Brain and Cognition 82 (2013) 181–186

Contents lists available at SciVerse ScienceDirect

Brain and Cognition

journal homepage: www.elsevier.com/locate/b&c

No trust on the left side: Hemifacial asymmetries for trustworthiness and emotional expressions

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ARTICLE INFO

Article history:
Accepted 13 April 2013
Available online 11 May 2013

Keywords:
Hemifacial asymmetry
Trustworthiness
Facial expression
The right hemisphere

ABSTRACT

People can discriminate cheaters from cooperators by their appearance. However, successful cheater detection can be thwarted by a posed smile, which cheaters display with greater emotional intensity than cooperators. The present study investigated the underlying neural and cognitive mechanisms of a posed smile, which cheaters use to conceal their anti-social attitude, in terms of hemifacial asymmetries of emotional expressions. Raters (50 women and 50 men) performed trustworthiness judgments on composite faces of cheaters and cooperators, operationally defined by the number of deceptions in an economic game. The left–left composites of cheaters were judged to be more trustworthy than the right–right composites when the models posed a happy expression. This left-hemiface advantage for the happy expression was not observed for cooperators. In addition, the left-hemiface advantage of cheaters disappeared for the angry expression. These results suggest that cheaters used the left hemiface, which is connected to the emotional side of the brain (i.e., the right hemisphere), more effectively than the right hemiface to conceal their anti-social attitude.

1. Introduction

The ability to discriminate potential cooperators from cheaters is fundamental for social cooperation, which is a universal feature of human societies (Cosmides, 1989; Trivers, 1971). Previous studies have demonstrated that people can successfully detect cooperative signals, or trustworthiness, just by inspecting facial photographs (e.g., Okubo, Kobayashi, & Ishikawa, 2012; Verplaetse, Vanneste, & Braeckman, 2007), by viewing videoclips of natural conversations (Oda, Yamagata, Yabiku, & Matsumoto-Oda, 2009), or by viewing participants reading a short story aloud (Brown, Palameta, & Moore, 2003).

Todorov and his colleagues have found a relationship between perceptions of facial trustworthiness and emotional expressions (Engell, Todorov, & Haxby, 2010; Oosterhof & Todorov, 2008, 2009; Todorov, Baron, & Oosterhof, 2008; Todorov & Duchaine, 2008). Todorov and Duchaine (2008) demonstrated that perceived facial trustworthiness was positively correlated with judgments of happiness. Oosterhof and Todorov (2008) identified trustworthiness and dominance as fundamental dimensions of face evaluation using a principal component analysis of judgments on various facial traits, and then developed computer models for representing how faces varied on these two fundamental dimensions. Based on their computer models, Oosterhof and Todorov (2009) created computer-generated faces and continually changed their facial trustworthiness. They found that lower trustworthiness increased the intensity of perceived anger whereas greater trustworthiness increased the intensity of perceived happiness. Engell et al. (2010) found that perceptual adaptation to an angry face increased the subsequent evaluation of trustworthiness of a face with a neutral expression, while adaptation to a happy face decreased the subsequent evaluation of trustworthiness. These results suggest that facial trustworthiness is evaluated on the basis of subtle facial cues that resemble emotional expressions signaling cooperativeness (Engell et al., 2010; Oosterhof & Todorov, 2009; Todorov & Duchaine, 2008). The positive correlation between perceptions of facial trustworthiness and emotional expressions has been replicated in other laboratories (Krumhuber, Manstead, Cosker, Rosin, & Marshall, 2007; Ozono et al., 2010).

Okubo et al. (2012) recently found that facial photographs of cheaters were rated to be less trustworthy than those of cooperators when the models expressed anger on their faces. However, cheater detection was unsuccessful when the models posed a smile (Okubo et al., 2012). In addition, the photographs of cheaters were rated to have higher emotional intensity than those of cooperators, irrespective of facial expressions. These results suggest that cheaters can cunningly conceal their anti-social attitude from observers by use of a posed smile, which they put on with greater intensity than do cooperators.

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http://dx.doi.org/10.1016/j.bandc.2013.04.004

The purpose of the present study was to investigate neural and cognitive mechanisms that underlie the posed smile of cheaters in terms of hemispheric and hemifacial asymmetries of emotional expressions. Previous studies have demonstrated that emotions are expressed more intensely in the left hemiface than in the right hemiface (e.g., Indersmitten & Gur, 2003; Kowner, 1995; Nicholls, Ellis, Clement, & Yoshino, 2004; Sackeim, Gur, & Saucy, 1978; Zaidel, Chen, & German, 1995). For example, a left hemiface advantage for emotional expression was found for the rating of emotional faces in video clips (e.g., Borod, Kent, Koff, Martin, & Alpert, 1988) and in 3-D computerized image analysis of emotional faces (Nicholls et al., 2004). These left hemiface advantages can be attributed to the right hemisphere (RH) dominance of emotional expressions (for a review, see Demaree, Everhart, Youngstrom, & Harrison, 2005). The RH dominance of muscle movement in the left hemiface should also contribute to the left-hemiface advantage for emotional expressions (Patten, 1996).

