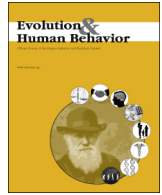




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Contents lists available at ScienceDirect

Evolution and Human Behavior

journal homepage: www.ehonline.org

Original Article

A sex difference in the context-sensitivity of dominance perceptions

Christopher D. Watkins^{a,*}, Lisa M. DeBruine^b, David R. Feinberg^c, Benedict C. Jones^b^a Division of Psychology, School of Social and Health Sciences, University of Abertay Dundee, Scotland, UK, DD1 1HG^b Face Research Laboratory, Institute of Neuroscience and Psychology, University of Glasgow, 58 Hillhead Street, Glasgow, G12 8QB^c Department of Psychology, Neuroscience and Behaviour, McMaster University, Hamilton, Ontario, L8S4L8, Canada

ARTICLE INFO

Article history:

Initial receipt 26 June 2012

Final revision received 24 June 2013

Keywords:

Dominance

Emotion

Intrasexual competition

Priming

Sex differences

ABSTRACT

Although dominance perceptions are thought to be important for effective social interaction, their primary function is unclear. One possibility is that they simply function to identify individuals who are capable of inflicting substantial physical harm, so that the perceiver can respond to them in ways that maximize their own physical safety. Another possibility is that they are more specialized, functioning primarily to facilitate effective direct (i.e., violent) intrasexual competition for mates, particularly among men. Here we used a priming paradigm to investigate these two possibilities. Facial cues of dominance were more salient to *women* after they had been primed with images of angry men, a manipulation known to activate particularly strong self-protection motivations, than after they had been primed with images of angry women or smiling individuals of either sex. By contrast, dominance cues were more salient to *men* after they had been primed with images of women than when they had been primed with images of men (regardless of the emotional expressions displayed), a manipulation previously shown to alter men's impressions of the sex ratio of the local population. Thus, men's dominance perceptions appear to be specialized for effective direct competition for mates, while women's dominance perceptions may function to maximize their physical safety more generally. Together, our results suggest that men's and women's dominance perceptions show different patterns of context-sensitivity and, potentially, shed new light on the routes through which violence and intrasexual competition have shaped dominance perceptions.

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1. Introduction

Dominance perceptions are fundamental to human social interaction (e.g., Oosterhof & Todorov, 2008; Puts, 2010). However, although previous research suggests that people from different cultures (e.g., Keating, Mazur, & Segall, 1981; Perrett et al., 1998; Undurraga et al., 2010) and people of diverse ages (e.g., Keating & Bai, 1986) judge others' dominance in similar ways, the specific function of dominance perceptions is still poorly understood. Some researchers have suggested that dominance perceptions simply function to identify individuals who are capable of inflicting substantial physical harm, so that the perceiver can respond to them in ways that maximize their own physical safety (e.g., by avoiding them, Oosterhof & Todorov, 2008). Alternatively, dominance perceptions may be more specialized, functioning primarily to facilitate effective direct (i.e., violent) intrasexual competition for mates, particularly among men (Puts, 2010). Because distinguishing between these two proposals could provide important insight into the routes through which physical violence and intrasexual competition for mates have shaped the visuo-cognitive processes that support social interactions, the current

research tested these two suggestions about the primary function of dominance perceptions.

Self-protection motivations are hypothesized to moderate aspects of social cognition and perception that have implications for survival (e.g., Kenrick, Neuberg, Griskevicius, Becker, & Schaller, 2010). For example, people are particularly quick to classify angry expressions in face images, especially when the angry expressions are presented in the context of male faces (Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007). These findings suggest that viewing images of angry faces, and of angry men in particular, activates self-protection motivations (Kenrick et al., 2010; see also Ackerman et al., 2006). If dominance perceptions function primarily to identify individuals capable of inflicting physical harm, as some researchers have suggested (e.g., Oosterhof & Todorov, 2008), then activating self-protection motivations should increase the salience of dominance cues. Thus, priming participants with angry male faces should increase the extent to which participants ascribe dominance to individuals displaying cues associated with physical dominance more than would priming participants with images of angry female faces or smiling faces of either sex. Additionally, this effect of priming participants with angry male, but not angry female, faces could be sex-specific in other ways. For example, activating self-protection motivations may have greater effects on the cognitions and perceptions of individuals who are less well equipped (or perceive

* Corresponding author.

E-mail address: c.watkins@abertay.ac.uk (C.D. Watkins).

themselves to be less well equipped) to defend themselves physically (e.g., Fox, Russo, Bowles, & Dutton, 2001; Kenrick et al., 2010). Given sex differences in both physical strength and aggression (see, e.g., Archer, 2009; Sell et al., 2009), activating self-protection motivations may have a greater effect on women's perceptions of others' dominance than it will on men's perceptions of others' dominance.

While testing the effect of activating self-protection motivations on the salience of dominance cues would test for evidence that dominance perceptions simply function to identify individuals capable of inflicting physical harm, other types of primes could be used to test the proposal that dominance perceptions serve a more specialized purpose and function primarily to minimize the potential costs of direct intrasexual competition for mates, particularly among men (see, e.g., Puts, 2010). Although competition among men tends to be increased in societies with a greater proportion of men than women (i.e., societies with male-biased sex ratios), this competition is generally indirect (i.e., non-violent) and focused on gaining access to economic resources (e.g., Barber, 2009; Del Giudice, 2012). Indeed, Griskevicius, Tybur, Ackerman, Delton, and Robertson (2012) recently showed that priming men with cues to a male-biased sex ratio increased the extent to which men were willing to sacrifice larger financial gains in the future for smaller, immediate gains (i.e., the extent to which they seek immediate access to economic resources). By contrast, in societies with female-biased sex ratios, relationship commitment tends to be relatively low and sexual promiscuity relatively common (Barber, 2000, 2009, 2011; Schmitt, 2005), which increase direct (i.e., violent) competition for mates among men, at least in modern societies (Barber, 2011; Del Giudice, 2012). Indeed, this may explain why rates of violent crime tend to be higher in countries with more female-biased sex ratios (Barber, 2000, 2009, 2011).

