

Measuring the Physical in Physical Attractiveness: Quasi-Experiments on the Sociobiology of Female Facial Beauty

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Two quasi-experiments investigated the relation between specific adult female facial features and the attraction, attribution, and altruistic responses of adult males. Precise measurements were obtained of the relative size of 24 facial features in an international sample of photographs of 50 females. Male subjects provided ratings of the attractiveness of each of the females. Positively correlated with attractiveness ratings were the neonate features of large eyes, small nose, and small chin; the maturity features of prominent cheekbones and narrow cheeks; and the expressive features of high eyebrows, large pupils, and large smile. A second study asked males to rate the personal characteristics of 16 previously measured females. The males were also asked to indicate the females for whom they would be most inclined to perform altruistic behaviors, and select for dating, sexual behavior, and childrearing. The second study replicated the correlations of feature measurements with attractiveness. Facial features also predicted personality attributions, altruistic inclinations, and reproductive interest. Sociobiological interpretations are discussed.

Charles Darwin (1871) noted that "In civilized life, man is largely, but by no means exclusively, influenced in the choice of his wife by external appearance." Social psychologists have confirmed Darwin's (1871) observations on the importance of physical attractiveness in social behavior. Physical attractiveness has been found to influence heterosexual dating, peer acceptance teacher behavior, altruism, attitude change, employment interviews, jury decisions, marriage happiness, and income (Berscheid & Walster, 1974; Cash, 1981; Hatfield & Sprecher, 1986). Although female facial attractiveness appears to be relatively stable both during childhood (Sussman, Mueser, Grau, & Yarnold, 1983) and adulthood (Livson, 1979), the social significance of the features of the face have not been examined in extensive detail (Liggett, 1974).

There may be several causes for the sporadic research attention directed towards the human face as a stimulus. The pseudosciences of phrenology and physiognomy may have made measuring

the face seem disreputable to some scientists. Those who did work on the topic quickly became aware of the complexity of the face as a stimulus (Goldstein, 1983). Some research on the perception of personality from faces produced data on dozens of physiognomic and evaluative dimensions but lacked a guiding theory to render them fully coherent, whereas other research tended to use only a limited number of globally defined variables (Hirschberg, Jones, & Haggerty, 1978; Iliffe, 1960; Lucker & Graber, 1980; Milord, 1978; Secord, 1958; Taylor & Thompson, 1955; Terry, 1977). Perhaps the major deterrent to the systematic investigation of facial physical attractiveness was the belief that beauty was in the eyes of the beholder, and that there were no cross-culturally universal standards for what constituted an attractive female face. Darwin (1871) was struck by cultural differences in preference for different skin colors and amounts of body hair, as well as such practices as teeth filing and lip ornamentation. Ford and Beach (1951) documented the cross-cultural variability in admired body weight, breast size, and other aspects of the female physique, suggesting little consensus in aesthetic preferences. Berscheid and Walster (1974) quoted Darwin's statement that "It is certainly not true that there is in the mind of man any universal standards of beauty with respect to the human body." Even within the West, there seemed to be substantial individual personality differences in preferences for various human body forms or physiques (Beck, Ward-Hull, & McLear, 1976; Lavrakas, 1975; Scodel, 1957; Wiggins, Wiggins, & Conger, 1968). Yet variability in some aspects of preferred physique or ornamentation does not preclude the possibility of other universally alluring characteristics (Horvath, 1981; Lott, 1979), so that certain facial configurations could be intrinsically attractive. Darwin (1871) adopted a more agnostic position on the issue of universal standards of facial beauty than he did with

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respect to the body, noting that "Mr. Winwood Reade . . . who has had ample opportunities for observation, not only with the Negroes of the west coast of Africa, but those of the interior who have never associated with Europeans is convinced that their ideas of beauty are, *on the whole*, the same as ours." Research with Western subjects disclosed significant consistency in evaluating attractiveness (Hatfield & Sprecher, 1986; Iliffe, 1960). The females judged to be most attractive may have such similar facial features that they were hard to distinguish one from another (Light, Hollander, & Kayra-Stuart, 1981). Cross-cultural investigations on the judgment of facial attractiveness tended to highlight societal differences, but rough agreements in facial aesthetic preferences were shown by Asian-American and Caucasian females (Wagatsuma & Kleinke, 1979), Chinese, Indian, and English females judging Greek males (Thakerar & Iwawaki, 1979), South African and American males and females (Morse, Gruzen, & Reis, 1976), and blacks and whites judging males and females from both races (Cross & Cross, 1971).

There is evidence for cross-species standards of facial attractiveness. Ethologists such as Lorenz (1943) and Eibl-Eibesfeldt (1970) noted that neonates in a wide range of species share such features as large eyes and forehead, smaller, rounded nose and chin, softer skin and a coloration which differed from that of more mature members of their species. These neonate features seemed to elicit instinctive protective and caretaking responses from adults. Humans also manifested more positive responses to stereotypic and even supernormal infant than to the features of older individuals (Alley, 1983; Sternglanz, Gray, & Murakami, 1977). Further, the closer that a human infant approximated the facial configuration of the ideal infant, the more positive were adult evaluations. Hildebrandt and Fitzgerald (1978) measured the size of various facial features of infants, and found that larger eye height and width, larger forehead height, and larger cheeks were positively correlated with cuteness ratings, whereas larger nose width, ear height, and mouth height were negatively associated with perceived cuteness.

The fact that the same facial features which were associated with infantile features in other species were correlated with perceived cuteness in human babies did not prove that an instinct caused the human response to infant features. If human adults have a preference for neonate features in the young for whatever reason the same preference may be evident in judgments of adults. In fact, Korthase and Trenholme (1982) demonstrated that younger appearing adults were seen as more attractive than older, more mature appearing adults. Younger individuals may have been preferred because neonate features elicited positive caretaking responses. Alternatively, neonate features may have conveyed the appearance of youth, health, and an extended period of fertility (Symons, 1979).

