The Biasing Effects of Visual Background on Perceived Facial Trustworthiness

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ABSTRACT. Trustworthiness is a quality that many people such as job candidates, coaches, mentors, and even friends look for in others in everyday situations. Research has established that people perceive trustworthiness in a consensual manner, even though these perceptions are not predictive of actual trustworthiness (Rule, Krendl, Ivcevic, & Ambady, 2013). The current study was conducted to see how the environmental context in which a face is seen could have an effect on perceptions of trustworthiness. Fifty-nine participants were shown 36 male faces on wealthy, impoverished, or control backgrounds. These conditions were manipulated within participants. Results indicated that ratings of trustworthiness were affected by both the target face, $F(1, 52) = 71.50$, $p < .001$, $\eta^2_p = .60$, and the background context, $F(2, 104) = 16.30$, $p < .001$, $\eta^2_p = .25$, of the photo. Implications for these results in criminal justice settings are discussed.

First impressions are comprised of a wide range of quickly established judgments and perceptions, and context may be an important moderator of these impressions. Because the environmental context within which people perceive others does at times come with its own stereotype content, context stereotypes may overflow into person perception. We focused in particular on trustworthiness, which has been shown to influence important behavioral outcomes and asked the question: Can context influence these input judgments of trustworthiness?

The way individuals perceive a person after a visual exposure—even if that exposure was very brief—can have a great impact on the way the person is treated, regardless of the accuracy of the perception. Such meaningful first impressions occur in many domains, and their impact last much longer than a person might guess (Bar, Neta, & Linz, 2006; Zebrowitz, 1997). A variety of studies have been conducted to understand the specific impact of these stereotypes on the perception of social targets depicted in photographs. Masip, Garrido, and Herrerdo (2004) examined the role of facial "babyfacedness" and how it affected others' perceptions of honesty, submissiveness, and trustworthiness. They found that younger-looking faces were rated as more honest, trustworthy, and less dominant, and relatively older faces were rated as more deceptive and more dominant. A study conducted by Paunonen (2006) suggested that people who are perceived as more attractive in a photograph are also perceived to be more honest and kind. Furthermore, when paired with equal criminal histories, Black and White inmates were given roughly similar sentences. However, within their respective races, faces with more Afrocentric features were given harsher sentences than those with less Afrocentric features (Blair, Judd, & Chapleau, 2004). This illustrated that stereotypes associated with Afrocentrism may impact important legal judgments. All of these are prime examples of how the perception of a person's face is very influential in terms of social judgments and life outcomes.

Of course, faces are not encountered in a social or environmental vacuum. Beyond the impact of facial appearance, the context within which a face is seen can also shape the way people perceive a social target. The general concept that context can have a biasing impact on person perception has a rich tradition in social psychology. Geiselman, Haight, and Kimata (1984) studied context effects

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on perceived attractiveness of faces and found that perceptions of attractiveness can be altered by the length of time a participant was exposed to a face, the presence of attractive friends in the photo, and the attractiveness of the surrounding visual context. Srull and Wyer (1980) determined that the judgments of a person can be significantly affected, or altered, based on the order in which the information received about the person was encoded into memory. Specifically, biasing information only matters when encoded before information about the social target.

In the current work, we were interested in the potential influence of the area or environmental background in which a social target is seen. Backgrounds carry their own social stereotypes that may color person perception. For example, Ernst and Tornabene (2012) wanted to find out if children learned better in different environments. They showed photographs to teachers who selected the best environment for learning. The results showed that most teachers chose parks over other areas as the most in line with the goal of enhancing educational outcomes (Ernst & Tornabene, 2012). This means that, at least in this context, environments come with stereotyped content that could bias person perception. If environments do come with stereotyped content, are those stereotypes strong enough to influence the perceptions of people viewed in those environments? O'Brien and Wilson (2011) studied the amount of trust and safety participants felt when encountering an unfamiliar neighborhood. They found that participants perceived neighborhoods with older buildings as having less close-knit communities and therefore as less safe. The results of their study suggested that perceived socioeconomic status had an effect on the perception of the neighborhood as a whole.

