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BRIEF REPORT

Competition Makes Observers Remember Faces as More Aggressive

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People use facial appearance to predict social behavior, but can social context also influence face perception? Leveraging a link between competition and aggression, we investigated the effects of competitive interactions with confederates on participants' performance in a face reconstruction task. Participants played a game either in competition or cooperation with confederates and were then asked to create facial portraits of these confederates by arranging their component features into their best estimate of an accurate configuration. Across 2 experiments, participants who played in a competitive context reconstructed faces in a more aggressive configuration—with higher width-to-height ratios—than did participants who played cooperatively or alone. This result demonstrates that the social perception of faces is not merely a feed-forward process, but instead that the social contexts in which people interact can shape memory for faces.

Keywords: face recognition, configural processing, social perception

Observers estimate multiple social and personality characteristics from brief exposure to faces (Willis & Todorov, 2006). Alongside judgments of attractiveness, sexual orientation, and so forth, many properties observers extract from faces are relevant to competition and cooperation (Gill, Garrod, Jack, & Schyns, 2014). For example, people can detect "cheating" behavior in bargaining games such as the Prisoner's Dilemma from faces (Verplaetse, Vanneste, & Braeckman, 2007). Trustworthiness more generally is a core dimension of social face perception (Oosterhof & Todorov, 2008) that is available in face images. Perceived trustworthiness can be manipulated in naturalistic face images (Todorov, Baron, & Oosterhof, 2008) and changing apparent trustworthiness influences performance in trust games (Rezlescu, Duchaine, Olivola, & Chater, 2012).

Whereas trustworthiness appears to depend on visual cues distributed over the entire face, another important social property that is relevant to competition, aggression, is both available in face images and may be based on a single geometric property of the face. Specifically, the facial width-to-height ratio (WHR; the horizontal distance across the eyes divided by the vertical distance between the brow and upper lip) is a useful cue indicating aggression. High WHR values correlate with in situ aggressive behavior (Carré & McCormick, 2008) and lead observers to judge faces as being more aggressive (Carré, McCormick, & Mondloch, 2009). Remarkably, this single feature of face geometry appears to have substantial value in predicting observers' impressions of whether or not an individual is aggressive and actual aggressive behavior.

We asked whether recent competitive or cooperative experience with an individual would lead to systematic WHR biases such that competition would modulate remembered facial appearance in a manner consistent with more aggression. Competition and aggression are tightly linked: Aggression is a behavior evolved in response to competition (Nelson & Trainor, 2007), many laboratory studies of aggression use competitive scenarios to provoke this behavior (e.g., Bjork, Dougherty, & Moeller, 1997; Bushman & Baumeister, 1998; Carré, McCormick, & Hariri, 2011), and higher levels of competition are linked to increased aggression (Adachi & Willoughby, 2011; Archer, 2006). Although existing work with the WHR has interpreted this ratio as a physical signal observers use to predict behavior, we hypothesized that recent behavior can influence observers' perception of the WHR. This would suggest that the social perception of faces is not simply a feed-forward process by which observers rapidly extract personality characteristics from the face, but rather that social environments also shape memory for faces.

To determine whether and how social interactions influence face perception and memory, we used a face reconstruction paradigm to assess observers' estimates of the WHR of confederates they interacted with in a game. We asked participants to play a ball-toss game either in cooperation with or competition against a confederate (Experiment 1) or alone (Experiment 2) while a second confederate supervised the game. Afterward, we asked observers to create facial portraits of both confederates by arranging each

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confederate's features into what they believed was a best likeness. We measured the WHR in these reconstructions to determine whether the nature of the interaction (competitive or cooperative) influenced the WHR. Across experiments, we found that the nature of the interaction affected the WHR in the expected direction, suggesting that competition makes observers remember and reconstruct faces with facial appearance consistent with increased aggression.

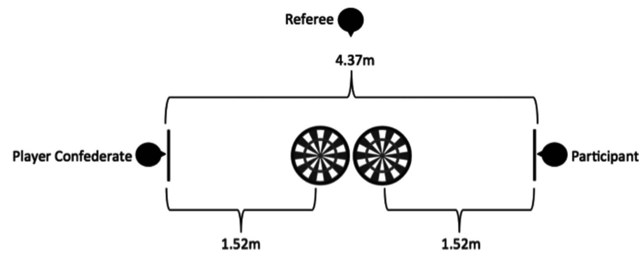

Figure 2. Layout of the ball-toss game.

