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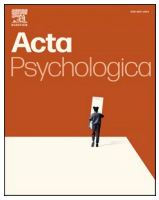

The effect of interpersonal distance and background context on trait impressions

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ABSTRACT

People rapidly form trait impressions of other individuals that they encounter based on their visual appearance. Such opinions are made with consensus between observers, yet external factors can also influence judgments. Here, we investigated the effects of two potentially important external factors - interpersonal distance and background context - by manipulating these variables while participants evaluated life-sized whole-person stimuli. Participants rated attractiveness, competence, dominance, and trustworthiness of target figures presented to them at near and far distances with different positively or negatively valenced backgrounds that were ambient (Experiment 1: beach vs. fire scenes) or social (Experiment 2: happy vs. disgusted flanking figures). We predicted that targets would be rated more favourably in positive vs negative background contexts, and that this effect may interact with interpersonal distance (at far distances people may rely relatively more on background cues). This is the first investigation of how these two factors jointly shape a broad set of trait impressions under naturalistic (life-sized, whole-body) viewing conditions. Results broadly confirmed a strong influence of background context tested. However, the predicted interaction with interpersonal distance was observed selectively for trustworthiness judgments in a social background context (Experiment 2). Together our findings provide first evidence of an influence of context on different trait judgments, and suggest the trait-selective differences in the integration of such cues with distance.

1. Introduction

People rapidly and spontaneously form impressions of others based on their visual appearance, for which there is a high consensus between observers (Oosterhof & Todorov, 2008; Rule et al., 2012; Sutherland et al., 2013, 2018; Willis & Todorov, 2006; Zebrowitz & Montepare, 2008). Contextual information may bias such judgments (Aviezer et al., 2008). For example, how far one is from the to-be-judged person alters the quality of the visual information we have available (Hahn et al., 2016), while people nearby might be more relevant to us (Veranic, Ewing, et al., 2025). From a relatively far distance, the perceptual system may also adapt rely more on surrounding contextual information from the scene in order to reach a judgment. In the current study we investigated how interpersonal distance and background context information, act and interact to affect impression formation. Specifically, we asked participants to make social judgments about images of people from near and far distances while the background context on which the images were presented was varied.

Our perception of others' appearance can be strongly influenced by their environment (e.g., Righart & De Gelder, 2008). This is true particularly when the person's actions or their personality are attributable to that context, i.e., whether the context could be linked to the person (Mattavelli et al., 2023). Research by Aviezer et al. (2008) demonstrated that response times for facial emotion categorization judgments were faster when an expression was paired with a background context (i.e., body postures and situational cues) that had matching affective valances (see also Bayliss et al., 2012). Convergent work in this area has also investigated the effects of scene context on facial emotion judgments, i.e., using background images with contrasting affective valances, e.g., car crash vs beach (see Barrett & Kensinger, 2010) and social context (e.g., happy vs angry faces; Ito et al., 2013; Mumenthaler & Sander, 2015). Cartaud et al. (2022) also demonstrated that emotional context also shifts judgments of neutral faces which can bleed into action-relevant judgments like preferred interpersonal

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distance. Other research found similar effects of context on bodily expression recognition (Kret & de Gelder, 2010a, 2010b; Reschke et al., 2018).Some studies have also explored the role of background context on *trait impressions*. Research has recently highlighted the importance of face-context integration when making trustworthiness judgments (e.g., Mattavelli et al., 2023). Brambilla et al. (2018) also found that visual scenes influence trustworthiness categorization of faces. When presented in a threatening scene context (e.g., featuring spattered blood), people's faces were perceived as less trustworthy than when on a non-threatening background (e.g., pastoral scene). Moreover, Mattavelli et al. (2022) found that threatening contexts decreased trustworthiness attributions even more when threatening stimuli could be potentially attributable to the perceived person's actions (e.g., smiling face in front of a bloody axe). These studies strongly signal that background context affects social judgments beyond emotional expression perception, in that people receive more extreme social attributions within differently valenced contexts (i.e., giving more positive/negative ratings in positive/negative contexts). To the best of our knowledge the effect of context has not yet been investigated on judgments of any other traits.

The processes underlying social cognition are tightly linked to processes of spatial cognition (Bogdanova et al., 2022; Iachini et al., 2015; Pellencin et al., 2018). When someone is near or approaching us, the potential for meaningful social engagement is increased. Closer distances are more likely to demand more immediate attention and responses from us, compared with when someone is far or moving away. Evidence for this phenomenon comes from studies of physiological reactions that have noted arousal changes (relatively increased heart rate and skin conductance responses) in reaction to proximity and approach (Candini et al., 2021; Cartaud et al., 2018; Coello & Cartaud, 2021; Evans & Wener, 2007; McBride et al., 1965; Ruggiero et al., 2021). Neural investigations have also reported patterns of selective activation of brain areas relating to behavioural relevance (amygdala and insula) under similar conditions (e.g., Kennedy et al., 2009; Mobbs et al., 2010). Similarly, a recent EEG study demonstrated greater alpha suppression (indication of greater arousal and relevance) at near distances (Veranic, Ewing, et al., 2025).

