</b>
Yarra Valley 1	5.3	5.1	0.619
Yarra Valley 2	6.8	6.6	0.579

The RATA results demonstrated that the preference scores between the two consumer groups (Informed and Uninformed) did not have an impact on the sensory attributes (repeated measures ANOVA,  $\alpha = 0.05$ ), meaning that both groups profiled the wines similarly (data not shown). Overall preference showed a correlation with ‘dark fruits’ and ‘jammy’ attributes, and fuller body wines. Furthermore, the panel appeared to be more familiar with samples that exhibited ‘herbal’ and ‘minty’ characters, which may be relevant to other studies that recruit panellists from within the general region of at least some of the wines under evaluation.

## Conclusions

The DA study was able to distinguish Cabernet Sauvignon wines from the four regions based on sensory composition, with the largest difference obtained between wines from Bordeaux and from the Australian regions. In addition, the consumer study provided insights into the importance of being informed of the region

of origin, whereby preference was significantly increased when wine provenance was known. Furthermore, this aspect of the study provided some understanding of the preferred sensory attributes for this cohort of consumers. Overall, the outcomes generated from these two sensory studies will be built upon to assist the wine industry to better understand their regional styles, to gain insights into consumers' preferred wine sensory traits, and to increase understanding of their target audience.

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