Physical Appearance, Attractiveness, and the Mediating Role of Emotions

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Determinants of physical attractiveness were investigated in a study employing U.S. college students of both genders. Five factors were derived from a study of 37 stable and changeable physical features: Masculinity (strength, larger body and chest, broader chin), Femininity (longer hair, make-up, larger and rounder eyes), Self-care (overall grooming, shapely figure, flat stomach, erect posture, fitted clothes), Pleasantness (friendly, happy, babyish face), and Ethnicity. Factor analytic results did not support a priori (and nonstatistical) groupings of babyish facial features by investigators who use this concept. Self-care, Masculinity (Femininity), and Pleasantness were positive correlates of male (female) attractiveness. Attractiveness was described parsimoniously in terms of emotions: more attractive targets elicited more pleasure, more arousal, and less dominance (or more submissiveness) from others. Men and women reacted in essentially similar ways in rating others' attractiveness. Statistical tests showed that emotional reactions *mediated* relations of the independent variables (physical features) to the dependent variables (judgments of attractiveness).

The present study was designed to investigate effects of most physical features previously shown to be determinants of physical attractiveness. Findings from studies conducted primarily with college students in the United States helped delineate the physical features to be explored.

Physical correlates of attractiveness have been categorized as static (or stable) and fluctuating (or changeable) features (Brown, Cash, & Noles, 1986). "Static" features included relatively enduring physical characteristics such as height or eye color. "Fluctuating" or changeable features referred to characteristics that varied over time, such as hair style or facial pleasantness.

Body shape has been found to be an important stable determinant of attractiveness. Shapeliness of physique related to ratings of attractiveness in men and women. Women preferred men exhibiting V-shaped bodies (Lavrakas, 1975). Also, upper body strength enhanced ratings of male attractiveness (Franzoi & Herzog, 1987). In comparison, men favored women with hourglass figures (Gitter et al., 1983).

Obesity has been found to decrease attractiveness (Clayson & Klassen, 1989). More specifically, Gitter, Lomranz, and Saxe (1982) used drawings of male figures varying in abdomen, shoulders, neck, head, and body shapes. A protruding abdomen was the strongest indicator of unattractiveness. In another study, the negative effect of obesity on attractiveness was more pronounced for female than for male targets (Furham & Radley, 1989).

Height also has been shown to be a determinant of attractiveness. Men found

shorter women more attractive and more desirable as dates, whereas women preferred to date taller men, but did not rate them as more attractive than shorter men (Shepperd & Strathman, 1989).

Many stable physical properties of the face have been studied also. Overall facial attractiveness was found to correlate positively with attractiveness of its component parts, with the mouth region having the greatest influence, followed by the eyes, hair, nose, and facial structure (Terry & Davis, 1976).

A considerable number of studies have dealt with so-called "babyish facial features," grouping facial cues on the basis of a priori assumptions rather than on the basis of factor-analytic findings. Zebrowitz and Montepare (1992) defined a babyish face as follows: "facial features of large eyes, thin and high eyebrows, a large cranium, a small chin, and a curved rather than an angular face" (p. 1143). Berry and McArthur (1985) found that large, round eyes, a small chin, and high eyebrows of men's faces were judged to be babyish in appearance. Furthermore, a composite score, based on the latter babyish characteristics, correlated positively with attributions of naivete, honesty, warmth, and kindness to stimulus persons. Finally, although correlations of babyish facial features with attractiveness were not reported, subjectively judged babyish facial quality and attractiveness of stimulus persons were positively intercorrelated. In a subsequent review, Berry and McArthur (1986) concluded that adults with more babyish facial features were perceived to have more of the following childlike traits: naivete, honesty, warmth, submissiveness, and physical weakness.

Working along similar lines, Cunningham (1986) used three conceptual groupings of facial features (neonate or babyish, mature, and expressive) to study attractiveness. He found that men judged women with larger eyes, a smaller chin, and a smaller nose as more attractive. "Mature" features of more prominent cheekbones and narrower cheeks, and "expressive" features of higher eyebrows, larger pupils and a larger smile, were also judged to be more attractive. In a subsequent study, Cunningham et al. (1995) obtained the following corroborating positive correlates of physical attractiveness: larger eyes, wider-set eyes, larger pupils, higher eyebrows, bigger smile, more prominent cheekbones, narrower cheeks and face; also, for men only, less bushy eyebrows and a smaller chin (Table 8). However, a thorough investigation of babyish facial cues across a wide age span showed no relation between babyish facial features and attractiveness, except in the case of infants. Instead, the evidence showed that babyish facial features connoted childlike traits (Zebrowitz & Montepare, 1992, Tables 3 and 4).