Trustworthiness is a quality that many people look for to help them make judgments in their interactions with others. Perceived facial trustworthiness is processed very quickly and can have an effect on the perception of a person, even when other information is available about the person such as relevant trust-related behavior (Rudoy & Paller, 2009; Todorov, Pakrashi, & Oosterhof, 2009). For example, in a hypothetical legal vignette, participants require less evidence to convict people who are viewed as visually less trustworthy than those viewed as more trustworthy (Porter, ten Brinke, & Gustaw, 2010). Even more importantly in the legal realm, independent of actual innocence or guilt, participants give less trustworthy faces more harsh penalties in criminal verdicts such as the death penalty (Wilson & Rule, 2015).

Perceived trustworthiness can also impact economic decisions. Partners of more trustworthy looking social targets often transfer more funds to them in a trust game, in which participants stand to gain financially if their partner can be trusted (Berg, Dickhaut, & McCabe, 1995; van't Wout & Sanfey, 2008). Importantly, these impacts exist even though perceived facial trustworthiness does not seem to be related to actual trustworthy behavior (Rule, Krendl, Ivcevic, & Ambady, 2013). The studies reviewed here make it clear that differential ratings of perceived trustworthiness move beyond the domain of mere judgment and may have real and important implications for the targets of those ratings.

Although extensive research exists on both perceived facial trustworthiness and the impact of context on person perception generally, we did not find work investigating the impact of visual background context on perceived trustworthiness. Some promising evidence exists along these lines though. One recent study found that placing a stethoscope (or 3 other medical instruments) in the hands of a doctor in online health advertisements boosted the perceived trustworthiness of that person (Jiwa, Millett, Meng, & Hewitt, 2012). Perceived criminality also has an effect on the perceived trustworthiness of an individual. If someone is rated high in criminal appearance, this person will be perceived as less trustworthy as well (Flowe, 2012). The current work combined these lines of inquiry. The critical question for the present work was whether perceived facial trustworthiness is such a strong signal that background context cannot exert an influence, or alternatively whether context is still powerful enough to bias such judgments. We hypothesized that background environment would have an effect on perceived trustworthiness even when the faces being rated already differed in terms of perceived trustworthiness by another sample. We used three visual contexts to test this idea. We predicted that people seen in an impoverished environment would be rated as less trustworthy than people seen in a high-income environment.

Methods

Participants and Design

Participants were 59 undergraduate students over the age of 18 recruited from Introductory

Psychology courses at a small, midwestern university. Demographic information was not collected. The experiment consisted of a 3 (photo background: wealthy, control, impoverished) x 2 (target face: trustworthy, untrustworthy face) within-participants design. We anticipated a large effect size for the target face main effect and a medium effect size for the photo background main effect. To achieve a power level of .80, Cohen (1992) suggested a sample size of at least 52 to detect a medium effect across three groups, and a sample size of at least 26 to detect a large effect across two groups, indicating that we had adequate power to detect the expected main effects of both photo background and target face.

Materials

The stimuli in the present study were 36 gray-scale images of male faces with neutral facial expressions. The images were obtained from a database of 40 faces that had been previously rated as either trustworthy or untrustworthy in a study by Rule et al. (2013). There were 18 images of trustworthy looking faces and 18 images of untrustworthy looking faces. The researchers determined perceived facial trustworthiness by having participants rate gray-scale images of a person with a neutral facial expression. To manipulate background, there were 12 images of wealthy environments, 12 images of impoverished environments, and 12 control images of a white background. Background images were gathered via Google image searches with the intent of creating a dramatic contrast between impoverished and wealthy backgrounds. The 36 face images were placed on the 36 environmental backgrounds (see Appendix for examples). This resulted in six pictures in each within-participants condition: low trust face on a wealthy background, low trust face on a control background, low trust face on an impoverished background, high trust face on a wealthy background, high trust face on a control background, and high trust face on an impoverished background. The faces were placed in the bottom-left corner of the background photos. Participants rated each face on a 1 to 7 Likert-type scale for trustworthiness (*not at all trustworthy* to *very trustworthy*), attractiveness (*not at all attractive* to *very attractive*), and aggression (*not at all aggressive* to *very aggressive*).

