Judging Trustworthiness, Competence and Dominance from Multimodal Emotional Expressions

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Abstract

It is well-established that facial physical resemblances to emotional expressions can be misattributed as enduring traits (Montepare & Dobish, 2003). However, faces are typically encountered in the presence of other cues such as bodies and voices. With only a few studies having examined the integration of multiple emotional cues in trait judgements, the present study aimed to address this gap by investigating how people make judgements of trustworthiness, competence, and dominance from dynamic audio-visual stimuli. Participants (N = 158) viewed 104 videos of two posers (male and female) posing four emotions (happy, sad, angry or fearful) and rated them on all three traits. The videos showed an isolated voice, face, or body, or voice-face-body pairings that were emotionally congruent (e.g. all three cues expressing happiness) or incongruent (e.g. two cues expressing happiness with the third expressing anger). The results demonstrated that trait intensities were impaired by the presence of the incongruent emotion. When viewing the emotionally incongruent audio-visual stimuli, the perceptions of traits were more likely to be informed by the emotion displayed via two cues. The influence of the incongruent emotion cue was also reported, such that the posers were rated as more trustworthy and competent when displaying a happy face, and more dominant when displaying an angry body or voice. Hence, the strength of the face, voice, and body varied according to the emotion displayed, and the trait being perceived. These findings suggest the importance of using whole-person multisensory stimuli when investigating trait impressions formation.

Declaration

This thesis contains no material which has been accepted for the award of any other degree of diploma in any University, and, to the best of my knowledge, this thesis contains no material previously published except where due reference is made. I give permission for the digital version of this thesis to be made available on the web, via the University of Adelaide's digital thesis repository, the Library Search and through web search engines, unless permission has been granted by the School to restrict access for a period of time.

Hai Linh Tran

September 2021

Contribution Statement

In writing this thesis, my supervisor: Dr Nicole Nelson, Taylor Barton, and I collaborated to generate research questions of interest and design the appropriate methodology. Dr Nelson provided stimuli used in research design. Taylor Barton and I completed the ethics application and were responsible for all participant recruitment and testing. Some hypotheses were generated in collaboration with Taylor Barton, and some hypotheses were generated by me and were unique to my thesis. All hypotheses were preregistered on the Open Science Framework. I completed my own data coding and analyses, using Jamovi software. I also wrote up all aspects of the thesis.

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Last but definitely not least, to my family, thank you for always believing in me and for giving me so much love and support. To my little sister, thank you for listening to me talking about my thesis, for the long conversations on the balcony, and for always being so understanding and caring. You have been my rock this year.

Judging Trustworthiness, Competence and Dominance from Multimodal Emotional Expressions

First impressions about strangers' traits are rapid and spontaneous (Willis & Todorov, 2006), and despite their possibility for error, are highly influential in decision making (Todorov, 2008; Jaeger et al., 2020). Such impressions typically result from the targets' emotional expressions, namely those produced by the face (Said et al., 2009), body (Van Der Zant et al., 2021) and voice (Pinheiro et al., 2021). On many occasions, these emotions are not congruently portrayed by the individual, which complicates the trait impression judgements individuals make about one another. The present study investigated the ways in which mismatching emotions expressed via multiple cues were integrated to make judgements of others' traits.

Forming First Impressions of Others

In relation to the traits of others, resulting rapid impressions guide interpersonal interactions and predict consequential outcomes. Person impression formation is a spontaneous, intuitive, uncontrollable and unprompted process (Ambady, 2010; Hassin & Trope, 2000). For example, exposure to a face of 100-ms or less has been shown to be sufficient for people to form impressions of strangers (Willis & Todorov, 2006). Deduced from "thin-slices" of information (Ambady & Rosenthall, 1993), these impressions include remarkably detailed inferences about the individuals' demographic information, such as identity, ethnicity, age and gender (Todorov, 2017), and what are presumed to be stable characteristics such as attractiveness, trustworthiness, dominance, likability, competence, intelligence, and aggressiveness (Oosterhof & Todorov, 2008; Todorov, 2017; Said et al., 2009; Willis & Todorov, 2006). Importantly, first impressions are long-lasting and often act as an anchor for later judgments (Gunaydin et al., 2017; Willis & Todorov, 2006) where they may persist even in light of newer contradictory information (Wyer, 2010).

Despite their quick formation and tendency to produce inaccurate reflections of enduring traits, trait impressions play a crucial role in many life domains. To illustrate, their importance in human social interactions and interpersonal functioning must first be emphasised. As an adaptive survival mechanism, individuals routinely look for appearance-based cues in others which may allow for the identification of potentially harmful intentions (Fiske et al., 2007). Hence, impressions of others underlie resulting approach and avoidance behaviours in social situations (Jones & Krammer, 2021; Oosterhof & Todorov, 2008; Todorov, 2008). Furthermore, first impressions could influence how one interacts with others (Snyder et al., 1977). This, in turn, elicits behaviours from others that are consistent with one's initial judgements, illustrated by the self-fulfilling prophecy theory (Snyder & Stukas, 1999). In addition, first impressions influence complex and consequential decisions. For instance, inferences of facial untrustworthiness and dominance underlie perceptions of criminality (Flowe, 2012; Jaeger et al., 2017; Wilson & Rule, 2016), and can even predict the actual provision of death sentences (Wilson & Rule, 2015). Alternatively, inferences of competence (Ballew & Todorov, 2007; Olivola & Todorov, 2010; Sussman et al., 2013; Todorov et al., 2005) or competence and trustworthiness (Chen et al., 2013; Riggio & Riggio, 2010) can predict successful leadership selection or electoral outcomes when viewing novel faces.

Models of Trait Perception

Current literature on trait impression formation proposes that impressions of others are systematically arranged along two or three principal dimensions. ‘Warmth’ (warm, trustworthy, friendly) and ‘Competence’ (competent, capable) were suggested by Fiske et al. (2007) as the universal dimensions of both individual and group social cognition, as when an individual encounters a stranger, they reflect survival pressures to identify whether the stranger intends to a) harm or help the individual and b) whether the stranger is capable of

enacting such intentions. Following this, Oosterhof & Todorov (2008) identified two orthogonal dimensions of 'Valence/Trustworthiness' and 'Dominance' using the trait judgments from emotionally neutral faces. Similar to the Fiske et al. (2007) model, these dimensions give rise to judgments about people's intentions and their ability to implement them. However, the aforementioned Dominance dimension (Oosterhof & Todorov,2008) refers to the perception of physical strength rather than the task-oriented aforementioned Competence dimension (Fiske et al.'s, 2007). The dimensions of 'Valence/Trustworthiness' and 'Dominance/Threat' were replicated by Said et al. (2009), who also investigated emotionally neutral faces, and by McAleer et al. (2014), who studied voices. Moreover, they were replicated by Sutherland and colleagues (2013) who used 1,000 ambient images to increase the representativeness of real faces people encounter every day. Reviewing the literature, 'Trustworthiness', 'Dominance' and 'Competence' consistently emerged, supporting their robustness in characterising social trait attributions.

Judging Traits from Facial Cues

Trait perception studies have extensively focused on investigating inferences from faces in the absence of other information. Faces contain a rich source of information, such as facial features, face morphology, and emotional expressions, all of which can be mapped onto judgements of traits. Faces that are more likely to be judged as trustworthy tend to be attractive and symmetrical with infantile features (Over & Cook, 2018), and typically have smiling, upturned mouths and happy eyes (Calvo et al., 2019). Faces that are more likely to receive judgements of being dominant tend to have traditionally masculine features (Batres et al., 2015), and prominent, lowered brow ridges (Keating et al., 1981). Lastly, faces that are more likely to be perceived as competent tend to be attractive, mature-looking and less round, and often feature a smaller distance between the eyebrows and the eyes, with higher cheekbones and an angular jaw (Olivola &Todorov, 2010).

To provide a theoretical account of the origin of face-related first impressions, a novel 'Trait Inference Mapping' framework was proposed by Over and Cook (2018). Summarised, they argue that throughout the lifespan, face and trait representation spaces are developed. Here, individuals might encounter others with a particular facial appearance who then subsequently exhibit a particular trait. When this contingency relationship is repeatedly seen, a face-trait mapping emerges. Once acquired, it automatically mediates the trait impressions we make upon viewing novel faces.