The space between people also crucially constrains the type and quality of sensory information that is available for different social judgments. Visual input changes markedly with interpersonal distance. As distance increases, high–spatial-frequency information is attenuated – reducing access to fine detail while emphasizing coarse structure – and a larger proportion of the body fits within a comparable visual angle; conversely, at close range, finer detail is available but the whole body subtends a larger visual angle. As distance increases, the information available at high spatial frequencies decreases, which may induce new processing strategies e.g., an increased reliance on information available at lower spatial frequencies (Lampinen et al., 2014; Loftus & Harley, 2005). Person and emotion recognition also worsens over distances (Goffaux & Rossion, 2006; Smith & Schyns, 2009) but the link between distance and trait attributions is not well understood.

The limited evidence available supports the relevance of spatial information for the processing of trait attributes. A recent study by Veranic, Bayliss, et al. (2025) investigated the effects of distance and distance related visual cues (size and spatial frequency) on trait impression formation and revealed amplification of trait impressions at closer distances and with increased visual information (greater size and broader spatial frequency information). This work also revealed important differences between investigated traits; specifically, particularly social judgments (especially of someone's trustworthiness) were more affected by distance than others (e.g., of their attractiveness). Furthermore, a study by Patterson and Sechrest (1970) found that when participants were asked to form impressions of confederate interviewees (aggressiveness, friendliness, extraversion, dominance) sitting at set distances from them (60 cm, 120 cm, 180 cm, 240 cm), all trait ratings generally decreased with distance (Patterson & Sechrest, 1970). The authors attributed this negative linear trend to people seeming more 'socially active' at closer distances.

More recently Bryan et al. (2012) presented photographs of the same face identities taken at 46 cm vs. 137 cm distance (i.e., within versus outside an observer's estimated personal space, respectively). Trait ratings (trustworthiness, competence, and attractiveness) were lower for the 'closer' images. Trifonova et al. (2024) also investigated participants' judgments of trustworthiness and dominance of online videos of avatars standing near/far, approaching/receding, with the camera moving toward/away from the avatars. Ratings of both traits were higher when avatars were approaching compared with standing still, however no differences were found between close and distant images. They concluded that movement of the avatars looked more naturalistic compared with stillness and that forward/approach motion increases perceptions of dominance. Together this emerging body of research suggests that interpersonal distance (real or implied) can affect trait judgments, and that the specific pattern of effects may vary across traits.

While previous research suggests that both distance and contextual information affect impression formation, how these two factors interact to form trait impressions remains unknown. Moreover, previous findings have been almost exclusively based on ratings of small photographs shown a computer screen, how well they generalise to impression formation for naturalistic life-sized people has rarely been explored. We aimed to address these questions by building upon the extant reports of context effects on trustworthiness attributions (Brambilla et al., 2018; Mattavelli et al., 2022, 2023) and work indicating trait ratings can be affected by distance (Bryan et al., 2012; Patterson & Sechrest, 1970; Trifonova et al., 2024; Veranic, Bayliss, et al., 2025) as well as work by Cartaud et al. (2022) who demonstrated exposure to angry faces affects the interpersonal distance preferences to neutral faces, linking emotional context, valence evaluation, and downstream social-spatial behaviour.

Our work set to extend the effects of a valenced social and ambient background contexts on trustworthiness to a wide set of trait impressions (i.e., attractiveness, competence, and dominance, as well as trustworthiness, investigated by Veranic, Bayliss, et al. (2025)). To our knowledge, this is the first study to directly test how background context and interpersonal distance interact in shaping trait impressions, and the first to do so across multiple trait dimensions under naturalistic viewing conditions. This approach allows us to determine whether context–-distance interactions are trait-general or trait-selective, with implications for models of cue integration in social perception. We aimed to explore ambient and social background contexts, which have been extensively investigated by prior studies (e.g., Barrett & Kensinger, 2010; Ito et al., 2013) in relation to emotional expressions, that might affect people's judgments. We examined both ambient and social background contexts to test whether context effects observed with affective scenes generalise to social environments, and whether socially meaningful cues exert a stronger influence on trait judgments. We varied the distance between the participant and the stimuli to explore whether interpersonal proximity might further influence context effects. In line with Veranic, Bayliss, et al. (2025) 'near' stimuli were presented at a distance of 1 m from participants. This distance reflects the average space that the local (English) population prefers to keep from strangers (Sorokowska et al., 2017) and corresponds to the region of 'personal space' (Hall, 1963) where the majority of social interactions are likely to occur. By contrast 'far' stimuli appeared 4 m away. At this range an individual is in public space (Hall, 1963) so we reasoned their social relevance would be lower to participants. They should also be relatively harder to fully visually resolve (Lampinen et al., 2014), which may prompt greater use of incidental contextual cues available during trait judgments.