Several recent studies have shown that watching slideshows consisting primarily of either images of men or images of women alters behavioral responses, such as attractiveness judgments or financial decisions, in ways that suggest participants use their recent visual experience to gauge the sex ratio of the local population (Griskevicius et al., 2012; Watkins, Jones, Little, DeBruine, & Feinberg, 2012). These findings demonstrate that priming paradigms can be used to explore the effects of cues to the sex ratio of the local population on aspects of social behavior and perception (Griskevicius et al., 2012; Watkins, Jones, et al., 2012). Thus, if dominance perceptions primarily function to minimize the potential costs of direct competition for mates among men (e.g., Puts, 2010), cues of others' dominance may be more salient to men in environments with a female-biased sex ratio (i.e., after they have been primed with a slideshow of images of women's faces) than in environments with a male-biased sex ratio (i.e., after they have been primed with a slideshow of images of men's faces). This effect could be specific to judgments of men's dominance or could occur for judgments of others' dominance more generally. For example, while some aspects of men's facultative responses to facial cues of dominance appear to be specific to judgments of other men's dominance (Watkins, Jones, & DeBruine, 2010), other studies suggest that men are also sensitive to cues of dominance of women (e.g., Perrett et al., 1998; Sell et al., 2009).

While the prediction that cues of others' dominance will be more salient to men in environments with a female-biased sex ratio may initially seem to be somewhat at odds with Griskevicius et al.'s (2012) finding that priming men with cues to a male-biased sex ratio increased the extent to which men favored smaller, immediate gains over larger gains in the future, Griskevicius et al.'s (2012) finding presumably reflects the well-established correlation between male-biased sex ratios and indirect (i.e., non-violent) competition (Barber, 2009; Del Giudice, 2012). By contrast, our prediction that priming men with cues that there is a greater proportion of women than men in the local population will increase the extent to which dominance

cues are salient is based on the reported positive correlations between female-biased sex ratios and measures of the intensity of direct (i.e., violent) competition (Barber, 2000, 2009, 2011).

To test the predictions described above, we investigated the effects of priming with images of angry men, smiling men, angry women, or smiling women on men's and women's perceptions of others' dominance. So that we could assess the effects of these different types of primes on the *salience* of cues of physical dominance (i.e., the extent to which participants perceived physically dominant individuals to be more dominant than less physically dominant individuals, Watkins & Jones, 2012), we assessed participants' perceptions of the dominance of masculinized versus feminized versions of men's and women's faces. We chose this image manipulation (masculinized versus feminized) because many recent studies have demonstrated that masculine characteristics are positively correlated with measures of actual physical dominance, such as strength and aggression (e.g., Fink, Neave, & Seydel, 2007; Windhager, Schaefer, & Fink, 2011; Puts, Apicella, & Cardenas, 2011), and because masculinized versions of faces are reliably perceived to be more dominant than feminized versions (Jones et al., 2010; Perrett et al., 1998; Watkins, Jones, et al., 2010).

2. Methods

2.1. Participants

One hundred women (mean age = 20.95 years, SD = 3.13 years) and 100 men (mean age = 22.49 years, SD = 3.58 years) completed the experiment online. Participants were recruited from links on social bookmarking websites, such as www.stumbleupon.com. Previous research on perceptions of facial dominance has demonstrated that laboratory and online studies produce equivalent results (Senior et al., 1999a, Senior, Phillips, Barnes, & David, 1999b; see also Watkins, Jones, et al., 2010; Watkins, Fraccaro, et al., 2010).

2.2. Face stimuli

The methods we used to manufacture stimuli to assess perceptions of the dominance of masculinized versus feminized versions of men's and women's faces have been used in many previous studies of dominance perceptions (e.g., DeBruine et al., 2006; Perrett et al., 1998; Watkins & Jones, 2012). Manipulating sexually dimorphic shape cues in face images using these methods has been shown to alter perceptions of men's and women's facial dominance in the predicted manner (e.g., DeBruine et al., 2006; Watkins, Jones, et al., 2010, Watkins, Quist, Smith, DeBruine, & Jones, 2012). Moreover, responses to masculinity stimuli manufactured using these methods are very similar to responses to facial masculinity stimuli that were manufactured using other methods (e.g., DeBruine et al., 2006, DeBruine, Jones, Smith, & Little, 2010).

First, we manufactured a male prototype (i.e., average) face by using specialist software (Tiddeman, Burt, & Perrett, 2001) to average the shape, color, and texture information from images of 50 young white men's faces. A female prototype face was also manufactured in this way by averaging the shape, color, and texture information from images of 50 young white women's faces. The 100 individual face photographs (50 male and 50 female) were taken under standardized lighting conditions and against a constant background. Individuals posed for these photographs with neutral expressions and direct gaze.

Next, we randomly selected 10 male and 10 female images from the set of 100 face images. We created a masculinized and a feminized version of each of the 10 individual male and 10 individual female images by adding or subtracting 50% of the linear (i.e., vector) differences in 2D shape between symmetrized versions of the male and female prototypes to (or from) each individual image. This process created 20 pairs of face images in total (10 male pairs and 10

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