Judging Traits from Facial Emotional Expressions

Trait judgements from faces are also grounded in the perceptions of emotional expressions. According to the Emotion Overgeneralization Hypothesis (Montepare & Dobish, 2003), as an attempt to infer others' intentions, individuals tend to overgeneralise specific facial features, temporary muscle contractions, and structural resemblance of non-emotion-posing faces to emotional expressions, which are then misattributed as traits (Adams et al., 2012; Albohn & Adams, 2021; Montepare & Dobish, 2003; Oosterhof & Todorov, 2008; Said et al., 2009; Todorov, 2008). Accordingly, traits can be conveyed via people's facial expressions of emotions or their facial physical resemblances to emotional expressions.

A range of different emotional expressions can be identified from isolated faces, including happy, surprised, fearful, angry, disgusted, and sad (Todorov, 2017). Adaptively, negatively valenced emotions which signal potential threats, such as anger and fear, are often more quickly detected, attended to, and remembered (Dennis et al., 2008; Kret et al., 2013; de Gelder et al., 2006; Wieser & Keil, 2014). Different parts of the face are more salient in the identification of different emotions (Todorov, 2017). For instance, the salience of the eye region increases when identifying fearful faces, the eyebrows when identifying anger, the forehead when identifying sadness, the mouth region when identifying happiness and surprise, and both the mouth and nose bridge when identifying disgust.

These facial emotional expressions are often associated with traits, and the current literature on how such expressions are overgeneralized as enduring traits has yielded consistent results for trustworthiness and dominance. Specifically, joyful cues convey trustworthiness (Calvo et al., 2019; Galinsky et al., 2020; Said et al., 2009; Todorov et al. 2013) and non-dominance (Said et al., 2009), while angry cues convey dominance (Knutson, 1996; Said et al., 2009; Ueda & Yoshikawa, 2018) and untrustworthiness (Said et al., 2009; Todorov et al. 2013). Fearful cues convey that the individual is low in trustworthiness and dominance (Said et al., 2009). Regarding competence, direct links between emotional expressions and this trait have not been found. However, the closely related concept of intelligence has been associated with happy cues and negatively correlated with angry and fearful cues (Said et al., 2009).

Interestingly, the relationship between emotion detections and trait impressions is bidirectional. In one direction, happy-looking faces are often judged as more trustworthy than non-happy faces (Calvo et al., 2019). In the alternate direction, facial trustworthiness has modulated the intensity of the perceived emotions. To illustrate, Oosterhof and Todorov (2009) found that the same expressions of happiness on trustworthy faces were perceived as happier than on untrustworthy faces, and the same expressions of anger on untrustworthy faces were perceived as angrier than on trustworthy faces. This would indicate that the relationship between emotions and traits is complex and dependent on the trait being judged.

Judging Traits from Bodily and Vocal Cues

Although faces have been the focus of the current literature on emotion and trait perception, bodily and vocal cues are also effective carriers of emotional information. The human body readily communicates emotional states (Atkinson et al., 2004; Coulson, 2004; de Gelder, 2009; Montepare et al., 1987; Stock et al., 2007; Xu et al., 2020), sometimes more effectively than faces (de Gelder, 2009). This is particularly salient in stressful social contexts

where individuals attempt to control their facial expressions to hide their real feelings (de Gelder et al., 2010). Different parts of the body are important when delivering different emotions. Flexions of the limbs are important in conveying and perceiving anger and fear (Roether et al., 2009), while the head inclination and collapsed body posture are important in conveying and perceiving shame and sadness (Wallbott, 1998). Likewise, vocalisations also are a rich modality for emotional displays, with auditory expressions conveying up to 22 emotional states in the absence of meaningful speech (Bestelmeyer et al., 2014; Davitz & Davitz, 1959; Patel et al., 2011; Simon-Thomas et al., 2009; Wallbott & Scherer, 1986).

In addition to faces, bodily and auditory cues in isolation also provoke trait inferences. Firstly, in situations where the face is less visible to the observer, such as perceiving someone from a far distance, people can rely on the body and its morphology or motion-related cues, to guide their impressions. For example, the frequency of a politician's body movements and the movements' expansiveness during speech delivery can convey dominance and trustworthiness (Koppensteiner et al., 2016). People's gait cues can drive reliable trait judgements between observers even for simplified point-light walkers (Thoresen et al.; 2012). Finally, a bigger, taller and more muscular body morphology is often associated with a higher level of threat (McElvaney et al., 2021), dominance (Lourenco et al., 2016; Undurraga et al., 2012) and aggression (Deaner et al., 2012).

Secondly, traits can also be perceived solely from auditory cues presented in isolation. From hearing one's first "Hello", people build impressions of one's personality (McAleer et al., 2014). This is attributable to the fact that a speaker's vocal characteristics of pitch, tone, loudness, breathiness, flatness, tenseness, and rate variety can all carry meaning. Specifically, research has found that from voices, people perceive others' personality (Addington, 1968) and social traits like trustworthiness (Elkins & Derrick, 2013; Schild et al., 2019), dominance (Apple et al., 1979; Mileva et al., 2018; Tusing & Dillard, 2000), competence,

thoughtfulness, and intelligence (Schroeder & Epley, 2015). Furthermore, they carry valid information about the speaker's extraversion and dominance (Stern et al., 2021).

Multimodal Integration of Emotion Perception

A great deal of research has examined recognition of isolated faces, bodies and voices in our perceptions of their affective states, but faces, bodies and voices are not perceived in isolation in real life. The congruency effect refers to how recognitions of facial emotions might be enhanced by additional contextual information or impaired when they are signalling contradictory emotions (Mondloch et al., 2013; Mileva et al., 2018; Piwek et al., 2015; Wieser & Brosch, 2012). According to several studies, when faces were accompanied by a matching bodily or vocal expression, observers made significantly more accurate and faster recognitions of facial emotional messages (Collignon et al., 2008; Reed et al., 2020; Van den Stock et al., 2007). In contrast, reduced facial emotion recognition accuracies have been observed in the studies where the contextual cues expressed a conflicting emotion to the face (de Gelder & Vroomen, 2000; Mondloch et al., 2013; Van den Stock et al., 2007).

However, the congruency effect is not unique to facial emotional expressions, and little is yet known about how emotional expressions of the three modalities are integrated. Conflicting emotional stimuli have been used to search for better understandings of this phenomenon, particularly regarding whether attention is biased towards certain emotions and/or modalities. The recognition of the emotion conveyed by the face is systematically influenced by the emotion of the simultaneously heard vocal expressions, and vice versa, even when instructed to pay attention exclusively to one modality (Collignon et al., 2008; de Gelder & Vroomen, 2000; Massaro & Egan, 1996). A similar process occurs for face-body pairings: when affective conflicts occurred, emotions of the body substantially modified the perceived emotion in the face (Aviezer et al., 2008; Meeren et al., 2005; Nelson & Monloch, 2017; Van den Stock et al., 2007). Lastly, in the studies utilising voice-body stimuli, the voice

was frequently observed to exert a bigger influence on emotion perceptions (Piwek et al., 2015; Watson & de Gelder, 2020). On the whole, the detection of emotional discordances, regardless of the required increased attentional demands, suggests that multiple cues are automatically attended to, and the influence of each emotion and modality vary in different situations.

Most of the current studies examining multimodal integration have used emotionally conflicting bimodal stimuli (i.e stimuli with two modalities; faces and voices, faces and bodies, or voices and bodies). To date, only one study has examined how people integrate face, voice and body in emotion perception via the use of dynamic, multimodal, emotionally congruent and incongruent stimuli (Casey et al., 2021). The emotions displayed were happy, sad, angry and fearful. In the incongruent stimuli, two cues expressed the same emotion, while the third cue expressed an incongruent one (e.g. the face and voice were expressing happiness while the body was expressing anger). It was found that participants adopted holistic processing of emotions, such that all emotions featured in each video interacted with each other and informed the perceptions of the overall emotion. In most stimuli, the perceived overall emotions were more likely to be the emotion portrayed via two cues. In other stimuli, attentional biases and preferences for certain modalities influenced the perceptions of the incongruent emotion. Specifically, when the face was expressing the incongruent emotion, its emotion was more likely to become the one that was overall perceived. The incongruent cue also interacted with the emotion it conveyed, as the perceptions of emotions were biased towards the fearful facial expressions. Lastly, the level of ambiguity between the emotions expressed was also reported to have impacted the perception of the incongruent emotion. When the incongruent emotion was distinctly different (versus ambiguous) from the one in the majority, it was more likely to be perceived.