There is scope to draw on existing theoretical accounts of cue weighting and perceptual uncertainty to interpret potential effects of background context and interpersonal distance on trait impressions. Under a Bayesian cue-integration view, observers up-weight whichever source is more reliable; as distance reduces high-spatial-frequency face

detail, contextual evidence should carry more weight (Ernst & Bülthoff, 2004; Knill & Pouget, 2004). As interpersonal distance increases and high–spatial-frequency facial detail becomes less available, contextual information may therefore exert a stronger influence on judgments. Consistent with this idea, classic degraded-input findings show that identity/emotion recognition decline with distance or spatial-frequency filtering, increasing uncertainty (Lampinen et al., 2014; Loftus & Harley, 2005; Smith & Schyns, 2009). In parallel, work on interpersonal proximity suggests that near-distance encounters heighten social salience and defensive or relevance-related responses, engaging neural systems associated with attention and threat monitoring (e.g., amygdala and insula; Kennedy et al., 2009; Mobbs et al., 2010), which may bias processing toward the target person rather than the surrounding context. Taken together, these theoretical perspectives suggest that contextual influences on trait judgments may vary with distance and may do so in a trait-selective manner. Relational and approach-avoidance-relevant judgments such as trustworthiness may be more sensitive to contextual information under conditions of uncertainty than appearance-focused (e.g., attractiveness) or action-related traits (e.g., competence, dominance). The present study provides the first direct test of whether context–distance interactions on trait impressions are trait-selective.

2. Experiment 1

Here we examined how affectively valenced ambient background scene contexts (a positive beach scene and a negative fire scene) and interpersonal distance (being near or far from the participant) influence ratings of attractiveness, competence, dominance, and trustworthiness. Based on past research we predicted that targets would receive more extreme attributions in valenced background contexts and that any such context effects would be greater at far vs near interpersonal distances.

2.1. Method

2.1.1. Participants

Sixty undergraduate psychology students completed this experiment for course credit. Four participants were excluded from the analysis due to poor engagement as indicated by repetitive and non-variable response profiles. This resulted in a sample of 56 participants (M = 20.1 years old, SD = 3.8 years, range 18–44 years, 48 female, 8 male, 0 non-binary). The procedure of both experiments reported here was approved by the local Ethics Committee (Reference Code: ETH2324-0775). All participants were naive as to the purpose of the study and provided informed written consent. The design and analysis plan were pre-registered (https://aspredicted.org/wd9is.pdf) and data were collected between September 2022 and February 2023.

2.1.2. Stimuli & apparatus

Life-sized whole person photographic stimuli were projected onto a 2.3 m (height) × 1.5 m (width) white screen (Optoma GT1080 projector, 2800 Lumens (ANSI), working resolution of 1080 × 1920 pixels; see Fig. 1). The high resolution images (1794 × 4494 pixels) featured 96 adults of different ages and ethnic backgrounds taken from an existing database (for more detail see Stephen et al., 2016). Each person is wearing standard close-fitting grey singlets and shorts and facing forward in a standard posture - with their arms by their side - and a neutral facial expression (Fig. 1). Near-distance images subtended vertically 84° of visual angle, and far-distance images 25° when participants stood at the near and far test distances (1 m, 4 m respectively).

We selected high and low-rated exemplars for trustworthiness, dominance, competence and attractiveness based on pre-ratings collected online. Seventy-two participants aged 18 to 26 years (M = 20.7 years old, SD = 3.7 years; 64 female, 8 male, 0 non-binary) pre-rated 159 images for attractiveness, competence, dominance, or trustworthiness (between subjects). Assuming a standard viewing distance (60 cm) images appeared at an average 17° of visual angle. The selected images made up four, non-overlapping stimulus sets (one for each trait), each comprising 12 male and 12 female stimuli (96 images in total), choosing the 6 highest and 6 lowest rated on each trait for each gender. Distance, traits and gender were blocked together, while the stimuli were presented randomly. Due to a technical error, 8 stimuli identities were excluded from analysis, leaving 20 for attractiveness, 22 for competence, 22 for dominance and 24 for trustworthiness.

In Adobe Photoshop we added two background images of either beach (I322) or fire (I59) (see Fig. 3 for stimuli examples). The background images were from the OASIS (Open Affective Standardized Image Set; Kurdi et al., 2017), chosen to have similar ratings of arousal (Fire = 4.74 ± 1.69; Beach = 5.29 ± 1.82; 7-point Likert rating scale, 1

Fig. 1. Examples of positive (beach) and negative (fire) scene background context stimuli.
Note. These are representative stimulus examples not used in the experiment.

meaning very negative and 7 very positive on arousal) and opposite valence (Fire = 6.37 ± 0.85; Beach = 1.74 ± 0.98; 7-point Likert rating scale, 1 meaning very low and 7 very high on valence). The same target identities were presented in both the positive and negative background conditions. We mirror-reversed each background scene, with each target appearing 4 times in total. A single image was used for each background type to minimise variability in viewpoint, lighting, spatial layout, and overall composition across conditions. This design choice allowed us to introduce contextual information while holding these visual factors constant relative to the target.