The Korthase and Trenholme (1982) results dovetailed with the investigations of child attractiveness; younger features were more attractive than older ones. Yet there is reason to believe that some mature features may be related to perceived attractiveness. In comparison with an infant, an adult's face has a relatively small forehead and eyes, and a large nose, cheekbones, jaw, and chin (Enlow, 1982). Guthrie (1976) and Keating, Mazur, and Segall (1981) suggested that maturity features may convey an image of status, power, and dominance. Responsivity to a few mature features such as high cheekbones or cheeks which have

lost some of their baby fat may have evolved to discourage pedophilia and insure that advances were made only to postpubescent females.

The architecture of the face which is involved in the expression of positive emotion may also contribute to attractiveness ratings. A smile indicates joy, friendliness (Kraut & Johnston, 1979), and sometimes submissive appeasement. Because individuals who were smiling received more positive attractiveness ratings than nonsmiling targets (Mueser, Grau, Sussman, & Rosen, 1984), individuals who have particularly large smiles may receive even higher attractiveness ratings. Because raised eyebrows often signal interest, greeting, and submission (Eibl-Eibesfeldt, 1970; Nakdimen, 1984), individuals whose eyebrows are set high on their foreheads may convey the image of a positive attitude and receive more positive ratings than their low-browed peers. Finally, dilated pupils have been found to elicit increased attractiveness ratings (Hess, 1965).

The present quasi-experiments were designed to investigate the specific features in adult human female faces which stimulate positive attractiveness ratings by adult males. Three categories of variables were used:

1. Neonate features: Congruent with the research on child cuteness, it was predicted that more attractive women would have larger foreheads, larger eyes, wider set eyes, smaller nose, smaller chin, and larger lips. Eye size was expected to be particularly powerful because it has been found to influence recognition memory for faces (McKelvie, 1976).

2. Mature features: The use of a separate category of mature features may seem arbitrary, because the maturity of a feature may be inversely rated to its apparent neoteny. Yet because mature features may serve a distinct functional role in the perception of attractiveness, a separate category was used. Based on ethological observations (Guthrie, 1976; Keating, Mazur, & Segall, 1981), it was expected that higher, wider cheekbones, and narrower cheeks would be related to greater perceived attractiveness.

3. Expressive features: It was predicted that individuals whose features were particularly effective at signaling positive emotions, with larger smiles, higher eyebrows, and larger pupils, would be seen as more attractive.

To provide wide variation in facial feature configurations, and to provide possible insights into cross-cultural standards of attractiveness, the pool of stimuli included faces from 28 countries. Because age has an effect on attractiveness judgments, the target stimuli were restricted to college age females.

Quasi-Experiment 1

Method

Subjects Seventy-five undergraduate males, who happened to be Caucasian, volunteered to participate in this study as part of a requirement of an introductory psychology course at a small Midwestern college.

Stimulus materials. Fifty black and white photographs were used as stimuli. Photographs were presented in a standard 4 × 5 cm size mounted on 8 × 12 cm cards. Twenty-three of the pictures portrayed graduating Caucasian seniors from a yearbook of a women's college. These photos were randomly selected except for the stipulations that the women be smiling and not wearing glasses. All faces appeared to be free of facial hair, disfigurement, or asymmetry. Twenty-seven photographs were taken from the yearbook section of a Miss Universe international beauty pageant program. The photographs portrayed individuals in normal clothing and

makeup, so that they did not look like beauty pageant contestants. The photographs of the contestants matched those of the college seniors in lighting, pose, clothing, and image size. Because the contestants had been selected for their beauty and talent in their country of origin, their features might provide a clue to cross-cultural standards of attractiveness. The international contestants were randomly selected except for the criterion that the women be smiling and no contest regalia be visible. In this group of portraits, 14 were Caucasian, 7 were Negro, and 6 were Oriental. During debriefing it was determined that none of the subjects suspected that some of the photographs portrayed beauty contestants. The distribution of mean attractiveness scores are presented in Table 1.

Table 1 demonstrates that the use of the international contestant photographs increased the number of highly attractive individuals in the stimulus pool, and provided a broader range of attractiveness scores and facial features than would have been evident if only the college seniors had been used.¹ It is likely that the attractiveness ratings of the college students were lowered by comparison with the highly attractive contestants (Kenrick & Gutierrez, 1980).

Procedure. Individual subjects were asked by a female experimenter to judge the photographs based on their estimates of the physical attractiveness of each female. Six numbered boxes were used for categories ranging from *extremely attractive* to *extremely unattractive*. No limit was placed on the number of photographs which could be placed in each box. So that the evaluation be based on objective aspects of attractiveness, participants were asked to try not to be influenced by racial or ethnic factors, or whether they would like to go out with the woman.

Concurrent with the collection of attractiveness ratings, precise measurements of the size of various facial features were made using a micrometer accurate to .05 mm. Because hundreds of measurements could be made on the complex topography of the face, measurement choices were based on the theoretical hypotheses noted earlier. The female experimenter, who was blind to the hypotheses, and the author made independent sets of physiognomic measurements, which correlated .863. Differences greater than 1.00 mm were resolved by a second measurement by the author, otherwise the female experimenter's measurements were used.

To control for minor variations in facial image size, the predictor measurements were standardized as ratios to the indicated horizontal or vertical axis. Thus, what is later referred to as height of eyes, for example, represents the ratio of the eye height to the overall length of the face (see Figure 1).

Results

The mean physical attractiveness rating for each target female was calculated by averaging across the evaluations provided by the male subjects. Correlations between the size of the various facial features and the physical attractiveness ratings are presented in Table 2.

A number of neonate feature measurements were associated with attractiveness ratings. Higher and wider eyes, greater distance between eyes, a smaller chin, and a smaller overall nose size were correlated with more positive ratings. The width of the nose at tip and the length of the nose were unrelated to attractiveness. Forehead height was also unrelated to attractiveness. The width of the nose at the nostrils was positively associated with attractiveness ratings. This was attributable to the correlation of nose width with smile width ($r[48] = .46, p < .01$). The muscles that stretched the mouth into a broad smile apparently also expanded the width of the nostrils. When the effect of smile width was partialled out, the association between width of nose at nostrils and attractiveness diminished to insignificance ($\beta = .11, t = .77, ns$).