Procedure

The procedure used in this study was approved by the university human subjects review board at Ashland University prior to the commencement of data collection, and all participants were treated in accordance with American Psychological Association ethical guidelines and university regulations for research with human participants. After providing consent, participants were randomly placed at one of six computers. Each computer had a different randomized presentation order in Microsoft® PowerPoint® loaded. Participants were given an answer packet and an instruction prompt was read to them. The PowerPoint slideshows advanced automatically to a preset timer so that participants saw each face for 3 s followed by 10 s of a blank slide while they recorded their ratings.

Results

We calculated overall ratings of trustworthiness, aggression, and attraction by summing all six ratings within a specific condition. Although our three measures were moderately correlated with each other, substantial variance remained unique to each, indicating that analyzing each separately was appropriate. The strongest correlation was between trustworthiness and attractiveness, $r(294) = .62$, $p < .001$. Aggression was negatively correlated with both trustworthiness, $r(294) = -.27$, $p < .001$, and attractiveness, $r(294) = -.17$, $p < .001$.

To test our main hypothesis, we conducted a repeated-measures Analysis of Variance (ANOVA) with two within-participants factors: prerated trustworthiness of the face (trustworthy and untrustworthy) and background context (wealthy, impoverished, and control). This revealed a significant main effect of face, $F(1, 52) = 71.50$, $p < .001$, $\eta_p^2 = .60$. Replicating previous research, we found that high trustworthy faces were rated as more trustworthy ($M = 21.30$, $SD = 0.89$) than low trustworthy faces ($M = 16.95$, $SD = 0.82$). We also found a significant main effect of background context, $F(2, 104) = 16.30$, $p < .001$, $\eta_p^2 = .25$. Paired-samples t tests using a Bonferroni adjusted alpha of 0.017 (0.05/3) revealed that faces presented on wealthy backgrounds were rated as more trustworthy ($M = 21.47$, $SD = 1.10$) than faces presented on no background ($M = 19.03$, $SD = 0.82$), $t(105) = 4.35$, $p < .001$, $d = 0.43$, which in turn, were rated as more trustworthy than faces presented on impoverished backgrounds ($M = 16.87$, $SD = 0.88$), $t(105) = 4.08$, $p < .001$, $d = 0.40$. The interaction between these two factors was not significant, $F(2, 104) = 0.10$, $p = .90$, $\eta_p^2 = .002$. See Figure 1 for condition means.

To test for differences on aggression, we conducted a repeated-measures ANOVA with two within-participants factors: photo background

(wealthy, control, impoverished) and target face (trustworthy, untrustworthy). This revealed a significant main effect of face, $F(1, 50) = 27.81$, $p < .001$, $\eta_p^2 = .36$. We found that high trustworthy faces were rated as less aggressive ($M = 17.61$, $SD = 0.95$) than low trustworthy faces ($M = 21.01$, $SD = 1.01$). We also found a significant effect of background context, $F(2, 100) = 8.62$, $p < .001$, $\eta_p^2 = .15$. Paired-samples t tests using a Bonferroni adjusted alpha of 0.017 (0.05/3) revealed that faces presented on wealthy backgrounds were rated no differently on aggression ($M = 17.89$, $SD = 1.00$) compared to faces presented on no background ($M = 18.92$, $SD = 0.97$), $t(101) = 1.74$, $p = .09$, $d = 0.17$, which were rated as less aggressive than faces presented on an impoverished background ($M = 21.13$, $SD = 1.13$), $t(101) = 3.45$, $p < .001$, $d = 0.34$. There was no significant interaction between these two factors. $F(2, 100) = 2.98$, $p = .06$, $\eta_p^2 = .06$. See Figure 2 for condition means.