2.1.3. Design & procedure

Participants were asked to rate images of people for the given trait when standing at a near distance (1 m) and far distance (4 m) from the screen. Detailed descriptions of characteristics to be rated were given before the start of each block (see Supplementary materials, Section 1). Images appeared for 2500 ms; and the participants could take as long as they needed to make their rating using a Likert scale (ranging from 1: low trait to 7: high trait). They were asked to use the whole range of the scale. Their rating was followed by a 500 ms inter-trial interval (ITI). Both experiments reported here were programmed using Gorilla Experiment Builder (gorilla.sc). Responses were made using a mouse, which rested on a platform that was moved with participants to their different rating locations. Order of standing distances and traits to be rated was counterbalanced across participants.

2.1.4. Data analysis

Statistical analyses were carried out using IBM SPSS Statistics (Version 25) and R Studio (Version 2025.09.2). Sensitivity analyses examining the detectable effect sizes for the main and interaction effects are reported in the Supplementary materials (Section 3). Because we were interested in how the stimuli were rated rather than how participants were rating them, we conducted an items-based analysis (participant ratings averaged for each stimuli identity). Repeated measures ANOVA investigated ratings for each trait dimension separately, with interpersonal distance (near, far), and background context (positive, negative) as within-subjects factors. As we collected data regarding 4 traits we have used an adjusted alpha value of 0.0125 for all statistical tests reported here. To reduce the influence of outliers and enhance the robustness of the statistical analysis, we applied a winsorization technique with 1st and 99th percentiles as cut-off points.

2.2. Results

Fig. 2 shows the effects of Distance and Background Context for each of the trait judgments. For all four traits we observed a significant main effect of Background Context (all $Fs > 14.81$, all $ps < 0.001$, all $\eta_p^2 s > 0.41$). When the target figure was presented with a positive background, people's rating of attractiveness, trustworthiness, and competence were higher compared with when they appeared on a negative background. Interestingly, the reverse pattern was observed for dominance. Here, targets were rated as more dominant when shown in the negative background context (i.e., in front of the fire rather than on the beach). There were no significant main effects of Distance (all $Fs < 2.69$, all $ps > 0.114$, all $\eta_p^2 s < 0.11$) or interactions between Distance and Context (all $Fs < 0.42$, all $ps > 0.522$, all $\eta_p^2 s < 0.02$). For detailed results of the

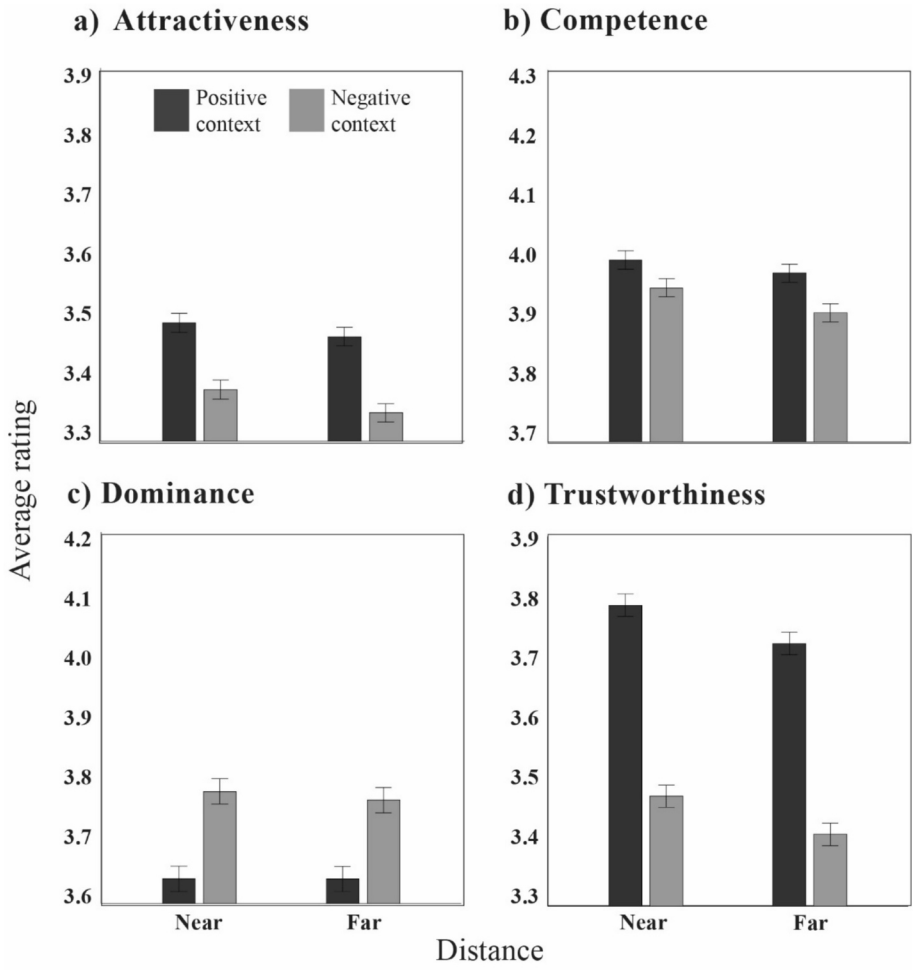

Fig. 2. Average ratings of the four traits as a function of ambient background context and distance. Error bars are within subject standard errors.