It is important to note differences in classification of babyish facial features by Cunningham et al. (1995) and by Zebrowitz and Montepare (1992). Inconsistencies were due to Cunningham's conceptual differentiations among neonate (babyish), mature, and expressive facial features (e.g., eyebrow height and chin size were not part of Cunningham's definition of babyish features, whereas these two cues helped define babyish features for Zebrowitz & Montepare). Thus, lack of agreement regarding the definition of babyish facial features and inconsistencies in findings relating these features to attractiveness were two areas of difficulty when the concept of babyish facial features was applied to study physical attractiveness. The present study, al-

though not focused directly on babyish facial features, included data that would (a) yield a statistical test of assumed groupings of babyish facial features and (b) assess relations of such features with attractiveness.

Differential contributions of face and body to overall judgments of attractiveness have also been investigated. In one study that combined three levels each of facial and bodily attractiveness, faces as well as bodies significantly influenced overall ratings (Alicke, Smith, & Klotz, 1986). In another study, the influence of facial attractiveness (27% of total variance) outweighed that of bodily attractiveness (20% of variance) (Mueser et al., 1984).

There are fewer studies dealing with influences of changeable features on judged attractiveness. Brown, Cash, and Noles (1986) found that overall grooming correlated positively with judged attractiveness of both men and women; tighter clothing was judged more attractive for male targets only; and perceived masculinity (femininity) correlated positively with attractiveness of male (female) targets.

Hair color and length have been found to influence attractiveness. Lighter hair was judged as more attractive. Blondes received the highest, and redheads the lowest attractiveness ratings (Clayson & Klassen, 1989; Clayson & Maughan, 1986). Longer and fuller hair were judged as more attractive in women (Cunningham et al., 1995). Women judged shorter hair as more attractive in men, although the relation was reversed for liberal women (Peterson & Curran, 1976).

Other changeable factors such as glasses, wardrobe, and makeup have been found to affect attractiveness as well. Wearing glasses reduced attractiveness ratings, particularly for female targets (Edwards, 1987). More formal attire (ranging from jeans/shirt to slacks/sweater, suits, and, most formal, uniforms) was judged as more attractive (Hewitt & German, 1987). Makeup increased men's ratings of women's attractiveness, but it did not influence women's ratings of women's attractiveness (Cash et al., 1988). Finally, in line with reinforcement theories of attraction and affiliation (Byrne & Clore, 1970; Clore & Byrne, 1974; Mehrabian & Ksionzky, 1970), studies showed positive relations between positive/negative facial expressions and attractiveness (Gouaux, 1971; Mueser et al., 1984; Veitch, 1976).

The present study investigated physical features noted in the preceding review. Hypotheses of the study relating attractiveness to specific physical features were derived from findings reviewed above. Because the reviewed studies typically employed U.S. university students, our hypotheses were proposed as being applicable, primarily, to the young adult segment of the U.S. population.

The hypotheses were as follows: For both men and women, physical attractiveness correlates positively with shapeliness of physique, overall grooming, more formal clothing, more positive and/or less negative facial expressions, less obesity, and flatness versus protrusion of abdomen. For men, physical attractiveness also correlates positively with bodily strength, perceived masculinity, and tighter clothing and, for women, it correlates positively with perceived femininity. Due to inconsistencies in findings bearing on relations of babyish facial features with attractiveness, no hypotheses were offered regarding babyish facial features.

Broader objectives of the present study were of a conceptual nature and involved the Pleasure-Arousal-Dominance (PAD) Emotion Model (e.g., Mehrabian, 1995). Precursors of the model were developed in the 1960s during studies of nonverbal communication. To harness the considerable complexity and diversity of nonverbal cues, *referents* or meanings (e.g., inferences of emotions and attitudes of another based on the other's nonverbal acts) rather than *symbols* or discrete behaviors (e.g., movements, postures, voice quality) of nonverbal communication were used to group and understand the significance of nonverbal cues in communication (e.g., Mehrabian, 1972; 1981).

The focus on referents helped rapid identification of coding rules (i.e., relations among symbols, on one hand, and referents, on the other) in nonverbal communication. Also, major referent dimensions in nonverbal communication were found to correspond to the Evaluation, Activity, and Potency factors of the semantic differential (Osgood, Suci, & Tannenbaum, 1957). This led to formulation of a general three-dimensional framework for describing emotions that included pleasure-displeasure (the positive emotional correlate of Evaluation), arousal-nonarousal (the positive emotional correlate of stimulus Activity), and dominance-submissiveness (the negative emotional correlate of stimulus Potency) (e.g., Mehrabian, 1995). Specific emotions were described as weighted linear combinations of the PAD factors (e.g., excitement or triumph included pleasure, high arousal, and dominance; fascination or respect were composed of pleasure, high arousal, and submissiveness; security or relaxation included pleasure, low arousal, and dominance; anger or hostility included displeasure, high arousal, and dominance; despair and boredom involved displeasure, low arousal, and submissiveness).

The PAD Emotion Model seemed particularly suited to study of the highly diverse features identified in research on physical attractiveness. As with research on nonverbal communication, it was expected that study of the emotional impact of various physical features would provide a parsimonious emotion-based description of the attraction process.