Multimodal Integration of Trait Judgements

The perception of traits is also a multimodal event formed by integrating signals from the target's face, body and voice, and the variability in modality strength has been demonstrated when contradicting signals are presented. Impressions of threat are greatly contributed by the person's facial appearance as compared to their body morphology (McElvaney et al., 2021). Impressions of dominance are influenced more strongly by voices compared to faces when they are both emotionally neutral (Mileva et al., 2018; Rezlescu et al., 2015). Impressions of trustworthiness have yielded differing results, with one study finding impressions of trustworthiness to be equally influenced by neutral facial expressions and voices of male posers (Rezlescu et al., 2015). In a different study, where both female and male posers were used, the impressions of trustworthiness were more greatly contributed by the facial expressions compared to the voices (Mileva et al., 2018). Lastly, the impressions of competence are significantly guided by the target's vocal characteristics. This is evident in simulated employment recruiting scenarios, where viewing candidates' appearance had no additional impact on hypothetical employers' evaluations of candidates' competence, thoughtfulness, and intelligence beyond the impacts of just hearing their voices (Schroeder & Epley, 2015).

Overall, past research shows that facial expressions are more influential in judgements of trustworthiness, whereas vocal cues are more influential in judgements of dominance and competence. Furthermore, the strength of a modality can be altered by changes in the emotions portrayed by the poser (McElvaney et al., 2021), in the traits instructed to be perceived (Rezlescu et al., 2015), in the posed trait intensity (Mileva et al., 2018), or in the context in which the traits are perceived (Schroeder & Epley, 2015). Therefore, the contribution of contextual cues, either demonstrating a matched or mismatched emotion with

the one expressed in the face, should be more frequently incorporated in the studies of social trait impressions.

The Current Study

The current study extends the earlier work by Casey et al. (2021). Here, the researcher will examine whether participants integrate emotion cues when judging trait information. Of specific interest will be the extent to which dynamic affect vocalisations, facial expressions and bodily expressions indicating the emotions 'happy', 'sad', 'angry', and 'fearful' contribute to the impressions of traits of competence, dominance and trustworthiness. Three modalities were combined to create emotionally congruent and incongruent voice-face-body pairings to create whole-body multisensory stimuli that resemble real-life situations. The incongruent stimuli provided researcher the opportunity to investigate whether participants relied more on the voice, body, or face when judging traits.

In this study, the 'majority emotion' refers to the emotion expressed via two cues, while the 'minority emotion' was the incongruent emotion portrayed via one cue. The cue expressing the minority emotion was referred to as the 'minority cue'.

Hypotheses

For this study, three hypotheses were pre-registered, which can be located on the Open Science Framework (https://osf.io/xtu7v/?view_only=90e82de00028427fbb80bbb0215958ba)[1]. These hypotheses were formed with respect to the review of literature related to trait judgements.

Hypothesis 1. Trait ratings would be informed by the majority emotion. Specifically, happy cues were expected to be rated as more trustworthy and competent, and less dominant.

[1] This study was part of a larger project, and not all pre-registered hypotheses are covered here. This study's two hypotheses correspond to Hypothesis 1, 2, 3 and 4 on the OSF page.

It was also predicted that angry cues would be rated as more dominant and less trustworthy and competent. Fearful cues were expected to convey the lowest levels of all three traits.

Hypothesis 2. There would be an interaction between the minority cue and the minority emotion, such that a) trustworthiness ratings would be the highest for the stimuli with a happy face as the minority cue, b) competence ratings would be the highest for the stimuli with a happy voice as the minority cue, and c) dominance ratings would be the highest for the stimuli with an angry voice as the minority cue.

Method

Participants

The University of Adelaide's First Year Psychology students were recruited to participate in the present study. Initially, the study received 204 participants. After removing those who failed to follow the instructions or provided incomplete data, a final sample size of 158 was achieved (Females = 109, Males = 49). Participants ranged from 17 to 55 years of age (M = 20.96 years) and have lived in Australia for an average of 16.10 years (range: 0 to 55 years). To compensate for their time, the students received course credit for their participation.

A power analysis using G*Power (Fau et al., 2007) indicated that 106 participants would be required to find a small effect size (f = .10) with .95 power (*alpha* = .05) for a 3 (traits) x 4 (emotions) x 3 (cue types) repeated measures ANOVA. The intended sample size was met, suggesting that this study has sufficient power to detect the effect of interest.

Materials

All participants were presented with the same 104 dynamic videos (~2-5 seconds long), showing a Caucasian male or female actor displaying the emotions 'happy', 'sad', 'angry', or 'fearful'. To depict these emotions, the actors posed a series of facial expressions, body expressions, or vocal expressions. the isolated face and isolated body stimuli (see

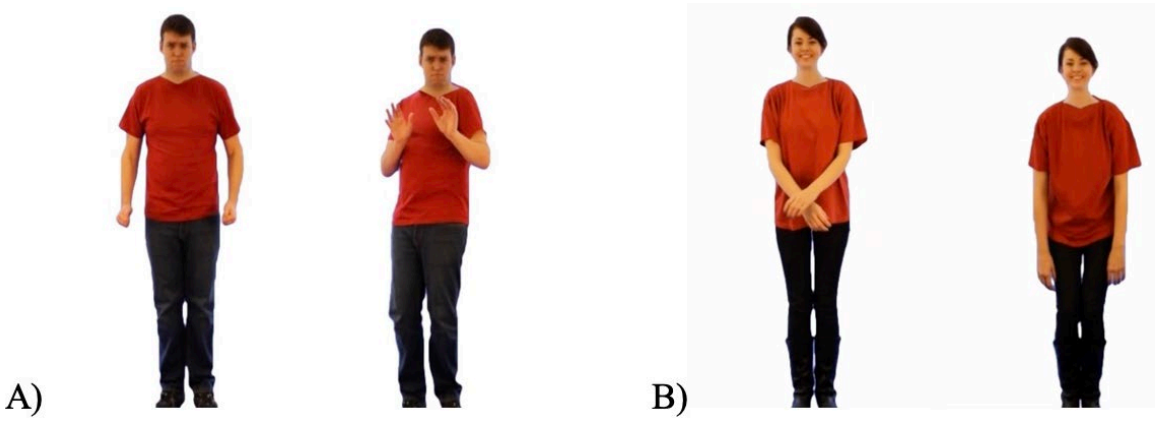
Appendix A) were adapted from Nelson and Mondloch (2017), with the isolated voice stimuli being adapted from Hawk et al. (2009). For the faces and bodies, the actors initially displayed an emotionally neutral face and body, followed by an emotional display. Both actors were dressed in the same clothing (Figure 1) to avoid the potentially biasing effects of apparel differences (Oh et al., 2020). The voices were non-linguistic affect vocalisations of the above emotions.

Using these 24 isolated stimuli, Casey et al. (2021) created 80 multimodal face-body-voice pairings. The emotions expressed by the three cues were either congruent or incongruent with each other. Specifically, in the 8 congruent stimuli, the same emotion was expressed throughout the three cues (e.g., a happy face on a happy body with a happy voice). In contrast, the 72 incongruent stimuli showed 2-versus-1 mismatching emotion expressions (e.g., an angry face and an angry body with a happy voice).

The emotions expressed in the chosen isolated stimuli were validated by the original authors within their respective studies (Hawk et al., 2009; Nelson & Mondloch, 2017). Specifically, the emotion identification accuracy rates were reported to range from 93.18% (happy female voice) to 100% (sad voices) for voices (Hawk et al., 2009), 85% (happy male body) to 100% (fearful bodies) for body expressions and 55% (angry male face) to 100% (fearful faces) for facial expressions (Nelson & Mondloch, 2017).