Experiment 1

Method

Subjects. Sixty North Dakota State University undergraduate volunteers participated for course credit and were randomly assigned to one of two experimental groups. To estimate our sample size, we carried out a power analysis based on a mean difference of 0.1 between low and high WHRs (using values from Carré et al., 2009, as a guide), with standard deviations of approximately 0.2. This analysis indicated that approximately 25 participants would be needed for an alpha of .05 and 80% power. We terminated data collection when we reached the sample size.

Stimuli. We used photographs of four White undergraduate confederates (two women) with neutral facial expression to create segmented images of the eyes, nose, and mouth that participants could arrange independently on a display. Original photographs (1,300 × 2,000 pixels in size) were blurred and thresholded to create two-tone "Mooney faces," and the features were cropped from the larger image for use in the reconstruction task (see Figure 1).

Procedure. Participants stood at a line facing one of the confederates (the partner) and played a game in which they tossed a ball at a Velcro target board with patches of varying point values lying on the floor. A second target board was positioned the same distance away from the confederate (see Figure 2). Both players took turns throwing toward their respective targets. Another confederate (the referee) stood outside of the game space, read instructions to the participants, kept score, and retrieved balls between rounds. In the *competitive* condition (n = 30: 20 men, 10 women, one African American, 29 Whites), the referee told participants that whoever first reached an individual score of 1,000 or more points would win. In the *cooperative* condition (n = 30: 22 men, eight women, two African Americans, three Asians, 25 Whites), the referee instructed participants that they would play with the other confederate and that the team would win when their total score reached 2,000 points. Both players were instructed not to talk during the game. The referee spoke following each round to announce each player's score (competitive condition) or the team score (cooperative condition). Confederates maintained a neutral facial expression across conditions. Immediately following the game, while both the participant and partner confederate stood at their starting lines, the participant provided a written estimate of the distance between themself and the partner. The referee remained constant across all participants, and each of the three partner confederates played equally often across conditions.

After collecting the distance estimate, the referee escorted participants into a separate room to perform a computerized face configuration task. After instructing the participant on the task, the referee left the participant alone to complete reconstructions of both confederates from memory sequentially in a balanced order across participants. For each face, participants saw the features belonging to the target individual arranged in a horizontal line across the bottom of the display and had unlimited time to arrange each eye, the nose, and mouth into their best approximation of the target individual's true appearance. Participants positioned each feature anywhere they wished using a mouse and pressed the spacebar when they were finished reconstructing a face.

Participants completed a posttest questionnaire following the face configuration task that probed for the presence of demand characteristics by asking what they thought the purpose of the study was and what outcome they would predict.

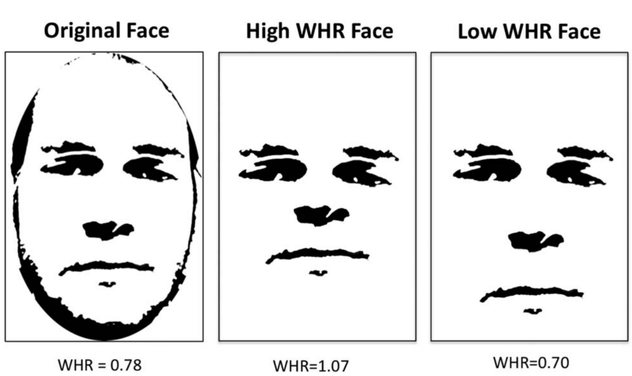

Figure 1. An example of the two-tone faces we used to segment the eyes, nose, and mouth for our facial reconstruction task (left). Also, examples of high and low WHR faces to illustrate how eye, nose, and mouth position could vary.

Results and Discussion

We calculated the WHR of the face configurations each participant made by dividing the interpupillary distance (x-coordinate right eye–x-coordinate left eye) by the eye-to-mouth height (y-coordinate mouth center–average eye y-coordinate). This yielded two ratios per subject, one for the partner confederate and another for the referee. We submitted these values to a 2 × 2 × 2 × 3 analysis of variance (ANOVA), with confederate type (partner/referee) as a within-subject factor and game type (competitive/cooperative), outcome (competitive win [n = 9]/loss [n = 21], cooperative higher [n = 13]/lower score [n = 17]), and partner confederate identity as between-subjects factors. Figure 3 displays average WHRs (collapsed across particular confederate and outcome) as a function of confederate and game types.