To test for differences on attraction, we conducted a repeated-measures ANOVA with two within-participants factors: prerated trustworthiness of the target face (trustworthy, untrustworthy) and photo background (wealthy, impoverished, and control). This revealed a significant main effect of face, $F(1, 50) = 54.98$, $p < .001$, $\eta_p^2 = .54$. We found that high trustworthy faces were rated as more attractive ($M = 17.18$, $SD = 0.79$) than low trustworthy faces ($M = 12.90$, $SD = 0.73$). We also found a significant effect of background context, $F(2, 100) = 4.21$, $p = .02$, $\eta_p^2 = .08$. Faces presented on wealthy backgrounds were rated as more attractive ($M = 16.09$, $SD = 0.92$) than faces presented on no background ($M = 14.44$, $SD = 0.67$), $t(101) = 2.87$, $p < .01$, $d = 0.29$, which were rated as equally attractive as faces presented on an impoverished background ($M = 14.58$, $SD = 0.75$), $t(101) = 0.34$, $p = .74$, $d = 0.03$. The interaction between these two factors was not significant, $F(2, 100) = 0.05$, $p = .95$, $\eta_p^2 = .001$. See Figure 3 for condition means.

Discussion

This study illustrated that the global context a person is observed in has a great effect on several person perception measures of trustworthiness, aggression, and attractiveness. Results suggested that the background on which an individual is placed affects ratings of trustworthiness, aggression, and attractiveness. The effect of perceived facial trustworthiness alone strongly replicated the findings of Rule et al. (2013) in a quite different student sample. There were in fact faces that

FIGURE 1

Mean Ratings of Trustworthiness of Faces in Each Condition.

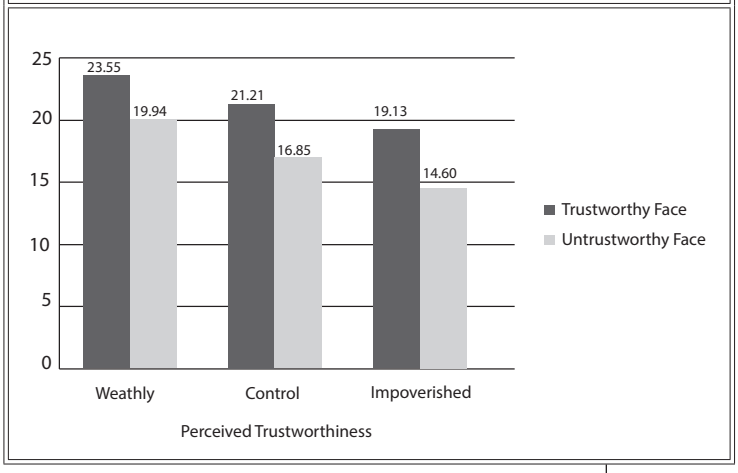


FIGURE 2

Mean Ratings of Aggression of Faces in Each Condition.

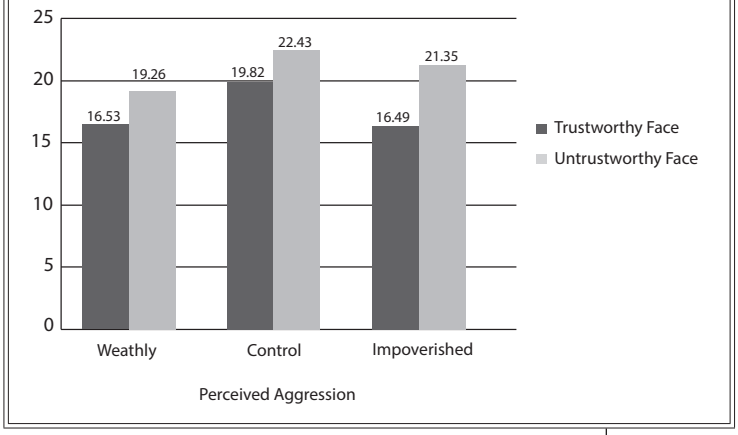
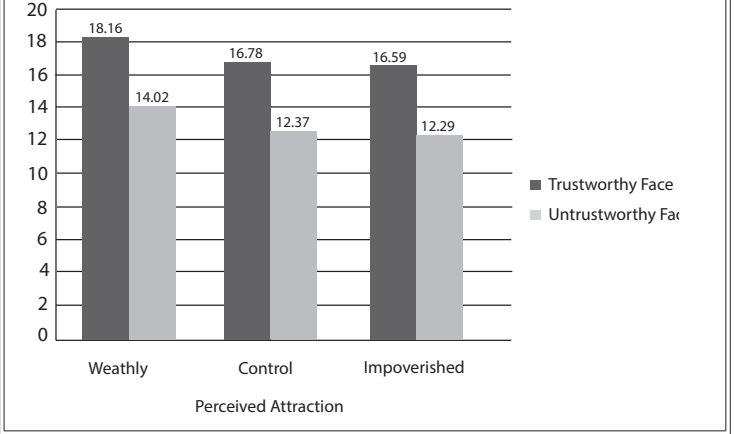


