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Original Article

Eye-tracking women's preferences for men's somatotypes

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ABSTRACT

Judging physical attractiveness involves sight, touch, sound and smells. Where visual judgments are concerned, attentional processes may have evolved to prioritize sex-typical traits that reflect cues signaling direct or indirect (i.e. genetic) benefits. Behavioral techniques that measure response times or eye movements provide a powerful test of this assumption by directly assessing how attractiveness influences the deployment of attention. We used eye-tracking to characterize women's visual attention to men's back-posed bodies, which varied in overall fat and muscle distribution, while they judged the potential of each model for a short- or long-term relationship. We hypothesized that when judging male bodily attractiveness women would focus more on the upper body musculature of all somatotypes, as it is a signal of metabolic health, immunocompetence and underlying endocrine function. Results showed that mesomorphs (muscular men) received the highest attractiveness ratings, followed by ectomorphs (lean men) and endomorphs (heavily-set men). For eye movements, attention was evenly distributed to the upper and lower back of both ectomorphs and mesomorphs. In contrast, for endomorphs the lower back, including the waist, captured more attention over the viewing period. These patterns in visual attention were evident in the first second of viewing, suggesting that body composition is identified early in viewing and guides attention to body regions that provide salient biological information during judgments of men's bodily attractiveness.

1. Introduction

Evolutionary perspectives on human mate preferences propose that men and women favour partners who are physiologically, financially and socially able to invest as a parent (Fletcher, Simpson, Thomas, & Giles, 1999). The process of selecting a partner is enormously complex, occurring in the context of one's own attractiveness relative to others, the availability of partners with preferred traits, and the synchrony between individuals in their social, political and religious values (Buss, 2003). Nevertheless, people use bodily and facial morphology to make inferences about mate-relevant properties such as age, health and fertility (Gangestad & Scheyd, 2005; Grammer, Fink, Møller, & Thornhill, 2003). Physical attractiveness positively predicts mating and reproductive success (Prokop & Fedor, 2011; Rhodes, Simmons, & Peters, 2005) and potentially reflects selection for cognitive processes supporting attention to physical traits that signal a potential mate's biological qualities, social status and trustworthiness (Gangestad & Scheyd, 2005; Grammer et al., 2003; Maner et al., 2003).

While men are somewhat larger than women in overall body size, greater sexual dimorphism is observed in body composition and shape (Wells, 2007). Masculine physique is characterized by broad shoulders and a narrow waist, lending a v-shaped appearance to the torso whereas women tend towards a gynoid distribution of body fat and an hour-glass physique (Wells, 2007). In women, body composition predicts fertility (Jasienska, Ziomkiewicz, Ellison, Lipson, & Thune, 2004), but male body composition, facial masculinity and vocal pitch are not associated with sperm motility (Fejes, Koloszár, Szöllő si, Závaczki, & Pál, 2005; Peters, Rhodes, & Simmons, 2008; Simmons, Peters, & Rhodes, 2011). Instead, masculine facial and bodily traits predict immunocompetence (Lassek & Gaulin, 2009; Moore et al., 2011; Rantala et al., 2013), long-term health (Rhodes, Chan, Zebrowitz, & Simmons, 2003; Thornhill & Gangestad, 2006), competitive drive (Archer, 2009) and physical strength (Puts, 2010; Windhager, Schaefer, & Fink, 2011).

Somatotyping provides a three-dimensional anthropometric assessment of a person's mesomorphy (muscularity), endomorphy (fatness), and ectomorphy (leanness) (Carter & Heath, 1990). In men mesomorphy predicts greater strength, endurance and cardiac function (Bolonchuk, Siders, Lykken, & Lukaski, 2000; Lassek & Gaulin, 2009; Malina, Katzmarzyk, Song, Theriault, & Bouchard, 1997; Sell et al., 2009). Endomorphy, characterized by more body fat and less muscular development, is associated with weaker immune function and greater susceptibility to type II diabetes and cardiovascular diseases (Bolonchuk

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et al., 2000; Malina et al., 1997). Muscularity may therefore augment men's attractiveness as an indirect signal of heritable immunocompetence (Rantala et al., 2013) and a direct signal of protectiveness and potential for resource acquisition (Puts, 2010). Muscularity is positively associated with male mating success (Peters, Simmons, & Rhodes, 2008; Rhodes et al., 2005), reproductive success (Genovese, 2008; Lassek & Gaulin, 2009; Schooling et al., 2011) and physical attractiveness to women from the U.S.A, U.K, New Zealand, Sri Lanka, China and Cameroon (Dixson, Dixson, Bishop, & Parish, 2010; Dixson, Dixson, Li, & Anderson, 2007; Dixson, Dixson, Morgan, & Anderson, 2007; Dixson, Halliwell, East, Wignarajah, & Anderson, 2003).

Given the importance of visual cues of health, competitive ability and genetic immunocompetence in perceptions of physical attractiveness, people should reliably attend to morphological traits that provide the most salient information for gauging fitness-relevant information. Behavioral techniques that measure response times or eye movements provide a powerful test of this assumption by directly assessing how attractiveness influences the deployment of attention (Krupp, 2008; Maner et al., 2003). Attention and attractiveness are linked through the gaze-cascade effect, whereby preferences guide attention that, in turn, enhances and reinforces preferences (Shimojo, Simion, Shimojo, & Scheier, 2003). Men also attend more to female targets when viewing erotic than non-erotic sexual scenes (Lykins, Meana, & Kambe, 2006, Lykins, Meana, & Strauss, 2008). Many other experiments using displays of multiple stimuli that compete for attention have demonstrated rapid attentional orienting to, and fixation on, attractive vs. unattractive female faces (Fink et al., 2008; Maner, Gailliot, & DeWall, 2007; Maner et al., 2003; Sui & Liu, 2009) and female bodies (Suschinsky, Elias, & Krupp, 2007), particularly when mating motives are activated (Duncan et al., 2007; Maner et al., 2007).

