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The faces of desirable mates and dates contain mixed social status cues

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Abstract

Digitized images of adult faces were manipulated to test the effects of facial status cues on social perceptions and the desire to form relationships. Large, immature-looking eyes and mouths signaled submissiveness, whereas small, mature-looking eyes and mouths signaled dominance. As predicted, dominance cues made faces look less warm and submissiveness cues made faces look less powerful, relative to unchanged faces. Although feature manipulations successfully reduced the warmth and power of faces, they did not amplify them. Moreover, changed faces were judged as having less potential than unchanged faces as dates and mates, even when perceptions of normalcy, masculinity/femininity, and health were controlled. Further analyses suggested that normal faces optimize status cues thereby conveying a charismatic mix of warmth and power.

Researchers studying facial attractiveness have used computer software to round, age, and blend facial images in an attempt to capture the essence of facial beauty. Nevertheless, the essential quality that makes some faces appealing—and others not—remains elusive. Contenders include symmetry, averageness, youthfulness, and sex-typicality, but existing evidence both supports and refutes each explanation (see Rhodes & Zebrowitz, 2002).

We investigated how facial status cues—the physiognomic expression of dominance and submissiveness—influenced heterosexual attractiveness. Our data comprised perceivers' impressions of digitized and altered facial images. A similar approach has been used by researchers to study the effects of averaged or prototypical features on facial attractiveness (e.g., Langlois & Roggman, 1990; Langlois, Roggman, & Musselman, 1994; Rhodes, Sumich, & Byatt, 1999). Whereas these researchers made "normal" faces appear more average by mathematically averaging many faces, we made "normal" faces look more extreme along status-related dimensions. Our aim was to alter the appeal of faces by amplifying the social status messages they conveyed.

Our facial feature manipulations were guided by universal patterns of human morphological development that evolved to signal social status. Feature sizes and shapes shift with development (e.g., Berry & McArthur, 1986; Gray, 1948; Mark, Shaw, & Pittenger, 1988). For example, the pudgy lips of infancy thin and the big eyes of babyhood appear smaller with maturity (Gray, 1948; Guthrie, 1970; Johnston & Franklin, 1993). Immature traits, such as pudgy lips and big eyes, signal the subordinate status of youth, whereas mature traits, such as thin lips and small eyes, signal the dominant status of adulthood (Guthrie, 1970; Lorenz, 1943). Adult faces exploit this signaling system by varying the degree to which they exhibit dominant-looking, mature features and mimic submissive-looking, immature ones (Guthrie, 1970; Keating, 1985b, 2002). We capitalized on this idea in the laboratory by transforming the sizes of eyes and lips on digitized images of adult faces. Feature maturity was enhanced by reducing the sizes of eyes and lips. Feature immaturity was enhanced by enlarging eyes and lips. Depending on gender, these manipulations were expected to sometimes improve and sometimes diminish the potential of adults who displayed them as dates, mates, and friends.

Social trait ratings for manipulated faces were expected to corroborate findings from studies of non-manipulated faces (e.g., Berry & Landry, 1997;

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Cunningham, 1986; Cunningham, Barbee, & Pike, 1990; Mueller & Mazur, 1997; Zebrowitz & Montepare, 1992). These studies have shown that adults with immature faces are attributed childlike characteristics related to powerlessness (e.g., submissive, weak, and dependent) and interpersonal receptivity or warmth (e.g., affectionate and honest). Adults with unusually mature-looking faces engender impressions related to power and threat (e.g., dominant, strong, independent, and dishonest). Thus, the facial features we manipulated to appear more or less mature were expected to evoke status-related messages. By exaggerating immaturity, ratings related to submissiveness and warmth (i.e., affectionate, caring, good parent, honest, and faithful) were predicted to increase, whereas ratings related to dominance and power (i.e., dominant, strong, and independent) were expected to decrease. Exaggerated facial maturity, in contrast, was predicted to increase the ratings of power and decrease the ratings of warmth. Warmth and power ratings were expected to change in these ways, regardless of the gender of a face.

When perceivers judged faces for physical attractiveness, sex appeal, and relationship potential, however, the effect of facial status cue was expected to be moderated by gender. Gender differences relate partly to differences in mate selection strategies. As Buss and Schmitt (1993) have argued, males primarily value the reproductive potential in mates, whereas females value mates with the ability to sequester and maintain resources. By signaling a long reproductive future, the display of immature traits by females should be especially attractive to males (Jones, 1995). Female mimicry of immature facial traits may also benefit females directly by signaling submissiveness and eliciting attachment and caregiving, just as these traits do for children (Guthrie, 1970; Keating, 2002; Perusse, 1995). Males should benefit by appearing mature and dominant, both in the eyes of females and in terms of discouraging competitors and rivals (Keating, 2002; Mueller & Mazur, 1997). Therefore immature features were expected to make females more attractive, sexier, and more desirable as dates, mates, or friends compared to unchanged and mature features of the same faces. Immature features were expected to make males less appealing in these ways. In contrast, mature features were expected to improve male attractiveness, sexiness, and desirability as dates, mates, and friends relative to unchanged or immature features, but make females less appealing in these ways.

Can status cues explain what makes male and female faces attractive better than other explanations of facial attractiveness? Some alternative explanations also invoke facial aspects related to status. For example, Jones (1995) reported that attractive female faces in many cultures convey youthfulness, a cue we argue signals submissiveness. Some researchers have suggested that the masculinity and femininity of facial features influence attractiveness (Johnson, Hagel, Franklin, Fink, & Grammar, 2001; Penton-Voak & Perrett, 2000; Perrett et al., 1998; Rhodes, Hickford, & Jeffery, 2000). Because sex is associated with status, these cues could also be construed as signaling dominance and non-dominance, respectively. Others have proposed that desirable mates and dates look healthy, rich, or smart (Buss, 1987; Gangestad & Buss, 1993; Thornhill & Gangestad, 1993), but these traits also relate to status. Thus, we put each alternative explanation to the test by analyzing perceivers' choices of mates, dates, and friends, while statistically controlling for ratings of masculinity/femininity, age, health, wealth, and intelligence.