FIGURE 3

Mean Ratings of Attractiveness of Faces in Each Condition.



generally looked more trustworthy than others, which in turn were rated as more attractive and less aggressive than the untrustworthy counterpart. This study extended the Rule et al. (2013) findings by demonstrating the powerful effect of context; regardless of perceived facial trustworthiness, the environmental stimuli that a face is seen in also has a large impact on the way the individual is perceived.

The current work also indicated several potentially interesting avenues for further research. Observing meaningful behavioral differences, perhaps in economic or criminal justice settings, directed toward those who are perceived in these varying backgrounds is a particularly important possible extension of our work. Would someone who is involved in an economic game such as a trust game (Berg et al., 1995) or ultimatum bargaining game (Güth, Schmittberger, & Schwarze, 1982) be willing to give less money based on which environment their partner is shown in? Considering that those who are observed in impoverished areas are perceived as less trustworthy and more aggressive, do harsher social judgments such as hypothetical criminal sentences result from this biased perception?

Although this study produced exceptional results, there were a few notable limitations that could have had an effect on data. Most students who attend the university where the research was conducted are from a similar socioeconomic status. This could have primed them to view the faces in the socioeconomic status most like theirs to be more relatable and therefore more trustworthy because they were viewed as part of the same in-group (Bernstein, Young, & Hugenberg 2007). In addition, the design was within-participants, so every participant saw every condition. This unintentionally produced a forced contrast between environments, which could have caused an increased difference in ratings. If the participants only saw one condition, there could have been less of a significant result because they would have only seen one environment with no large contrast. Finally, the quick decision-making process gave participants a limited time to analyze the photograph, which could have possibly had a different effect than if participants had been given more time to deliberate about their perceptions.

One cannot help but notice parallels between the current work and several current events with social psychological influences. One topic receiving considerable media attention is police use of force and biases in this use. Although much of the discussion has focused on race as a factor, it seems plausible given the current results that environmental context also plays a role. Similarly, the Treyvon Martin case with George Zimmerman relied heavily on photographs to present the victim and suspect in court. Zimmerman was shown in a mug shot and in a photo smiling with family while Martin was pictured as a smiling young teenager versus an older teenager with a hooded sweatshirt on. The current research suggested that the way in which victims and suspects are presented in court could affect the perceptual outcomes of judges, jurors, and the general public due to environmental context. One also wonders if police respond to potential suspects more aggressively in impoverished areas because they have the perception that people in impoverished areas are less trustworthy and more aggressive, or if they would respond with the same aggression if they were in more wealthy areas. It would be interesting to study police response to criminal activity when the same police officers are placed in different environments. This study shed much needed light on the topic of stereotyping and perception. The results were all the more informative given the recent work of Wilson and Rule (2015) showing that perceived trustworthiness biases impact even the most important decisions such as sentencing a possible criminal to the death penalty. Perhaps people should add to the old saying, "Don't judge a book by its cover," a new caution of, "Don't judge a book by the shelf that it sits on."

References

Bar, M., Neta, M., & Linz, H. (2006). Very first impressions. *Emotion, 6*, 269–278. doi:10.1037/1528-3542.6.2.269

Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social history. *Games and Economic Behavior, 10*, 122–142. doi:10.1023/A%3A1009946125005

Bernstein, M. J., Young, S. G., & Hugenberg, K. (2007). The cross-category effect: Mere social categorization is sufficient to elicit an own-group bias in face recognition. *Psychological Science, 18*, 706–712. doi:10.1111/j.1467-9280.2007.01964.x

Blair, I. V., Judd, C. M., & Chapleau, K. M. (2004). The influence of Afrocentric facial features in criminal sentencing. *Psychological Science, 15*, 674–679. doi:10.1111/j.0956-7976.2004.00739.x

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 115–159. doi:10.1037/0033-2909.112.1.155

