Research Article

ARE AVERAGE FACIAL CONFIGURATIONS ATTRACTIVE ONLY BECAUSE OF THEIR SYMMETRY?

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Abstract—*Several commentators have suggested that the attractiveness of average facial configurations could be due solely to associated changes in symmetry. If this* symmetry hypothesis *is correct, then averageness should not account for significant variance in attractiveness ratings when the effect of symmetry is partialed out. Furthermore, changes in attractiveness produced by manipulating the averageness of individual faces should disappear when all the images are made perfectly symmetric. The experiments reported support neither prediction. Symmetry and averageness (or distinctiveness, the converse of averageness) made independent contributions to attractiveness (Experiments 1 and 2), and changes in attractiveness resulting from changes in averageness remained when the images were made perfectly symmetric (Experiment 2). These results allow us to reject the symmetry hypothesis, and strengthen the evidence that facial averageness is attractive.*

Images of surprising beauty can be produced by averaging faces together (Galton, 1878; Langlois & Roggman, 1990; Langlois, Roggman, & Musselman, 1994; Rhodes & Tremewan, 1996). This observation has generated considerable debate about why such images should be attractive. Are they attractive because they are average, or are other factors responsible?

Part of the appeal of averaged composites no doubt stems from the smooth complexions and soft-focus look that result when faces are blended (Benson & Perrett, 1992). Blending artifacts cannot be the whole story, however, because averageness is still attractive when these artifacts are eliminated (e.g., when line drawings of faces are used; Rhodes & Tremewan, 1996).

Another striking feature of averaged facial composites is their high degree of bilateral symmetry, which results from the elimination of fluctuating asymmetries (small, random deviations from perfect symmetry) when faces are averaged together.[1] This observation has led several commentators to conjecture that symmetry may explain the attractiveness of averaged composites or of averageness generally (Alley & Cunningham, 1991; Grammer & Thornhill, 1994; Ridley, 1992; Thornhill & Gangestad, 1993).[2] We refer to this conjecture as the *symmetry hypothesis*.

Langlois et al. (1994) have rejected the symmetry hypothesis, arguing that facial symmetry is not attractive and therefore cannot account for the attractiveness of averaged composites. They showed that symmetry did not correlate with attractiveness, and that perfectly symmetric versions of faces were less attractive than the originals. Other studies have also found that perfectly symmetric versions of faces are less attractive than the originals (Kowner, 1996; Samuels, Butterworth, Roberts, Graupner, & Hole, 1994; Swaddle & Cuthill, 1995). However, these studies are not without flaws. The symmetric images (except in Swaddle & Cuthill, 1995) were constructed by reflecting each hemiface about the midline. With this technique, asymmetries in the location of midline features, or in the size of the hemifaces (Previc, 1991), can result in odd-looking symmetric images (e.g., abnormal eye spacing, nose width, or aspect ratio). It is difficult, therefore, to determine whether the unattractiveness of these images is due to their symmetry or their structural abnormalities. In Swaddle and Cuthill's (1995) study, the generalizability of the results was limited by failure to display the whole face (only internal facial features were shown).

Recently, we (Rhodes, Proffitt, Grady, & Sumich, in press) have shown that perfectly symmetric images, made by blending each face with its mirror image, are more attractive than the original faces, and that the attractiveness of individual faces can be altered by manipulating their level of symmetry.[3] Significant correlations between facial symmetry and attractiveness have also been reported in several studies (Grammer & Thornhill, 1994; Jones & Hill, 1993, for some ethnic groups; Rhodes et al., in press; Zebrowitz, Voinescu, & Collins, 1996). These findings fit well with evidence that bodily symmetry is attractive to humans and many other species (Brooks & Pomiankowski, 1994; Concar, 1995; Møller & Pomiankowski, 1993; Thornhill & Gangestad, 1994; Watson & Thornhill, 1994).

The symmetry hypothesis cannot, therefore, be ruled out a priori on the grounds that symmetry is not attractive. We report here the results of two studies designed to test the symmetry hypothesis. If it is correct, then symmetry should explain a significant proportion of the variance in attractiveness judgments when the effect of averageness is partialed out, and averageness should not account for a significant proportion of variance when the effect of symmetry is partialed out. We tested these predictions using regression analyses in Experiments 1 and 2. We also reasoned that if changes in attractiveness produced by manipulating averageness are due solely to associated changes in degree of symmetry, then changes in attractiveness should disappear when all the images are made perfectly symmetric. We tested this prediction in Experiment 2.