In short, plan of the present study included (a) identification of statistically-founded and, hopefully, meaningful groupings of physical features, (b) assessment of the differential importance of various groups/factors in determining attractiveness, and (c) assessment of emotional response concomitants of physical attraction to another. To explore the role of emotions in physical attraction, emotional reactions of raters were treated as mediating the relation between the independent variables (physical features) and the dependent variable (judged attractiveness of another).

METHOD

Participants

These were 117 University of California undergraduates (53 men, 64 women) who participated in the study in partial fulfillment of a course requirement.

Materials

Photographs of targets rated for attractiveness. Student volunteers from University of California, Berkeley, and University of California, Los Angeles, and other individual volunteers from the West Los Angeles area were photographed in a standardized format. Ages of the targets ranged from 18 to 32 years. Photographs were taken at a distance of five feet, with the target standing against a white background.

The initial sample of 400 photographs depicted variations in stable features (e.g., body type, weight, eye color, height, hair color, hair length, muscular strength) and changeable features (e.g., attire, affect, posture, grooming, clothing tightness, exposure of body, makeup). The final set of 76 photographs (38 men, 38 women) selected for use encompassed extensive variations, and random combinations, of all the stable and changeable features of interest in the present study.

Physical features rated by the experimenters. To minimize testing time and effort/ concentration required of participants, ten features that were easily and reliably judged were scored from the photographs by experimenters. These features included gender (female=1, male=2), eye color (blue=0, hazel=1, green=2, brown=3), use of glasses (yes=0, no=1), hair length (short=0, medium=1, long=2), hair fullness (thin=0, medium=1, full=2), facial hair (none=0, mustache=1, beard=2, mustache and beard=3), skin color (dark=0, medium=1, light=2), lip fullness (thin=0, medium=1, full=2), use of makeup (a lot=0, medium=1, slight=2, none=3), and affect (sad=0, neutral=1, happy=2).

Physical features rated by the participants. A questionnaire was prepared for participants to rate 27 (18 stable, 9 changeable) features. All items were in semantic-differential format, with extreme evaluations anchored by adjectives. Item-scoring directions were varied to reduce response bias. Thus, for instance, shoulder width was rated narrow to wide, with higher scores corresponding to wider shoulders; muscular strength was rated strong to weak, with higher scores for greater weakness.

The 18 items bearing on stable features were: shoulder width (narrow-wide), muscular strength (strong-weak), chest or breasts (large-small), shapely physique (unshapely-shapely), obesity (underweight-overweight), hair color (light-dark), degree of masculinity (low-high), degree of femininity (high-low), chin size (narrow-broad), eyebrow height (low-high), eyebrow thickness (narrow versus bushy and thick), size of eyes (large-small), eye shape (elongated-round), nose size (small-large), babyish face (mature-immature), height (short-tall), appearance of stomach (flat-protruding), body build (large-petite).

The 9 items for changeable features were: hair neatness (messy-neat), overall grooming (neat-messy), clothing neatness (neat-messy), clothing formality (casual-formal), clothing exposure (revealing-covering), clothing tightness (loose-tight), posture (erect-slumped), affect (sad-happy), friendliness (friendly-unfriendly).

Dependent measure of physical attractiveness. This measure consisted of four semantic-differential items assessing facial attractiveness (very attractive-very unattractive), bodily attractiveness (very unattractive-very attractive), overall attractiveness (very attractive-very unattractive), physical appeal (very low-very high).

Measures of emotional responses to the photographs. The PAD Emotion Model and corresponding scales (Pleasure-Displeasure, Arousal-Nonarousal, Dominance-Submissiveness) were used (Mehrabian, 1995). Pleasure-displeasure was defined in terms of positive versus negative affective states. Arousal-nonarousal referred to a combination of physical activity and mental alertness. Dominance-submissiveness was defined in terms of a person's feelings of control over his/her activities and surroundings.

Items of the three PAD scales were in semantic differential format. Pleasure-Displeasure items were exemplified by the pair of words *affectionate-nasty* and *excited-enraged.* For each pair, participants placed a check mark in one of nine spaces separating the pair to show how they felt. Arousal-Nonarousal items were exemplified by *troubled-dull* and *frustrated-sad.* Dominance-Submissiveness items were exemplified by *masterful-fascinated* and *violent-fearful.* Half the items in the Pleasure Scale and nearly half the Arousal and Dominance items were inverted to control for response bias. Items from all three scales were intermixed and presented in a random order.

Procedure

The 76 photographs employed were subdivided into 19 sets of four photographs (2 men, 2 women) each. Participants were tested two at a time. Each participant sat at an individual desk in a small room and was given a packet of four photographs and four sets of questionnaires. Participants rated the first of four photographs on each of the 27 features and the 4 attractiveness items. They next reported their emotional reactions to the photograph using the three PAD emotion scales (Mehrabian, 1995).