The composite face technique is widely used to investigate the left-hemifacial advantage for emotional expressions, which originates in the RH (e.g., Indersmitten & Gur, 2003; Kowner, 1995; Sackeim et al., 1978; Zaidel et al., 1995). A composite face is composed of a left or right hemiface and its mirrored (left or right) hemiface, resulting in a left–left or right–right composite (see Fig. 1). Previous studies have repeatedly demonstrated that left–left composites are judged to be emotionally more expressive than right–right composites (e.g., Indersmitten & Gur, 2003; Kowner, 1995; Sackeim et al., 1978; Zaidel et al., 1995). Although such an advantage for left–left composites have been observed both for posed and spontaneous expressions (for a review, Skinner & Mullen, 1991), the advantage of left–left composites was more consistent across emotions for posed emotions than for spontaneous ones (Indersmitten & Gur, 2003; Mandal, Harizuka, Bhushan, & Mishra, 2001).

Nicholls, Clode, Wood, and Wood (1999) found that participants tended to present the left side of their face when asked to portray as much emotion as possible for a family portrait, whereas they tended to present the right side when asked to pose as a scientist and avoid portraying emotion. Since the left hemiface is more emotionally expressive than the right hemiface (e.g., Indersmitten & Gur, 2003; Nicholls et al., 2004; Sackeim et al., 1978), the posing biases observed by Nicholls et al. (1999) can be explained on the basis of participants' motivation to express or conceal emotion: People may tend to adopt the most efficient means of using their hemispheric functions.

We expect that cheaters also try to utilize their hemispheric functions most effectively in concealing their anti-social attitude. Because emotions are expressed more intensely in the left hemiface than in the right hemiface (e.g., Borod et al., 1988;

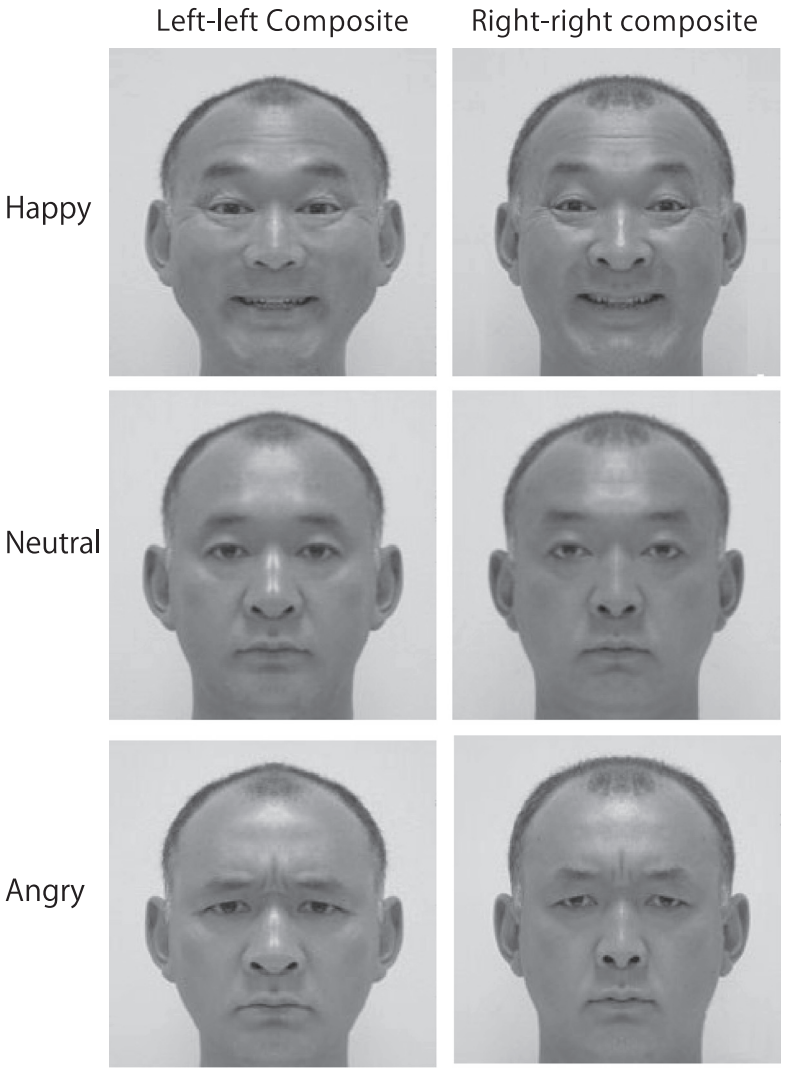

Fig. 1. Examples of left–left (left) and right–right (right) composites for happy (top), neutral (middle) and angry (bottom) expressions.