Table 1
Percentages of Female Targets at Each Mean Level of Attractiveness

Attractiveness rating	Complete sample (<i>n</i> = 50)	Beauty pageant (<i>n</i> = 27)	College seniors (<i>n</i> = 23)
5.50—6.00: most attractive	2.0	3.7	0.0
5.00—5.49	8.0	14.8	0.0
4.50—4.99	18.0	29.6	4.3
4.00—4.49	16.0	29.6	0.0
3.50—3.99	18.0	11.1	26.1
3.00—3.49	10.0	3.7	17.4
2.50—2.99	20.0	3.7	39.1
2.00—2.49	6.0	0.0	13.0
1.00—1.99: least attractive	2.0	3.7	0.0

The maturity features of prominent cheekbones and narrower cheeks were positively linked to attractiveness, whereas midface length was unrelated to attractiveness. The expressive features of higher eyebrows, larger smile, and dilated pupils were also positively linked to attractiveness ratings. Dilated pupils were correlated with attractiveness even when the effects of iris size were controlled.

To exclude the possibility that the observed feature-attractiveness relations were due to some unique factors associated with the beauty contestants, the correlations between facial measurements and attractiveness were calculated separately for the college senior photographs. Because of the reduced range and diminished statistical power, fewer correlations were significant, but eye height, eye width, distance between the eyes, cheekbone width, cheek width, and eyebrow height were significantly associated with male attractiveness judgments. The few differences, such as with lower lip thickness and pupil width may be attributed to sample fluctuation.

Several additional analyses were conducted to further examine the relation between feature size and beauty. Correlations of the direct measurements of feature size, uncorrected by the size of the head, were found to bear roughly the same relation to attraction as the corrected measurements. Lip size was found to be uncorrelated with attractiveness when only Caucasian target females were analyzed (upper lip, $r[35] = -.16, ns$; lower lip, $r[35] = .08, ns$). Darkness of hair color ($r = .18, ns$) and darkness of skin color ($r = .005, ns$), were unrelated to attractiveness. Tests for curvilinear relations between feature measurements and attractiveness ratings were considered. Although it was likely that exophthalmic eyes or a minuscule chin would have been unattractive, such extreme features were absent in the collection of target photos.²

A multiple regression analysis was conducted using the significant facial feature measurements, except for the redundant standardized pupil width, to predict attractiveness ratings for all

¹ Tables of the distribution of selected facial feature measurements are available from the author.

² Analyses of symmetry in the vertical and horizontal proportioning of the face were conducted, using parameters suggested by Luckier (1981). Nothing substantial was found, but the results are available from the author.