ANOVAs for each trait, see Table S4 and S5 in Supplementary materials.

2.3. Discussion

Results show that our ambient background contexts significantly influenced how target figures were rated on the four targeted trait dimensions. When shown in a positive background context (beach scene) targets were perceived to be more attractive, trustworthy, and competent compared with those appearing in a negative background context (fire scene). The pattern was reversed when people rated dominance. We speculate that the appearance of close proximity to a raging fire might have endowed targets with an impression of and power, which resulted in an elevated impression of dominance. This is also in line with recent findings that red backgrounds increase ratings of dominance in people's faces (Chen et al., 2024).

We speculate that the appearance of close proximity to a raging fire might have endowed targets with an impression of and power, which resulted in an elevated impression of dominance.

Counter to predictions, no interactions between background context and interpersonal distance were observed. That is, there was no increased effect of background context at greater viewing distances; the expected greater availability of contextual information, relative to person stimulus information, did not influence ratings as anticipated. A recent study by Veranic, Ewing, et al. (2025) concluded that social relevance may interact with the effects of interpersonal distance. Thus, we were also keen to directly test the effects of a more socially charged background context manipulation, to understand whether it might interact with interpersonal distance and affect trait impressions.

3. Experiment 2

To investigate the extent to which the observed background context effects on trait judgments generalise to scenarios that are more socially meaningful, here we broadly reproduced the design of Experiment 1 but utilised background images that showed human figures expressing positively or negatively valenced emotional expressions. Based on previous reports that social background context affects other social judgments, e.g., ratings of emotional expressions are affected by surrounding happy faces vs angry faces (Cartaud et al., 2022; Ito et al., 2013; Mumenthaler & Sander, 2015), we predicted that positive social background contexts (cf. negative) would increase the ratings of all traits and that these effects would be more pronounced at far distances.

3.1. Method

3.1.1. Participants

Sixty-one adult undergraduate psychology students (M = 21.0 years old, SD = 5.1 years, ranging from 18 to 44 years, 51 female, 9 male, 1 non-binary) completed this experiment for course credit. 10 participants were excluded from the analysis due to poor engagement, as indicated by repetitive and non-variable response profiles. All participants were naive as to the purpose of the study and provided informed written consent. The design and analysis plan were pre-registered (https://aspredicted.org/zn9qq.pdf) and data were collected between September 2022 and February 2023.

3.1.2. Stimuli, apparatus & procedure

The stimuli, apparatus and procedure matched Experiment 1, except for the context/background manipulation. We used Adobe Photoshop to add background figures (one male and one female) behind the target stimuli, which both displayed disgusted or happy facial expressions. All figures were positioned on a grey background and appeared to be approximately standing on the same ground plane (Fig. 3). These positively and negatively valenced expressions were chosen because they are well recognisable across a range of distances (Smith & Schyns, 2009). We edited the heads of the Karolinska Directed Emotional Faces (KDEF; Lundqvist et al., 1998) dataset onto the bodies of exemplars from our primary stimulus set to ensure all three figures were matched for pose and dress. From the KDEF we have chosen the following stimuli: two happy expressions (male: AM24HAS; female: BF10HAS) and two disgust expressions (male: AM24DIS; female: BF10DIS).

We also equated the relative heights of each male and female target stimulus to be consistent with the background figures on each trial (i.e., no individual appeared particularly tall or short relative to the to-be-rated central person). The same identities appeared in the background of the positive and negative social background context conditions. We

Fig. 3. Examples of positive (happy) and negative (disgusted) social background context stimuli.
Note. These are representative stimulus examples not used in the experiment.

mirror-reversed the sides on which each gender of the background figures was presented, with each target appearing 4 times in total.

3.2. Results

Once again, we used an items-based analysis for the repeated measures ANOVA, with Interpersonal Distance (Near, Far) and Background Context (Positive, Negative) as within-subjects factors. Fig. 4 depicts the effects of Distance and Background Context upon ratings of each of the four trait dimensions (for complete numerical representation of these results see Table S6 and Table S7 in Supplementary materials). Target figures were consistently rated relatively 'higher' on all traits when presented in front of people with positively valenced (happy) facial expressions, compared with negative (disgusted) facial expressions (all $Fs > 35.13$, all $ps < 0.001$, all $\eta_p^2 s > 0.64$), while the effect of background context on perceived Dominance was approaching significance $F(1, 21) = 7.43$, $p = .013$, $\eta_p^2 = 0.24$. We also observed the effect of Interpersonal Distance approaching significance on Dominance ratings, $F(1, 21) = 5.52$, $p = .029$, $\eta_p^2 = 0.21$, indicating that target stimuli were perceived as more dominant when viewed at Near cf. Far distances. The effect of distance was non-significant for all other traits (all $Fs < 1.01$, all $ps > 0.325$, all $\eta_p^2 s < 0.042$).