Cunningham and his colleagues have suggested that attractive faces convey mixed messages of power/maturity and warmth/immaturity rather than strong forms of either message (Cunningham, 1986; Cunningham et al., 1990, 1995). If so, then feature manipulations that exaggerate one status message at the expense of the other may make faces less, not more, appealing. We used perceptions of power and warmth, separately and combined, to test whether exaggerated or balanced messages best predicted attractiveness.

Our specific hypotheses follow:

1. Immature-looking features were predicted to increase female desirability and decrease male desirability as a date, mate, and friend.
2. Mature-looking features were predicted to increase male desirability and decrease female desirability as a date, mate, and friend.
3. Immature-looking features were predicted to increase female and decrease male attractiveness and sexiness.
4. Mature-looking features were predicted to increase male and decrease female attractiveness and sexiness.
5. Immature-looking features were predicted to make faces look warm, whereas diminished features were predicted to make faces look powerful.

Method

Participants

Forty-eight undergraduates made social judgments about faces. Half were men and all were Caucasians. An independent set of 15 male and 21 female undergraduate raters assessed the structure and age of the faces as a manipulation check. Another 46 undergraduates (19 male and 27 female) rated how normal the faces looked. All of these participants were enrolled in introductory psychology at the same liberal arts college and received credit for the experience. Twelve male and 12 female volunteers (all Caucasians) from two other colleges posed for photographs.

Fig. 1. Exemplary stimulus faces. Faces on the left appear with enlarged eyes and lips. Faces on the right appear with shrunken eyes and lips. Unchanged faces appear in the middle.

Materials

Portrait photographs of the 24 volunteers were scanned into a Power Macintosh computer. No attempt was made to capture particular types of faces. Manipulations were guided by a preliminary study and previously published research (Keating, Randall, & Kendrick, 1999).[1] For each digitized facial image, a big-eyed, full-lipped immature version was created by inflating the sizes of eyes and lips by 15%. A second manipulation produced a small-eyed, thin-lipped mature version of each face by shrinking the sizes of eyes and lips by 15%. A third version was left unaltered. Fig. 1 depicts exemplary faces.

The 36 raters who performed the manipulation checks judged faces for maturity (babyish facial structure/mature facial structure) and age (in years). The 46 raters who assessed how normal faces looked used seven-point, bipolar scales, ranging from 1 "extremely normal-looking" to 7 "extremely abnormal-looking."

Participants rated the likelihood that they would ever wish to *marry*, *date*, *and befriend* the people whose faces they saw. Ratings were made on seven-point scales ranging from 1 "definitely not a possibility" to 7 "definitely a possibility" with a midpoint of "not sure." In addition, they rated the *physical attractiveness* of faces using seven-point scales ranging from 1 "extremely unattractive" to 7 "extremely attractive" and from 1 "extremely unsexy" to 7 "extremely sexy." Participants used similar scales to assess social traits associated with *warmth* (uncaring/caring, unaffectionate/affectionate, dishonest/honest, unfaithful/faithful, likely to become a bad parent/likely to become a good parent) and *power* (submissive/dominant, weak/strong, dependent/independent). We explored other variables by collecting participants' judgments of how masculine/feminine, unhealthy/healthy, unintelligent/intelligent, and rich (unlikely to become rich/ likely to become rich) the faces appeared.

Procedure

The experiment was described as a study of the qualities that attract men and women to one another

[1] A preliminary study, in which 10 unfamiliar adult faces ranging in age from 20 to 45 were rated by 88 female and 61 male undergraduate perceivers, revealed that a 15% change in eye and lip sizes altered the maturity of faces and ratings made about faces, without disturbing the realism of faces. Keating et al. (1999) found that the 15% changes altered judgments of familiar faces in predictable ways without being consciously detected.

Table 1
Deviation and raw score mean ratings of facial maturity and age

	Feature Manipulation								
	Enlarged			Unchanged			Diminished		
	M	*SD*	Dev	M	*SD*	Dev	M	*SD*	Dev
Maturity	3.97	.77	−.45	4.53	.76	.11	4.76	.84	.33
Age	20.78	2.88	−.90	21.79	3.34	.11	22.48	3.90	.79

Note. Summary statistics were based on a total of 72 faces (three versions each of 12 male and 12 female faces). Deviation scores (Dev) of zero represent no difference from the average rating across all raters and faces for that rating scale (see text).

when they first meet. Because some qualities are conveyed by physical appearance, participants were asked to make judgments based only on facial appearances.

Participants were randomly assigned to view one of the three subsets of 12, other-sex faces. Each subset presented one version of a particular face (with either immature, mature, or unaltered features). This was done to prevent the carry-over effects that could occur if participants saw all three versions of the same stimulus face. Each subset included four immature, four mature, and four unchanged faces.

Task instructions, faces, and rating scales were presented by a computer. Judgments were recorded using a mouse to click on scaled responses. All 12 faces in a subset were displayed before subsequent scales appeared. The three relationship scales (marry, date, and friend) appeared first, in a different random order for each participant, before the trait scales appeared. Trait scales and faces appeared in different random orders for each participant. Participants were thanked and debriefed when done.