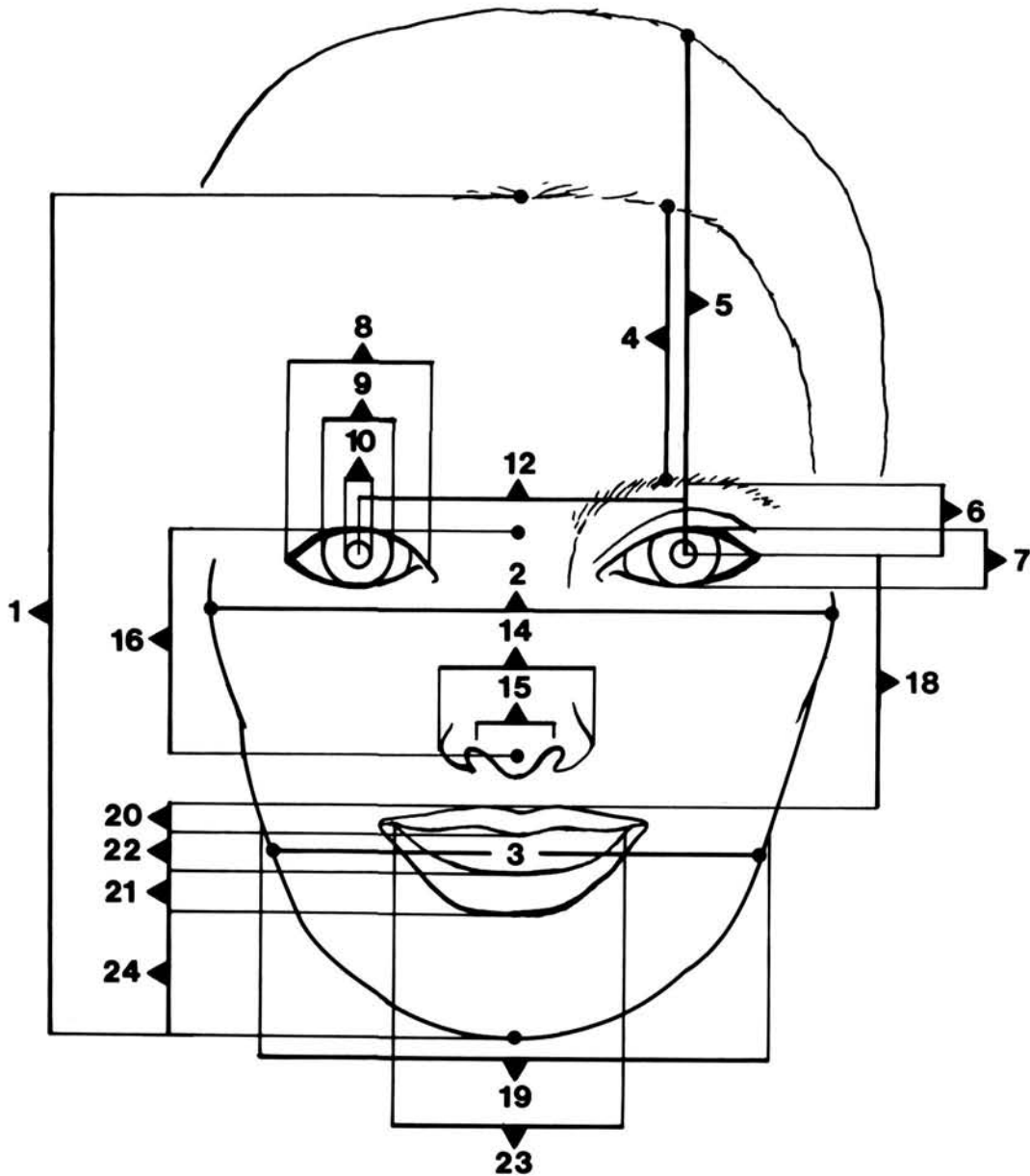


Figure 1. 1 = Length of face, distance from hairline to base of chin; 2 = Width of face at cheekbones, distance between outer edges of cheekbones at most prominent point; 3 = Width of face at mouth, distance between outer edges of cheeks at the level of the middle of the smile; 4 = Height of forehead, distance from eyebrow to hairline—length of face; 5 = Height of upper head, measured from pupil center to top of head estimated without hair—length of face; 6 = Height of eyebrows, measured from pupil center to lower edge of eyebrow—ratio to length of face; 7 = Height of eyes, distance from upper to lower edge of visible eye within eyelids at pupil center—length of face; 8 = Width of eyes, inner corner to outer corner of eye—width of face at cheekbones; 9 = Width of iris, measured diameter—width of face at cheekbones; 10 = Width of pupil, measured diameter—width of face at cheekbones; 11 = Standardized width of pupil, calculated as a ratio of the width of the pupil to the width of the iris—width of face at cheekbones (not shown). 12 = Separation of eyes, distance between pupil centers—width of face at cheekbones; 13 = Cheekbone width, an assessment of relative cheekbone prominence calculated as difference between the width of the face at the cheekbones, and the width of the face at the mouth—length of the face (not shown). 14 = Nostril width, width of nose at outer edges of nostrils at widest point—width of face at mouth; 15 = Nose tip width, width of protrusion at tip of nose, usually associated with crease from nostril—width of face at mouth; 16 = Length of nose, measured from forehead bridge at level of upper edge of visible eye to nose tip—length of face; 17 = Nose area, calculated as the product of the length of nose and width of nose at the tip—length of the face (not shown). 18 = Midface length, distance from pupil center to upper edge of upper lip, calculated by subtracting from the length of face the height of forehead, height of eyebrows, width of upper lip, height

Table 2
Correlations of Feature Measurement Ratios With Mean Attractiveness Ratings

Feature	Complete sample (n = 50)	College seniors (n = 23)
Neonate features		
Forehead height, eyebrow to hairline	-.09	.08
Upperhead height, pupil to top of head	.16	.01
Eye height	.50*	.42*
Eye width	.41*	.48*
Iris width	.17	.02
Separation of eyes	.29*	.47*
Nose tip width	-.05	-.23
Nostril width	.33*	.32
Nose length	-.02	-.28
Nose area	-.34*	-.31
Upper lip thickness	-.06	-.14
Lower lip thickness	.11	-.19
Chin length	-.38*	-.24
Mature features		
Cheekbone width	.58*	.50*
Cheek width	-.47*	-.55*
Mid-face length	.06	.11
Expressive features		
Eyebrow height	.46*	.37*
Pupil width	.42*	-.24
Standardized pupil width	.30*	-.24
Smile height	.23	.14
Smile width	.53*	.19

* $p < .05$.

targets. The resulting prediction equation was highly significant ($R = .77$, $F[12, 37] = 4.37$, $p < .0001$). Separate regressions equation using only the group of neonate ($R = .63$), only mature ($R = .61$), and only expressive features ($R = .63$) were also highly significant. Because the predictors were not independent, partial correlations were conducted. It was determined that the groups of neonate ($R = .34$), mature ($R = .25$), and expressive ($R = .23$) features each were significantly associated with attractiveness independently of the effects of the other two groups of predictors. The optimal multiple regression analysis used the neonate features of eye height ($\beta = .24$, $t = 2.03$, $p < .05$), and nose area ($\beta = .28$, $t = 2.48$, $p < .02$), the mature feature of narrow cheek width ($\beta = .35$, $t = 2.96$, $p < .005$), and the expressive feature of smile width ($\beta = .28$, $t = 2.44$, $p < .02$); it was found to be as effective ($R = .73$, $F[4, 45] = 12.46$, $p < .0001$) as the full set and accounted for 52.5% of the variance in mean attractiveness ratings.

The nonwhite beauty pageant contestants received further attention to determine the attractiveness standards used in other cultures to govern representatives to international beauty competition. In comparison with the American college seniors, the

Black and Oriental beauty contestants had significantly greater eye height ($F[1, 34] = 18.43$, $p < .0001$), eye width ($F[1, 34] = 18.76$, $p < .0001$) and distances between their eyes ($F[1, 34] = 15.40$, $p < .0001$), wider nostrils ($F[1, 34] = 21.91$, $p < .0001$), marginally longer noses ($F[1, 34] = 2.96$, $p = .09$), larger upper lips ($F[1, 34] = 13.40$, $p < .0001$), larger lower lips ($F[1, 34] = 9.25$, $p < .005$), smaller chins ($F[1, 34] = 10.13$, $p < .003$), somewhat wider cheekbones ($F[1, 34] = 3.76$, $p = .06$), somewhat narrower cheeks ($F[1, 34] = 3.78$, $p = .06$), higher eyebrows ($F[1, 34] = 28.94$, $p < .0001$), and wider smile ($F[1, 34] = 6.67$, $p < .01$). There were no differences between the Black and Oriental pageant contestants, compared with the American college seniors in nose tip width ($F[1, 34] = .69$, *ns*), nose area ($F[1, 34] = .11$, *ns*), height of smile ($F[1, 34] = 1.64$, *ns*), and pupil width ($F[1, 34] = 2.00$, *ns*). Thus, the Black and Oriental beauty contestants possessed ethnically distinct features, but also displayed most of the facial features associated with attractiveness in Caucasians.