Figure 1

A male and female poser displaying incongruent and congruent emotional expressions.



Note. Male poser (panel A), showing angry face and body (left) and angry face and fearful body (right). Female poser (panel B), showing happy face and body (left) and happy face and sad body (right).

Procedure

This study was approved by the University of Adelaide School of Psychology Ethics Review Committee. The study was advertised on the School of Psychology's SONA Research Participation System, where the students could sign up to partake in the study. The data were collected from the 13th of May, 2021 to the 18th of June, 2021. It should take no longer than an hour to complete the survey.

The participants were first provided with the Information Sheet which introduced the purpose of the project, the tasks they would complete, the risks and benefits associated with participating, how the information and data would be stored and used in future analyses, and the researchers' contact details. Those who provided consent proceeded to answer the survey questions.

Participants first reported their age, gender, and the number of years they had lived in Australia. Next, they completed a practice trial to familiarise them with the trait rating tasks. Participants were instructed to watch the practice video (a clip of the children's movie 'Inside

Out') with the sound on. Then, they used a 5-point Likert scale to answer three questions asking whether they thought the actor was trustworthy, dominant and competent (1 = "Not at All", 5 = "Completely"). All videos could be replayed multiple times and no time limit was set.

Following the practice trial, participants viewed and rated the traits displayed in the 104 test videos. The incongruent and congruent stimuli were presented first, in a randomised order, followed by the isolated stimuli, also in a randomised order. It should be noted that the participants were presented with each combination of emotions twice, as the same combination was posed by a male and a female actor. Lastly, the participants were debriefed on the study's aims and independent variables and were provided with resources on the current topic.

Data Analysis Plan

Jamovi software was used to analyse the data. Descriptive statistics were used to provide a summary of the participants' demographic information. Participants' responses for the voice-face-body incongruent stimuli were grouped into two different variables; one variable grouped stimuli according to the majority emotion displayed, and the second variable grouped stimuli by the minority emotion and minority cue displayed.

Three within-subject repeated measures ANOVAs were run to address the hypotheses. Bonferroni-corrected post-hoc tests were used to follow-up significant effects. First, a preliminary analysis compared the trait ratings obtained for the congruent, incongruent and isolated stimuli in a trait x stimuli type repeated-measures ANOVA. The purpose of this analysis was to examine whether the participants integrated multiple cues when forming their judgements of traits. Second, to examine Hypothesis 1 which considered the influence of the dependent variable (DV) majority emotion on the trait judgements, a trait x majority emotion repeated-measures ANOVA was conducted. Third, Hypotheses 2 investigated the interaction

between the DVs minority emotion and minority cue on the trait judgements. Hence, a separate repeated-measures ANOVA for trait x minority cue x minority emotion was conducted.

Lastly, to test whether the stimuli were good exemplars of the three traits, one-sample t-tests were run to compare the trait ratings of the isolated, congruent and incongruent stimuli against the middle point (set at 3.0) of the 5-point Likert scale.

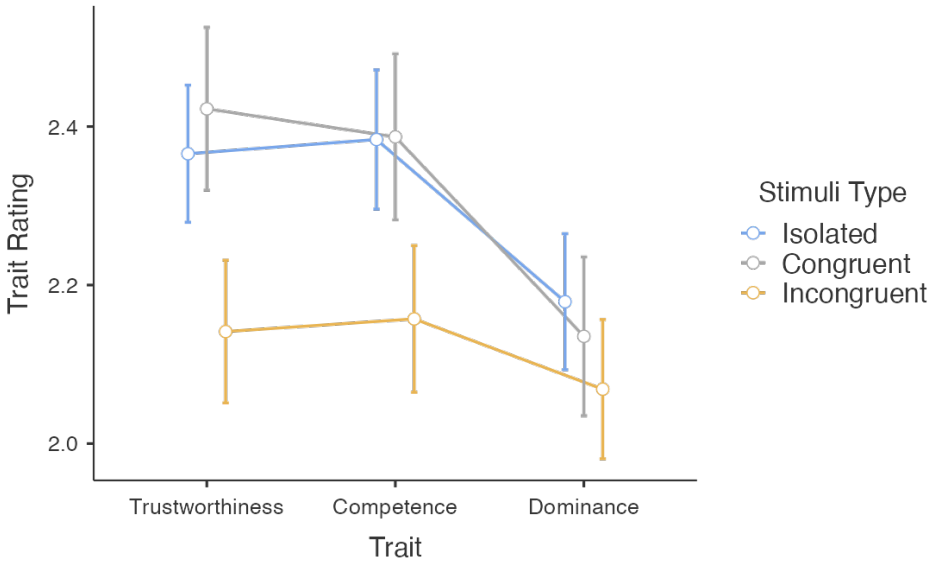
Results

Multimodal Integration

A preliminary analysis using a 3 (trait: competence, dominance, or trustworthiness) x 3 (stimuli type: isolated, congruent or incongruent) repeated measures ANOVA revealed a significant main effect of trait, $F(2, 157) = 16.20$. $p < .001$, $\eta^2_p = .09$, and stimuli type, $F(2, 157) = 28.00$. $p < .001$, $\eta^2_p = .15$, and they were qualified by a significant trait x stimuli type interaction, $F(4, 157) = 12.40$. $p < .001$, $\eta^2_p = .07$ (Fig. 2).

Figure 2

The mean trustworthiness, competence and dominance ratings for the isolated, congruent and incongruent stimuli. Error bars represent standard errors.



Nine tests were conducted, meaning that the Bonferroni-corrected alpha level = .05/9 = 0.0056. The Bonferroni-corrected post-hoc tests revealed that participants perceived a significantly higher level of trustworthiness and competence when viewing the congruent (M = 2.42; SD = 0.65 and M = 2.39; SD = 0.67 respectively) and isolated stimuli (M = 2.37; SD = 0.55 and M = 2.38; SD = 0.56) compared to the incongruent stimuli (M = 2.14; SD = 0.57 and M = 2.16; SD = 0.59), ps < .001. The difference in trustworthiness and competence ratings for the isolated and congruent stimuli were not significant, ps > .05. In addition, the isolated stimuli (M = 2.18; SD = 0.55) were rated as significantly more dominant than the incongruent stimuli (M = 2.07; SD = 56; p = .001). However, there was no significant difference in the obtained dominance ratings between the isolated and congruent stimuli (M = 2.14; SD = 0.64; p = .284); and between the congruent and incongruent stimuli, p = .017. These findings suggest that when an expression included mismatched emotion cues, the intensity of perceived trustworthiness, competence and dominance was decreased. Subsequently, participants' trait judgements integrated emotional information from all three modalities presented.

Majority Emotion Coding

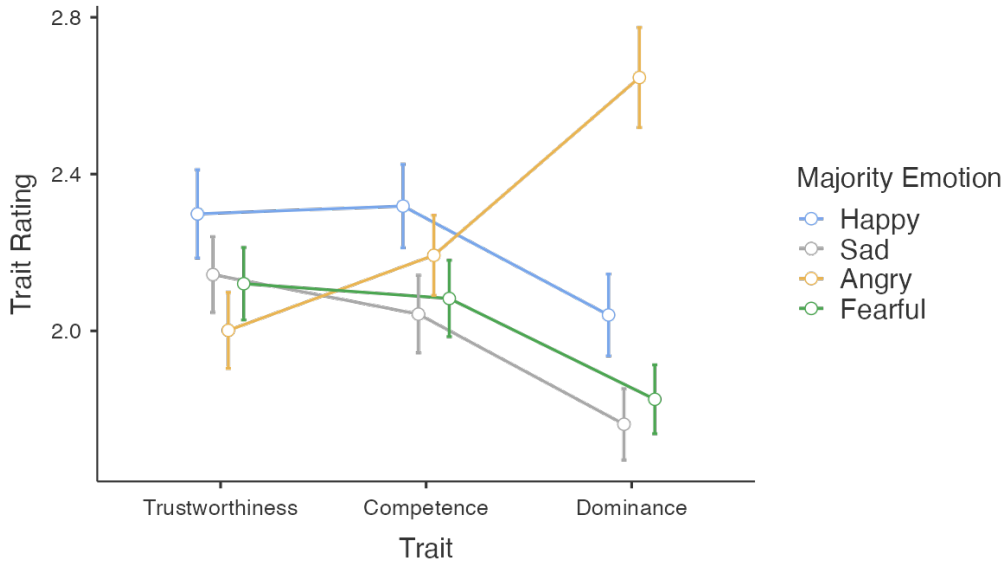
To examine how the majority emotion influenced ratings of the incongruent stimuli, a 3 (trait: competence, dominance, or trustworthiness) x 4 (majority emotion: happy, sad, angry, or fearful) repeated measures ANOVA was run. The majority emotion displayed in the expression was the DV. There were main effects of majority emotion, $F(3, 157) = 58.75$, $p < .001$, $\eta^2_p = .27$, and trait, $F(2, 157) = 3.05$, $p < .05$, $\eta^2_p = .19$, which were qualified by the majority emotion x trait interaction, $F(6, 157) = 110.96$, $p < .001$, $\eta^2_p = .414$ (Fig. 3).