Results

Design and scoring

"Face" was used as the unit of analysis. The basic independent variables were Feature Manipulation (decreased, increased, and unchanged feature sizes) and Sex of Face. The dependent variables were the mean ratings for each scale. These means were based on the ratings of participants who saw one of the three face subsets. Raw score means reflected more than just the influence of feature manipulation. They also contained variability created by having different participants judge different subsets of faces and thus were not directly comparable to one another. Therefore raw scores were converted to deviation scores to "normalize" or center scores for each face and make trait ratings comparable across faces (Rossi & Anderson, 1982). For each trait scale, deviation scores reflected differences from the overall mean rating across all faces and raters. A deviation score of zero represented no difference from the mean rating of an attribute across all faces and raters.[2] Analyses were based on mean deviation scores because controlling for differences in the way individual participants used scales for the particular subsets of faces they saw provided a standard, "baseline" score (of zero) across all rater/face combinations. However, raw score means are included in the tables that follow as an indication of how participants used scales for the subsets of faces they judged.

Manipulation check

Using face as the unit of analysis, we first determined whether altering the sizes of eyes and mouths did produce immature and mature appearances. Mean scores were computed from the 36 raters who judged faces for structural maturity and age (see Table 1). Using deviation scores, separate 2 (Sex of Face) by 3 (Feature Manipulation) analyses of variance with repeated measures on the last two factors were computed for each dependent measure.

The results for maturity yielded only a significant main effect for Feature Manipulation, $F(2,44) = 29.84$, $p < .001$. Planned comparisons confirmed that enlarged features lowered facial maturity scores relative to diminished features, $F(1,23) = 30.80$, $p < .001$, or unchanged features, $F(1,23) = 23.52$, $p < .001$; and diminished features raised facial maturity scores relative to unchanged features, $F(1,23) = 30.43$, $p < .001$.

Results for the age scores were comparable to those for maturity scores. The overall test yielded only a significant main effect for Feature Manipulation, $F(2,44) = 9.84$, $p < .001$. Enlarged features made faces look younger compared to diminished features, $F(1, 23) = 15.15$, $p < .001$, or unchanged features, $F(1,23) = 13.42$, $p < .001$; and diminished features made faces look marginally older relative to unchanged features, $F(1,23) = 2.96$, $p < .09$.[3]

[2] Neither standard deviations nor significance tests were affected by subtraction of the mean (a constant).

[3] Participants were told that they were judging the ages of students from a different university, which may have constrained age estimates at the high end, because most graduate at age 22.

Table 2
Deviation and raw score mean ratings of relationship potential

	Feature Manipulation											
	Enlarged				Unchanged				Diminished			
	M	*SD*	Dev	Adj	M	*SD*	Dev	Adj	M	*SD*	Dev	Adj
Female faces												
Mate	2.22	.72	−.05	−.01	2.60	.77	.30	.33	2.02	.64	−.27	−.24
Date	2.15	.60	−.17	−.14	2.71	.87	.40	.44	2.08	.69	−.19	−.16
Friend	3.91	.58	−.02	−.01	4.21	.73	.34	.36	3.60	.59	−.32	−.31
Male faces												
Mate	2.32	.53	−.22	−.26	2.76	.78	.23	.21	2.50	.78	−.04	−.07
Date	2.67	.60	−.19	−.22	3.10	.68	.24	.20	2.82	.73	−.03	−.06
Friend	4.20	.65	−.15	−.17	4.68	.60	.33	.30	4.17	.69	−.18	−.19

Note. Deviation score means (Dev) represent deviations from average trait ratings across all faces and perceivers. Scores of zero represent no difference from the average rating across all raters and faces for that trait. Adjusted deviation score means (Adj) were corrected for independent ratings of how "normal" faces appeared.

In general, our manipulations of facial features seemed to be effective. We next tested whether the attractiveness of the face was affected as well and explored some reasons for such effects.

Relationship potential

Participants' ratings (in deviation scores) of whether they would consider befriending, dating, or marrying the people whose faces they saw were analyzed in a 2 (Sex of Face) by 3 (Feature Manipulation) by 3 (relationship potential; friend, date, and mate) analysis of variance with repeated measures on the last two factors (see Table 2 for deviation and raw score means). According to Hypotheses 1 and 2, relationship potential should increase for large-featured females and small-featured males and decrease for small-featured females and large-featured males. However, the analysis produced only a main effect for Feature Manipulation, $F(2,44) = 10.08$, $p < .001$. The pattern of means was unexpected but consistent: Unchanged male and female faces appeared more desirable as potential friends, dates, and mates than did faces whose features were altered. Means for faces whose features were enlarged versus diminished did not differ from one another on any of the relationship variables.

Perhaps altered faces were unappealing because they were generally less "normal" looking. Similar to Rhodes et al. (1999), we explored this possibility (and others) by repeating the tests for relationship potential, using ratings of how normal each face looked as covariates. Normalcy scores came from the 46 raters who judged faces for this quality alone. Not surprisingly, unchanged faces appeared most normal. Mean uncorrected (raw) scores for the normalcy (1 = extremely normal; 7 = extremely abnormal) of faces with unchanged, enlarged, and diminished features were 3.65 ($SD = 1.02$), 4.96 ($SD = 1.15$), and 4.58 ($SD = .80$) or −.67, .64, and .30, respectively, in deviation units. A 2 (Sex of Face) by 3 (Feature Manipulation) analysis of variance with repeated measures on the last factor revealed that these means were significantly different, $F(2,44) = 15.11$, $p < .001$. Both enlarged and diminished features reduced normalcy scores relative to unchanged faces, $Fs(1,23) = 26.27$ and 19.46, $ps < .001$, respectively. Enlarging versus diminishing features did not produce normalcy ratings that differed from one another, $F(1,23) = 2.14$, $p > .15$.