EXPERIMENT 1

Subjects rated the attractiveness of male and female averaged composites (each created by mathematically averaging 24 same-sex faces), and low-, normal-, and high-averageness versions of 48 faces. The

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1. Averaged faces may not be perfectly symmetric because directional asymmetries, which have a consistent bias in the population, are not eliminated by averaging.

2. Thornhill and Gangestad (1993) also noted that symmetry and averageness could both contribute to the attractiveness of averaged composites.

3. The perfectly symmetric images were more attractive than other blends, suggesting that the result is not a blending artifact.

high- and low-averageness versions were created by warping photographs of faces (normal averageness) halfway toward (high) or away from (low) the same-sex average (see Method). This procedure extends Rhodes and Tremewan's (1996) line-drawing manipulation of averageness to photographic images, and we expected to replicate the finding that attractiveness increases with manipulated averageness. Such a result would provide strong additional evidence that averageness is attractive in the absence of blending artifacts.

We also obtained symmetry, averageness, and expression ratings for all the images. Our main aim was to determine whether variations in averageness account for significant variance in attractiveness ratings when the effects of symmetry are partialed out. Alternatively, changes in symmetry and averageness could both contribute to variance in attractiveness ratings. A secondary question was whether positivity of expression also contributes to the attractiveness of averageness. Averaged composites have pleasant expressions (see Fig. 1), and low-averageness faces created by caricaturing sometimes have slightly unpleasant expressions. Positive expressions are attractive (e.g., Cunningham, Roberts, Barbee, Druen, & Wu, 1995), so we hypothesized that expression might contribute to the attractiveness of averageness.[4]

Method

Subjects

Thirty-six Caucasian undergraduates (18 males, 18 females) received $10 each for participating in a 1-hr session.

Stimuli

Black-and-white photographs were taken of 48 young adults (24 male, 24 female) from senior high school classes and the university community. All faced the camera directly and displayed neutral expressions. Gryphon's Morph™ software was used to manipulate the averageness of the faces. First, a fixed set of 120 landmark points was found (by eye) on each face, and their locations indicated with a mouse-click. These points captured the spatial layout of the internal features, face outline, inner and outer hairline, ears, and any prominent facial lines (cf. Rhodes & Tremewan, 1996). The program automatically joined subsets of these points with smooth curves to create facial contours, and interpolated three additional points between each pair of points on a contour. The resulting 656 points were used to manipulate the images. Second, the program created an average male composite and an average female composite, by computing the mean location of each of these 656 points for same-sex faces, warping individual same-sex faces onto this average configuration, and then averaging the gray-level values in corresponding regions of the faces (see Beale & Keil, 1995, for more details). This averaging technique should produce averages superior to those produced by pixel-based techniques that do not align facial features or anatomical locations before averaging (cf. Langlois & Roggman, 1990). Finally, the high- and low-averageness versions of each face were created by moving each point (along the difference vector connecting corresponding points on the same-sex average and the target face) either halfway toward (high) or the same distance away from (low) the average, and remapping the original pattern of gray levels, or "texture," onto this new configuration. Each image measured approximately 12.5 × 10 cm.

4. Any such contribution might be small given that the original faces all had neutral expressions.

Fig. 1. Male and female averages from Experiment 1. Each is the average of 24 faces.

The stimuli consisted of the male and female averages (averaged composites) together with a high-averageness version, a low-averageness version, and the original (normal-averageness) version of each face. A second set of images was created by placing each face inside an oval mask, which hid most of the hair but displayed the face outline, chin, and inner hairline. Masked versions of the stimuli are shown in Figure 1 (male and female averages) and the top row of Figure 2 (low-, normal-, and high-averageness versions).

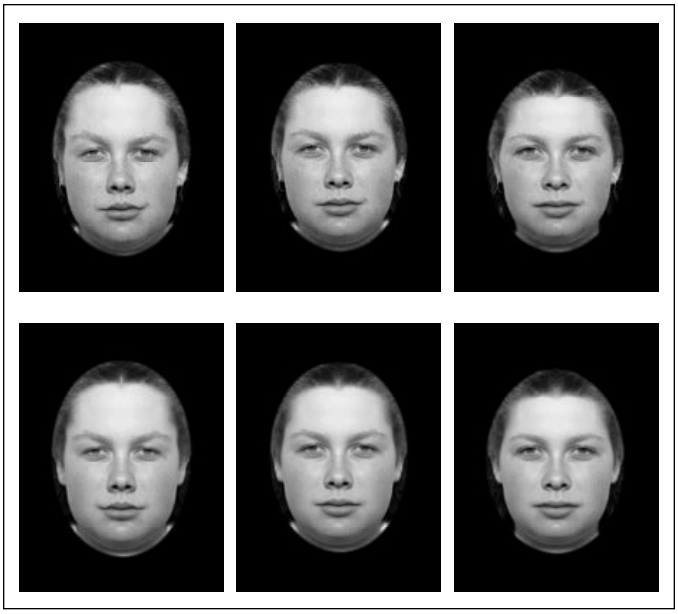

Fig. 2. Examples of low-, normal-, and high-averageness versions of a face. The examples in the top row were used in both experiments, and those in the bottom row are perfectly symmetric versions of the same images, used in Experiment 2 only.