For the trait x majority emotion interaction, Bonferroni-corrected post-hoc tests (α = .05/12 = .0042) were conducted, comparing differences between the trait ratings for each

majority emotion. Results for trustworthiness, competence, and dominance are presented separately.

Figure 3

The mean competence, trustworthiness and dominance ratings for the incongruent stimuli where happy, sad, angry, or fearful was the majority emotion. Error bars represent standard errors.



Trustworthiness

The incongruent stimuli with a majority happy emotion ($M = 2.30$; $SD = 0.72$) received significantly higher trustworthiness ratings than sad ($M = 2.14$; $SD = 0.62$; $p < .001$), fearful ($M = 2.12$; $SD = 0.59$; $p < .001$), and angry stimuli ($M = 2.00$; $SD = 0.62$; $p < .001$). The stimuli with sad or fearful as the majority emotion were rated as similarly trustworthy ($p = .300$), and more trustworthy than those with angry as the majority emotion ($ps < .001$).

Competence

The competence ratings of the Incongruent stimuli with majority happy emotion ($M = 2.32$; $SD = 0.68$) were similar to those with a majority angry emotion ($M = 2.19$; $SD = 0.65$; $p = .002$), and significantly higher than those with a minority fearful emotion ($M = 2.08$; $SD = 0.62$; $p < .001$) or minority sad emotion ($M = 2.04$; $SD = 0.63$; $p < .001$). The stimuli with a

majority angry emotion were rated as significantly more competent than those with a majority sad or fearful emotion (*p*s < .001). However, the majority fearful stimuli were not rated as significantly more trustworthy than the majority sad stimuli ($p = .111$).

Dominance

The dominance ratings of the incongruent stimuli with a majority angry emotion ($M = 2.65$; $SD = 0.81$) were significantly higher than those with a majority happy emotion ($M = 2.04$; $SD = 0.67$; $p < .001$), fearful ($M = 1.83$; $SD = 0.65$; $p < .001$), and sad ($M = 1.76$; $SD = 0.58$; $p < .001$). The majority happy stimuli were significantly more dominant than the majority fearful and majority sad stimuli (*p*s < .001). Lastly, the majority fearful and sad stimuli were rated as similarly dominant ($p = .009$).

To summarise, the stimuli where happy was the majority emotion were rated as the most trustworthy and the most competent. The stimuli where anger was the majority emotion were rated as the most dominant. Taken together, these findings supported Hypothesis 1.

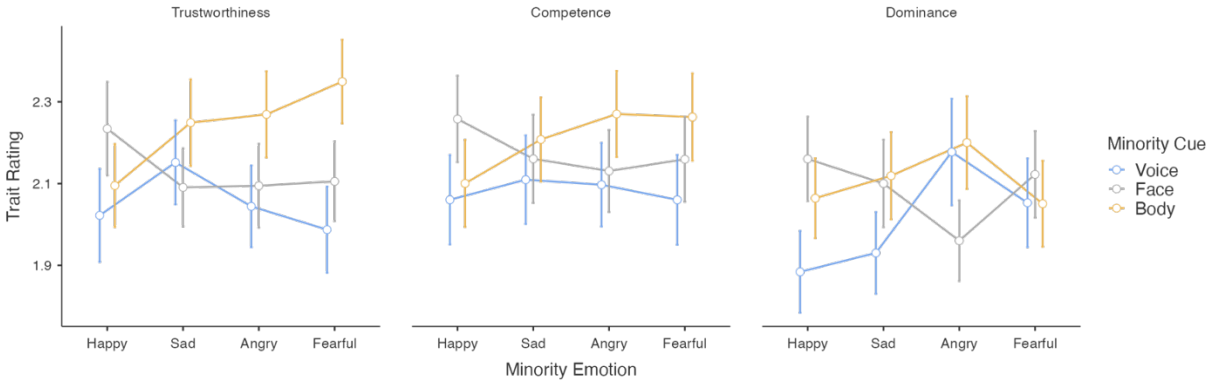
Minority Emotion Coding

To examine how the minority emotion and the cue displaying it influenced ratings of the incongruent stimuli, a 3 (trait: competence, dominance, or trustworthiness) x 4 (minority emotion: happy, sad, angry, or fearful) x 3 minority cue (voice, face, or body) repeated measures ANOVA was run. Here, the minority emotion cue displayed in the expression was the DV. The analysis revealed no main effect of minority emotion, $F(3, 157) = 2.27$, $p = .08$, $\eta^2_p = .14$, but a main effect of trait, $F(2, 157) = 3.01$, $p = .049$, $\eta^2_p = .019$, and minority cue, $F(2, 157) = 31.35$. $p < .001$, $\eta^2_p = .166$). There were two-way interactions between trait x minority cue, $F(4, 157) = 5.08$, $p < .001$, $\eta^2_p = .031$, and minority emotion x minority cue interaction, $F(6, 157) = 10.26$, $p < .001$, $\eta^2_p = .05$, but these were superseded by a 3-way trait x minority emotion x minority cue interaction, $F(12, 157) = 8.31$. $p < .001$, $\eta^2_p = .05$ (Fig. 4).

For the trait x minority cue x minority emotion interaction, Bonferroni-corrected post-hoc tests ($\alpha = .05/36 = .0014$) were conducted, comparing differences between the face, body and voice cues for each emotion. Results for trustworthiness, competence, and dominance are presented separately, below.

Figure 4

The mean trustworthiness, competence and dominance ratings for the incongruent stimuli grouped by their minority cue and minority emotion. Error bars represent standard errors.



Trustworthiness

When happy was the minority emotion, stimuli where the minority cue was the face ($M = 2.23$; $SD = 0.73$) were rated as more trustworthy than those with the voice ($M = 2.02$; $SD = 0.72$; $p < .001$). No other comparisons were significant.

When sad was the minority emotion, stimuli where the minority cue was the body ($M = 2.25$; $SD = 0.65$) were rated as more trustworthy than those with the face ($M = 2.09$; $SD = 0.61$; $p < .001$). No other comparisons were significant.

When angry was the minority emotion, stimuli where the minority cue was the body ($M = 2.27$; $SD = 0.67$) were rated as more trustworthy than those with the face ($M = 2.09$; $SD = 0.65$, $p < .001$) or the voice ($M = 2.04$; $SD = 0.64$, $p < .001$), which were rated as similarly trustworthy ($p = .0396$).

When fearful was the minority emotion, stimuli where the minority cue was the body (M = 2.35; SD = 0.65) were rated as more trustworthy than those with the face (M = 2.11; SD = 0.62) or the voice (M = 1.99; SD = 0.67). The differences between the three cues were all statistically significant (ps < .001).

Competence

When happy was the minority emotion, stimuli where the minority cue was the face (M = 2.26; SD = 0.67) were rated as more competent than those with the body (M = 2.10; SD = 0.68; p < .001) or the voice (M = 2.06; SD = 0.70; p < .001), which were rated as similarly competent (p = .0398).