Crucially, we found the hypothesised interaction effect between Background Context and Distance for Trustworthiness ratings only, $F(1, 23) = 10.19$, $p = .004$, $\eta_p^2 = 0.31$, which reflected the relative amplification of background context effects at far distances. That is, when contrasted with trustworthiness ratings made at near distances, the relatively favourable ratings associated with the positive background context were numerically elevated at far distances which did not reach significance ($t(23) = 2.29$, $p = .032$), and the relatively unfavourable ratings associated with the negative background context remained similar over distances ($t(23) = -0.26$, $p = .795$). Complementary Bayesian analyses (see Supplementary Section 6) offered convergent but moderate support for this interaction, suggesting the effect is reliable though not decisively strong. This interaction was not significant for any other trait (all $Fs < 1.25$, all $ps > 0.276$, all $\eta_p^2 s < 0.06$).

3.3. Discussion

Once again, we have identified strong and significant effects of stimulus background context on all targeted trait attributions and show for the first time that this profile is observed with social backgrounds. That is, when a target is presented alongside positively valenced (happy) figures, participants' ratings of all traits are consistently more favourable compared with when they appear alongside negatively valenced (disgusted) figures.

This experiment utilising social background stimuli, which provided external signals potentially attributable to the target, also yielded some results that were distinct from those observed in Experiment 1. For example, for one of the traits – dominance – we observed a significant main effect of distance. Here overall targets were perceived as more dominant when they appeared closer to the participant (i.e., within personal space), compared with further away (in public space). This result could reflect a selectively altered perceptual impression of the target when considering their dominance alongside other agents, or perhaps the extent to which members of a group of three people might

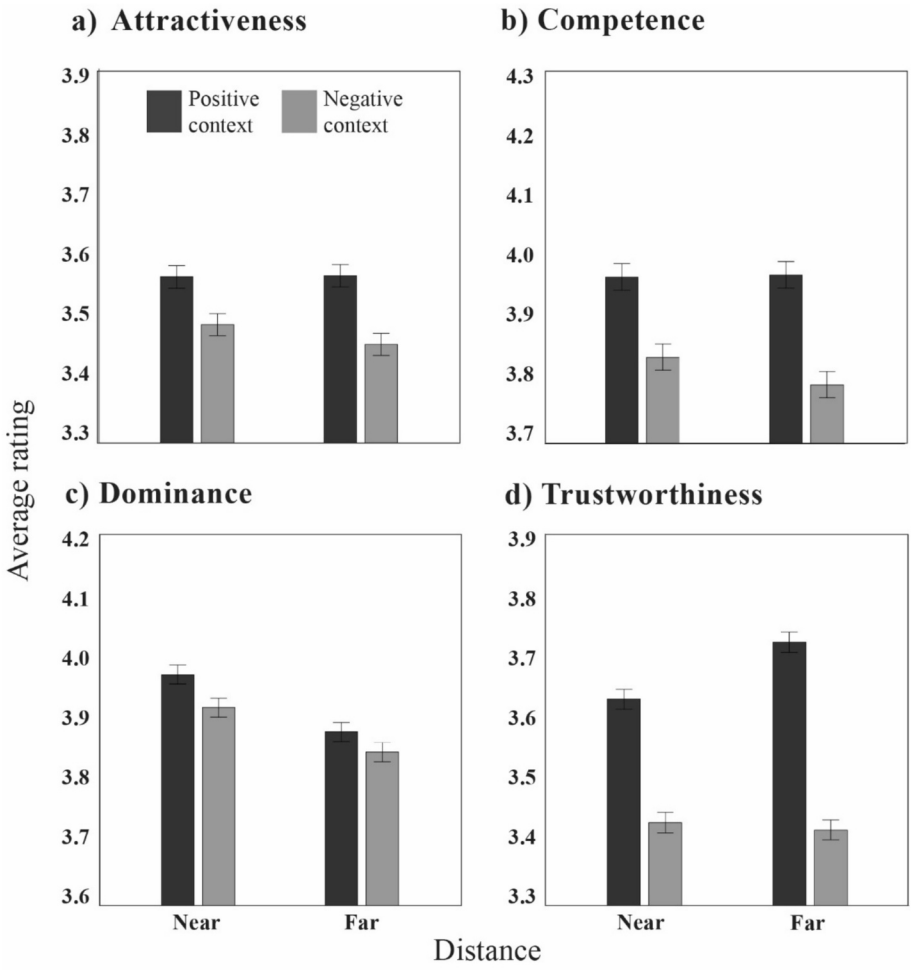

Fig. 4. Average ratings of the four traits as a function of social background context and distance. Error bars are within subject standard errors.

look intimidating at nearer distances, regardless of their emotional expressions.

We also observed a selective interaction between background context and interpersonal distance in ratings of trustworthiness. When happy people surrounded the target figure, the target individual was rated as *more* trustworthy with increased distance, however when they were surrounded by disgusted people, the target was rated similarly across distance. The distinction between emotions could be due to the attributability of smiling and grimacing people in the background. Happy people might signal more that the target person is trustworthy, while this link is not as straightforward with disgust. This result constitutes partial support for our hypothesis that at greater distances observers might be prompted to rely more on other cues. This could be due to relatively increased difficulty resolving detailed visual information at a greater distance (Hu & O'Toole, 2022), which could lead inputs such as background context to be more heavily weighted in judgment processes.