Thus, altering the faces influenced how normal they looked. Could that account for the effects we observed in relationship potential? Perhaps participants were attracted to normal, average-looking faces and repelled by less normal-looking ones. If so, then the effects we observed should dissipate once normalcy scores are controlled (deviation score means adjusted for normalcy ratings are reported in Table 2). However, with ratings of normalcy controlled, an analysis of covariance revealed a smaller, but still significant main effect for Feature Manipulation, $F(2,43) = 4.40$, $p < .018$, that generalized across relationship type and gender. No other effects were significant. Thus although unchanged faces appeared more normal, that was not the only reason for their appeal.

What else might underlie preferences for unchanged faces? Separate analyses of covariance included ratings of each of the other four control variables (health, femininity, wealth, and intelligence) to control their effects on ratings of mating, dating, and friendship potential (see Table 3 for control variable means and significance tests). None of these tests entirely accounted for the effects of changing the faces. In each case, the effects of such changes remained significant (*p*s ranged from .04 to .001).

Thus, men and women were captured by similar faces, namely those that were left unchanged. Perhaps variability in the social traits conveyed by faces explained differences in their appeal.

Table 3
Deviation and raw score mean ratings of control traits

	Feature Manipulation								
	Enlarged			Unchanged			Diminished		
	M	*SD*	Dev	M	*SD*	Dev	M	*SD*	Dev
Control traits									
Healthy	4.38	.69	−.06	4.64	.93	.20	4.30	1.06	−.17
Rich	4.06	.78	.10	4.17	.77	.24	3.60	.87	−.36
Intelligent	4.45	.67	.08a	4.55	.79	.18a	4.09	.94	−.28b
Masculine	3.99	1.21	−.38a	4.48	1.40	−.03a	4.85	1.27	.45b

Note. Deviation score means (Dev) represent deviations from average trait ratings across all faces and perceivers. Scores of zero represent no difference from the average rating across all raters and faces for that trait. Significant main effects for face manipulation were found for the potential to get rich, intelligent, and masculine, $Fs(2,44) = 8.25, 3.98, 16.44$, $ps < .001, .05, .001$, respectively. Row means with varied subscripts differ at $p < .05$ or better.

Trait ratings

Physical attractiveness. Tests of Hypotheses 3 and 4 were framed as 2 (Sex of Face) by 3 (Feature Manipulation) analyses of variance with repeated measures on the second factor (see Table 4 for means). For attractiveness, a significant main effect for Feature Manipulation, $F(2,44) = 11.72$, $p < .001$, was qualified by a significant Feature Manipulation × Sex of Face interaction, $F(2,44) = 3.13$, $p < .05$, which offered some support for the hypothesis that enlarged features look better on female than on male faces. Tests for male and female faces revealed different patterns, $Fs(2,22) = 8.04$ and 6.60, $ps < .008$. For females, enlarged features did not produce significantly different attractiveness ratings than unchanged features, $F(1,11) = 2.81$, $p > .10$. But diminished features reduced the attractiveness of female faces compared to either unchanged faces, $F(1,11) = 32.34$, $p < .001$, or faces with enlarged features, $F(1,11) = 3.76$, $p < .07$. In contrast, enlarged features reduced male attractiveness compared to unchanged features, $F(1,11) = 17.10$, $p < .002$. Unexpectedly, diminished features also reduced the attractiveness of male faces, $F(1,11) = 4.86$, $p < .05$, and the difference between faces with enlarged versus reduced features was not significant, $F(1,11) = 1.65$, $p > .10$, though in the predicted direction.

The analysis for sexiness yielded a main effect for Feature Manipulation, $F(2,44) = 6.75$, $p < .01$, but no interaction with Sex of Face, $F(2,44) = 1.95$, $p > .15$. Across all faces, those rated sexiest had unchanged features, rather than features that were either enlarged, $F(1,23) = 12.16$, $p < .002$, or diminished, $F(1,23) = 10.91$, $p < .003$ (see Table 4). There was no difference between faces with enlarged versus diminished features, $F(1,23) < 1.0$.

To determine whether differences in normalcy explained differences in physical attractiveness, the analyses described above were repeated using normalcy scores (from an independent set of raters) as a covariate (adjusted means are given in Table 4). The results for attractiveness ratings remained almost the same. The results for sexiness diverged, albeit weakly, from the original. Specifically, the interaction of Feature Manipulation and Sex of Face was marginally significant, $F(2,43) = 2.64$, $p < .08$. For male faces, enlarged features marginally decreased the sexiness compared to unchanged features, $F(1,10) = 3.6$, $p < .08$. Diminished features had no effect at all, $F(1,10) = 1.43$, $p > .25$. For female faces, there was no difference in the

Table 4
Deviation and raw score mean ratings of physical attractiveness for male and female faces

	Feature Manipulation											
	Enlarged				Unchanged				Diminished			
	M	*SD*	Dev	Adj	M	*SD*	Dev	Adj	M	*SD*	Dev	Adj
Female faces												
Attractive	3.01	1.09	−.01	.04	3.40	1.37	.54	.59	2.29	1.03	−.56	−.51
Sexy	2.70	1.20	−.03	.04	3.14	1.40	.37	.41	2.36	1.24	−.38	−.34
Male faces												
Attractive	2.83	.83	−.40	−.45	3.70	.98	.46	.41	3.20	1.13	−.05	−.10
Sexy	2.18	.73	−.54	−.60	3.31	1.07	.51	.46	2.67	1.05	−.06	−.09

Note. Deviation score means (Dev) represent deviations from average trait ratings across all faces and perceivers. Scores of zero represent no difference from the average rating across all raters and faces for that trait. Adjusted deviation score means (Adj) were corrected for independent ratings of how "normal" faces appeared.

sexiness of faces with unchanged versus enlarged features, $F(1,10) < 1.0$, but faces with diminished features were marginally less sexy than faces whose features were unchanged, $F(1,10) = 4.45$, $p < .06$. Thus, when normalcy was controlled, the results for sexiness weakly conformed to the pattern of sex differences found for physical attractiveness.