Participants followed the identical procedure to rate the second photograph. Following this, they were given a 5-minute break and then proceeded to rate the third and fourth photographs, one at a time. Target gender alternated from the first to the fourth photograph. The 19 four-photograph sets were used with approximately equal frequency across all participants.

RESULTS AND DISCUSSION

Reliabilities of the Emotion Scales

Cronbach's (1951) alpha was computed for each of the PAD emotion scales (Mehrabian, 1995). The alpha internal consistency coefficient was .97 for the Pleasure-Displeasure, .75 for the Arousal-Nonarousal, and .89 for the Dominance-Submissiveness, Scale. Internal consistencies were deemed to be sufficient for the purposes of additional data analyses using these measures.

Factor Analysis of Items Describing Physical Features

Various features of targets in the photographs had been rated by experimenters (10 items) and by participants (27 items). The 37x37 matrix of intercorrelations was

TABLE 1
Factors Describing Physical Features

Factor Item	Scoring Direction	Factor Loading	Approximate Raw Item Weight
Masculinity			
Muscular Strength	weak	-.86	-1
Body Build	petite	-.81	-1
Chest or Breasts	small	-.75	-1
Shoulder Width	wide	.72	+1
Masculinity	high	.57	+1
Eyebrow Thickness	bushy, thick	.43	+1
Chin Size	broad	.30	+1
Self-care			
Overall Grooming	messy	-.75	-1
Physique	shapely	.73	+1
Hair Neatness	neat	.68	+1
Clothes Neatness	messy	-.68	-1
Stomach	protruding	-.62	-1
Posture	slumped	-.54	-1
Obesity	overweight	-.48	−1
Clothing Tightness	tight	.40	+1
Clothing Formality	formal	.37	+1
Femininity			
Photograph Gender (M=2, F=1)	male	-.75	-4
Use of Makeup	none	-.69	-3
Length of Hair	long	.66	+3
Femininity	low	-.62	-1
Eye Size	small	-.49	-1
Eye Shape	round	.35	+1
Pleasantness			
Friendliness	unfriendly	-.76	-1
Expressed Happiness	happy	.75	+1
Affect of Photograph	happy	.71	+3
Babyish face	immature	.42	+1
Ethnicity			
Hair Darkness	dark	.70	+1
Fullness of Lips	full	.68	+3
Eye Darkness	dark	.66	+1
Lightness of Skin	light	-.63	-3
Height	tall	-.53	-1
Eyebrow Height	high brows	.37	+1

Note: In computing total scores for each factor, the approximate weights given in the last column were applied to raw items to adjust for item scoring directions and for standard deviation differences among the items.

factor-analyzed, and a principal components solution was obtained. There were five factors with eigenvalues exceeding 2.0. These were rotated using oblimin rotation, and factor loading scores helped identify the best items on each factor. Table 1 summarizes results of the factor analysis.

Item-scoring directions had been varied to reduce response bias and required clarification in Table 1 so that results could be interpreted unambiguously. Accordingly, Table 1 contains one column showing the scoring direction for each item. For instance, muscular strength, rated strong to weak, had lower numerical scores for judgments of greater muscular strength. Thus, "weak" is listed for muscular strength under "scoring direction" in Table 1.

The first factor, Masculinity, consisted of seven items: greater muscular strength, larger body build, larger chest, wider shoulders, greater judged masculinity, thicker eyebrows, and broader chin. This factor contained several items dealing with physical strength and was consistent with findings by Franzoi and Herzog (1987) showing that strength was more relevant to attractiveness of men than of women.

Items included in Masculinity had comparable variances; thus, the approximate raw item weights shown in Table 1 were used to calculate total Masculinity scores for each photograph. The resulting Masculinity scale had an alpha internal consistency coefficient of .79.

The second factor, Self-care, consisted of nine items: neater overall grooming, shapelier figure or physique, neater hair, neater clothing, less protruding stomach, more erect posture, less overweight, tighter fitted clothing, and more formal clothing. The alpha coefficient for the Self-care scale, using the approximate raw item weights given in Table 1, was .80.

The third factor, Femininity, consisted of six items: gender of target (female vs. male), more makeup, longer hair, greater judged femininity, larger eyes, and rounder eyes (alpha for Femininity was .71).

The fourth factor, Pleasantness, consisted of four items: friendlier, happier (participant rated), happier (experimenter rated), and more babyish face (alpha was .77).

The fifth factor, Ethnicity, consisted of six items: darker hair, fuller lips, darker eyes, darker skin, shorter (vs. taller), and higher eyebrows (alpha was .68).

Results of the factor analysis of physical features, given above, were encouraging in that the identified factors formed simple and conceptually meaningful units. Together, these five factors provided a parsimonious description of a wide range of physical characteristics that studies had shown to be relevant to judgments of attractiveness.