4. General discussion

The present study provides the first investigation of how background context and interpersonal distance jointly influence trait impressions under naturalistic viewing conditions. Across two experiments, we investigated for the first time how background context and interpersonal distance act and interact to inform trait impressions. Past evidence indicates that background context can bias judgments of emotional expressions (e.g., Reschke et al., 2018) and evaluations of trustworthiness (e.g., Mattavelli et al., 2022). Notably, recent work shows that emotional context shapes not only perceived facial valence but also interpersonal spacing decisions (Cartaud et al., 2022). Furthermore, as distance decreases, the availability and social/behavioural relevance of information relevant to person perception judgments is known to change (e.g., Hahn et al., 2016; Kennedy et al., 2009; Veranic, Ewing, et al., 2025). Building on this work, we examined how background context and distance jointly influence a range of trait dimensions using life-sized, whole-body targets presented at near and far interpersonal distances. We incorporated both ambient and social contexts that were positively valenced (beach scenes; smiling facial expressions) or negatively valenced (fire scenes; disgusted facial expressions), allowing us to distinguish between effects of affective valence more broadly and the influence of socially meaningful background cues. Comparable context effects emerged in Experiment 2 under highly constrained visual conditions, where contextual manipulation involved only subtle changes in facial expressions and global visual properties were closely matched. This convergence across experiments suggests that the observed effects are not likely driven solely by idiosyncratic features of specific background images. We found that both ambient and social backgrounds influenced judgments of all traits in the anticipated direction, apart from judgments of dominance in the ambient background. That is, a positively valenced background increased trait ratings and a negative valence decreased them. That said, some distinct effects were observed across experiments. For example, in the ambient background condition only, we identified a selectively 'flipped' profile of dominance trait ratings. Here, targets received elevated ratings of dominance in the negative background context (fire scene) cf. the positive background context (beach scene). Standing in front of fire may have some association with resilience, brave, strong character, which may increase the perception of dominance. This is also in line with the Chen et al. (2024) showing that such bright orange and red colours systematically shift categorical judgments toward dominance for faces. The opposite pattern observed for dominance judgments across experiments further illustrates how the same contextual modulation mechanism can manifest differently depending on both trait and context type. In Experiment 1, targets were rated as more dominant in a negative ambient context (fire), which may reflect associations between threat, power, and physical strength. This result highlights importantly that although context effects might be broadly predictable, they are tied to stimulus-specific contingencies, i.e., varying based on the qualities of individual targets and backgrounds, along with the judgments to be made.

In the social background context condition, we also observed some effects of interpersonal distance. Ratings of dominance diverged from the other traits, with a main effect of distance. Participants gave selectively higher ratings for targets shown at near compared with far distances. We account for this finding by suggesting that having a group of three people appearing within each participant's 'personal space' (cf. the 'public space' location of far ratings), with their attention collectively directed toward them, may yield a broadly intimidating appearance for group members regardless of their expressions. Interpersonal distance was not found to be an important factor for dominance in the ambient background context, nor for the other trait ratings: people appeared as attractive, competent and trustworthy near as far when they appeared alone (Experiment 2) and in groups (Experiment 1).

Our predicted interaction effect between background context and distance was found selectively in one condition. The effect of positive social background context valence on trustworthiness ratings became stronger with distance – increasing ratings in positive contexts, while they remain relatively stable in the negative background contexts. These results indicate a distinct interaction effect of social background context and distance on trustworthiness, which may reflect this effect being driven by increased social referencing when making trustworthiness judgments at greater distances, rather than by the mere valence of the background. This may reflect adaptive cue re-weighting under perceptual uncertainty. As distance increases, access to high spatial-frequency facial information decreases, reducing the fidelity of fine-grained features and subtle expressions. Under these conditions, the perceptual system places greater weight on supporting cues (in our case, the affect of surrounding people), which can serve for inferring the target's likely intent or traits. This aligns with Bayesian accounts of perception, in which cue weights track relative uncertainty: when the facial signal is noisy, contextual information carries more influence. This is particularly evident in positive background contexts, likely due to the choice of emotional expressions of the background figures. While happy people in the background might clearly signal a positive effect, the presence of disgusted people may not be as easily attributed to the target individual. However, some caution is warranted in interpreting this effect, as complementary Bayesian analyses provided only anecdotal-to-moderate evidence for the interaction.

The specificity of this effect likely reflects that trustworthiness judgments are relational, approach/avoidance appraisals tuned to social safety (i.e., rapid decisions about whether another person signals opportunity or threat). Such appraisals are consequential for survival (Ames et al., 2011; Brambilla & Leach, 2014), and these higher stakes may make the accuracy more important, compared with other judgments. Consistent with this view, during COVID-19, simple prosocial cues such as mask wearing reduced preferred interpersonal distances, i.e., people were comfortable standing closer to masked than unmasked people, consistent with inferences of safety/prosocial intent (Cartaud et al., 2020). Distance may amplify this selectivity: changes in attentional capture and defensive/relevance systems at near versus far distances are plausibly most critical for trustworthiness, increasing the relative weight placed on contextual social cues when facial detail is degraded. Additionally, social backgrounds afford causal inferences (if surrounding people are happy, the target is safe/prosocial), which map more directly onto perception of trustworthiness than onto appearance-centric traits like attractiveness or ability-centric traits like competence/dominance. The absence of interactions for attractiveness, dominance, and competence could indicate that these traits are psychologically more stable across distances, which reduces the advantage of contextual proxies when facial detail is reduced, limiting the emergence of the interaction between distance and context observed for trustworthiness judgments.