When sad was the minority emotion, stimuli were rated as similarly competent when expressed via the body (M = 2.21; SD = 0.66), the face (M = 2.16; SD = 0.69) or the voice (M = 2.11; SD = 0.69) (ps > .0014).

When angry was the minority emotion, stimuli where the minority cue was the body (M = 2.27; SD = 0.67) were rated as more competent than those with the face (M = 2.13; SD = 0.64; p < .001) or the voice (M = 2.10; SD = 0.65; p < .001), which were rated as similarly competent (p = .333).

When fearful was the minority emotion, stimuli where the minority cue was the body (M = 2.26; SD = 0.68) were rated as more competent than those with the voice (M = 2.06; SD = 0.70; p < .001). No other comparisons were significant.

Dominance

When happy was the minority emotion, stimuli were rated as similarly dominant when expressed via the face (M = 2.16; SD = 0.66) or body (M = 2.06; SD = 0.62; p = .024), and significantly less dominant when expressed via the voice (M = 1.88; SD = 0.64; ps < .001).

When sad was the minority emotion, stimuli were rated as similarly dominant when expressed via the body (M = 2.12; SD = 0.68) or face (M = 2.10; SD = 0.68; p = .653), and significantly less dominant when expressed via the voice (M = 1.93; SD = 0.64; ps < .001).

When angry was the minority emotion, stimuli were rated as similarly dominant when expressed via the body (M = 2.20; SD = 0.72) or voice (M = 2.18; SD = 0.83; p = .678), and significantly less dominant when expressed via the face (M = 1.96; SD = 0.63; ps < .001).

When fearful was the minority emotion, stimuli were rated as similarly dominant when expressed via the face (M = 2.12; SD = 0.67), the body (M = 2.05; SD = 0.67) or the voice (M = 2.05; SD = 0.69) (ps > .05).

To summarise, stimuli with a minority happy face, or a sad, angry or fearful body received the highest trustworthiness ratings compared to those where these minority emotions were conveyed by the different modalities. A similar pattern was observed for competence. Stimuli with a minority happy face, sad face or body, angry body or voice were rated as the most dominant compared to when these minority emotions were conveyed by the different modalities.

The data provided partial support for Hypothesis 3. The ratings of trustworthiness were indeed the highest when the mismatched face expressed happiness, although ratings for the face and the body were not statistically different, and the ratings of dominance were the highest when the mismatched body or voice expressed anger. However, the highest ratings of competence were not observed for the stimuli with a minority voice showing happiness. Instead, it was found that the stimuli with a minority happy face received the highest competence ratings compared to when happiness was conveyed via other modalities.

Trait Representativeness of the Stimuli

Finally, to determine how strongly our stimuli were viewed by participants as representing trustworthiness, competence, or dominance, a series of one-sample t-tests were

conducted (see Appendix C). Compared were the mean trait ratings for the isolated, congruent and incongruent stimuli to the midpoint score (3.0) of the five-point Likert scale used by participants. 31 out of 36 tests were below 3.0. Mean ratings ranged from 1.59 for dominance ratings of sad congruent stimuli to 3.17 for dominance ratings of angry congruent stimuli. Therefore, participants did not judge the stimuli as being strong exemplars of the three traits examined.

Discussion

Recent findings point to close links between facial physical resemblances to emotional expressions and trait judgements, yet faces are not typically encountered in isolation. Thus far, relevant literature has only recently begun to study trait judgements from faces in the presence of contextual cues, such as the body and voice. Moreover, studies employing more than two modalities are scarce, and little is known about how multiple emotional cues are integrated to make trait judgements. The present study aimed to address this gap by investigating the formation of trustworthiness, competence and dominance impressions from facial, bodily, and vocal cues conveying happiness, sadness, anger, and fear. The study also examined potential attentional biases towards certain emotional modalities when viewing multimodal stimuli and their impact on trait judgements.

Subsequently, a number of predictions were formed. Firstly, the participants were predicted to integrate multiple emotional cues to make trait judgements (preliminary analysis). Secondly, the perceived levels of traits were hypothesised to be informed by the emotion in the majority (Hypothesis 1). Thirdly, the study hypothesised that there would be an interaction between the minority emotion and minority cue, such that a) stimuli with a minority happy face would be judged as the most trustworthy, b) stimuli with a minority happy voice as the most competent, and c) stimuli with a minority angry voice as the most dominant (Hypothesis 2). Support was found for Hypothesis 1, and Hypothesis 2 was

partially supported. Located below is the interpretation and evaluation of the study's findings with respect to the existing literature. Additionally, the study's implications and limitations are discussed, and new directions for future research are proposed.

Multimodal Integration

The current study is the first to examine how people integrate multimodal emotional cues to make judgements of various traits. It was revealed that trustworthiness, competence and dominance intensities were significantly impaired when a mismatched emotion was shown. The mismatched emotion, signalled either by the voice, face, or body, was not neglected, however meaningfully contributed to the overall perceptions of traits. Therefore, the participants directed their attention to the emotional information of all audio-visual cues presented and integrated them to form their trustworthiness, competence and dominance impressions. Similarly, several studies have reported the influence of the simultaneously displayed mismatched body (Van den Stock et al., 2007) and voice (de Gelder & Vroomen, 2000) on the perception of facial emotion, and the influence of two emotionally neutral modalities on the inferences of traits (McElvaney et al., 2021; Mileva et al., 2018; Rezlescu et al., 2015). The holistic processing view was not only reinforced but also extended by this study to underlie audio-visual whole-person perceptions. These findings highlight the importance of integrating whole-person stimuli into research and theories of trait perception.

In addition, mean dominance ratings of the isolated, congruent, and incongruent stimuli were observed to be relatively similar and low (Figure 2). This could indicate that dominance was less influenced by conflicting emotion signals than trustworthiness and competence. The finding reported by Hehman and colleagues (2015) provides a potential explanation for this finding. In their study, the evaluations of facial dominance, conceptualised by the perception of physical ability, were significantly less modifiable compared to the evaluations of facial trustworthiness, conceptualised by the perception of

intentions. The target's facial structure was suggested to be more important in the judgements of dominance than the dynamic features of emotion resemblances. However, the averaged dominance ratings of the isolated, congruent and incongruent stimuli did not take into consideration which emotion(s) were displayed. When the stimuli were divided into categories based on their emotional expressions, the dominance ratings were more distributed, contradicting Hehman et al.'s (2015) findings. In the present study, dominance ratings were differentiated by the emotion(s) the stimuli were showing, and this malleability of dominance impressions has also been reported by other researchers (Knutson, 1996; Montepare & Dobish 2003; Said et al., 2009). Therefore, the importance of studying the link between the perceptions of emotions and traits is emphasised.

Majority Emotion

Hypothesis 1 was formed based on Casey et al.'s (2021) finding that viewing the incongruent stimuli, the perceptions of the overall emotion were more likely to be the emotion in the majority than the emotion in the minority. Following the overgeneralization hypothesis of emotional expressions to trait judgements (Montepare & Dobish, 2003), the same pattern was predicted to occur for the perceptions of trustworthiness, competence and dominance. The data of the present study supported Hypothesis 1, as the emotion in the majority guided the participants' trait ratings. Furthermore, using the patterns observed in the current literature (Calvo et al., 2019; Mondloch et al., 2019; Montepare & Dobish, 2003; Oosterhof & Todorov, 2009; Said et al., 2009; Todorov et al. 2013; Ueda & Yoshikawa, 2018), Hypothesis 1 predicted that trait judgements would vary across emotions. Specifically, stimuli with happiness as the majority emotion would convey higher trustworthiness and competence than dominance, while stimuli with anger as the majority emotion would convey higher dominance than trustworthiness and competence. Lastly, stimuli with fear as the majority emotion would be rated as low in all three traits. The results of this research

provided support for these predictions. Therefore, the existing patterns found for faces could be applied for the multimodal stimuli in which the target's face, body and voice were present.