Procedure

One version of each face was assigned to each of three blocks, balanced for averageness level and sex of face. The male and female averages were added to Block 1. Blocks were presented in three different orders (123, 231, 312), with image order randomized within blocks. SuperLab (CedrusCorp.) controlled presentation of the images on a PowerMac 6300 computer and recorded responses. Each image was displayed until subjects made a rating, using the keyboard keys 1 through 7. Faces were rated on 7-point scales of attractiveness, averageness, symmetry, and expression (1 = negative, 7 = positive). All the images were rated on one scale before the next scale was presented. Attractiveness was always rated first, and the order of the other three rating tasks was counterbalanced with block order and sex of subject. Half the subjects saw masked and half saw unmasked faces, counterbalanced across task order, block order, and sex of subject. Subjects were tested individually.

Results and Discussion

All four sets of ratings were highly reliable, with Cronbach alphas from .94 to .97. A four-way analysis of variance (ANOVA) was carried out on the attractiveness ratings, with display condition (mask vs. no mask) and sex of subject as between-subjects factors, and averageness level (low vs. normal vs. high) and sex of face as repeated measures factors.[5] Planned comparisons were used to test predicted differences between averageness levels.

Mean attractiveness, averageness, symmetry, and expression ratings were calculated for each image, averaging across subjects. A multiple regression analysis was carried out on these ratings, with attractiveness as the dependent variable and averageness, symmetry, and expression as the independent variables.

Attractiveness ANOVA

Attractiveness increased with manipulated averageness, as expected, $F(2, 64) = 288.26$, $p < .0001$ (Ms = 2.4, 3.4, and 3.8 for low, normal, and high averageness, respectively; ts > 6.62, ps < .0001). This result extends Rhodes and Tremewan's (1996) findings with line drawings to more realistic photographic images. There was a significant effect of sex of face (female: $M = 3.3$, male: $M = 3.1$), $F(1, 32) = 11.96$, $p < .002$, and a three-way interaction between sex of face, averageness level, and display condition, $F(2, 64) = 9.84$, $p < .0002$. Female faces showed a bigger drop in attractiveness than male faces when distorted away from the average when the hair was visible (presumably because of the greater distorting effect on female hair, which tends to be fuller and longer than male hair). This interaction does not qualify our main finding that attractiveness increased with averageness, because that finding was observed for both sexes and display conditions (for low, normal, and high averageness, respectively, Ms = 2.6, 3.5, and 3.9 for masked female faces; Ms = 2.3, 3.5, and 3.9 for female faces with no mask; Ms = 2.4, 3.4, and 3.8 for masked male faces; Ms = 2.2, 3.2, and 3.5 for male faces with no mask).

Attractiveness of averaged composites

The average male face was more attractive ($M = 4.6$) than any individual male face, and the average female face was more attractive ($M = 5.2$) than all but one female face ($M = 5.3$).

Predicting attractiveness

Overall, averageness, symmetry, and expression accounted for 71% of the variance in attractiveness ratings, $F(3, 142) = 121.12$, $p < .0001$. Table 1 shows the zero-order and partial correlations of each independent variable with attractiveness. The main results of interest are the partial correlations, which indicate the (unique) contribution of each variable when the effects of the other variables are partialed out.

There was no support for the symmetry hypothesis. Although symmetry explained significant variance in attractiveness ratings (even when the effects of averageness and expression were partialed out), averageness still accounted for significant variance when the effect of symmetry (and expression) was partialed out. Therefore, even though symmetry and averageness were significantly correlated, $r(144) = .70$, $p < .001$ (all versions), $r(46) = .30$, $p < .05$ (undistorted faces), the attractiveness of averageness was not due solely to this accompanying increase in symmetry. Averageness, symmetry, and expression each contributed independently to variance in attractiveness ratings. This finding held when all versions (low, normal, and high averageness, plus the averaged composites) of the faces were considered, and when only the undistorted faces were considered.

