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The relationship between shape symmetry and perceived skin condition in male facial attractiveness

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Abstract

Studies have shown that male faces high in symmetry are judged more attractive than faces low in symmetry even in images where visual cues to facial symmetry are reduced. These findings suggest that there are correlates of facial symmetry that influence male facial attractiveness independently of symmetry itself. Apparent healthiness of facial skin is one factor that may influence male facial attractiveness and covary with facial symmetry. Here, using real and composite male faces, we found that males with symmetric faces were perceived as having healthier facial skin than males with relatively asymmetric faces (Study 1), and that facial colour and texture cues were sufficient to maintain an attractiveness–symmetry relationship when the influence of facial shape was minimised (Study 2). These findings suggest that colour and texture cues contribute to the relationship between attractiveness and symmetry in real faces.

Keywords: Shape symmetry; Skin condition; Male facial attractiveness

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1. Introduction

As the face is thought to play a central role in human mate choice (Perrett et al., 1998), many studies have sought to identify visual cues that determine judgements of facial attractiveness. Facial symmetry has been the focus of much empirical research, as symmetry is thought to reflect an individual's heritable ability to maintain good health and preferences for symmetrical individuals are therefore potentially adaptive (Thornhill & Gangestad, 1999a; 1999b).

Studies of attractiveness using image manipulation techniques have reported preferences for faces that had been manipulated to be more symmetrical (Little, Burt, Penton-Voak, & Perrett, 2001; Perrett et al., 1999; Rhodes et al., 1998, Rhodes, Zebrowitz, et al., 2001). As facial symmetry alone was varied in these studies, many researchers have proposed that symmetry is an important visual cue for judgements of the attractiveness of real faces (Little et al., 2001; Perrett et al., 1999; Rhodes et al., 1998, Rhodes, Zebrowitz, et al., 2001). Although studies of facial attractiveness using real faces have reported positive relationships between symmetry and attractiveness (Grammer & Thornhill, 1994; Jones et al., 2001; Mealey, Bridgestock, & Townsend, 1999; Penton-Voak et al., 2001; Rhodes et al., 1999; Rhodes, Yoshikawa, et al., 2001; Scheib, Gangestad, & Thornhill, 1999), relationships between facial symmetry and attractiveness judgements of faces in which the visibility of cues to facial symmetry was reduced have also been reported (Penton-Voak et al., 2001; Scheib et al., 1999). These latter findings suggest that correlates of symmetry influence facial attractiveness independent of symmetry itself.

Scheib et al. (1999) reported positive associations among facial symmetry, attractiveness and a composite masculinity index derived from the shape of facial characteristics thought to be male sex-typical traits (cheekbone prominence and face length relative to lower face length). Given these findings, Scheib et al. (1999) proposed that masculinity of facial shape mediated the link between attractiveness and facial symmetry. However, Penton-Voak et al. (2001) disputed this link between facial masculinity and symmetry, finding that cheekbones were more prominent in a female sample than a male sample. Furthermore, a masculinity index derived from measurements of facial characteristics, first identified as being sexually dimorphic, was not associated with symmetry in male faces (Penton-Voak et al., 2001; but for a positive result, see Gangestad & Thornhill, 2003). Penton-Voak et al. (2001) were unable to ascertain what cues covary with symmetry in male faces but posited that apparent healthiness of facial skin might be one such characteristic. Indeed, visible skin condition and facial symmetry may be expected to covary as healthy-looking skin and symmetrical features are both potential cues to general health (Thornhill & Gangestad, 1999a; 1999b).

The link among apparent health of facial skin, symmetry and male facial attractiveness was investigated here in two studies. First, the relationship between male facial symmetry and perceived facial skin health was explored in real faces (Study 1). Image processing techniques were then used to investigate whether facial colour and texture cues were sufficient to maintain the attractiveness–symmetry relationship when the influence of facial shape was minimised (Study 2).

2. Study 1

Study 1 tested for a positive correlation between shape symmetry and ratings of the apparent healthiness of skin in male faces.

3. Method

Full-face colour photographs of 113 Caucasian males (20–30 years) were taken with a digital camera (resolution set at 1200×1000 pixels) and under standardised diffuse lighting conditions. Background was constant in all photographs. Facial expression was neutral and hair pulled back from the face. Each digital face image was first scaled and rotated so as to standardise interpupillary distance to 100 units. All males photographed were unfamiliar to those taking part in the ratings phase of the study.

Facial symmetry was assessed using a perceptual technique (Mealey et al., 1999; Penton-Voak et al., 2001; Rhodes, Zebrowitz, et al., 2001) where high symmetry was indicated by high ratings of the similarity between a left–left chimeric face and a right–right chimeric face (chimeras are original full-face photographs split down a central vertical axis and each individual side of the face aligned with a mirror-reflected version of itself). By contrast with other studies that have used this technique, in the present study, texture and colour information of each face were made symmetrical prior to the generation of chimeras (see Tiddeman, Burt, & Perrett, 2001), minimising nonshape differences between the left and right sides of each face. Examples of chimeric faces can be seen in Fig. 1.