Power and warmth. Deviation scores for traits related to power and warmth were submitted to separate 2 (Sex of Face) by 3 (Feature Manipulation) analyses of variance with repeated measures on the second factor. Significant main effects for Feature Manipulation emerged for each trait (see Table 5 for means). For ratings of dominance, strength, and independence, the F-values (with $df = 2,44$) were 17.96, 26.15, and 9.76, respectively ($ps < .001$). For ratings of care, affection, being a good parent, and being faithful and honest, the F-values (with $df = 2,44$) were 13.78, 14.0, 8.41, 5.37, and 13.59, respectively ($ps < .01$). Consistent with Hypothesis 5, these effects were generally reliable across gender; there was only one significant interaction involving this variable.

Further analyses of the effects for each trait revealed two different patterns (see Table 5 for significance tests). The first involved differences between faces with enlarged and diminished features. Planned comparisons showed that faces with diminished features seemed more powerful (i.e., dominant, strong, and independent), whereas faces with enlarged features seemed warmer (i.e., more caring, affectionate, honest, faithful, and like better parents). Thus, the failure of participants to see much relationship potential in faces with either enlarged *or* diminished features corresponded to *different* constellations of social traits.

When faces with enlarged or diminished features were compared with unchanged faces, a second general pattern emerged (see Table 5). Planned comparisons showed that replacing normal features with smaller ones decreased perceived warmth as predicted, but failed to increase perceived power. Similarly, replacing normal features with larger ones decreased perceived power as predicted, but failed to increase warmth ratings. In other words, making faces seem more powerful also made them seem less warm and vice versa. Altering features seemed to spoil the balance of warmth and power messages conveyed by unchanged faces. Unchanged faces seemed to convey optimal degrees of power and warmth.

The only main effect to be qualified by an interaction with Sex of Face was for judgments of independence, $F(2,44) = 4.65$, $p < .015$. Contrary to our predictions, perceptions of women's independence were not affected by Feature Manipulation, $F(2,22) = 1.25$, $p > .25$. But perceptions of men's independence were influenced as predicted by Feature Manipulation, $F(2,22) = 16.39$, $p < .001$. Male faces with diminished features expressed a greater independence (mean $= .49$) than when features were either unchanged ($M = -.02$) or enlarged ($M = -.48$), $Fs(1,11) = 20.84$ and 29.73, respectively, $ps < .001$. Male faces with enlarged features expressed less independence than did faces whose features were unchanged, $F(1,11) = 5.17$, $p < .04$.

Were relationships between facial features and perceptions of warmth and power simply a matter of how normal faces looked? Were they part of an attractiveness halo effect? To evaluate these two possibilities, analyses for each trait were repeated using normalcy and attractiveness scores for each face as covariates. Results from these analyses were comparable to those just reported, suggesting that perceptions of social traits were not driven by differences in either normalcy or attractiveness.

Warmth, power, and social appeal

We tested whether differences in the relationship potential of various faces could be explained by the warmth

Table 5
Deviation and raw score mean ratings of traits related to power and warmth

	Feature Manipulation								
	Enlarged			Unchanged			Diminished		
	M	*SD*	Dev	M	*SD*	Dev	M	*SD*	Dev
Power									
Dominant	3.56	.66	−.53a	4.24	.82	.08b	4.50	.84	.38b
Strong	3.77	.78	−.59a	4.60	.73	.22b	4.73	.97	.36b
Independent	4.16	.55	−.33a	4.56	.58	.07b	4.74	.70	.25b
Warmth									
Caring	4.60	.90	.30a	4.53	1.09	.15a	3.80	1.22	−.43b
Affectionate	4.25	1.00	.22a	4.24	1.15	.22a	3.50	1.27	−.54b
Good parent	4.84	1.02	.14a	4.70	.98	.14a	4.39	1.10	−.37b
Faithful	4.60	1.09	.14a	4.75	.82	.12a	4.29	1.05	−.88b
Honest	4.66	1.02	.37a	4.50	1.06	.11b	3.89	1.16	−.47c

Note. Deviation score means (Dev) represent deviations from average trait ratings across all faces and perceivers. Scores of zero represent no difference from the average rating across all raters and faces for that trait. Row means with varied subscripts differ at $p < .05$ or better.

Table 6
Size of feature manipulation effect with covariates removed

	Covariate removed			
	None	Warmth	Power	Warmth + power
Mate	.19**	.17*	.20**	.09
Date	.25***	.27***	.26***	.11
Friend	.35***	.30***	.40***	.22**

Note. Effect size measure = partial eta squared.
*$p < .05$.
**$p < .01$.
***$p < .005$.

and power messages those faces conveyed. Our a priori conceptualizations of power and warmth perceptions were supported by the correlations among their elements (alpha coefficients of .88 and .79, respectively). Therefore composite scores were computed for warmth by summing trait ratings for affectionate, caring, good parent, honest, and faithful. And composite scores for power were computed by summing trait ratings for dominance, independence, and strength. The correlation between warmth and power composite scores was $-.43$, $p < .05$.