When male and female faces were considered separately, these conclusions held for all versions of the faces. However, when the undistorted faces were considered (reducing the range of each variable and the power of the analyses), only averageness made a (significant) unique contribution to male attractiveness, and only expression made a unique contribution to female attractiveness.

5. Symmetry, averageness, and expression ratings were collected primarily for use in the regression analyses, but ANOVAs on these ratings showed that all three increased significantly with increases in (manipulated) averageness level. The averaged composites were also rated as more symmetric (both Ms = 6.6) than any individual face, as expected if averaging eliminates fluctuating asymmetries.

Table 1. *Partial and zero-order (in parentheses) correlations of attractiveness with averageness, symmetry, and expression: Experiment 1*

Faces	Correlations with averageness		Correlations with symmetry		Correlations with expression	
All versions						
All (n = 146)	.40***	(.71***)	.54***	(.76***)	.45***	(.46***)
Male (n = 73)	.63***	(.88***)	.40***	(.81***)	.33**	(.25*)
Female (n = 73)	.28*	(.60***)	.51***	(.71***)	.54***	(.64***)
Undistorted						
All (n = 48)	.37*	(.45***)	.40*	(.46***)	.47**	(.46***)
Male (n = 24)	.75***	(.83***)	.07	(.53**)	.23	(.19)
Female (n = 24)	.01	(.12)	.30	(.37)	.69***	(.71***)

*p < .05. **p < .01. ***p < .001.

EXPERIMENT 2

In Experiment 2, we tested the symmetry hypothesis experimentally. If the changes in attractiveness associated with our manipulation of averageness in Experiment 1 were due solely to changes in symmetry, as asserted by the symmetry hypothesis, then they should disappear when all the images are made perfectly symmetric. We tested this prediction by comparing the attractiveness of the images from Experiment 1 and their symmetric counterparts (Fig. 2, bottom row).

We also attempted to replicate our regression results, with two procedural improvements. First, we replaced averageness ratings with distinctiveness (the converse of averageness) ratings, in case subjects interpreted "averageness" to mean "average-looking" (i.e., not particularly "good-looking"), rather than spatially average, as intended. As in previous studies, we interpret these distinctiveness ratings as a (converse) measure of averageness (Rhodes & Tremewan, 1996). Second, we obtained each set of ratings from a different group of raters to avoid any carryover effects between rating scales.

In addition, we asked subjects to rate opposite-sex faces on "appeal as a potential life partner," in a preliminary investigation of whether perceived averageness or symmetry might influence reproductive choices, as predicted by biological accounts of such preferences (Kalick, Zebrowitz, Langlois, & Johnson, 1998; Møller & Swaddle, 1997; Shackelford & Larsen, 1997; Thornhill & Møller, 1997).

Method

Subjects

One hundred and eighty Caucasian undergraduates (90 males, 90 females) received $5 each for participating. None had participated in Experiment 1.

Stimuli

For each image in Experiment 1, including the male and female averages, we created a perfectly symmetric composite by blending that image with its mirror image, using Gryphon's Morph™ software (see Rhodes et al., in press, for details). This procedure averages the locations of corresponding landmark points on the two images, warps each image onto that average configuration, and averages the gray-level values in corresponding facial regions. Blemishes and jewelry were removed from the original images using the cloning tool in Adobe Photoshop before the symmetric versions were made. Six versions of each face were used in the experiment: the low-, normal-, and high-averageness versions from Experiment 1, and their perfectly symmetric counterparts (see Fig. 2). Normal and perfectly symmetric versions of the male and female averages were also used. All images were displayed in the oval masks used in Experiment 1.

Procedure

The procedure was similar to the procedure in Experiment 1, with the following differences. Six blocks of trials were constructed by assigning one of the six versions of each face to each block, counterbalancing averageness level, symmetry level, and sex of face across blocks. The male and female averages and their perfectly symmetric versions were assigned to Block 1. Six different block orders were used (123456, 234561, etc.), with image order randomized within blocks. Block order was counterbalanced with sex of subject. Five different groups of 36 subjects (18 male, 18 female) rated all the images for either attractiveness, symmetry, distinctiveness, expression, or mate appeal (opposite-sex faces only). Subjects were instructed to rate a face as distinctive if it would be easy to spot in a crowd and to rate mate appeal high if the person looked appealing as a potential life partner (i.e., someone to settle down and have children with). Subjects were requested to use the full range of the scales.