Discussion

Quasi-Experiment 1 demonstrated that males were attracted to females possessing the neonate features of large eyes, small nose area, small chin, and widely spaced eyes. The males were also attracted to females with the mature features of wide cheekbones and narrow cheeks, and the expressive features of highly set eyebrows, wide pupils, and a large smile. Beautiful features seemed to be those which deviate in specific ways from what is typical in the population (cf. Galton, 1907; Light et al., 1981). Such features are the focus of cosmetic, orthodontic (Korabik, 1981), and rhinoplastic alteration (Cash & Horton, 1983), further attesting to their importance.

Forehead size was uncorrelated with attractiveness ratings. This may have been due to measurement error caused by hairstyle covering the forehead. Both forehead and nose shape may prove more influential with profile portraits. Lip size was also unrelated to attractiveness, perhaps because lip size differences were minimized by the smiling pose. Nostril width was positively associated with attractiveness, but this was found to be attributable to the effect of smiling. Hair and skin color were unrelated to attractiveness ratings, but the use of black and white photographs may have minimized differences due to pigmentation.

Black and Oriental beauty pageant contestants were found to possess most of the patterns of neonate, mature, and expressive features associated with attractiveness in Caucasians. Although contestants were chosen by their native countries, the Miss Universe contest panel of judges were multinational, and the pageant was held in Japan, perhaps those facial features found to be attractive in this investigation were universally attractive. Alternatively, because the Miss Universe pageant derived substantial revenues from sales of television time, chiefly in Western nations, it was possible that the Black and Oriental contestants were cho-

of smile, width of lower lip, and length of chin—length of face; 19 = Width of cheeks, calculated as an assessment of facial roundness based on the measured width of face at mouth—length of face; 20 = Thickness of upper lip, measured vertically at center—length of face; 21 = Thickness of lower lip, measured vertically at center—length of face; 22 = Height of smile, vertical distance between lips at center of smile—length of face; 23 = Width of smile, distance between mouth inner corners—width of face at mouth; 24 = Length of chin, distance from lower edge of lower lip to base of chin—length of face.

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sen as their nation's representatives only because they approximated Western standards of beauty rather than those of their native lands.

The present data cannot exclude the possibility that the use of Western standards governed the choice of beauty pageant contestants in non-Western nations. Perhaps there is a culture in which small eyes, a large nose, narrow cheekbones, wide cheeks, a long chin, low eyebrows, and a small smile represents the epitome of beauty. Ultimately, the issue of cross-cultural universality can be settled only by obtaining the attractiveness ratings of non-Western individuals judging photographs which vary along the dimensions discussed here. Studies using very young subjects may also provide insight into noncultural factors in attractiveness judgments (Brooks & Lewis, 1976).

Quasi-Experiment 2

Although the previous investigation demonstrated that feature size influenced attractiveness ratings, it left open the issue of whether facial features influenced other judgments about the targets. Previous research suggested that a consistent yet ambivalent pattern of personality attributions were made for physically attractive individuals (Bar-Tal & Saxe, 1976; Hatfield & Sprecher, 1986). Good looking people were seen as being more sociable, outgoing, interesting, poised, and sexually responsive than their plainer peers, but not better parents (Dion, Berscheid, & Walster, 1972). Subsequent research indicated that attractive women were perceived to be more vain, materialistic, and more likely to have an extramarital affair than other women (Cash & Duncan, 1984; Dermer & Theil, 1975).

If facial feature form influences attractiveness ratings, it is reasonable to anticipate a linkage between the facial feature measurements and personality judgments. Categories of facial features could be linked directly to categories of personal characteristics. Neonate features may influence judgments about personality traits suggesting childlike qualities such as vanity and perhaps sociability. Maturity features could influence judgments of traits indicating greater sophistication, such as assertiveness and fertility. Expressive features could suggest personal qualities laden with vitality, such as brightness and health. Alternately, the discrete neonate, maturity, and expressive features could contribute to an overall impression of attractiveness. The global gestalt of attractiveness could then influence personality attributions, with little predictability of personal qualities from the category of the facial feature.

A second quasi-experiment was designed to examine these issues and the relation between physical features and the stimulation of a range of self-sacrificial, monetary, and risky altruistic behaviors. Physically attractive women have been found to receive more help in a number of circumstances (Benson, Karabenick, & Lerner, 1976; West & Brown, 1975), although the helping requests were low in cost to the helper, such as giving directions or a nominal amount of money. Infant features have also been found to elicit prosocial responses (Malamuth, Shayne, & Pogue, 1982; Alley, 1983), while their absence may contribute to abuse (McCabe, 1984). Quasi-Experiment 2 therefore investigated whether specific facial features contribute to selections for high cost forms of helping.

A final concern of this study was the relation between facial features and mating success. The relation between physical at-

tractiveness and dating popularity has been well established, but the association with other life outcomes is less clear (Berscheid, Walster, & Campbell, 1972; Hatfield & Sprecher, 1986; Murstein & Christy, 1976). Elder (1969), however, reported that socioeconomically upwardly mobile women were higher in physical attractiveness than nonmobile women. Similarly, Udry and Eckland (1984) found that the more attractive women were in high school, the greater their likelihood of marriage, the younger their age of marriage, and the higher their household income 15 years later. Although the present study will not focus on all of the foregoing measures of success, it will endeavor to determine the relation between female facial features and some measures of fitness, notably the males' selection of the female with whom they would most prefer to date, mate, or procreate.

Method

Subjects. Eighty-two Caucasian male undergraduates volunteered to serve as participants to fulfill a requirement of a small Midwestern college general psychology course.

Procedure. Sixteen photographs were chosen from the set used in the preceding investigation. Based on the previous ratings, four were selected as being high in physical attractiveness, four as medium high, four as medium low, and four as low in perceived attractiveness. Six of the targets were from the set of Caucasian college seniors, whereas the beauty contestants were represented by five Caucasians, three Blacks, and two Orientals. Mean attractiveness ratings for Caucasian (4.10) and non-Caucasian targets (4.34) were reasonably equivalent.

Subjects were asked to separately evaluate nine personal characteristics of the target in each of the photographs. They recorded on 6-point scales their judgments using the anchors *very bright-very dull*, *very sociable-very unsociable*, *very assertive-very submissive*, *very modest-very vain*, *have very few medical problems-have many medical problems*, *very sterile-very fertile*.