Factor Analysis of Items Assessing Physical Attractiveness

The four items designed to assess attractiveness of a target were factor analyzed. A principal components solution yielded a single factor with eigenvalue exceeding 1.0. This factor accounted for 73% of total variance. The item assessing facial attractiveness had a loading of .82 in absolute value, whereas the corresponding loading was .44 for bodily attractiveness. This finding was consistent with other studies (e.g., Mueser

et al., 1984) showing that facial, compared with bodily, attractiveness was a superior predictor of overall attractiveness.

For simplicity, total attractiveness scores were computed for each photograph, using weights of +1 for the two positively scored, and weights of -1 for the two negatively scored, items. The resulting attractiveness scale constituted the major dependent variable in the present study and had a high alpha internal consistency coefficient of .87.

Test of the Mediation Hypothesis

The proposed approach to the analysis of physical attractiveness includes: (a) person A's physical features as the independent variable, (b) emotional reactions of person B who is viewing person A as the *mediating* variable, and (c) person B's judgments of the attractiveness of person A as the dependent variable.

Baron and Kenny (1986) offered a precise definition of mediation and proposed a statistical test to assess mediation. They noted that "theorists as diverse as Hull, Tolman, and Lewin shared a belief in the importance of postulating entities or processes that intervene between input and output. . . . Mediators explain how external physical events take on internal psychological significance" (p. 1176). Thus, as used here, mediation by emotional reactions provided a way of understanding the mechanisms whereby physical features of another were translated into judgments of attractiveness. Understanding this mechanism, in turn, provided a way of conceptualizing and integrating findings in this field.

Application of Baron and Kenny's statistical tests in the present context required three sets of regression analyses. First regression: regress the mediator variable (person B's emotional reactions to person A) on the independent variable (person A's physical features). Second regression: regress the dependent variable (person B's judgments of the attractiveness of person A) on the independent variable (person A's physical features). Third regression: regress the dependent variable on both the mediator variable and the independent variable. The requirements for establishing mediation were as follows: (a) the independent variable must be a significant determinant of the mediator in the first regression, (b) the independent variable must be a significant determinant of the dependent variable in the second regression, (c) the mediator must be a significant determinant of the dependent variable in the third regression, and (d) the magnitude of the effect of the independent variable on the dependent variable must be greater in the second regression equation than in the. third equation (Baron & Kenny, 1986, p. 1177). Results of the three sets of regression analysis required for establishing mediation are given in the following three sections, respectively.

Emotional reactions (the mediator variable) as functions of physical features (the independent variable). In the first stage of the mediation test, emotional reactions were explored as functions of physical features. Three regression analyses were required because emotional reactions had been assessed with three separate scales. In the first, Pleasure-Displeasure was analyzed as a function of the five physical feature factors given in Table 1. Unless noted otherwise, equation 1 *and all subsequent regression equations used for presentation of results in this study contain .05-level significant*

effects and are written for standardized variables. The multiple-correlation coefficient for equation 1 was .60.

Pleasure = .45 Pleasantness +.28 Self-care +.13 Femininity
+.10 Masculinity   (1)

Results of the regression analyses for Arousal-Nonarousal and Dominance-Submissiveness are given in equations 2 and 3, which have multiple-correlation coefficients of .21 and .35, respectively.

Arousal = .17 Self-care +.16 Masculinity +.10 Femininity   (2)

Dominance = −.35 Self-care −.13 Masculinity   (3)

Equations 1 through 3 satisfied the first requirement of mediation in showing that physical features (the independent variable) were indeed significant correlates of emotional reactions (the mediator). Specifically, in equation 1, happy and friendly expressions (Pleasantness), a well-groomed, neat, and trim appearance together with good posture and more formal attire (Self-care) were the two strongest correlates of pleasure. More Feminine and Masculine attributes of targets also elicited greater pleasure.

Rater arousal, in equation 2, was greater to shapely, neat, masculine, and feminine attributes. Also, rater dominance, in equation 3, was greater when viewing unshapely, messy, and informally dressed individuals who appeared to have less strength and/or less Masculinity.

Physical attractiveness (the dependent variable) as a function of physical feature factors (the independent variable). In the second stage of the mediation test, rater judgment of another's physical attractiveness was explored as a function of the other's physical features. A stepwise regression analysis explored possible significant contributions of the five physical feature factors (given in Table 1) to judgments of attractiveness. The .05-level significant effects, written for standardized variables, are given in equation 4.

Attractiveness (all raters and targets) = .58 Self-care +.21 Femininity
+.19 Masculinity +.13 Pleasantness   (4)

The multiple-correlation coefficient for equation 4 was .65, showing that the four physical feature factors accounted for 42% of variance in attractiveness ratings. Magnitudes of the coefficients in equation 4 provided estimates of the differential strengths of the four significant factors on judgments of attractiveness. It can be seen that Self-care was by far the strongest correlate of attractiveness. Indeed, Self-care contained two items that were among the best single predictors of attractiveness: shapeliness of physique and overall grooming (Table 2).