Results and Discussion

All sets of ratings were highly reliable, with Cronbach alphas from .91 to .98. A four-way ANOVA was carried out on the mean attractiveness ratings, with sex of subject as a between-subjects factor, and averageness level (low vs. normal vs. high), symmetry level (normal vs. perfect), and sex of face as repeated measures factors. A three-way ANOVA was carried out on mean mate-appeal ratings, with sex of subject as a between-subjects factor, and averageness level and symmetry level as repeated measures factors. Planned comparisons were used to test predicted differences between averageness levels.

Mean attractiveness, mate-appeal, distinctiveness, symmetry, and expression ratings were calculated for each image, averaging across subjects. Two multiple regression analyses were carried out on these ratings, one with attractiveness as the dependent variable and the other with mate appeal as the dependent variable. In both cases, distinctiveness, symmetry, and expression were the independent variables.

Attractiveness ANOVA

The increase in attractiveness associated with an increase in averageness level was unaffected by making all the images perfectly symmetric (see Fig. 3). Attractiveness increased with averageness level, $F(2, 68) = 214.57$, $p < .0001$ (Ms = 2.1, 3.0, and 3.4 for low, normal, and high averageness, respectively; ts > 6.65, ps < .0001), and with symmetry level, $F(1, 34) = 72.22$, $p < .0001$ (Ms = 2.7 and 3.0 for normal and perfect symmetry, respectively), but there was no interaction between averageness level and symmetry level, $F < 1$. These results are inconsistent with the symmetry hypothesis.

There were several effects involving sex of face, but these did not affect our conclusion that averageness is attractive and that its appeal is not due solely to changes in symmetry. Female faces were generally more attractive than male faces, $F(1, 34) = 6.05$, $p < .02$, and an increase in symmetry increased the attractiveness of female faces (perfect symmetry: $M = 3.1$, normal symmetry: $M = 2.8$) more than male faces (perfect symmetry: $M = 2.8$, normal symmetry: $M = 2.6$), $F(1, 34) = 14.10$, $p < .0006$. There was also a three-way interaction between sex of face, symmetry level, and averageness, $F(2, 68) = 4.44$, $p < .02$ (see Fig. 3). This interaction has no obvious theoretical significance, and planned comparisons showed that the increase in attractiveness from low- to normal- to high-averageness versions was significant for both male and female faces, at both symmetry levels, all ts > 10.16, ps < .0001.

Attractiveness of averaged composites

As expected, male and female averages were more attractive (male average: $M = 4.4$, female average: $M = 4.8$) than any (undistorted) same-sex face. Similar results were obtained when the perfectly symmetric averages were compared with perfectly symmetric individual faces. The symmetric male average was more attractive ($M = 4.1$) than any individual symmetric male face, and the symmetric female average was more attractive ($M = 4.9$) than all but two symmetric individual female faces (Ms = 5.0 and 5.1). The averages with normal and perfect symmetry did not differ significantly in attractiveness, for either male or female images, both ts < 1.

Mate-appeal ANOVA

The mate-appeal ratings showed that averageness and symmetry were both appealing in a potential life partner, $F(2, 68) = 149.54$, $p < .0001$ (Ms = 1.8, 2.5, and 3.0 for low, normal, and high averageness) and $F(1, 34) = 34.40$, $p < .0001$ (Ms = 2.3 and 2.5 for normal and perfect symmetry). Averageness interacted with symmetry level, $F(2, 68) = 6.01$, $p < .004$. However, rather than the effect of averageness being reduced when all the images were perfectly symmetric, as expected if the appeal of averageness is due to an accompanying increase in symmetry, the effect was slightly increased (Fig. 4). Moreover, mate appeal increased with averageness for both symmetry levels, all ts > 10.82, ps < .0001, indicating that the mate appeal of more average facial configurations cannot be due solely to their greater symmetry.

Mate appeal of averaged composites

The average male and female faces had greater mate appeal (male: $M = 4.8$, female: $M = 4.5$) than any individual same-sex face. The perfectly symmetric average male and female faces also had greater mate appeal (male: $M = 4.7$, female: $M = 4.5$) than any individual symmetric same-sex face. Averages with normal and perfect symmetry did not differ in mate appeal for either male or female images, both ts < 1. These results exactly parallel those obtained for attractiveness.