Subjects also indicated which one of the 16 photographed women they would be most willing to choose for each of 13 actions. These actions included three involving altruistic self-sacrifice; helping to load furniture for a move across town, donating a pint of blood, and donating a kidney. Three events involved physical risks: swimming to rescue one half mile from shore, saving from the second story of a burning building, and jumping on a terrorist hand grenade. Three activities were concerned with monetary investment: loaning \$500 for car repairs, giving a birthday present worth \$100, and cosigning a loan of \$10,000 to start a business. The three selections within each category were summed to provide indices of self-sacrificial, physical risk-taking, and monetary helping. Subjects were further asked to indicate which target they would hire for a job and select for three actions relating to courtship and reproduction: prefer to ask for a dinner date, prefer for sexual intercourse, prefer for raising children. No limit was placed on the number of times that the same target could be chosen. The self-sacrifice, physical risk, and items pertaining to money were used in an earlier investigation and were found to be closely correlated with degree of genetic relatedness and friendship with the beneficiary (Cunningham, 1983). The order of asking questions concerning personal characteristics and about helping was counterbalanced across subjects.

Results

The mean judgment for each of the personal characteristic dimensions was calculated across the male subjects for each of the 16 target portraits. The judgments of attractiveness proved to be highly stable across the two samples of male evaluators. The mean attractiveness ratings of the 16 portraits used in this

Table 3
Correlations Between Feature Measurement Ratios and Personality and Reproductive Attributions

Personal characteristic attributions	Bright	Sociable	Assertive	Modest	Few medical problems	Fertile	Not have affairs	Attractive
Alpha	.65	.71	.79	.42	.84	.85	.79	.74
Neonate features								
Eye height	.48*	.64*	.52*	-.52*	.58*	.44*	-.66*	.62*
Eye width	.36	.53*	.26	-.30	.44*	.57*	-.59*	.54*
Eye separation	.13	.20	-.01	.10	.12	.35	-.14	.09
Nose area	-.64*	-.59*	-.67*	.43*	-.58*	.34	.20	-.54*
Chin length	-.35	-.44*	-.27	.44*	-.60*	-.48*	.62*	-.53*
Mature features								
Cheekbone width	.44*	.48*	.30	-.48*	.42*	.57*	-.52*	.52*
Cheek width	-.26	-.27	-.18	-.18	-.34	-.42*	.44*	-.33
Expressive features								
Eyebrow height	.24	.45*	.33	-.47*	.50*	.51*	-.66*	.40
Pupil width	.38	.43*	.11	-.01	.39*	.71*	-.34	.49*
Smile height	.17	.19	.17	-.16	.24	.33	-.20	.28
Smile width	.56*	.64*	.43*	.39	.58*	.73*	-.46*	.60*
4 Predictor regression	.85*	.88*	.82*	.63	.87*	.83*	.79*	.86*
Rated Attract.	.90*	.93*	.81*	-.69*	.93*	.85*	-.81*	

Note. Attract. = attractiveness; $n = 16$. * $p < .05$.

study correlated with the ratings obtained in Quasi-Experiment 1 ($r[14] = .94, p < .001$), even though subjects in the second study received no instructions against ethnic or racial prejudices. Cronbach alpha coefficients for the personal characteristic dimensions (presented in Table 3) indicated that these variables also possessed strong reliability, except for modesty. The facial feature measurements for the 16 portraits were correlated with the personal characteristics ratings and these resulted are presented in Table 3.

Replicating the results of the first study, eye height and width, cheekbone width, and smile width were positively correlated with attractiveness ratings, whereas nose area and chin length were negatively correlated. All other correlations, except eye separation, were in the same direction and were of the same magnitude as those in the first study, although they fell short of statistical significance due to the limited degrees of freedom.

Facial feature measures predicted both flattering and socially undesirable personal characteristic judgments, suggesting that a halo effect did not produce the results. Females with greater eye height, smaller nose area, greater cheekbone width and a wider smile were seen as brighter than their counterparts. The females with greater eye height and width, smaller nose area, wider cheekbones, higher eyebrows, wider pupils, and wider smiles were perceived to be more sociable. Those with the foregoing qualities except wide pupils were also seen as likely to have few medical problems. Females with greater eye height, smaller nose area, and wider smiles were seen as more assertive, whereas those with smaller eye height, larger nose width, greater chin length, narrower cheekbones, and lower eyebrows were seen as more modest. Those with large eye height and width, shorter chins, wider cheekbones, narrower cheeks, higher eyebrows, wider pupils, and wider smiles were seen as more likely to be fertile and have many children, but also more likely to have an extramarital affair.

Despite their association with the participants' attractiveness ratings, some feature measurements were not correlated with some attributions. These results could have been caused by the stringent critical value or the range restriction in some features imposed by the use of only 16 photographs. Global attractiveness ratings seemed to be slightly stronger predictors of attributions than any single feature measurement, but that may indicate that attractiveness was based on more than a single feature, and could have been due to the fact that both attractiveness ratings and attributions shared the same methodology. More to the point, multiple regression predictions of attributions by the combination of the four most successful predictors from the first study (eye height, smile width, nose area, and cheek width) produced significant relations with six of the seven criteria, with multiple correlations rivaling the associations of global attractiveness ratings with the attributions.

The facial measurements were not associated with personality judgments in a manner which followed strict theoretical lines. Mature features such as cheekbone prominence, for example, were not uniquely associated with mature qualities such as assertiveness. Yet because such relations could have been due to one category of features being associated with the other features composing an attractive face, multiple regression analyses were conducted to determine the independent contribution of the features to the prediction of personal characteristic attributions. The beta weights are reported after each feature, and each beta weight was statistically significant at $p < .05$. Sociability was best predicted by eye height (.52) and smile width (.51). Brightness was predicted by wide pupils (.44) and a small nose (-.68), whereas assertiveness was independently predicted only by a small nose (-.49). Modesty was linked with a long chin (.45) and a large nose (.44), whereas few medical problems were linked with a small chin (-.45), narrow cheeks (-.48), and a small nose

(-.77). Judged fertility was linked with a wide smile (.51) and wide pupils (.46). Low likelihood of having an extramarital affair was predicted best by small eyes (-.50).