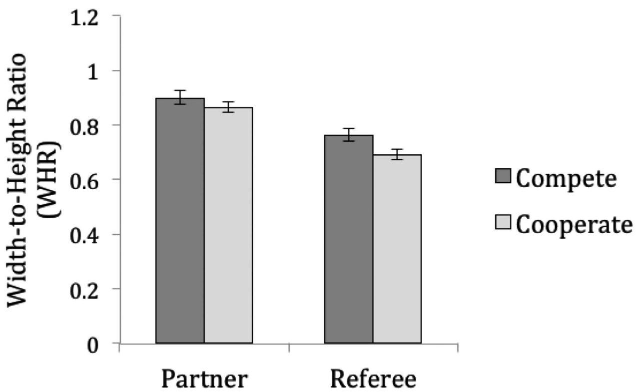

Figure 3. Average WHR ratios across conditions (collapsed across different confederates and outcomes) in Experiment 1. We observed effects related to physical differences in facial configuration across confederates as well as effects that were related to the social context of the game participants played during the session. Error bars represent ±1 *SEM*.

We observed a main effect of confederate type, $F(1, 48) = 66.4$, $p < .001$, partial $\eta^2 = .58$, qualified by a two-way interaction between confederate type and the confederate identity, $F(2, 48) = 6.86$, $p = .002$, partial $\eta^2 = .22$, which likely reflects veridical WHR differences between the referee and partner confederates. We also observed main effects of game type, $F(1, 48) = 7.59$, $p = .008$, partial $\eta^2 = .14$, and outcome, $F(1, 48) = 5.78$, $p = .020$, partial $\eta^2 = .11$, suggesting that the nature of social interaction impacted the perceived WHR. Specifically, competition led to significantly larger WHRs ($M_{\text{compete}} = 0.86$, $SEM = 0.021$) than cooperation ($M_{\text{cooperate}} = 0.78$, $SEM = 0.018$), suggesting that competition increased reconstructed facial aggression. Participants who scored more points than the partner confederate ($n = 22$) also created face configurations with a larger WHR ($M_{\text{high scorers}} = 0.85$, $SEM = 0.023$) than participants who scored fewer points ($n = 38$, $M_{\text{low scorers}} = 0.78$, $SEM = 0.015$). No other main effects or interactions were significant.

A 2 × 2 × 3 between-subjects ANOVA with factors of game type, outcome, and confederate identity on distance estimates revealed no main effects or interactions ($ps > .300$).

Posttest questionnaire responses suggested that none of the participants linked the social context of the game to their reconstructions of the confederates' faces.

The results of Experiment 1 provide initial evidence that the dynamics of social interaction can shape face perception, showing that when observers are in a competitive, as opposed to a cooperative, social context, other people are remembered and reconstructed with facial geometry consistent with increased aggression. These results suggest that social perception does not proceed in a strictly feed-forward fashion, but it is unclear whether the WHR differences we obtained across conditions were a result of competition increasing reconstructed/remembered aggression, cooperation decreasing aggression, or a combination of both influences. In addition, although these results show that social context alters memory for faces, we could not determine whether this effect was a result of competition/cooperation causing participants to become more/less aggressive themselves, or whether the perceptual influence was independent from participants' own feelings of aggression at the time of testing. Experiment 2 examined these questions.

Experiment 2

Method

Subjects. Ninety North Dakota State University undergraduate male volunteers were randomly assigned to one of three experimental groups. This sample size was determined using the same analysis described in Experiment 1.

Stimuli. We used the techniques described in Experiment 1 to create segmented images of two White female confederates.

Procedure. Participants played the ball-toss game under the same conditions as Experiment 1. In addition to testing a group of participants in the *competitive* ($n = 30$: two African Americans, one Asian, 27 Whites) and *cooperative* conditions ($n = 30$: one Asian, 29 Whites), an additional group of participants played the game in a *control* condition in which they stood across the room from a partner confederate who observed their performance without playing ($n = 30$: one African American, one Asian, one Hispanic/Latino, 27 Whites). The referee informed participants in this condition that they would win the game when their score reached 1,000 or more points. The two confederates served as the partner confederate and referee equally often, and role assignment was counterbalanced across conditions.