Interestingly, angry-looking faces were rated as appearing to be the most unintelligent compared to happy, fearful and sad-looking faces (Said et al., 2019). However, in this study, the stimuli with anger as the majority emotion were only judged as being less competent than those with happiness. Two possible explanations are proposed to explain this unexpected finding. The first explanation is related to the interrelationships between anger, dominance, masculinity and competence. A leader's facial quality of competence has been found to comprise facial dominance and trustworthiness (Riggio & Riggio's, 2010), which suggests that competence can be linked to dominance. Dominance is also indirectly linked to competence via the perception of facial masculinity, as dominance is more likely to be inferred from masculine female and male faces compared to feminine faces (Pivonkova et al., 2011; Wen et al., 2020), and facial masculinity is associated with the impression of competence (Oh et al., 2019; Olivola & Todorov, 2010; Walker & Wanke, 2017; Wen et al., 2020). Therefore, the emotional expression of anger might be linked to both dominance (Montepare & Dobish, 2003) and competence evaluations.

The second potential explanation for the finding is that the patterns observed for trait impressions from emotions might differ by cue. A large body of literature is face-specific, and whether or not the findings could be applied to other modalities is under-researched. Faces resembling anger may appear incompetent (Said et al., 2019), but angry voices and angry bodies may not. Moreover, bodies expressing anger were found to appear dominant (Van Der Zant et al., 2021). An interplay between the incompetent face and dominant body might have led to an overall impression of not being highly competent but also not incompetent.

Minority Emotion and Minority Cue

The literature suggests that a certain modality and emotion could be more influential when perceiving a specific trait. This study investigated these attentional biases by examining which emotional cue in the minority received the highest ratings on each trait. An interaction between the minority emotion and minority cue was predicted, such that a) stimuli with a minority happy face would be judged as the most trustworthy, b) a minority happy voice as the most competent, and c) a minority angry voice as the most dominant (Hypothesis 2). Results provided support for the predictions for trustworthiness and dominance. For competence, the highest ratings were obtained when the stimuli had a minority happy face in comparison to those with a minority happy body or voice. The sections below will discuss the findings for each trait by drawing on the literature discussing attentional biases in both emotion and trait perception.

Trustworthiness

Hypothesis 2-a was informed by studies showing the preferences for facial cues in the perception of happiness (Casey et al., 2021) which signals trustworthiness (Calvo et al., 2019; Said et al., 2009; Todorov et al., 2013), and for non-emotion posing faces in the perception of trustworthiness (Mileva et al., 2018). The present study supported this hypothesis, as a happy face paired with a sad, angry, or fearful voice and body were rated the highest on trustworthiness, which is indicative of a strong influence of the happy face on the perception of this trait. This result is consistent with the findings from a recently published research paper in which the stimuli were posed by the same actor as the present study (Van Der Zant et al., 2021). In that paper, the participants were given a storybook task where they had to select a partner who would help them in a challenge. There were two choices, one potential partner had a happy or angry face on a neutral body, while the other had a neutral face on a happy or angry body. When selecting a trustworthy partner, the one with a happy face on a neutral

body was preferred over the one with a neutral face. Taken together, these results imply that happy faces are prominent when forming judgements of others' trustworthiness, even when they are incongruent with the simultaneously presented cues.

Unexpectedly, although fearful faces are likely to be judged as being non-trustworthy (Said et al., 2009), in the present study, the stimuli with an incongruent fearful body received the highest trustworthiness ratings. A possible explanation for this result is related to a link between fearful faces and low levels of perceived threat (Said et al. 2009). If this association can be generalised to bodies, fearful bodies could also be non-threatening and not conveying harmful intentions which correspond to the quality of being warm or trustworthy in the models of social cognition (Fiske et al., 2007; Oosterhof & Todorov, 2008). In addition, fearful bodies have been found to influence the recognition of emotional voices and faces. In one study, a happy voice presented on a fear-expressing body was less frequently categorized as being happy compared to when it was presented on a happy-expressing body (Van den Stock et al., 2007). In a different study, when a sad face was paired with a fearful body, the target was more frequently categorised as appearing fearful (Aviezer et al., 2008). Other studies have also reported the influence of fearful bodies over emotional faces when the body-face compound stimuli were expressing fear and anger (Meeren et al., 2005), and fear and happiness (Van den Stock et al., 2007). Therefore, people are more likely to pay attention to the fearful body than an emotionally conflicting voice or face by which it is accompanied, and fearful bodies are suggested to be perceived as non-threatening. As a result, when a fearful body was the minority cue, the stimuli were perceived as being highly trustworthy.

Competence

Facial resemblances to happy expressions are perceived as intelligent (Said et al., 2009), suggesting that happy cues might underlie the perception of competence. Moreover, vocal characteristics were found to be dominant in the perception of competence and tend to

override the influence of visual cues (Schroeder & Epley, 2015). Hence, the present study predicted that the stimuli with a minority happy voice would be perceived as higher on competence than those with a happy body or face. However, the stimuli with a minority happy face received the highest competence ratings. This finding contradicts what was observed in Schroeder and Epley's (2015) study where being able to see the potential employees did not have any impact in addition to the perception formed when only their voices were heard. On the other hand, it aligns with the finding that candidates' appearance outweighed the verbal cues in political voting scenarios (Benjamin & Shapiro, 2009; Olivola & Todorov, 2010), as there, competence evaluations were the results of rapid and unreflective judgments from faces (Ballew & Todorov, 2007). However, in these studies, voices were not affect vocalisations but carried meanings such as job pitches (Schroeder & Epley, 2015) or political debates (Benjamin & Shapiro, 2009; Olivola & Todorov, 2010). Taking into consideration Casey et al.'s (2021) study which utilised affective vocalisations, the happy faces as the mismatched cue had a higher likelihood of being perceived as the overall emotion. Therefore, it could be suggested that although vocal characteristics are dominant in the perception of competence, when the vocal cue only conveys emotional expressions without meaningful contents, they are not as influential as the happy facial expressions.

Dominance

The present study predicted that the stimuli with a minority angry voice would be perceived as more dominant than those with a minority angry body and face, which was supported by the data obtained. This hypothesis considered the studies using emotionally neutral faces, voices and bodies due to the lack of research on the overlap between emotional voices and bodies and trait judgements at the time it was formed. In these studies, the target's voice exerted a stronger influence on the perception of dominance than their face, as the vocal pitch was hypothesised to be linked to masculinity which is correlated with dominance

(Mileva et al., 2018; Rezlescu et al., 2015). The hypothesis also considered Casey et al.'s (2021) finding that the minority angry body was perceived less frequently than the minority angry voice and face. However, the stimuli with a minority angry body received similarly high dominance ratings to those with a minority angry voice. The angry body was also found to indicate dominance in the study by Van Der Zant et al. (2021). When selecting a dominant partner for the challenge, the participants preferred one with an angry body and neutral face over the one with a neutral body. These results demonstrate a preference for angry bodies in the perception of dominance, even though this was not the pattern observed in the perception of emotion.

Curiously, the stimuli with a minority angry face were rated as being the least dominant compared to those with a minority angry body or voice. In the perception of dominance from non-emotion posing targets, faces were found to have a larger contribution than the vocal cues (Han et al., 2017). However, in this study, an angry face on a body and a voice of a different emotion were not perceived as dominant. This may be supported by Nelson and Mondloch's (2017) finding that angry faces are malleable and dependent on the body they are presented with. The recognition accuracy rates of the angry face dropped from 80% when it was paired with an angry body to slightly over 50% when it was paired with a sad or fearful body. Therefore, the face's anger was merged with its bodily emotional expression and lost its meaning. Hence, when an angry face was only in the minority, its impact on the level of dominance perceived by the participants could be insignificant. Taken together, the angry face might be malleable in both the perception of emotion and trait dominance.