The foregoing analysis controlled for the halo effect of the intercorrelation of facial features, but not for the possibility that the relation of features to traits may be mediated by perceived attractiveness. Additional regression analysis attempted to predict personal attributions while controlling for rated attractiveness. Significant betas are reported. Independent of attractiveness, few medical problems was associated with narrow cheek width (-.25), smaller chin length (-.26), and smaller nose area (-.42). Perceived fertility was associated with larger pupil width (.33) and a wider smile (.26) while controlling for attractiveness. Small nose area was marginally associated with perceived brightness (-.22, $t = 1.80$, $p < .09$) and assertiveness (-.32, $t = 2.00$, $p < .07$).

Questions concerning self-sacrifice, physical risk, monetary investment, hiring, and reproductive behavior required the subject to separately select a single target as the beneficiary of each behavior. Each target could have received from 0 to 105 selections for each category. Because such data were highly skewed, the scores were subjected to log transformations. The correlations between facial feature measurements and the log of the frequency of selections for altruistic, monetary, and reproductive behavior selections are presented in Table 4.

Males were significantly more likely to choose as a beneficiary for self-sacrificial actions a female with greater eye height and smaller nose area. The beneficiary of physically risky helping was likely to possess greater eye height and width and smaller nose area. Attractiveness was not a strong predictor of monetary investments, except that the most frequently chosen women tended to have a small nose area. Facial features were, however, a strong predictor of job hiring, in that women with greater eye height and width, greater eye separation, smaller chin, wider cheekbones, larger pupils, and a wider smile were selected. Males preferred to date females with greater eye height and width and a smaller nose area, and indicated a greater interest in sexual intercourse with females with greater eye height and width, and a smaller chin. Finally, the females selected for childrearing tended to possess greater eye height and width, smaller nose area, shorter chin length, and a wider smile. Four of the behavioral criterion were also significantly predicted by multiple regression equations based on the combination of eye height, nose area, cheek width, and smile width.

General Discussion

Quasi-Experiment 2 demonstrated that measurements of individual features could successfully predict the discriminative patterns of personality, health, and sexual attributions made about photographed individuals obtained in previous research. Those with more desirable neonate, mature, and expressive features were seen as being more bright, sociable, and assertive, with less likelihood of medical problems or sterility, but with more vanity and a greater likelihood of having an extramarital affair than their peers.

Quasi-Experiment 2 also demonstrated associations between feature measurements and selection of an individual for altruistic behavior and reproductive interest. Those with more attractive features, such as greater eye height, and smaller nose area, were

more likely to be chosen for self-sacrificial and physically risky actions, for a job, dating, sexual preferences, and childrearing, although not for monetary investments. Such results suggest that the possession of attractive facial features may be of survival value for adults.

Although global attractiveness ratings were strong predictors of personal quality attributions and behavioral selections, regression equations using eye height, nose area, cheek width, and smile width predicted subjects' personal quality attributions, if not their behavioral selections, about as well as did the global attractiveness ratings. Such results suggest that the whole may not be substantially greater than the sum of its parts.

These findings on female faces can be compared with those on male faces reported by Berry and McArthur (1985) after the present studies were completed. The focus of their investigation was the perception of a baby face rather than attractiveness, but the methodology was similar. Berry and McArthur (1985) made 11 facial measurements using projected slides of 20 black and white photographs of male Caucasians taken from a college yearbook. They asked subjects to rate the slides on five personality dimensions, attractiveness, whether the target possessed a baby face or a mature face, and other variables. Berry and McArthur reported that measurements of eye size, eye shape, chin width, and eyebrow height correlated with participants' ratings that the targets possessed baby faces. The correlations between facial measurements and attractiveness were not reported, but rated babyishness was correlated with perceived male attractiveness, which was congruent with the present correlations of neonate features with female attractiveness. Berry and McArthur did not report the correlations between feature measurements and personality ratings but multiple regression composites of eye size, chin width, perceived attractiveness, and perceived babyishness were found to predict ratings of warmth, kindness, naivete, honesty, and responsibility. Attractiveness in the Berry and McArthur study was inversely associated with perceived naivete, which was comparable with the present correlation of attractiveness with assertiveness. Their associations of facial measurements and attractiveness with rated warmth and kindness was similar to the present results on sociability. Berry and McArthur also found attractiveness to be associated with ratings of honesty and responsibility, but the present study found attractiveness to be associated with an increased expectation that the target would be likely to have an extramarital affair, which suggested dishonesty and irresponsibility. Such differences across studies could have been due to the use of different genders for the target photographs, the use of different physiognomic measures, different procedures with the subjects, or different personality trait terms. Further research would be warranted to clarify the relation between physiognomy, gender, and personality attributions.³

³ McArthur and Apatow (1983-1984) also presented a partial replication of some of the findings reported here. Using 18 line drawings rather than photographs, and more liberal degrees of freedom, those investigators found that larger eye size was associated with higher attractiveness, warmth, and intelligence ratings. Somewhat contrary to the present results of extramarital affairs, female faces drawn with large eyes were seen as more honest and less likely to cheat on an exam than others. Of course, cheating on a spouse and cheating on an exam involve different mixtures of opportunity and motive.