Following the game, participants performed the face configuration task using the procedures described previously. Afterward, participants completed two written questionnaires modified from the Buss–Perry Aggression Questionnaire (Buss & Perry, 1992) to measure state aggression (Farrar & Krcmar, 2006). By assessing participants' aggression posttest only, we point out that we cannot speak to the extent to which our manipulations modulated aggression from baseline. However, these measures did allow us to determine whether or not aggression differed in our participant groups at test, which could in part explain why WHR differences might arise in reconstructed faces. Each questionnaire contained 24 statements participants responded to on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*; see Table 1 for examples). The instructions for each questionnaire informed participants whether they were reporting their feelings about the partner confederate or referee; questionnaires were otherwise identical. Participants placed finished questionnaires in a lockbox accessible only to the authors before leaving.

Results and Discussion

Figure 4 displays average WHRs as a function of confederate type (partner/referee) and game type (competitive/cooperative/control). We submitted WHR values to a 2 × 3 ANOVA with confederate type as a within-subject factor and game type as a between-subjects factor. This analysis revealed a main effect of game type, $F(2, 87) = 5.14$, $p = .008$, partial $\eta^2 = .11$, again

Table 1
Example Items for State Aggression Scale

• I could not control my urge to strike this person.
• I would tell this person openly if I disagreed with her.
• If I were frustrated with this person, I would let my irritation show.
• This person made me feel eaten up with jealousy.
• I would be suspicious of this person if she were overly friendly.

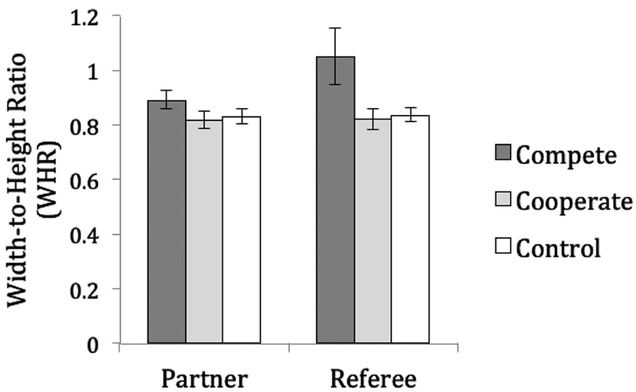

Figure 4. Average WHR across conditions in Experiment 2. Error bars represent ±1 *SEM*.

suggesting that social context impacted the WHRs. Tukey post hoc comparisons showed that participants in the competitive condition ($M_{\text{compete}} = 0.97$, $SEM = 0.054$) reconstructed faces with significantly larger WHRs than participants in the cooperative condition ($M_{\text{cooperate}} = 0.82$. $SEM = 0.023$, $p = .013$) or the control condition ($M_{\text{control}} = 0.83$, $SEM = 0.018$, $p = .027$). WHRs for the cooperative and control conditions were not significantly different from each other. The main effect of confederate type was not significant, nor did it interact with game type.

An additional 2 × 2 × 2 ANOVA examining WHR data only for participants in the competitive and cooperative conditions with confederate type as a within-subject factor and game type and outcome (competitive win [$n = 19$]/loss [$n = 11$], cooperative higher score [$n = 12$]/lower score [$n = 18$]) as between-subjects factors also revealed a main effect of game type, $F(1, 56) = 7.08$, $p = .010$, partial $\eta^2 = .11$. No other main effects or interactions were significant.

Each participant's responses to individual items on the aggression questionnaire were combined into separate aggregate scores for the partner confederate and referee. These scores were submitted to a 2 × 3 ANOVA with a within-subject factor of confederate type and a between-subjects factor of game type. Neither the main effects nor interaction was significant ($M_{\text{compete}} = 43.50$, $SEM = 2.99$; $M_{\text{cooperate}} = 40.02$, $SEM = 2.03$; $M_{\text{control}} = 45.05$, $SEM = 2.14$).

The results of Experiment 2 replicate and extend the findings of Experiment 1, providing converging evidence that social contexts influence face reconstruction and perception. Although participants in this experiment who entered into a competition did not show increased levels of aggression at test as measured by the self-report questionnaire, they nonetheless reconstructed confederate faces with higher WHRs than participants who cooperated with or were observed by a confederate, suggesting that competitive social contexts specifically lead observers to remember faces with larger WHRs.