Predicting attractiveness

Overall, distinctiveness, symmetry, and expression explained 67% of the variance in attractiveness ratings for the full set of images, $F(3, 288) = 199.08$, $p < .0001$. Table 2 shows the zero-order and partial correlations of each independent variable with attractiveness. There was no support for the symmetry hypothesis. Although symmetry explained significant variance in attractiveness judgments when the effects of distinctiveness (converse of averageness) and expression

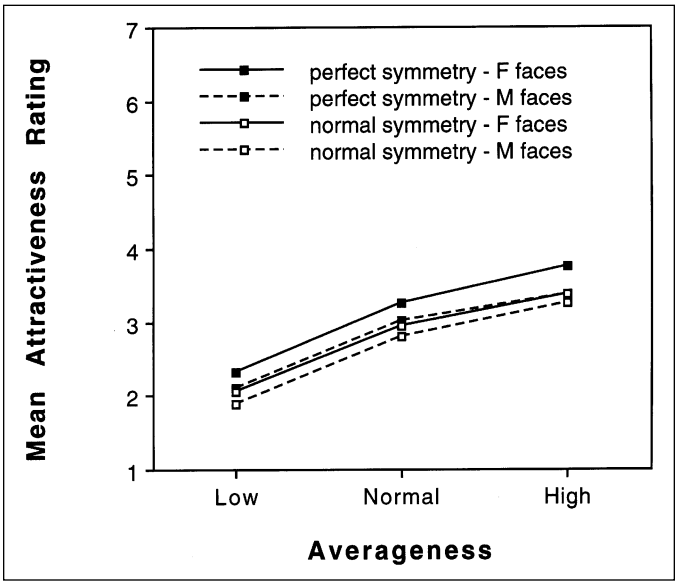

Fig. 3. Mean attractiveness ratings as a function of averageness level, symmetry level, and sex of face in Experiment 2. For clarity, *SE* bars have been omitted (maximum *SE* = 0.15). F = female, M = male.

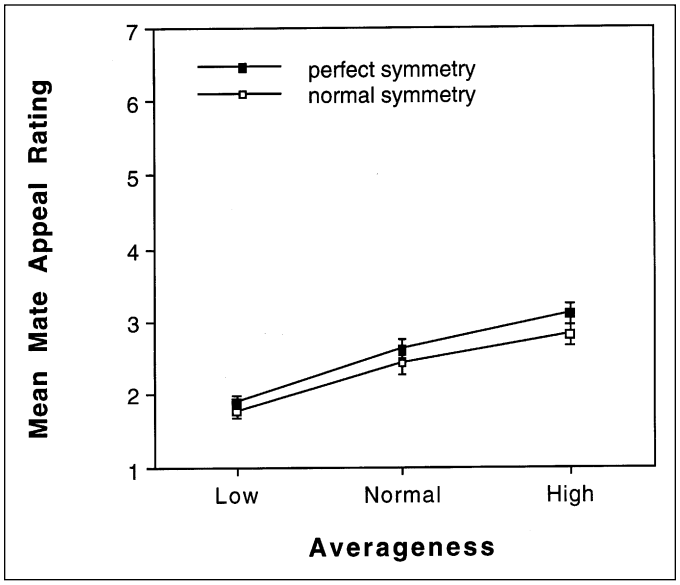

Fig. 4. Mean mate-appeal ratings as a function of averageness level and symmetry level in Experiment 2. *SE* bars are shown.

Table 2. *Partial and zero-order (in parentheses) correlations of attractiveness with distinctiveness, symmetry, and expression: Experiment 2*

Faces	Correlations with distinctiveness	Correlations with symmetry	Correlations with expression
All versions			
All (n = 292)	–.71*** (–.77***)	.30*** (.43***)	.37*** (.46***)
Male (n = 146)	–.88*** (–.90***)	.25** (.43***)	.34*** (.29***)
Female (n = 146)	–.50*** (–.67***)	.35*** (.44***)	.45*** (.62***)
Undistorted			
All (n = 48)	–.35* (–.52***)	.48*** (.51***)	.45** (.45***)
Male (n = 24)	–.72*** (–.80***)	.32 (.60**)	.43* (.28)
Female (n = 24)	.23 (–.24)	.46* (.43*)	.66*** (.65***)

*p < .05. **p < .01. ***p < .001.

were partialed out, distinctiveness still accounted for significant variance in attractiveness after the effect of symmetry (and expression) was partialed out. Therefore, although symmetry and distinctiveness were significantly negatively correlated, $r(290) = –.33$, $p < .001$ (all versions), $r(46) = –.34$, $p < .02$ (undistorted faces), the unattractiveness of distinctiveness was not due solely to the accompanying decrease in symmetry.