Implications

The present study addressed the situations where facial, bodily and vocal expressions do not provide the same meaning, and added to the currently limited literature on how

emotions are overgeneralized as competence. Several implications emerged as a result. The participants were found to integrate multiple emotional cues to make their judgements of traits. This is evident via the impaired perceived trait intensities in the presence of an emotionally incongruent cue. Investigations of whole-body stimuli will extend the current face-based research and will capture a more complete view of the mechanism which underlies trait impression formation. Furthermore, the processing of emotional bodies and voices might be different from the processing of emotional faces. Several findings of the present study suggested that the established patterns for isolated real or computer-generated faces were not always generalisable to other modalities. For instance, anger when expressed by the face conveyed incompetence (Said et al., 2009), but a moderate level of competence was inferred when fear was expressed by the body (Hypothesis 2-2). In addition, some judgements of traits were more influenced by the minority emotional cue than the emotion in the majority. In some cases, an emotional cue was more influential towards the trait ratings even when it was mismatched with the other two cues. Altogether, this study highlights the importance of using multimodal stimuli in trait impression research to gain a better understanding of the holistic processing of emotions from which traits are inferred.

Limitations and Directions for Future Research

Several limitations which could be appropriately addressed in future studies were identified. The first of which concerns the stimuli's trait representativeness. As reported by t-tests, the stimuli used in this study to examine the role of emotions in making trait judgements were not perceived as being strong exemplars of the three traits examined. This could be a design limitation, whereby no attempt was made by the posers to evoke high or low levels of the traits, but the stimuli were designed to demonstrate different emotions. In addition, the variability in modality strength could be different for the stimuli consisting of emotionally neutral faces, bodies, and voices that are manipulated to display a high or low

trait level. Hence, future research might use different stimuli to examine which modality could be more salient in the perception of the traits.

The second potential limitation is that latter trait judgements could be influenced by the initial impressions which are formed within the first 100ms of exposure (Willis & Todorov, 2006). First implicit impressions were not found to be effectively corrected by new information and the initial beliefs were reported to persist, influencing the subsequent judgements (Wyer, 2010). In the present study, 104 videos were shown, and it is possible that the trait ratings of the latter stimuli did not reflect the participants' true first impressions. Future research where each individual participant rates only one video of each poser may shed light on how trustworthiness, dominance and competence first impressions differ according to the emotion(s) portrayed.

The third limitation is related to the stimuli's generalizability. Having only two posers could suggest the lack of variability in factors influencing perceptions of traits such as clothing (Oh et al., 2020), attractiveness (Dion et al., 1972; Oh et al., 2019), facial features (Olivola &Todorov, 2010), body structure (McElvaney et al., 2021), body movements (Koppensteiner et al., 2016), and vocal characteristics (Schild et al., 2019). Furthermore, the present study only examined four emotional expressions. Future research could consider including more actors who vary in factors listed and portray more emotions to increase the generalisability of the results.

Another potential limitation considers how trustworthiness, competence and dominance can be different concepts depending on the context in which they are judged. For example, competence can adopt the meaning of social competence (Eagly et al., 1991), intellectual competence (Eagly et al., 1991), occupational competence (Riggio & Riggio, 2010), physical ability (Hehman et al., 2015), or general competence (Fiske et al., 2002, Fiske et al., 2007; Oh et al., 2019). For this study, the specific aspect of these traits was not

specified in the task instruction. As the result, the judgements obtained reflected what participants considered as being generally trustworthy, competent and dominant. Future research could consider investigating what comprises the quality of their specific types and to determine whether or not the patterns observed in this study can be applied.

Conclusion

In summary, the present study has provided clear support for the integration of all three available cues to form trait judgments. In emotionally incongruent stimuli, the emotion displayed in two cues were more likely to predict the judgements of traits. The emotional cue in the minority was not neglected but had an influence on the traits perceived, such that trustworthiness and competence ratings were biased towards a minority happy face and dominance ratings were biased towards a minority angry body or angry voice when the other two cues were displaying a different emotion. The present research contributes to a growing body of evidence emphasising the importance of integrating whole-person stimuli into impressions formation research. Studies using multimodal stimuli could provide insight into the mechanisms that underlie the formation of first impressions, and into the variability of modality strength. Finally, the study indicates the need for future work looking at how traits are inferred from emotional vocal and bodily cues, as in some cases, the face-based patterns could not be applied to bodies and voices. Therefore, impressions of traits are fascinating as they are spontaneous and effortless yet highly complicated and various factors dependent nature.

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Appendix A: Isolated faces and isolated bodies.

Happy	Sad	Angry	Fear

Appendix B: Example test trial

Please press Play on the video. Do you think this person is..

	Not at all	A little bit	Neither A little nor A lot	A lot	Completely
Trustworthy	○	○	○	○	○
Dominant	○	○	○	○	○
Competent	○	○	○	○	○

Appendix C: Descriptive statistics for isolated, congruent and incongruent stimuli, their one-sample t-test scores and the effect size

	Emotion	Min	Max	M (SD)	t-test	p-value	Effect Size
Isolated Stimuli							
Trustworthiness	Happy	1.00	5.00	3.03 (0.87)	0.38	0.71	0.03
	Sad	1.00	3.83	2.35 (0.65)	-12.56	< .001	-1.00
	Angry	1.00	4.00	1.89 (0.73)	-18.99	< .001	-1.51
	Fearful	1.00	4.17	2.19 (0.7)	-14.42	< .001	-1.15
Competence	Happy	1.00	4.50	2.93 (0.69)	-1.25	0.21	-0.10
	Sad	1.00	3.83	2.10 (0.69)	-16.58	< .001	-1.32
	Angry	1.00	4.67	2.39 (0.75)	-10.28	< .001	-0.82
	Fearful	1.00	4.67	2.12 (0.74)	-14.93	< .001	-1.19
Dominance	Happy	1.00	4.00	2.19 (0.8)	-12.71	< .001	-1.01
	Sad	1.00	3.17	1.62 (0.66)	-26.14	< .001	-2.08
	Angry	1.00	5.00	3.17 (0.95)	2.26	0.03	0.18
	Fearful	1.00	4.33	1.73 (0.72)	-21.99	< .001	-1.75
Congruent Stimuli							
Trustworthiness	Happy	1.00	5.00	2.91 (1.01)	-1.07	0.29	-0.08
	Sad	1.00	5.00	2.41 (0.88)	-8.38	< .001	-0.67
	Angry	1.00	5.00	1.98 (0.87)	-14.75	< .001	-1.17
	Fearful	1.00	4.50	2.38 (0.83)	-9.46	< .001	-0.75
Competence	Happy	1.00	5.00	2.85 (0.91)	-2.11	0.04	-0.17
	Sad	1.00	5.00	2.17 (0.9)	-11.57	< .001	-0.92
	Angry	1.00	5.00	2.39 (0.92)	-8.28	< .001	-0.66
	Fearful	1.00	4.50	1.66 (0.79)	-21.33	< .001	-1.70

Dominance	Happy	1.00	5.00	2.18 (1.01)	-10.23	< .001	-0.81
	Sad	1.00	4.50	1.59 (0.8)	-22.07	< .001	-1.76
	Angry	1.00	5.00	3.09 (1.14)	1.01	0.31	0.08
	Fearful	1.00	4.50	1.66 (0.79)	-21.33	< .001	-1.70
Incongruent Stimuli - Majority emotion							
Trustworthiness	Happy	1.00	3.83	2.3 (0.72)	-12.30	< .001	-0.98
	Sad	1.00	3.39	2.14 (0.62)	-17.52	< .001	-1.39
	Angry	1.00	3.17	2 (0.62)	-20.36	< .001	-1.62
	Fearful	1.00	3.33	2.12 (0.59)	-18.81	< .001	-1.50
Competence	Happy	1.06	3.78	2.32 (0.68)	-12.65	< .001	-1.01
	Sad	1.00	3.94	2.04 (0.63)	-19.12	< .001	-1.52
	Angry	1.00	4.00	2.19 (0.65)	-15.58	< .001	-1.24
	Fearful	1.00	3.39	2.08 (0.62)	-18.60	< .001	-1.48
Dominance	Happy	1.00	3.78	2.04 (0.67)	-18.15	< .001	-1.44
	Sad	1.00	3.56	1.76 (0.58)	-26.93	< .001	-2.14
	Angry	1.00	4.61	2.65 (0.81)	-5.47	< .001	-0.44
	Fearful	1.00	3.22	1.83 (0.56)	-26.42	< .001	-2.10