Brain and Cognition

Appearance of symmetry, beauty, and health in human faces

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Abstract

Symmetry is an important concept in biology, being related to mate selection strategies, health, and survival of species. In human faces, the relevance of left–right symmetry to attractiveness and health is not well understood. We compared the appearance of facial attractiveness, health, and symmetry in three separate experiments. Participants inspected front views of faces on the computer screen and judged them on a 5-point scale according to their attractiveness in Experiment 1, health in Experiment 2, and symmetry in Experiment 3. We found that symmetry and attractiveness were not strongly related in faces of women or men while health and symmetry were related. There was a significant difference between attractiveness and symmetry judgments but not between health and symmetry judgments. Moreover, there was a significant difference between attractiveness and health. Facial symmetry may be critical for the appearance of health but it does not seem to be critical for the appearance of attractiveness, not surprisingly perhaps because human faces together with the human brain have been shaped by adaptive evolution to be naturally asymmetrical.
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1. Introduction

In nature, many animal species depend on their ability to perceive symmetry in potential sexual mates. This is assumed to be accomplished through detection of deviations from symmetry, since the deviations imply poor health and bad genes. The neuronal wiring in the brain is presumed to be fine-tuned to such perceptual deviations. Thus, in animals other than humans, symmetry means perfect health. In human interactions, the face is a principle source of communication (speech and facial expressions) and inspection. However, the symmetry status in faces is not clear considering previous evidence that human faces are both structurally and functionally asymmetric (Zaidel, Chen, & German, 1995) and inconsistent published reports regarding the relationship between symmetry and attractiveness (Grammer & Thornhill, 1994; Knowner, 1996; Rhodes, Proffitt, Grady, & Sumich, 1998; Samuels, Butterworth, Roberts, Graupner, & Hole, 1994). Moreover, animals have largely left–right symmetrical brains whereas humans do not. In humans, there is a well-developed hemispheric functional asymmetry for many types of cognition, including the lateralization of language to the left hemisphere. On this basis alone one would expect a different role for symmetry in humans compared to other animals in nature.

Inconsistencies among studies investigating the relationship between facial beauty and symmetry may stem from divergent methodologies and approaches. Studies that have used normal, head-on photographs and created symmetrical left–left and right–right faces have reported a weak relationship between beauty and symmetry (Knowner, 1996; Samuels et al., 1994) whereas studies that manipulated photographs through morphing or digital smoothing have reported a strong relationship (Grammer & Thornhill, 1994; Rhodes et al., 1998). Small infants, for example, are more interested in beautiful faces than they are in symmetrical faces (Samuels et al., 1994) and this suggests that from birth the human brain is neuronally wired to attend to features related to beauty rather than to features related to symmetry in faces. Similarly, left–left and right–right

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faces are perfectly symmetrical and they have been found to be less attractive than the original faces giving rise to these composites (Knowner, 1996). Together, the findings on this issue suggest that in humans symmetry and attractiveness are not one and the same.

To determine the relationship between the appearance of facial attractiveness and facial symmetry in normal faces, we compared attractiveness to the appearance of health as well as to symmetry. We conducted three experiments that measured ratings for the appearance of attractiveness, health, and symmetry in digitally unmanipulated photographed faces. Our findings suggest a strong association between symmetry and health, as in animals, but a poor association with attractiveness.

2. Method

2.1. Participants

The participants were right-handed undergraduate students enrolled in introductory psychology classes at the University of California, Los Angeles. They participated in exchange for partial course credit. In Experiment 1, there were 20 female and 13 male participants. In Experiment 2, there were 13 female and 12 male participants. In Experiment 3, there were 15 females and 12 males. Separate participants were tested in the three experiments.

2.2. Stimuli

The black and white photographed faces were straight, head-on views of 30 women and 98 men from the FERET database and from the Psychological Image Collection at Stirling, UK. They had natural expression and largely symmetrical illumination. No known quantitative measurements were performed on the faces; they were selected from these databases for the present study based on their clear head-on views and illumination, regardless of age, sex, or ethnic background (although the majority were Caucasian). Nothing is known regarding the photographed persons' health status.

2.3. Procedures

Faces were viewed on a Macintosh computer screen for an exposure duration of 7 s per image. Participants were asked to rate each face on a 5-point Likert scale by pressing the appropriate point directly on the computer keyboard. In Experiment 1, the scale referred to degree of attractiveness (very unattractive to very attractive). Participants were asked to decide how attractive each face appeared to them. In Experiment 2, the scale referred to degree of health appearance (very unhealthy to very healthy). Participants were asked to decide how healthy
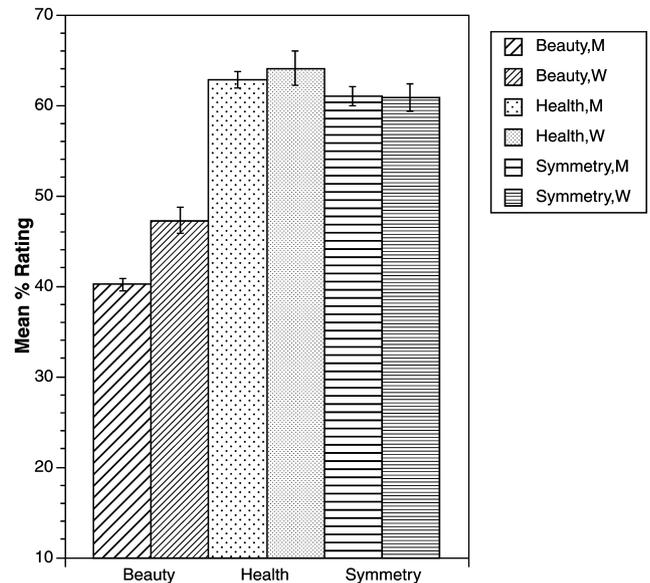