Others have tested how attractiveness guides visual attention when participants view bodies singularly and measuring attentional allocation to morphological cues within a body (Cornelissen, Hancock, Kiviniemi, George, & Tovée, 1999; Dixson, Grimshaw, Linklater, & Dixson, 2011; Nummenmaa, Hietanen, Santtila, & Hyönä, 2012). Subtle differences in attentional allocation to body regions occur in multiple vs. singular presentations of female bodies. For example, Suschinsky et al. (2007) presented male participants with three versions a female body that were identical except for waist-to-hip ratio (WHR), which was manipulated to reflect low, medium and high values. Men allocated most attention to those images judged to be most attractive irrespective of the WHR size, providing support for the hypothesis that attractiveness captures attention. However, attention to specific body regions differed with attractiveness and WHR. While the head and bust attracted more attention than the waist irrespective of WHR, the bust region attracted more attention when judging the more attractive images with lower WHRs (Suschinsky et al., 2007). In contrast, Cornelissen et al. (1999) found that, when viewing female bodies presented singularly, eye movements clustered around the stomach and the bust. This pattern of visual attention has been shown in several other studies where female bodies were presented singularly (Dixson, Grimshaw, Linklater, & Dixson, 2010, 2011; Nummenmaa et al., 2012), highlighting that morphological cues that relate to female health and fertility compete for men's attention when assessing attractiveness.

Interestingly, few studies have measured women's visual attention during attractiveness judgments of male bodies. Given the association between muscularity and long-term health, competitive ability and immunocompetence (Puts, 2010; Rantala et al., 2013), women's attentional bias should be greatest towards the upper back and shoulders when assessing the attractiveness of male physique. In the present study we test the hypothesis that muscularity augments male attractiveness and that the upper back and shoulders, where muscle mass accumulates, capture more attention than other body regions during judgments of male physical attractiveness. We used back-posed images to better capture the role of body composition in attractiveness judgments, because frontal features including faces and genitalia also capture attention and determine attractiveness (Mautz, Wong, Peters, & Jennions, 2013; Nummenmaa et al., 2012). We recorded women's eye movements as they judged the attractiveness of male physiques varying in somatotype with pronounced muscularity (mesomorphs), lean muscularity (ectomorphs) or prominent body fat (endomorphs).

2. Method

2.1. Participants

Thirty-one heterosexual women, aged 22–59 years (Mean age ± SD = 33.58 ± 11.82 years), were recruited opportunistically. All participants were residents of New Zealand, twenty-eight of whom were of European ethnicity, two were of Asian ethnicity and one participant was Fijian. Before the start of data collection participants were given individual standard verbal orientation regarding the eye-tracking procedure, including the lack of risk of being exposed to the infra-red light, how to alter the chin-rest to a height that was comfortable for them and that they were free to withdraw from the study at any point. The details of the study were not discussed with participants beforehand. However, after each participant completed the experiment they were provided with written details of the rationale for the research. All participants had normal vision or correction by contact lenses and none wore glasses. A female researcher undertook all eye-tracking sessions.

2.2. Stimuli

Photographs of back-posed nude men were scanned from Sheldon (1954). Images depicted Caucasian men standardized for height, visual angle and body posture. Five men were selected from each of three categories of somatotype: Mesomorphic (muscular), ectomorphic (lean) and endomorphic (heavily set; Fig. 1). Somatotypes were of similar ages: Mesomorphs (mean age ± SD = 22.20 ± 2.95, range = 18–25 years), ectomorphs (22.00 ± 4.53, range = 18–29 years), endomorphs (22.20 ± 3.56, range = 19–26 years) that did not significantly differ ($F_{2,12} = 0.01$, $P = 0.995$). The experiment was programmed using SR Research Experiment Builder (version 1.4.128 RC) and conducted on a 3-GHz Pentium D computer. Stimuli were saved at a resolution of 1024 × 768 pixels and presented on a 21-inch monitor with a refresh rate of 60 Hz. Images had an on-screen height of approximately 30 cm by 10 cm wide and were presented from a viewing distance of 57 cm. Thus, the images subtended an average visual angle of 28° by 10°, which is sufficiently large that fixations could be localized to our defined body regions.

2.3. Apparatus and materials

Experiments were conducted using an EyeLink® 1000 Tower Mount Head Supported System (SR Research Ltd., Ontario, Canada). Eye position and eye movements were determined by measuring the corneal reflection and dark pupil with a video-based infrared camera and an infrared reflective mirror. A fixation was defined as lasting longer than 50 ms. The eye tracker had a spatial resolution of 0.01° of visual angle and the signal was sampled and stored at a rate of 1000 Hz. While viewing was binocular, recording was monocular, measuring right eye movements only (Lykins et al., 2006; 2008). Calibration and validation of measurements were performed before each block of experimental trials.

2.4. Procedure

Participants faced the monitor placed at a viewing distance of 57 cm, maintained by a forehead and chin-rest. Each image was presented individually, in random order, for five seconds, allowing us