Results for Self-care, obtained here, corroborated findings by Gitter, Lomranz, and Saxe (1982) showing that a protruding stomach was the single best predictor of unattractiveness. The present findings also corroborated those by Brown et al. (1986), showing that neatness influenced attractiveness ratings.

Combined effects of physical features and emotional reactions on judgments of

attractiveness. The third stage of the mediation test required treatment of the three emotion variables (the mediator) as one group and the four physical feature factors (the independent variable) as a second group. Equation 4 contains the overall impact of another's physical features, as a group, on rater judgments of the other's attractiveness. To explore the overall impact of rater emotional reactions (as a group), attractiveness scores were analyzed in a stepwise regression analysis as a function of Pleasure, Arousal, and Dominance reactions of raters to the other. Equation 5 summarizes the significant results and has a multiple-correlation coefficient of .61.

Attractiveness (all raters and targets) = .40 Pleasure +.16 Arousal
  −.24 Dominance   (5)

Photographs of men and women that elicited greater pleasure, greater arousal, and less dominance (more submissiveness) from the raters were rated as more attractive. Noting that participants felt submissive with targets who were dominant (or, conversely, participants felt dominant with targets who were submissive), the preceding results can be paraphrased as follows: more pleasant, more arousing, and more dominant targets were judged as more physically attractive.

To test the mediation hypothesis, a final regression analysis was done in which the quantity on the right-hand side of equation 4 constituting the combined effect of physical features (i.e., .58 Self-care +.21 Femininity +.19 Masculinity +.13 Pleasantness) and the quantity on the right-hand side of equation 5 constituting the combined effect of emotional reactions (i.e., .40 Pleasure + .16 Arousal - .24 Dominance) were the independent variables, and judged attractiveness of another was the dependent variable. Self-care, Femininity, Masculinity, and Pleasantness were standardized in computing the combined effect of physical features, and Pleasure, Arousal, and Dominance were standardized in computing the combined effect of emotional reactions.

Attractiveness = .45 Features +.39 Emotions   (6)

Both independent variables in equation 6 were significant ($p < .05$), and the multiple-correlation coefficient of the equation was .73. It is seen that "Features" (i.e., the combined effect of Self-care, Femininity, Masculinity, Pleasantness, as given in equation 4) and "Emotions" (i.e., the combined effect of Pleasure, Arousal, and Dominance, as given in equation 5) were both significant determinants of judged attractiveness. Thus, the mediator variable (Emotions) was significant in equation 6 and, furthermore, the effect of the independent variable (Features) was less in equation 6 than it was in equation 4 (compare the beta weight for Features in equation 6 with the multiple-correlation coefficient of .65 in equation 4). Overall, then, all requirements of the mediation hypothesis were met, showing that a rater's emotional reactions to another did indeed mediate and help explain the rater's judgments of the other's attractiveness.

Relations of Physical Features with Attractiveness for Male and Female Raters and Targets

Assessment of relations for raters of each gender. To explore possible differences due to rater gender, the regression analysis that resulted in equation 4 was repeated separately for male raters and, again, for female raters. The significant results are given in equations 7 and 8 below.

Attractiveness (male raters only) = .58 Self-care +.11 Femininity
+.13 Pleasantness (7)

Attractiveness (female raters only) = .56 Self-care +.25 Femininity
+.25 Masculinity +.14 Pleasantness (8)

Multiple-correlation coefficients were .65 for both equations 7 and 8. Equations 7 and 8 resemble equation 4 and show that raters of either gender found greater Self-care, Femininity, and Pleasantness of another as more attractive. The major difference between male and female raters was that, whereas female raters found greater Masculinity of another as more attractive, there was no corresponding effect for male raters. Stated otherwise, men did not find the Masculinity of another as attractive or unattractive.

Assessment of relations for targets of each gender. Two additional regression equations were computed, one each for male and female targets, to clarify contributions of the Masculinity and Femininity factors to judged attractiveness in equation 4. Equations 9 and 10 summarize the significant results for male and female targets, respectively.

Attractiveness (male targets only) = .46 Self-care +.33 Masculinity
+.15 Pleasantness (9)

Attractiveness (female targets only) = .58 Self-care +.20 Femininity
+.16 Pleasantness (10)

Multiple-correlation coefficients were .58 and .73, respectively, for equations 9 and 10, showing that physical features were better overall determinants of attractiveness for women than for men. Also, equations 9 and 10 help clarify the puzzling combined contributions of Masculinity and Femininity to attractiveness in equation 4. Consistent with the findings of Brown, Cash, and Noles (1986), Masculinity contributed to the attractiveness of men only (equation 9), whereas Femininity contributed to the attractiveness of women only (equation 10).

Relations of Emotional Reactions with Attractiveness for Male and Female Raters and Targets

Assessment of relations for raters of each gender. To explore possible differences due to rater gender, the regression analysis that resulted in equation 5 was repeated

separately for male raters and, again, for female raters. The results are given in equations 11 and 12 that have multiple-correlation coefficients of .65 and .59, respectively.