Twenty-two female participants (mean age = 24.13, S.D. = 3.83) rated the 113 paired chimeric faces (each pairing consisting of a left–left and right–right chimeric face derived from a photograph of one male) for "similarity" (1 = *very dissimilar*, 7 = *very similar*). The same female participants also rated the 113 original faces for "healthiness of facial skin" (1 = *very unhealthy*, 4 = *neutral*, 7 = *very healthy*) and "attractiveness" (1 = very unattractive, 4 = *neutral*, 7 = *very attractive*). For ratings of "similarity", "healthiness of facial skin" and "attractiveness", full-colour images were presented on-screen in a fully randomised order. The order in which participants performed "similarity", "healthiness of facial skin" and "attractiveness" ratings was randomised across participants. All images were cropped to minimise the influence of clothing, neck and hairstyle.

3.1. Results

As interrater agreement for ratings of "similarity" (Cronbach's alpha > .93), "healthiness of facial skin" (Cronbach's alpha > .86) and "attractiveness" (Cronbach's alpha > .88) was high, mean ratings for each face were calculated across all participants for use in analyses. As not all of the measures were normally distributed, results of nonparametric tests (Spearman's rho) are reported. Two-tailed probabilities are reported throughout. For all statistics, $N = 113$.

Rated symmetry ("similarity") was positively correlated with ratings of the apparent healthiness of facial skin ($r_s = .23$, $P = .015$). In addition to this, a significant positive correlation

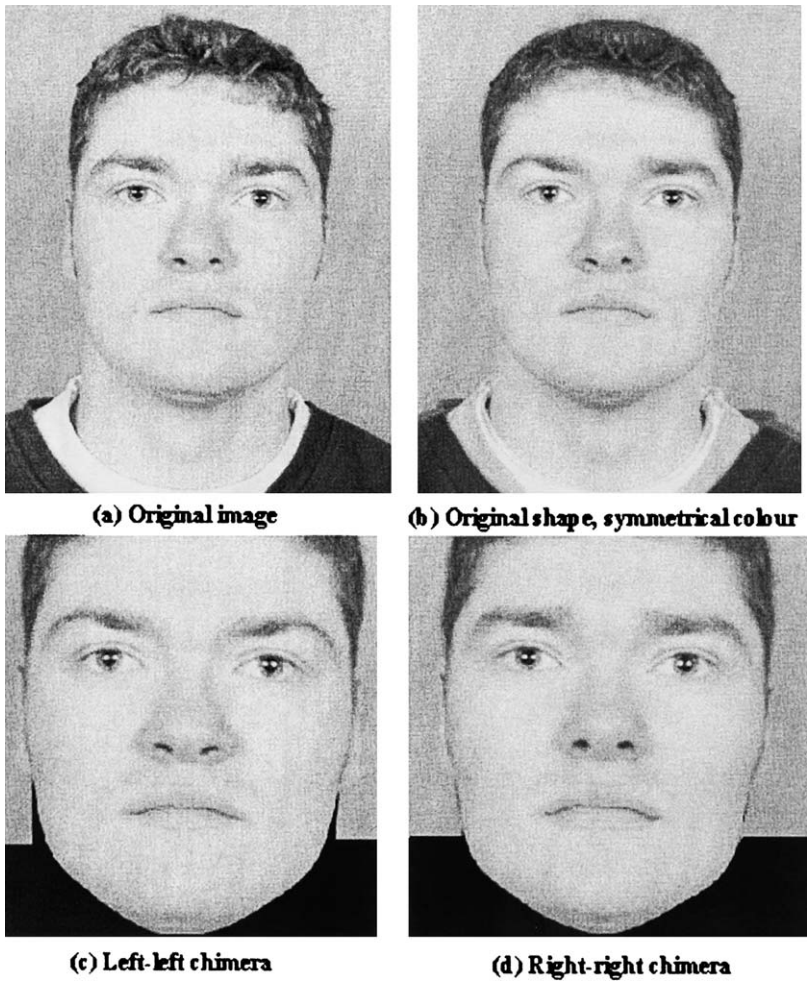

Fig. 1. Assessing facial symmetry in Study 1 using chimeric faces. Facial symmetry was assessed from the degree of perceived similarity between left–left and right–right chimeric faces generated from each individual face. Chimeric faces were created in the following stages. (a) An original full-face photograph. (b) The manipulated version from which chimeric faces were derived. Note that this image is in the same shape as the original image but possesses equivalent colour and texture information on the left and right sides of the face. Chimeric faces were generated from these images. (c) A left–left chimeric face. (d) A right–right chimeric face. Chimeric faces were generated by creating a horizontal axis that bisected both pupil centres and a vertical axis perpendicular to, and bisecting, the horizontal axis. Each image was then split along this vertical axis and mirror-reflected versions of both the left and right sides of the face were generated. Finally each side of the face was aligned with a mirror-reflected version. Full-colour images were presented on-screen for all ratings.

between symmetry and ratings of male facial attractiveness was also observed ($r_s = .21$, $P = .025$). Ratings of the apparent healthiness of facial skin and ratings of male facial attractiveness were also significantly correlated ($r_s = .70$, $P < .0001$).