The selectivity of the effect to social and not ambient background context cues suggests that people maybe more likely to draw upon social

reference points when making trustworthiness judgments, rather than merely the valence of the background context. Our results show some specificity and seem to apply to certain types of background contexts that could be theoretically important. Stronger effects might be observed if the contexts were more directly engaging, such as being related to approaching or causally linked to the observed person (Mattavelli et al., 2022). Moreover, samples drawn from different cultures may integrate background context into judgments differently. For example, Asian people might show stronger background context effects than western people (see Masuda, Ellsworth, et al., 2008; Masuda, Gonzalez, et al., 2008).

4.1. Limitations and future directions

It is important to note that several design and analytic constraints qualify our conclusions. First, our design used a single background image per condition, which raises the possibility that observed effects reflect idiosyncrasies of particular photographs rather than the intended constructs. Moreover, the contextual images differed along uncontrolled visual and semantic dimensions beyond valence (e.g., semantic density, composition, colour palette, luminance/contrast). This concern applies particularly to the ambient conditions in Experiment 1, where the beach and fire scenes differed dramatically in visual properties and semantic content, making it difficult to attribute the observed effects specifically to valence per se, and accordingly, the generalizability of Experiment 1's findings to the broader construct of affective valence should be interpreted with caution. Sampling multiple images per condition and counterbalancing across targets would improve generalizability and help isolate the influence of valence from these confounding factors. However, it is important to note that in Experiment 2, the manipulation (i.e., of facial expressions) in the social background conditions constituted a much more visually subtle change compared to the more dramatic variation/manipulation applied in the ambient conditions, yet we still found similar effects of valence. Importantly however, background context effects on face judgments have been demonstrated repeatedly in prior work, including with both social and ambient cues. Given this established literature, our goal here was not to exhaustively map the space of background contexts but to test whether background context interacts with distance for first impressions. On that rationale, we opted for minimal, representative manipulations rather than extensive context variation.

Furthermore, we contrasted outcomes associated with two specific interpersonal distances (1 m and 4 m) and we acknowledge that from an evolutionary standpoint it might be very unusual to form a first impression of someone appearing suddenly at a close distance. Similarly, since social interactions occur at various distances our findings might not generalise to effects observed at other/all interpersonal distances (see Patterson & Sechrest, 1970).

Moreover, although our interpretation assumes that observers integrate background cues with target information, we did not directly test integration. We did not obtain separate ratings for the background and the target on the same trials, so we cannot determine whether impressions in the combined displays exceed the sum of their parts or merely reflect scene-level priming. Future work should collect independent ratings of the background alone and the target alone (matched in visual degrees) and then test whether the combined displays show additive effects relative to the parts. Furthermore, we have not collected the arousal and valence ratings of the background figures in Experiment 2, which might also be informative for future studies. Additionally, while our item-based approach is appropriate for generalizing across stimuli, the effective item sample per trait may be underpowered for detecting higher-order interactions. Future studies should plan power for interaction terms under hierarchical models and increase both participant and item sampling.

Lastly, our stimulus sampling strategy prioritized clear exemplars at the extremes of each trait (i.e., the highest and lowest pre-rated identities per trait), creating a bimodal distribution. This choice can bias the results, masking whether background context shifts the baseline level of a perceived trait or instead interacts with trait extremity. Including more moderate exemplars would help dissociate shift versus interaction accounts. The stimulus set also lacked diversity across variables such as race and age, highlighting the need for future studies to validate whether our findings are generalizable to a broader and more diverse range of stimuli.

5. Conclusion

These experiments demonstrate that the affective valence of a target figure's background context has a substantial impact on trait ratings, and that this influence varied with qualities of the contextual information available, and the judgments being made. Together our findings generally highlight the importance of considering external factors when studying real world social cognition and specifically reveal that both background context and interpersonal distance can meaningfully contribute to trait impressions.

CRediT authorship contribution statement

Kristina Veranic: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Andrew P. Bayliss:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Ian D. Stephen:** Writing – review & editing, Visualization, Validation, Software, Investigation, Formal analysis, Data curation, Conceptualization. **Mintao Zhao:** Writing – review & editing, Visualization, Validation, Supervision, Methodology, Conceptualization. **Louise Ewing:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Conceptualization.

Disclosure statement

The manuscript reports all studies, measures, manipulations, and data/participant exclusions.

Declaration of competing interest

The authors declare no competing interests.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.actpsy.2026.106770.

Data availability

The design and analysis plan were pre-registered (https://aspredicted.org/zn9qq.pdf) and anonymised data and materials is available via OSF (DOI 10.17605/OSF.IO/DU3SK).

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