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SHORT AND SWEET

Look out, there is a triangle behind you! The effect of primitive geometric shapes on perceived facial dominance

Alexander Toet
TNO, Kampweg 5, 3769DE Soesterberg, the Netherlands; e-mail: lex.toet@tno.nl

Susanne Tak
TNO, Kampweg 5, 3769DE Soesterberg, the Netherlands; e-mail: susanne.tak@tno.nl

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Abstract. Previous research has shown that perceived facial valence is biased toward background valence. Here, we examine whether background dominance also affects perceived facial dominance. In particular, we hypothesized that downward-pointing triangles, which are known to convey threat, would affect perceived facial dominance. Participants judged perceived facial dominance of neutral faces presented overlaid on downward- or upward-pointing background triangles. Our results show that neutral faces are indeed judged more dominant when seen with a downward-pointing triangle in the background. The fact that simple geometric background shapes can affect facial judgments may have important implications for the design and experience of our daily environment and multimedia content.

Keywords: facial dominance, triangles, facial expression, facial affect.

People routinely evaluate facial expressions to infer each others' specific behavioral or interaction intentions. These judgments, which are often made spontaneously and rapidly (Ballew & Todorov, 2007; Todorov, Mandisodza, Goren, & Hall, 2005; Todorov, Pakrashi, & Oosterhof, 2009; Tracy & Robins, 2008), influence various social outcomes, ranging from electoral success to criminal sentencing decisions (Blair, Judd, & Chapleau, 2004; Little, Burriss, Jones, & Roberts, 2007; Todorov et al., 2005).

Prototypical facial expressions seen in isolation reliably signal the specific emotional state of an individual (Tracy & Robins, 2008). However, in daily life, faces are typically not encountered in isolation but perceived in a (multisensory) context. It appears that context information modulates face perception already at the early stages of facial feature processing (de Gelder et al., 2006), such that the affective quality of the context transfers to the perceived affective state of a face (Barrett, Mesquita, & Gendron, 2011; de Gelder et al., 2006; Koji & Fernandes, 2010; Lee, Choi, & Cho, 2012; Righart & de Gelder, 2008). Identical facial configurations may therefore convey strikingly different emotions depending on the context in which they are perceived (Koji & Fernandes, 2010).

Simple geometric shapes such as downward-pointing triangles, angular lines, and acute angles are known to convey threat and negative valence (Aronoff, Woike, & Hyman, 1992; Lundqvist, Esteves, & Öhman, 2004; Watson, Blagrove, Evans, & Moore, 2012). Downward-pointing triangles recruit brain regions involved in perception of threat and negative facial emotion (Larson, Aronoff, Sarinopoulos, & Zhu, 2009). It has been suggested that the affective connotations of these simple shapes may have evolutionary or cultural causes, since they resemble threatening stimuli such as fangs or the V-shaped torsos of dominant men (items that were clearly relevant to survival in our evolutionary past) and the underlying primitive features of negative facial expressions (like the inward- and downward-pointing eyebrows typical of angry faces: Aronoff et al., 1992; Lundqvist et al., 2004).

We hypothesized that the threat association of downward-pointing triangles transfers to an increased perceived facial dominance. This may have important social implications, since facial dominance is often associated with physical strength (Fink, Neave, & Seydel, 2007), leadership and competence (Little et al., 2007), and criminal propensity (Flowe, 2012).

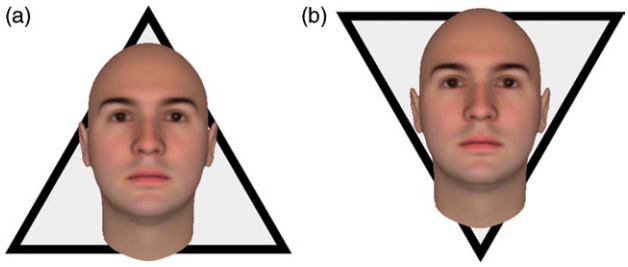

Figure 1. Neutral face with an upward (a) and downward (b) pointing triangle in the background.