Attractiveness (male raters only) = .37 Pleasure +.25 Arousal
   –.26 Dominance   (11)

Attractiveness (female raters only) = .40 Pleasure +.11 Arousal
   –.29 Dominance   (12)

Equations 11 and 12 are consistent with equation 5 and show that raters of either gender judged another as more attractive when that person made them feel pleasant, aroused, and submissive. However, the arousal effect in equation 12 was only marginally significant ($p < .10$), showing that the arousal/attraction relation was less important for female, than for male, raters.

Assessment of relations for targets of each gender. Two additional multiple regressions were done to explore possible differential effects due to target gender. Equations 13 and 14 below summarize the significant effects and have multiple-correlation coefficients of .62 and .61, respectively.

Attractiveness (male targets only) = .38 Pleasure +.14 Arousal
   –.28 Dominance   (13)

Attractiveness (female targets only) = .41 Pleasure +.18 Arousal
   –.22 Dominance   (14)

Comparisons of the coefficients in equations 13 and 14 show that results were essentially comparable for male and female targets. Thus, findings given in equation 5 were applicable, generally, for targets of either gender and showed that more attractive men, as well as of women, elicited more pleasure (+P), more arousal (+A), and less dominance (-D) from others.

Assessment of relations for targets and raters of opposite gender. Two more multiple regressions were done to explore relations for male targets with female raters and, conversely, for female targets with male raters. Equations 15 and 16 below summarize the significant effects and have multiple-correlation coefficients of .66 and .72, respectively.

Attractiveness (male targets and female raters) = .51 Pleasure
   +.15 Arousal –.18 Dominance   (15)

Attractiveness (female targets and male raters) = .51 Pleasure
   +.32 Arousal (–.10 Dominance)   (16)

The Dominance term in equation 16 is placed within parentheses because its coefficient did not achieve significance ($p > .25$). It is given, however, for comparison with other similar terms in equations 11 through 14. It is seen, then, that women judged male targets who elicited greater submissiveness from raters (i.e., more dominant male targets) as being more attractive. However, men did not judge more dominant female targets as being significantly more attractive.

TABLE 2
Correlations of Some Important Physical Features with Attractiveness and Elicited Emotions

	Attractiveness	Pleasure	Arousal	Dominance
Stable Features				
Shapeliness	.69*	.36*	.26*	-.38*
Flat Stomach	.46*	.29*	.06	-.28*
Obesity	-.30*	-.26*	-.19*	.30*
Changeable Features				
Overall grooming	.49*	.37*	.16*	-.31*
Make-up	.28*	.11*	.10*	-.10*
Happy affect	.25*	.54*	.09*	-.18*
Poor Posture	-.29*	-.26*	-.04	.18*

Note: *p < .05.

Single Physical Features as Predictors of Attractiveness

Strong correlates of attractiveness. In addition to the factor-related results given in equation 4 and in equations 7 through 10, it also is useful to note some of the individual physical features that had very strong relations with attractiveness. Table 2 highlights features that were central to attractiveness and details the emotional reactions elicited by each.

Among stable features, shapeliness of physique and flatness versus protrusion of the stomach had strong correlations with attractiveness and exhibited the expected patterns of correlations with emotions (+P+A–D). Obesity, on the other hand, correlated negatively with attractiveness and showed the opposite pattern of correlations with emotions (–P–A+D).

Among changeable features, overall grooming, makeup, and happy affect had significant positive correlations with attractiveness and the expected patterns of correlations with emotions (+P+A–D). In contrast, poor posture related negatively to attractiveness and evidenced the opposite pattern of correlations with emotional states.

Babyish facial features as correlates of attractiveness. Because considerable research effort has been devoted to the study of babyish facial features, it is also important to note specific findings bearing on these features. Obtained correlations between attractiveness ratings and babyish features were as follows: –.07 (*p* > .05) for babyish

face; .16 ($p < .05$) for larger eyes; .04 ($p > .05$) for rounder eyes; -.01 ($p > .05$) for higher eyebrows; .13 ($p < .05$) for less bushy eyebrows; .12 ($p < .05$) for smaller chin; .01 ($p > .05$) for smaller nose.

Thus, results for babyish features were mixed and considerably weaker than were those reported by Cunningham et al. (1995). Larger eyes, less bushy (or thinner) eyebrows, and a smaller chin were judged as more attractive; however, subjective judgments of babyish facial quality and ratings of eye roundness, eyebrow height, and nose size did not relate to attractiveness.

Physical Attractiveness as a Function of Interactions among, and Second-Order Effects of, Dimensions of Emotion

Equation 5 summarizes a rater's judgments of another's attractiveness as a function of the rater's emotional responses to the other's physical features. An additional analysis was done to explore physical attractiveness as a function of main effects and all interactions of Pleasure (P), Arousal (A), and Dominance (D). In the regression analysis, Attractiveness was the dependent variable, and P, A, D, P*A, P*D, A*D, and P*A*D were the independent variables. Results were the same as those given in equation 5; that is, none of the interaction terms achieved the .05 level of significance.