Ernst, J., & Tornabene, L. (2012). Preservice early childhood educators' perceptions of outdoor settings as learning environments. *Environmental Education Research, 18*, 643–664. doi:10.1080/13504622.2011.640749

Flowe, H. D. (2012). Do characteristics of faces that convey trustworthiness and dominance underlie perceptions of criminality? *PLoS ONE, 7*. doi:10.1371/journal.pone.0037253

Geiselman, R. E., Haight, N. A., & Kimata, L. G., (1984). Context effects on the perceived physical attractiveness of faces. *Journal of Experimental Social Psychology, 20*, 409–424. doi:10.1016/0022-1031(84)90035-0

Güth, W., Schmittberger, R., & Schwarze, B. (1982). An experimental

analysis of ultimatum bargaining. *Journal of Economic Behavior and Organization, 3*, 367–388. Retrieved from http://webspace.pugetsound.edu/facultypages/gmilam/courses/econ291/readings/Guth82.pdf

Jiwa, M., Millett, S., Meng, X., & Hewitt, V. M. (2012). Impact of the presence of medical equipment in images on viewers' perceptions of the trustworthiness of an individual on-screen. *Journal of Medical Internet Research, 14*, 238–249. doi:10.2196/jmir.1986

Masip, J., Garrido, E., & Herrero, C. (2004). Facial appearance and impressions of credibility: The effects of facial babyishness and age on person perception. *International Journal of Psychology, 39*, 276–289. doi:10.1080/00207590444000014

O'Brien, D., & Wilson, D. S. (2011). Community perception: The ability to assess the safety of unfamiliar neighborhoods and respond adaptively. *Journal of Personality and Social Psychology, 100*, 606–620. doi:10.1037/a0022803

Paunonen, S. V. (2006). You are honest, therefore I like you and find you attractive. *Journal of Research in Personality, 40*, 237–249. doi:10.1016/j.jrp.2004.12.003

Porter, S., ten Brinke, L., & Gustaw, C. (2010). Dangerous decisions: The impact of first impressions of trustworthiness on the evaluation of legal evidence and defendant culpability. *Psychology, Crime, and Law, 16*, 477–491. doi:10.1080/10683160902926141

Rudoy, J. D., & Paller, K. A. (2009). Who can you trust? Behavioral and neural differences between perceptual and memory-based influences. *Frontiers in Human Neuroscience, 3*, 16. doi:10.3389/neuro.09.016.2009

Rule, N. O., Krendl, A. C., Ivcevic, Z., & Ambady, N. (2013). Accuracy and consensus in judgments of trustworthiness from faces: Behavioral and neural correlates. *Journal of Personality and Social Psychology, 104*, 409–426. doi:10.1037/a0031050

Srull, T. K., & Wyer, R. S., (1980). Category accessibility and social perception: Some implications for the study of person memory and interpersonal judgments. *Journal of Personality and Social Psychology, 38*, 841–856. doi:10.1037/0022-3514.38.6.841

Todorov, A., Pakrashi, M., & Oosterhof, N. N. (2009). Evaluating faces on trustworthiness after minimal time exposure. *Social Cognition, 27*, 813–833. doi:10.1521/soco.2009.27.6.813

van't Wout, M., & Sanfey, A. G. (2008). Friend or foe: The effect of implicit trustworthiness judgments in social decision-making. *Cognition, 108*, 796–803. doi:10.1016/j.cognition.2008.07.002.

Wilson, J. P., & Rule, N. O., (2015). Facial trustworthiness predicts extreme criminal-sentencing outcomes. *Psychological Science, 26*, 1325–1331. doi:10.1177/0956797615590992

Zebrowitz, L. A. (1997). *Reading faces: Window to the soul?* Boulder, CO: Westview Press

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APPENDIX

Example of Background Conditions

Background images shown here and used in the study were gathered from publicly available photographs via Google Image search (http://www.cbhunter.com/Property/OH/44067/Sagamore_Hills/8580_Eaton_Dr), (https://texashousers.net/2010/07/01/current-fema-disaster-recovery-policy-will-leave-low-income-hurricane-survivors-unassisted/).

The face presented in this appendix is not the one used as a stimulus in this study, but is a volunteer who granted use of their photograph for publication purposes.