Distinctiveness, symmetry, and expression each contributed unique variance to attractiveness. These results held for both male and female faces when all versions of the faces were considered, but for undistorted faces, the distinctiveness effect was restricted to male faces (cf. averageness result in Experiment 1), and the symmetry effect to female faces. There was a narrower range of averageness (Experiment 1) and distinctiveness (Experiment 2) ratings for female (4.0–5.9, averageness; 2.6–4.7, distinctiveness) than male faces (3.9–6.1, averageness; 2.6–5.1, distinctiveness), but this seems unlikely to fully account for the sex difference. Nor could a sex difference in the range of ratings account for restriction of the symmetry effect to female faces, because the range was larger for male (2.0–4.7) than female (2.6–5.1) faces. A greater effect of symmetry on female than male attractiveness was also found in the ANOVA results for attractiveness. These two sex differences were also apparent in the results for all versions of the faces (although in that analysis both factors were significant predictors for both sexes). Therefore, it is possible that facial symmetry is a stronger predictor of female than male attractiveness, and that facial averageness (converse of distinctiveness) is a stronger predictor of male than female attractiveness. Other studies, however, have found either no sex difference (Thornhill & Gangestad, 1994) or the opposite sex difference (Gangestad, Thornhill, & Yeo, 1994), for bodily symmetry. Moreover, although averageness contributed only to male attractiveness in Grammer and Thornhill's study (1994), averageness was unattractive (cf. our finding that distinctiveness was unattractive). These inconsistencies indicate that the sex differences we obtained should be viewed with caution.

Predicting mate appeal

Overall, the three variables explained 60% of the variance in mate-appeal ratings for the full set of images, $F(3, 288) = 147.20$, $p < .0001$. There was no support for the symmetry hypothesis (see Table 3). Distinctiveness was a significant predictor of mate appeal even when the effect of symmetry (and expression) was partialed out. The overall pattern of results was similar to that obtained for attractiveness, although distinctiveness and symmetry appeared to have stronger effects on attractiveness than on mate appeal, whereas expression had a stronger influence on mate appeal. The latter result may reflect a sensible desire for a pleasant disposition in a life partner.

Table 3. *Partial and zero-order (in parentheses) correlations of mate appeal with distinctiveness, symmetry, and expression: Experiment 2*

Faces	Correlations with distinctiveness	Correlations with symmetry	Correlations with expression
All versions			
All (n = 292)	–.61*** (–.68***)	.20*** (.36***)	.47*** (.54***)
Male (n = 146)	–.67*** (–.68***)	.15† (.34***)	.44*** (.38***)
Female (n = 146)	–.37*** (–.59***)	.31*** (.39***)	.57*** (.69***)
Undistorted			
All (n = 48)	–.35* (–.50***)	.30* (.37**)	.50*** (.52***)
Male (n = 24)	–.47* (–.49*)	.12 (.34)	.47* (.35)
Female (n = 24)	.04 (–.29)	.41† (.37)	.72*** (.75***)

†p < .10. *p < .05. **p < .01. ***p < .001.

More generally, the finding that averageness and symmetry are appealing in a life partner provides preliminary evidence that these preferences might influence reproductive behavior. More direct evidence of an influence on reproductive behavior and fitness is now needed, to test predictions that these preferences increase reproductive success (e.g., Grammer & Thornhill, 1994; Symons, 1979).

CONCLUSIONS

Our results settle the dispute about whether the attractiveness of averageness is due solely to associated changes in symmetry. Averageness remained a significant predictor of attractiveness when the effect of symmetry was partialed out, and changes in attractiveness produced by experimentally manipulating the averageness of individual faces remained when the images were made perfectly symmetric. These results rule out the symmetry hypothesis. The attractiveness of average facial configurations cannot be attributed solely to their symmetry.

Blending artifacts can also be ruled out as a complete account of the attractiveness of average facial configurations. Rhodes and Tremewan (1996) showed that individual line-drawing faces can be made more (or less) attractive by distorting them toward (or away from) an average configuration. The use of line drawings allowed blending artifacts to be eliminated, but at the cost of losing realism. By extending these results to more realistic photographic images (also without introducing blending artifacts), we have further strengthened the case that averageness is attractive.

It now seems clear that the attractiveness of averageness cannot be explained by symmetry, blending artifacts, or a variety of other factors (see Langlois et al., 1994, for a review). Perhaps it is time to shift attention from the question of whether averageness is genuinely attractive to the question of why averageness is attractive. At one level, one might ask what mechanisms render average faces attractive. Does prototype abstraction play a role, as has been hypothesized (Langlois & Roggman, 1990)? Is this a kind of mere-exposure effect, whereby the similarity of an unseen average to many seen faces generates a positive response to that average? Does some (unconscious) statistical analysis of a population of faces contribute? At another level, one can ask why humans find averageness attractive. Is the preference culturally instilled, or has it been built in by evolutionary processes, perhaps because it increases reproductive success? Attention to these questions should enrich understanding of human nature as well as the nature of beauty.