General Discussion

Much evidence suggests that people use facial appearance to predict social behavior (e.g., Willis & Todorov, 2006); we have shown for the first time that the competitive dynamics of social interaction also shape how observers remember and reconstruct other faces. Across experiments, participants' interactions with confederates were brief and focused on an identical tossing action; yet, differences in the social context of these interactions impacted the configural properties participants used when attempting to reconstruct confederates' faces. When participants experienced competition, they reconstructed faces with higher WHRs than when they cooperated with or were merely observed by confederates. High WHRs are linked with perceived aggression (e.g., Carré et al., 2009). Angry facial expressions entail brow-lowering and lip-raising that create a higher WHR (Marsh, Cardinale, Chentsova-Dutton, Grossman, & Krumpos, 2014), and individuals who wish to appear more intimidating naturally adopt poses and expressions that increase the WHR (Hehman, Leitner, & Gaertner, 2013). High WHRs in males also predict aggressive behavior in trust games and lead to lower perceived trustworthiness (Stirrat & Perrett, 2010). These converging results suggest that in our study, when participants were placed in a competitive social context, the people around them were remembered/reconstructed as more aggressive on average.

Does this difference in face reconstruction translate directly to faces that look more aggressive to naïve observers? To determine whether or not the faces created by participants would look aggressive to naïve observers, we used the average WHR from the competitive and cooperative conditions of Experiment 2 to create stimuli for a new group of observers to evaluate. We arranged the facial features of the two confederates who assisted with Experiment 2 into two average "compete" faces and two average "cooperate" faces, with WHRs of 0.97 and 0.82, respectively. Next, we recruited 80 observers using the Amazon Mechanical Turk, each of whom simultaneously viewed both versions of a single confederate's facial features and selected the face that looked more aggressive. This sample size was determined based on a power analysis in which we assumed (using an alpha of .05 and 80% power) that the true binomial proportion of "successes" was 65%. We found that 58% of our observers chose the face with the higher WHR as the more aggressive face. This trend did not reach significance, however (one-tailed binomial test, $p = .10$), suggesting that faces with the average WHRs observed in the reconstructions made by participants in our two conditions did not reliably signal aggression.

Given that the WHRs created by our participants are commensurate with prior results that do find perceptual differences in aggression, we suggest that there are several possible reasons why we did not observe such an effect here. To avoid imposing prior structure on participants' reconstructions, we presented participants in our reconstruction tasks with segmented facial features on an empty background and showed the same kind of images to observers via the Mechanical Turk. The lack of an external outline may have affected participants' processing of these faces, especially given the importance of the external outline for unfamiliar face recognition (Johnston & Edmonds, 2009). We also note that the WHR is calculated in some studies using the width of the face across the zygomatic region, which includes the external contour. The lack of an external outline in our stimuli may have thus introduced some variation between our estimates of the WHR and the values used in prior studies and observed with real faces. Regardless of the reason for this discrepancy, our results suggest an interesting dissociation between face reconstruction and face perception that may be consistent with other results comparing perceptual tasks with reconstruction tasks (Balas & Sinha, 2007). The faces created by observers after competition may not on average look more aggressive to new observers, but they are reconstructed/remembered with WHRs that are consistent with more aggression. This effect occurred for both the direct competitor—the partner confederate—as well as for the referee responsible for setting the rules of the competition and tracking performance.

Why did competition encourage players to reconstruct confederates' faces in a more aggressive configuration? The results of Experiment 2 suggest that this effect is not necessarily tied to increased aggression in observers: Social context did not influence ratings on the aggression questionnaire, yet this context had a substantial impact on face reconstructions. These results, along with established links between competition and aggression (e.g., Nelson & Trainor, 2007), suggest that our competitive condition specifically introduced a bias to create faces with higher WHRs based on perceiving/remembering more aggression in others. Previous work has demonstrated that people primed or instructed to adopt competitive goals are more likely to attribute competitive motives to others (Kawada, Oettingen, Gollwitzer, & Bargh, 2004) and that mood inductions involving happiness or sadness can create a bias to directly perceive stronger traces of these emotions in changing facial expressions (Niedenthal, Halberstadt, Margolin, & Innes-Ker, 2000). Our work extends these findings, showing that a simple manipulation in social interaction can alter the extent to which observers remember partners as looking aggressive. Although confederates held neutral facial expressions in the photographs we used to provide participants with segmented facial features, participants who experienced competition arranged these features into a configuration associated with more aggression than did participants who cooperated or were observed. Interestingly, although participants experienced the two confederates from different angles—viewing the partner confederate from a single angle at a distance, yet observing the referee from multiple viewpoints—the effects of competition on face perception were consistent across both confederates, suggesting that social context can shape memory for faces across viewing conditions.