Fig. 1. This bar figure summarizes the mean percent rating in each of three separate experiments using the identical face stimuli. The left two bars represent the mean ratings for attractiveness, the middle two bars represent the mean ratings for appearance of health, and the last two bars represent the ratings for the appearance of symmetry. W, women's faces. M, men's faces.

each faced appeared. In Experiment 3, the scale referred to the degree of symmetry (very asymmetrical to very symmetrical). Participants were asked to decide on the extent of left–right symmetry of each face. The faces of women and men were randomly intermixed within the series, and each participant saw a differently ordered series.

3. Results

In each experiment, the percent mean rating was calculated for each face and entered into statistical analysis. Bonferroni correction for multiple comparisons was applied to determine significance level ($p < .008$). The results are summarized graphically in Fig. 1. The difference between the attractiveness and symmetry ratings were significant for women's faces [$t(118) = -6.43$, $p < .0001$] and for men's faces [$t(354) = -16.367$, $p < .0001$]. The difference between the health and symmetry ratings was not significant for either women's faces ($p < .19$) or men's faces ($p < .20$). Attractiveness and health ratings were significantly different in both the women's [$t(118) = -7.003$, $p < .0001$] and men's faces [$t(354) = -19.521$, $p < .0001$]. These similarities and differences are clearly seen in Fig. 1.

4. Discussion

This study set out to assess the relationship between the appearance of facial symmetry, attractiveness, and

health, through Likert scale ratings, and discovered that there was no significant difference between symmetry and health while there was a significant difference between attractiveness and symmetry. Similarly, there was a significant difference between health and attractiveness. All of this was true for both women's and men's faces, suggesting a fundamental feature that applies to human faces regardless of face sex. Moreover, even while the mean rating for attractiveness in women's faces was significantly higher than for men's faces, women's faces were not even close to being rated as having symmetry or health. The results of the three experiments thus show dramatic similarities and differences.

The faces in this study were digitally unmanipulated head-on views. The present results are consistent with previous findings that showed a poor relationship between attractiveness and symmetry in adult faces (Knowner, 1996) or with infants (Samuels et al., 1994). Sex of face did not explain the present results nor previously published findings, regardless of whether or not those other findings are inconsistent with ours (Grammer & Thornhill, 1994; Rhodes et al., 1998). Moreover, sex of participant does not explain the poor relationship between attractiveness and symmetry; in preliminary perusal of the data we found no significant trends with participant sex. The other relevant published studies have found similar outcomes to our data regarding participant sex.

By investigating the issue of health appearance on faces, this study helped elucidate the role of symmetry in assessment of facial attractiveness. It would appear that attractiveness in humans is relatively independent of health or symmetry. However, the latter two features seem to be related in humans as they are in animals (mate selection strategies are reviewed in Grammer & Thornhill, 1994 and in Zaidel et al., 1995). It is indeed difficult to say whether "beauty" is a cognitive feature in animal considerations of potential mates. It may be that facial beauty is a cognitive function applied by the uniqueness of the human brain, namely a brain that is functionally and structurally asymmetrical where sophisticated language and other cognitions are lateralized to one or the other hemisphere. That is not to say that health and facial beauty are unrelated in humans. The human face has evolved to communicate both language and expressions most likely through the same adaptive biological considerations that have shaped human brain asymmetries (Zaidel et al., 1995). While deviations from symmetry are critical perceptual units in detecting appearance of health, in both animals and humans, the natural subtle asymmetry of the human face may be relatively unimportant for judgment of facial attractiveness.

References

Grammer, K., & Thornhill, R. (1994). Human (homo sapiens) facial attractiveness and sexual selection: The role of symmetry and averageness. *Journal of Comparative Psychology, 108*, 233–242.

Knowner, R. (1996). Facial asymmetry and attractiveness judgment in developmental perspective. *Journal of Experimental Psychology, 22*, 662–675.

Rhodes, G., Proffitt, F., Grady, J. M., & Sumich, A. (1998). Facial symmetry and the perception of beauty. *Psychonomic Bulletin and Review, 5*, 659–669.

Samuels, C. A., Butterworth, G., Roberts, T., Graupner, L., & Hole, G. (1994). Facial aesthetics: Babies prefer attractiveness to symmetry. *Perception, 23*, 823–831.

Zaidel, D. W., Chen, A. C., & German, C. (1995). She is not a beauty even when she smiles: Possible evolutionary basis for a relationship between facial attractiveness and hemispheric specialization. *Neuropsychologia, 33*, 649–655.