Three separate analyses of covariance were computed with marriage, date, and friendship potential as dependent variables and Feature Manipulation and Sex of Face as independent variables. Scores for warmth, power, and then warmth *and* power were covaried from the effects. We wondered whether covariates would reduce the size of our effects. If the combination of warmth and power explains social appeal, then only the latter test should diminish those effects, whereas covarying warmth or power alone should spare them. As Table 6 shows, covarying out power and warmth together eliminated the effects of feature manipulation on dating and marriage potentials. And for friendship potential, the effect of feature manipulation was reduced, but not eliminated. In contrast, controlling for power or warmth alone failed to substantially reduce feature manipulation effects on our marriage, date, and friendship potential measures. A substantial portion of the variance in the effects of feature manipulation on relationship potential was thus due to the combined messages of power and warmth (see Table 6).

Fig. 2 depicts relationship preferences for faces conveying varying degrees of both warmth and power. Distributions of ratings for dating, marriage, and friendship potential were trichotomized across all 72 faces. Each face was categorized as having either potential ("Yes"), possible potential ("Maybe") or no potential ("No") as a mate, date, and friend. The resulting data points were plotted along coordinates comprising each face's warmth and power scores. As the figure reveals, the most desirable faces (the Yes faces) were disproportionately found in the upper-right quadrant, which indicated moderately strong ratings of each trait. Of the 13 faces in the upper-right quadrant for mating and dating potential, 10 were categorized as Yes. Given an expected probability of .33, the binomial probability of each result was $p < .002$. For friendship, 8 of the 13 faces in the upper-right quadrant were most desirable, $p < .04$. In contrast, faces with relatively high ratings along only one or the other dimension, or low in both dimensions (i.e., those in the other three quadrants), were generally less desirable (the No and Maybe faces).

Regression analyses confirmed that across all faces, ratings of power and warmth predicted relationship potential. Separate simultaneous regression analyses were computed for mate, date, and friendship potential. Scores for power and warmth were entered as predictor variables.[4] Table 7 shows that warmth and power contributed significantly and independently to relationship appeal across changed and unchanged male and female faces. These findings were not merely an artifact of our transformed faces—when each analysis was performed exclusively on unchanged faces, the same pattern of results was obtained.

Discussion

Try as we might to improve the appeal of faces by changing status cues, unchanged faces were identified as having the greatest potential as dates, marriage partners, and friends. These results could not be explained by variations in perceived health (Thornhill & Gangestad, 1993) or age (Busey, 1998; Buss, 1987), or by how feminine and masculine the faces appeared (Perrett et al., 1998; Rhodes et al., 2000). And relationship preferences were largely independent of how "normal" the faces looked. Thus, we demonstrated that it was difficult to improve on Mother Nature's handiwork. But why?

The appeal of various faces was best predicted by status cues that conveyed warmth and power. Appealing faces projected the additive effects of both kinds of messages. When we tried to strengthen signals in one direction, we instead weakened signals coming from the other. Thus, enhancing the dominance of faces decreased their warmth, but failed to increase their power. When submissiveness was enhanced, impressions of power eroded, while perceived warmth was largely unchanged. Faces that optimized each message, instead of maximizing one message at the expense of the other, were perceived as most desirable. Consistent with the ideas of Cunningham (Cunningham, 1986; Cunningham et al., 1990, 1995), these findings suggested that male

[4] Preliminary analyses included Sex of Face and tested all possible interactions. No significant interactions emerged for dating and mating potential. For friendship potential, interactions with Sex of Face revealed that while power and warmth made independent contributions for female faces, only warmth was a significant predictor for male faces.