Table 4
Correlations Between Feature Measurement Ratios and Selections for Altruistic, Monetary, and Reproductive Behaviors

Feature	Self-sacrifice	Physical risk	Monetary investment	Hire for a job	Prefer to date	Prefer for sex	Prefer for raising children
Neonate features							
Eye height	.48*	.56*	.24	.46*	.58*	.64*	.49*
Eye width	.36	.43*	.37	.70*	.46*	.55*	.51*
Eye separation	-.08	.01	.09	.44*	.09	.14	.16
Nose area	-.72*	-.51*	-.44*	-.22	-.45*	-.35	-.43*
Chin length	.19	-.22	-.29	-.57*	-.37	-.44*	-.36
Mature features							
Cheekbone width	.36	.27	.18	.50*	.24	.20	.35
Check width	.08	-.10	-.10	-.48*	-.17	-.18	-.33
Expressive features							
Eyebrow height	.04	-.03	-.12	.52*	.21	.21	.18
Pupil width	.20	.33	.39	.56*	.34	.39	.38
Smile height	.19	-.01	-.03	-.01	.07	.20	.18
Smile width	.36	.18	.32	.61	.29	.25	.42*
4 Predictor regression	.82*	.68	.52	.77*	.67	.67	.70*
Rated attract.	.79*	.78*	.64*	.75*	.83*	.78*	.86*

Note. Attract. = attractiveness; $n = 16$. * $p < .05$.

The present study did not find exclusive relations between specific categories of facial features and specific types of personal characteristics. It is possible that the use of other exemplars of infantile, mature and expressive personal characteristics, such as innocent, sophisticated and emotional, may have produced more discrete associations. Perceived attractiveness may have mediated the relation between facial features and the attribution of some personal characteristics, but the multiple regression analyses indicated that was not the case with others. Those results indicated that the neonate features of a large smile and dilated pupils were the best predictors of perceived fertility independently of rated attractiveness, perhaps because a large smile suggested friendliness and receptivity and the dilated pupils conveyed sexual arousal. The perception that a female might have a few medical problems was influenced by narrow cheek width, small nose area, and short chin length independently of perceived attractiveness. These health perceptions could have been veridical, in that females with lean cheeks and without double chins could have followed a higher social class diet involving less fat and an effective exercise program, whereas females with small noses and perhaps high self-esteem might seek better health care. Healthiness is an attribute which may be cross-culturally attractive (Ford & Beach, 1951), perhaps as a biological marker for other adaptive characteristics, such as a superior constitution, longevity, or an extended period of fertility (Lott, 1979; Symons, 1979).

The fact that facial features predicted the perception of fertility and health independently of rated attractiveness adds some support to the hypothesis that rated attractiveness may be caused, in part, by the tendency of facial features to directly stimulate the impression of certain personal characteristics. For example, the neonate features of large eyes and the expressive feature of a large smile were associated with the judgment of sociability. A wide-eyed, open and happy look may have lead to the belief that the target was innocent and friendly and that perception of guile-

less sociability may have lead to the rating of attractiveness. Yet, because large eyes and smile were correlated with attractiveness ratings, it is equally possible that judges used their knowledge that attractive targets tend to be more sociable than other people (Goldman & Lewis, 1977; Reis et al., 1982), without the facial features directly stimulating the perception of sociability.

Facial features may stimulate the perception of other variables which may mediate the relation of features with attractiveness. The extreme neonate and expressive features noted in the more attractive faces tend to be sexually dimorphic and more evident in female than male faces (Enlow, 1982; Nakdimen, 1984). Females possessing more sexually dimorphic features might be seen as possessing more sex role stereotyped personalities (Deaux & Lewis, 1985). Although attractive females have been rated more extremely on feminine attributes (Nida & Williams, 1977), they have also been seen as possessing non-sex-typed positive qualities (Gillen, 1981). In the present results, attractive neonate, and expressive features were related to the masculine attribute of assertiveness, suggesting that the perception of femininity alone may not determine judgments of attractiveness.

Maturity features, which might be considered masculine, were present in the most attractive female faces. Although neonate features predominate, and may elicit caretaking and affection, the maturity features could suggest status and encourage respect rather than condescension. Attractive females have been rated as higher in leadership and dominance characteristics (Weisfeld, Block, & Ivers, 1984). The combination of mature with neonate features may signal that the female is at an optimal age for mating. Yet because nubility could be conveyed by the neonate feature of round cheeks in combination with the mature feature of small eyes and a large nose, the perception of young adulthood status may not be the only factor in determining facial aesthetics. An experiment which held attractive neonate features constant while altering maturity features such as cheekbone prominence and

chin size could determine if such variations affected the perception of dominance, femininity, sexual maturity, or other attributes.

The consistent relations obtained in these studies between attractiveness and neonate, mature, and expressive features demonstrated that beauty is not an inexplicable quality which lies only in the eye of the beholder. Yet such results do not preclude some variability in judgments of attractiveness. Females may use slightly different standards than males (Morse, Gruzen, & Reis, 1976). The context, including the relative attractiveness of other targets, influences judgments (Geiselman, Haight, & Kimata, 1984; Kenrick & Gutierrez, 1980). The perceiver's attentional focus and the importance attached to specific features may also affect judgments, particularly of targets of medium attractiveness (Hirschberg, Jones, & Haggerty, 1978). Individual males also may differ in whether they fantasize about sultry, dark, relatively mature appearing women or cute, bouncy, blond, and blue-eyed child-women. Although both fantasies may include large eyes and a small nose, there may be differences in preferences for some features such as nose length, cheek width, and coloration. Experiments linking perceivers' personalities with their hair, eye color, neonate, and maturity feature preferences would be warranted.

Historical and cross-cultural data may provide further insight into consistency and variability in the facial features associated with attractiveness. Cultures differ in the degree to which status and respect is accorded to women. In subsistence economics, or cultures in which women produced goods of high market value, female status tended to be relatively high (Rosenblatt & Cunningham, 1976). Perhaps those social groups which accorded greater power and autonomy to females also idealized women with more pronounced maturity features, whereas those cultures which emphasized submissive females also may have preferred few maturity cues, and instead desired rounded cheeks, minimal cheekbone prominence, and a small mouth (cf. Banner, 1983).

The suggestion of a degree of individual, historical, and cross-cultural variability in some physiognomic preferences does not preclude the possibility of universal human responses to other neonate, maturity, and expressive features. Yet the suggestion of a set of ideal female features should not be mistaken to be an endorsement of the legitimacy of discrimination based on physical appearance, or an assertion that facial features are the only factors that determine attraction. Further fine-grained research on both female and male facial attractiveness may provide insight into individual, social, and biological determinants of facial perception.

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