Critically, this means that social perception is not strictly feedforward. The capabilities of "thin-slice" vision notwithstanding (Ambady & Rosenthal, 1993), social variables are not simply measured in the input image in service of downstream perceptual or cognitive processes. Instead, our results suggest that estimates of facial appearance are malleable such that the social environment may influence perceived face structure. This is consistent with a large literature suggesting that an important component of high-level vision is the use of top-down estimates of scene/object structure (the "forest") to modulate bottom-up inputs (the "trees"; see Bar et al., 2006). Moreover, our results are commensurate with reports of increased error in thin-slice tasks as a function of observer mood (Ambady & Gray, 2002) but extend this result by demonstrating that social perception may actually be altered systematically.

Our work joins a growing literature investigating the consequences of social behavior on visual perception (e.g., Pitts, Wilson, & Hugenberg, 2014; Soliman & Glenberg, 2014; Thomas, Davoli, & Brockmole, 2014), showing that simple social interactions can have significant consequences on subsequent memory for faces. This finding points to the potentially far-reaching power of social setting to shape perception. In future studies, we hope to examine the influence of social context not only on the perception of recent interaction partners, but also the extent to which social influences may color perception of new individuals.

References

Adachi, P. J. C., & Willoughby, T. (2011). The effect of video game competition and violence on aggressive behavior: Which characteristic has the greatest influence? *Psychology of Violence, 1,* 259–274. http://dx.doi.org/10.1037/a0024908

Ambady, N., & Gray, H. M. (2002). On being sad and mistaken: Mood effects on the accuracy of thin-slice judgments. *Journal of Personality and Social Psychology, 83,* 947–961. http://dx.doi.org/10.1037/0022-3514.83.4.947

Ambady, N., & Rosenthal, R. (1993). Half a minute: Predicting teacher evaluations from thin slices of nonverbal behavior and physical attractiveness. *Journal of Personality and Social Psychology, 64,* 431–441. http://dx.doi.org/10.1037/0022-3514.64.3.431

Archer, J. (2006). Testosterone and human aggression: An evaluation of the challenge hypothesis. *Neuroscience and Biobehavioral Reviews, 30,* 319–345. http://dx.doi.org/10.1016/j.neubiorev.2004.12.007

Balas, B. J., & Sinha, P. (2007). Portraits and perception: Configural information in creating and recognizing face images. *Spatial Vision, 21,* 119–135. http://dx.doi.org/10.1163/156856807782753949

Bar, M., Kassam, K. S., Ghuman, A. S., Boshyan, J., Schmid, A. M., Dale, A. M., . . . Halgren, E. (2006). Top-down facilitation of visual recognition. *Proceedings of the National Academy of Sciences, USA, 103,* 449–454. http://dx.doi.org/10.1073/pnas.0507062103

Bjork, J. M., Dougherty, D. M., & Moeller, F. G. (1997). A positive correlation between self-ratings of depression and laboratory-measured aggression. *Psychiatry Research, 69,* 33–38. http://dx.doi.org/10.1016/S0165-1781(96)03025-9

Bushman, B. J., & Baumeister, R. F. (1998). Threatened egotism, narcissism, self-esteem, and direct and displaced aggression: Does self-love or self-hate lead to violence? *Journal of Personality and Social Psychology, 75,* 219–229. http://dx.doi.org/10.1037/0022-3514.75.1.219

Buss, A. H., & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology, 63,* 452–459. http://dx.doi.org/10.1037/0022-3514.63.3.452

Carré, J. M., & McCormick, C. M. (2008). In your face: Facial metrics predict aggressive behaviour in the laboratory and in varsity and professional hockey players. *Proceedings of the Royal Society B: Biological Sciences, 275,* 2651–2656. http://dx.doi.org/10.1098/rspb.2008.0873

Carré, J. M., McCormick, C. M., & Hariri, A. R. (2011). The social neuroendocrinology of human aggression. *Psychoneuroendocrinology, 36,* 935–944. http://dx.doi.org/10.1016/j.psyneuen.2011.02.001

Carré, J. M., McCormick, C. M., & Mondloch, C. J. (2009). Facial structure is a reliable cue of aggressive behavior. *Psychological Science, 20,* 1194–1198. http://dx.doi.org/10.1111/j.1467-9280.2009.02423.x