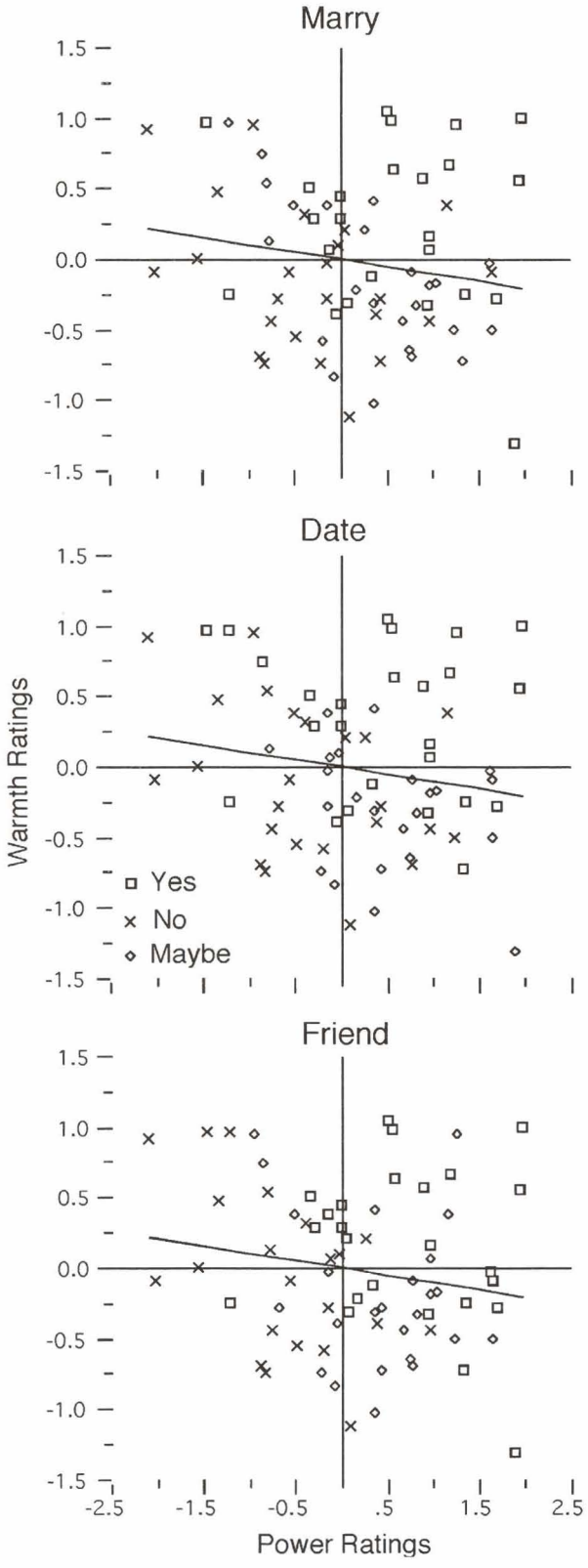

Fig. 2. Relationship potential, trichotomized as "Yes," "No," or "Maybe," plotted against ratings of power and warmth (in deviation units). Each data point represents one version of a face. The most desirable faces (the Yes faces) cluster in the upper-right-hand quadrants, reflecting relatively high levels of each trait.

and female faces evolved by conveying a charismatic mix of warmth and power.

Whereas judgments of relationship potential were similar regardless of gender, judgments of "attractiveness" per se were moderated by gender. Substituting immature, submissive-looking features for normal ones diminished the attractiveness of men, as predicted, but unexpectedly left women's attractiveness unchanged. We expected submissiveness cues to increase female attractiveness, as it did in our earlier work on schematic female faces (Keating, 1985a). Relatively mature, dominant-looking features decreased female attractiveness, as predicted, but rather than improving male faces, they decreased male attractiveness, similar to what others have found (Perrett et al., 1998; Rhodes et al., 2000). Thus, our "designer" features failed to improve attractiveness either by increasing the dominance of male faces or by increasing the submissiveness of female faces. Instead, by making male faces "speak" more submissively and female faces "speak" more powerfully, we undermined their attractiveness. As for other social traits, unchanged faces seemed to broadcast the right volume of status signal.

Status cues influenced perceptions of faces differently in response to different judgments. Participants seemed sensitive to the social contexts implied by the judgments they were asked to make. For instance, unchanged faces were not consistently rated as most "attractive" per se, or as most honest or affectionate. But they were perceived as sexiest and most desirable in terms of relationship potential. There seemed to be no monolithic notion of attractiveness among perceivers, as researchers sometimes imply. Instead, perceivers seem to make distinctions among judgments of physical attractiveness, social traits, and relationship potential. Notions about the nature of attractiveness are apparently complex (Feingold, 1992) and sensitive to context (Keating, 2002; Zebrowitz & Collins, 1997).

There were several limitations to our research. Our feature manipulations were meant to alter cues for submissiveness and dominance by exaggerating facial aspects related to immaturity and maturity. However, changing the sizes of features necessarily shifted spatial relationships among them. Feature modifications may have generated facial "expressions" that altered attractiveness—perhaps small eyes made faces appear angry and large eyes made them seem surprised. Future studies are needed to confirm our post hoc discoveries by transfiguring faces ranging in age and ethnicity, by altering different features by different amounts, and by controlling for appearances of emotion.

It is also possible that making "normal" features more extreme moved faces away from the population average thereby eroding their appeal (Langlois & Roggman, 1990; Rhodes et al., 1999; cf. Alley & Cunningham, 1991; cf. Jones, 1995). Of course, we had no information about how well our 24 unaltered faces reflected the population

Table 7
Simultaneous regression analyses predicting relationship potential from perceptions of the power and warmth of faces ($N = 72$)

	Predictor set					
	Power			Warmth		
	B	*SE B*	*B*	*B*	*SE B*	*B*
Predicted						
Mate	.34	.12	.34**	.40	.09	.53***
Date	.37	.11	.36**	.43	.08	.58***
Friend	.27	.10	.28**	.49	.07	.70***

Note. Similar results were obtained when only unchanged faces ($N = 24$) were analyzed.

average, which would have been required if our aim was to provide a proper test of the "average is attractive" hypothesis (Langlois et al., 1994). Instead, our research broached a different question. We asked not whether faces could be made more attractive by averaging their features, but whether typical faces could be made more attractive by amplifying the social signals they transmit. We challenged status quo facial morphologies and tried to improve them. Thus, in a sense, we asked why human faces have converged on the "average" appearance evident today. Why not a *different* human facial prototype, perhaps one with bigger eyes or thinner lips? And could we not enhance the attractiveness of typical faces by altering features in these ways?

Of course, functional requirements for chewing, vision, brain development and the like account for major constraints on human facial structure (Carello, Grosofsky, Shaw, Pittenger, & Mark, 1989; Mark et al., 1988). But the signal value of status messages imbued in facial features over evolutionary history may have also contributed to the development of the human face and to what humans find appealing in a face. Our data indicate that eye size and lip thickness are among the facial elements that influence social perception by sending status messages conveying warmth and power. "Good" combinations of these messages make faces appealing, suggesting 'what is good is beautiful,' as well as the other way around (Dion, Berscheid, & Walster, 1972). In short, the appeal of a face is inherent in the social messages it conveys.

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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.

Berry, D. S., & Landry, J. C. (1997). Social perception in the real world: Facial maturity and daily social interaction. *Journal of Personality and Social Psychology, 72*, 570–580.

Berry, D. S., & McArthur, L. A. (1986). Perceiving character in faces: The impact of age-related craniofacial changes on social perception. *Psychological Bulletin, 100*, 3–18.

Busey, T. A. (1998). Physical and psychological representations of faces: Evidence from morphing. *Psychological Science, 9*, 476–483.

Buss, D. M. (1987). Sex differences in human mate selection criteria: An evolutionary perspective. In C. Crawford, D. Krebs, & M. Smith (Eds.), *Sociobiology and psychology: Ideas, issues, and applications* (pp. 335–351). Hillsdale, NJ: Erlbaum.

Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review, 100*, 204–232.

Carello, C., Grosofsky, A., Shaw, R. E., Pittenger, J. B., & Mark, L. S. (1989). Attractiveness of facial profiles is a function of distance from archetype. *Ecological Psychology, 1*, 227–251.

Cunningham, M. R. (1986). Measuring the physical in physical attractiveness: Quasi-experiments on the sociobiology of female facial beauty. *Journal of Personality and Social Psychology, 50*, 925–935.

Cunningham, M. R., Barbee, A. P., & Pike, C. L. (1990). What do women want? Facialmetric assessment of multiple motives in the perception of male facial physical attractiveness. *Journal of Personality and Social Psychology, 59*, 61–72.

Cunningham, M. R., Roberts, A. R., Wu, C., Barbee, A. P., & Druen, P. B. (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.

Dion, K., Berscheid, E., & Walster, E. (1972). What is beautiful is good. *Journal of Personality and Social Psychology, 24*, 285–290.

Feingold, A. (1992). Good-looking people are not what we think. *Psychological Bulletin, 111*, 304–341.

Gangestad, S. W., & Buss, D. M. (1993). Pathogen prevalence and human mate preferences. *Ethology and Sociobiology, 14*, 89–96.

Gray, H. (1948). *Anatomy of the human body*. Philadelphia: Lea & Febiger.

Guthrie, R. D. (1970). Evolution of human threat display organs. In T. Dobzhansky, M. K. Hecht, & W. C. Steere (Eds.), *Evolutionary biology* (Vol. 4). New York: Appleton-Century-Crofts.

Johnston, V. S., & Franklin, M. (1993). Is beauty in the eye of the beholder? *Ethology and Sociobiology, 14*, 183–199.

Johnson, V. S., Hagel, R., Franklin, M., Fink, B., & Grammar, K. (2001). Male facial attractiveness: Evidence for hormone-mediated adaptive design. *Evolution and Human Behavior, 22*, 251–267.

Jones, D. (1995). Sexual selection, physical attractiveness, and facial neoteny: Cross-cultural evidence and implications. *Current Anthropology, 36*, 723–748.

Keating, C. F. (1985a). Gender and the physiognomy of dominance and attractiveness. *Social Psychology Quarterly, 48*, 61–70.

Keating, C. F. (1985b). Human dominance signals: The primate in us. In S. L. Ellyson, & J. F. Dovidio (Eds.), *Power, dominance, and nonverbal behavior* (pp. 89–108). New York: Springer.

Keating, C. F. (2002). Charismatic faces: Social status cues put face appeal in context. In G. Rhodes, & L. A. Zebrowitz (Eds.), *Advances in visual cognition, Volume I: Facial Attractiveness: Evolutionary, cognitive, and social perspectives* (pp. 153–192). Westport, CT: Ablex Publishing.

Keating, C. F., Randall, D., & Kendrick, T. (1999). Presidential physiognomies: Altered images, altered perceptions. *Political Psychology, 20*, 593–610.

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

Lorenz, K. (1943). Die angeborenen Formen moglicher Arfahrung. *Zietschrift fur Tierpsychologie, 5*, 234–409.

Mark, L. S., Shaw, R. R., & Pittenger, J. B. (1988). Natural constraints, scales of analysis, and information for the perception of growing faces. In T. R. Alley (Ed.), *Social and applied aspects of perceiving faces* (pp. 11–49). Hillsdale, NJ: Erlbaum.

Mueller, U., & Mazur, A. (1997). Facial dominance in *Homo sapiens* as honest signaling of male quality. *Behavioral Ecology, 8*, 569–579.

Penton-Voak, I. S., & Perrett, D. I. (2000). Female preference for male faces changes cyclically: Further evidence. *Evolution and Human Behavior, 21*, 39–48.

Perrett, D. I., Lee, K. J., Penton-Voak, I., Rowland, D., Yoshikawa, S., Burt, D. M., Henzi, S. P., Castles, D. L., & Akamatsu, S. (1998). Effects of facial dimorphism on facial attractiveness. *Nature, 394*, 884–887.

Perusse, D. (1995). Comments on "sexual selection, physical attractiveness, and facial neoteny". *Current Anthropology, 36*, 740–741.

Rhodes, G., Hickford, C., & Jeffery, L. (2000). Sex-typicality and attractiveness: Are supermale and superfemale faces super-attractive? *British Journal of Psychology, 91*, 125–140.

Rhodes, G., Sumich, A., & Byatt, G. (1999). Are average facial configurations attractive only because of their symmetry? *Psychological Science, 10*, 52–58.

Rhodes, G., & Zebrowitz, L. A. (2002). *Facial Attractiveness: Evolutionary, cognitive, and social perspectives*. Westport, CT: Ablex Publishing.

Rossi, Ph. H., & Anderson, A. B. (1982). The factorial survey approach: An introduction. In Rossi, & S. Nock (Eds.), *Measuring social judgments: The factorial survey approach* (pp. 15–67). Beverly Hills, CA: Sage.

Thornhill, R., & Gangestad, S. W. (1993). Human facial beauty: Averageness, symmetry, and parasite resistance. *Human Nature, 4*, 237–269.

Zebrowitz, L. A., & Collins, M. A. (1997). Accurate social perception at zero acquaintance: The affordances of a Gibsonian approach. *Personality and Social Psychology Review, 1*, 204–223.

Zebrowitz, L. A., & Montepare, J. M. (1992). Impressions of babyfaced males and females across the lifespan. *Developmental Psychology, 28*, 1143–1152.