Twelve dominance-neutral faces from the Dominance data set of the validated Princeton faces database (http://webscript.princeton.edu/~tlab/databases/database-4-dominance-dataset; see also Oosterhof & Todorov, 2008) were selected as stimuli. In a preliminary validation study, they were placed on a neutral (black) background and 22 participants rated their perceived dominance on a five-point scale ranging from very submissive (−2) to very dominant (2). As expected, we found that the faces were not judged different from neutral on the dominance scale when shown on a neutral (black) background (Wilcoxon one sample test, $Z = -1$, $p = 0.317$). Next, in the current study, 20 (10 female) participants (ages 18–67 years, mean 29) judged these neutral faces overlaid on either an upward- or a downward-pointing background triangle (Figure 1). Each face was presented twice: once superposed on an upward-pointing triangle, and once superposed on a downward-pointing background triangle. All stimuli were presented in random order. Participants rated the perceived dominance of the faces on a five-point scale. The participants were instructed to respond quickly and base their answer solely on their first impression of each face.

Figure 2 shows the distribution of median dominance scores of all ($N = 20$) participants, for the neutral faces shown with either an upward (panel a) or a downward (panel b) pointing triangle in the background. Faces presented on downward-pointing triangles were judged as significantly more dominant than faces on upward-pointing triangles (Wilcoxon test $Z = 2.807$, $p < 0.01$). There were no gender or age effects. To investigate whether upward-pointing triangles decreased dominance ratings, or the downward-pointing triangles increased dominance ratings, or both, we performed two one-sample Wilcoxon tests to compare the results to neutrality (i.e. zero). The results show that dominance ratings of faces superposed on upward-pointing triangles were not different from zero ($Z = -1.300$, $p = 0.194$), while the ratings of faces superposed on downward-pointing triangles differed from zero ($Z = -2.309$, $p < 0.05$).

The current results show that a simple geometric background shape like a triangle can influence perceived facial dominance. Neutral faces are judged more dominant when seen with a downward-pointing triangle in the background. Knowledge of the effects of simple geometric background shapes on facial judgments may have important implications for the design and experience of our daily environment and multimedia content (Figure 3).

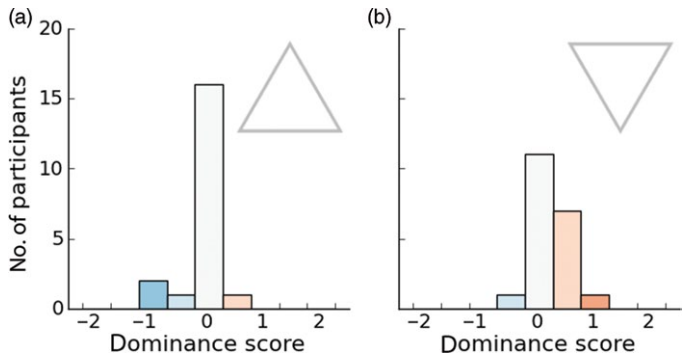

Figure 2. Distribution of median dominance scores (ranging from −2 = very submissive to 2 = very dominant) of all ($N = 20$) participants, for neutral faces shown with upward (a) or downward (b) pointing triangles in the background.

Figure 3. Downward-pointing triangles in our daily environment and multimedia content.

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Alexander Toet received his PhD in physics from the University of Utrecht, Utrecht, the Netherlands, in 1987. He is currently a guest researcher at the Intelligent System Laboratory Amsterdam, Faculty of Science, University of Amsterdam, where he investigates the effects of color on affective image classification, and a senior research scientist at TNO (Soesterberg, the Netherlands), where he investigates multimodal image fusion, image quality, human visual search and detection, and visual target distinctness. He also studies cross-modal perceptual interactions between the visual, auditory, olfactory, and tactile senses.

Susanne Tak received her PhD in human–computer interaction from the University of Canterbury, Christchurch, New Zealand. She currently works as a research scientist at TNO (Soesterberg, the Netherlands). Her research interests are in information visualization (in particular, cognition and visualization), human–computer interaction (in particular, the interaction of everyday users with technology), cognitive psychology, and human problem solving.