4. Study 2

The aim of Study 2 was to investigate whether facial colour and texture cues were sufficient to maintain the attractiveness–symmetry relationship when the influence of facial shape was minimised.

4.1. Method

First, an average male face was generated representing the mean shape, colour and texture information for all 113 faces used in Study 1 (for methods, see Rowland & Perrett, 1995; Tiddeman et al., 2001). Using the similarity ratings from Study 1, the 30 males with the most asymmetric faces (the asymmetric sample) and the 30 males with the most symmetric faces (the symmetric sample) were identified. Average faces, again representing shape, colour and texture information, were generated that represented the asymmetric and symmetric samples. These average faces were made perfectly symmetrical by blending each face with a mirror-reflected version. By applying the average colour and texture information for the asymmetric and symmetric samples to the average symmetrical shape of all 113 faces (for methods, see Rowland & Perrett, 1995; Tiddeman et al., 2001), 2 faces (asymmetric and symmetric samples) were generated that differed only in colour and texture information and possessed the average symmetrical shape of all 113 faces (http:perception.st-and.ac.uk/expt/ben/figure.html).

Eighty female participants (mean age = 27.5, S.D. = 4.3; none of whom had taken part in Study 1) assessed, using forced choice paradigms, either which of the two faces was the "most attractive" or which looked the "most healthy." Forty of the 80 females made attractiveness judgements while the remaining 40 females made health judgements. For all trials, the two composite faces were presented adjacent to one another and the position of each face (left or right) randomised.

4.2. Results

All probabilities are two tailed. The symmetric sample average was judged more attractive than the asymmetric sample average significantly more often than would be predicted by chance (33 out of 40 participants choosing the symmetric average, binomial distribution: $P < .0001$). The symmetric sample average was judged healthier looking than the asymmetric sample average significantly more often than would be predicted by chance (36 out of 40 participants choosing the symmetric average, binomial distribution: $P < .0001$).

5. Discussion

Analyses indicated that apparent healthiness of facial skin covaried with facial symmetry (Study 1). Rated skin health was also positively correlated with females' judgements of male facial attractiveness (Study 1). The positive correlation between facial symmetry and

judgements of male facial attractiveness (Study 1) is consistent with the findings of previous studies (Grammer & Thornhill, 1994; Jones et al., 2001; Mealey et al., 1999; Penton-Voak et al., 2001; Rhodes et al., 1999, Rhodes, Yoshikawa, et al., 2001; Scheib et al., 1999). Although these findings suggest that males with symmetrical faces also possess healthy-looking attractive facial skin, ratings of visible skin condition may have been influenced by a shape "halo" effect whereby the attractiveness of facial shape influenced judgements of visible skin condition. Study 2, however, indicated that facial colour and texture cues were sufficient to maintain both attractiveness–symmetry and perceived health–symmetry relationships when the influence of 2D shape was minimised. Thus, when considered together, the findings of Studies 1 and 2 suggest that apparent health of facial skin is a correlate of symmetry that is attractive independent of facial shape. The attractiveness of symmetrical real faces appears to be due, at least partly, to the influence of surface information.

Although the findings of the present study are neutral to the mechanisms underpinning the observed link between healthy-looking attractive facial skin and male facial symmetry, one possibility is that both symmetry and skin condition are traits that are cues to general health (Thornhill & Gangestad, 1999b). Indeed, healthy-looking facial skin appears to be a characteristic of males possessing good genes for immunocompetence (Roberts et al., 2003), although evidence for a link between medical health and symmetry is equivocal (Milne et al., 2003; Rhodes, Zebrowitz, et al., 2001; Shackelford & Larsen, 1997). While preferences for symmetrical faces have been observed in diverse cultures, suggesting that such symmetry preferences have a biological basis (Rhodes, Yoshikawa, et al., 2001), the cross-cultural stability of preferences for correlates of symmetry has yet to be studied.

The findings of the present study suggest that symmetric males possess healthy-looking attractive facial skin. Additionally, symmetric males also appear to have more attractive voices (Feinberg & Jacobson, 2001; Hughes, Harrison & Gallup, 2002) and body odours (Rikowski & Grammer, 1999; Thornhill & Gangestad, 1999b) than asymmetric males. The influence of these correlates of symmetry may explain why preferences for symmetrical males are evident in female mate choice (Thornhill & Gangestad, 1997), even though variations in symmetry are often so subtle they may not be easily visible during social interactions.

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