Farrar, K., & Krcmar, M. (2006). Measuring state and trait aggression: A short, cautionary tale. *Media Psychology, 8,* 127–138. http://dx.doi.org/10.1207/s1532785xmep0802_4

Gill, D., Garrod, O. G. B., Jack, R. E., & Schyns, P. G. (2014). Facial movements strategically camouflage involuntary social signals of face morphology. *Psychological Science, 25,* 1079–1086. http://dx.doi.org/10.1177/0956797614522274

Hehman, E., Leitner, J. B., & Gaertner, S. L. (2013). Enhancing static facial features increases intimidation. *Journal of Experimental Social Psychology, 49,* 747–754. http://dx.doi.org/10.1016/j.jesp.2013.02.015

Johnston, R. A., & Edmonds, A. J. (2009). Familiar and unfamiliar face recognition: A review. *Memory, 17,* 577–596. http://dx.doi.org/10.1080/09658210902976969

Kawada, C. L. K., Oettingen, G., Gollwitzer, P. M., & Bargh, J. A. (2004). The projection of implicit and explicit goals. *Journal of Personality and Social Psychology, 86,* 545–559.

Marsh, A. A., Cardinale, E. M., Chentsova-Dutton, Y. E., Grossman, M. R., & Krumpos, K. A. (2014). Power plays: Expressive mimicry of valid agonistic cues. *Social Psychological and Personality Science, 5,* 684–690. http://dx.doi.org/10.1177/1948550613519684

Nelson, R. J., & Trainor, B. C. (2007). Neural mechanisms of aggression. *Nature Reviews Neuroscience, 8,* 536–546. http://dx.doi.org/10.1038/nrn2174

Niedenthal, P. M., Halberstadt, J. B., Margolin, J., & Innes-Ker, A. H. (2000). Emotional state and the detection of change in facial expression of emotion. *European Journal of Social Psychology, 30,* 211–222. http://dx.doi.org/10.1002/(SICI)1099-0992(200003/04)30:2<211::AID-EJSP988>3.0.CO;2-3

Oosterhof, N. N., & Todorov, A. (2008). The functional basis of face evaluation. *Proceedings of the National Academy of Sciences, USA, 105,* 11087–11092. http://dx.doi.org/10.1073/pnas.0805664105

Pitts, S., Wilson, J. P., & Hugenberg, K. (2014). When one is ostracized, others loom: Social rejection makes other people appear closer. *Social Psychological and Personality Science, 5,* 550–557. http://dx.doi.org/10.1177/1948550613511502

Rezlescu, C., Duchaine, B., Olivola, C. Y., & Chater, N. (2012). Unfakeable facial configurations affect strategic choices in trust games with or without information about past behavior. *PLoS One, 7,* e34293. http://dx.doi.org/10.1371/journal.pone.0034293

Soliman, T., & Glenberg, A. M. (2014). The embodiment of culture. In L. Shapiro (Ed.), *The Routledge handbook of embodied cognition* (pp. 207–219). New York, NY: Routledge.

Stirrat, M., & Perrett, D. I. (2010). Valid facial cues to cooperation and trust: Male facial width and trustworthiness. *Psychological Science, 21,* 349–354. http://dx.doi.org/10.1177/0956797610362647

Thomas, L. E., Davoli, C. C., & Brockmole, J. R. (2014). Competitive interaction leads to perceptual distancing between actors. *Journal of Experimental Psychology: Human Perception and Performance, 40,* 2112–2116. http://dx.doi.org/10.1037/a0038307

Todorov, A., Baron, S. G., & Oosterhof, N. N. (2008). Evaluating face trustworthiness: A model-based approach. *Social Cognitive and Affective Neuroscience, 3,* 119–127. http://dx.doi.org/10.1093/scan/nsn009

Verplaetse, J., Vanneste, S., & Braeckman, J. (2007). You can judge a book by its cover: The sequel. A kernel of truth in predicting cheating detection. *Evolution and Human Behavior, 28,* 260–271. http://dx.doi.org/10.1016/j.evolhumbehav.2007.04.006

Willis, J., & Todorov, A. (2006). First impressions: Making up your mind after a 100-ms exposure to a face. *Psychological Science, 17,* 592–598. http://dx.doi.org/10.1111/j.1467-9280.2006.01750.x

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