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REFERENCES

Alley, T.R., & Cunningham, M.R. (1991). Averaged faces are attractive, but very attractive faces are not average. *Psychological Science, 2*, 123–125.

Beale, J.M., & Keil, F.C. (1995). Categorical effects in the perception of faces. *Cognition, 57*, 217–239.

Benson, P., & Perrett, D. (1992). Face to face with the perfect image. *New Scientist, 1809*, 32–35.

Brooks, M., & Pomiankowski, A. (1994). Symmetry is in the eye of the beholder. *Trends in Ecology and Evolution, 9*, 201–202.

Concar, D. (1995). Sex and the symmetrical body. *New Scientist, 146*, 40–44.

Cunningham, M.R., Roberts, A.R., Barbee, A.P., Druen, P.B., & Wu, C.-H. (1995). "Their ideas of beauty are, on the whole, the same as ours": Consistency and variability in the cross-cultural perception of female physical attractiveness. *Journal of Personality and Social Psychology, 68*, 261–279.

Galton, F. (1878). Composite portraits. *Journal of the Anthropological Institute of Great Britain & Ireland, 8*, 132–142.

Gangestad, S., Thornhill, R., & Yeo, R. (1994). Facial attractiveness, developmental stability and fluctuating asymmetry. *Ethology & Sociobiology, 15*, 73–85.

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.

Jones, D., & Hill, K. (1993). Criteria of facial attractiveness in five populations. *Human Nature, 4*, 271–296.

Kalick, S.M., Zebrowitz, L.A., Langlois, J.H., & Johnson, R.M. (1998). Does human facial attractiveness honestly advertise health? Longitudinal data on an evolutionary question. *Psychological Science, 9*, 8–13.

Kowner, R. (1996). Facial asymmetry and attractiveness judgment in developmental perspective. *Journal of Experimental Psychology: Human Perception and Performance, 22*, 662–675.

Langlois, J.H., & Roggman, L.A. (1990). Attractive faces are only average. *Psychological Science, 1*, 115–121.

Langlois, J.H., Roggman, L.A., & Musselman, L. (1994). What is average and what is not average about attractive faces? *Psychological Science, 5*, 214–220.

Møller, A.P., & Pomiankowski, A. (1993). Fluctuating asymmetry and sexual selection. *Genetica, 89*, 267–279.

Møller, A.P., & Swaddle, J.P. (1997). *Asymmetry, developmental stability and evolution*. Oxford, England: Oxford University Press.

Previc, F.H. (1991). A general theory concerning the prenatal origins of cerebral lateralization in humans. *Psychological Review, 98*, 299–334.

Rhodes, G., Proffitt, F., Grady, J., & Sumich, A. (in press). Facial symmetry and the perception of beauty. *Psychonomic Bulletin & Review*.

Rhodes, G., & Tremewan, T. (1996). Averageness, exaggeration, and facial attractiveness. *Psychological Science, 7*, 105–110.

Ridley, M. (1992). Swallows and scorpionflies find symmetry is beautiful. *Science, 257*, 327–328.

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

Shackelford, T.K., & Larsen, R.J. (1997). Facial asymmetry as an indicator of psychological, emotional, and physiological distress. *Journal of Personality and Social Psychology, 72*, 456–466.

Swaddle, J.P., & Cuthill, I.C. (1995). Asymmetry and human facial attractiveness: Symmetry may not always be beautiful. *Proceedings of the Royal Society of London, B, 261*, 111–116.

Symons, D. (1979). *The evolution of human sexuality*. Oxford, England: Oxford University Press.

Thornhill, R., & Gangestad, S.W. (1993). Human facial beauty. *Human Nature, 4*, 237–269.

Thornhill, R., & Gangestad, S.W. (1994). Human fluctuating asymmetry and sexual behavior. *Psychological Science, 5*, 297–302.

Thornhill, T., & Møller, A.P. (1997). Developmental stability, disease and medicine. *Biological Reviews, 72*, 497–548.

Watson, P.M., & Thornhill, R. (1994). Fluctuating asymmetry and sexual selection. *Trends in Ecology and Evolution, 9*, 21–25.

Zebrowitz, L.A., Voinescu, L., & Collins, M.A. (1996). Wide-eyed and crooked-faced—Determinants of perceived and real honesty across the lifespan. *Personality and Social Psychology Bulletin, 22*, 1258–1269.

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