An additional regression analysis was done to explore physical attractiveness as a function of possible curvilinear effects of the three emotion variables. Independent effects in the regression analysis were: P, A, D, P^2, A^2, D^2. In addition to significance for linear effects of P, A, and D (paralleling those in equation 5), the effect of A^2 approached significance ($p < .1$). When attractiveness was regressed on A and A^2 only, both effects were significant ($p < .05$) and yielded equation 17 with a multiple-correlation coefficient of .33.

$$\text{Attractiveness} = .24\,A - .18\,A^2 \tag{17}$$

The relation in equation 17 is depicted in Figure 1 and is discussed below in reference to the controversy regarding the differential attractiveness of typical versus atypical faces.

GENERAL DISCUSSION

Basic Factors of Attractiveness

Interest in the study of various specific determinants of physical attractiveness has been intense and has yielded a plethora of findings. The present study was designed to bring together within a single experimental paradigm many of the important correlates of physical attractiveness. This plan had the advantage of allowing assessments of the differential strengths of the various effects identified in earlier work. More importantly, factor analysis of the entire group of physical features yielded simple, and conceptually meaningful, groupings of these cues.

FIGURE 1
Attractiveness of Target as a Function of Arousal Elicited by Target
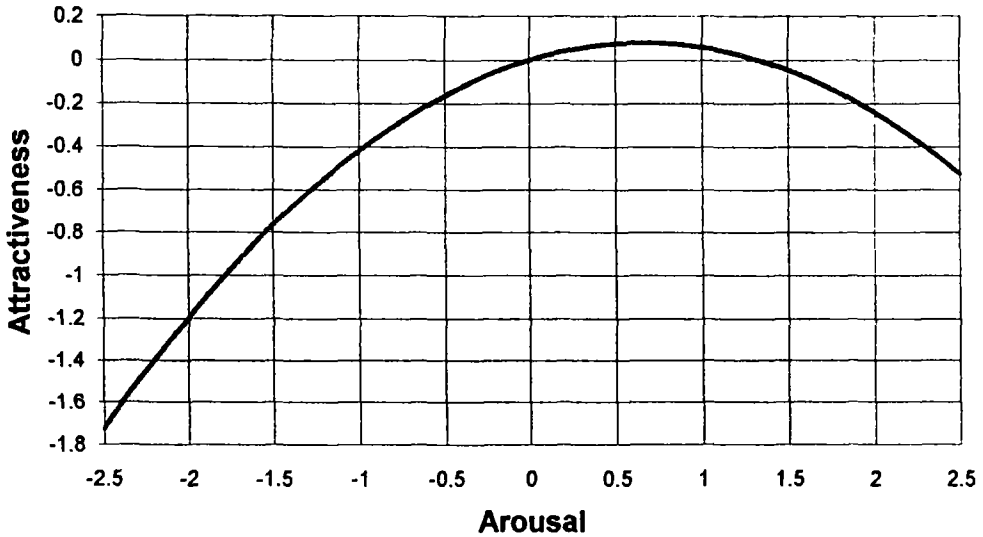
Correlates of attractiveness were summarized simply by using factor groupings of physical features (Table 1): Attractiveness of men was enhanced by greater Self-care, more Masculinity, and greater Pleasantness. Attractiveness of women was enhanced by greater Self-care, more Femininity, and greater Pleasantness.

Babyish Facial Features

Factor analytic findings, obtained here, failed to yield an interrelated group of babyish facial features, and thus ran counter to an important assumption in the work of several investigators (e.g., Berry & McArthur, 1985; 1986; Cunningham, 1986; Cunningham et al., 1995; Zebrowitz & Montepare, 1992). Instead, babyish facial features, when considered within the broader context of facial and bodily cues investigated here, were dispersed among several factors. Larger and rounder eyes were components of the Femininity factor, thicker eyebrows and a broader chin were included in the Masculinity factor, subjective ratings of a babyish facial quality and a larger nose were part of the Pleasantness factor, and higher eyebrows were included in the Ethnicity factor. (Nose size had the lowest loading on the Pleasantness factor and was not included in computations involving that factor.)

Target age in the present sample ranged from 18 to 32 years. Thus, a limited age range was explored here, and a broader sampling of infants as well as adults could possibly yield a babyish facial features factor. Nevertheless, the present findings showed

that, for adults, variations in facial and bodily characteristics failed to produce babyish facial features as a basic factor of physical appearance.

In the event that a babyish facial features factor can be identified using a wider target age span, our emotion-based approach would have the following implications regarding attractiveness. Rater emotional responses to targets possessing babyish facial features (assumed to be generalized from emotional reactions to babies) are likely to be dominant and pleasant, that is, for the targets themselves to appear to be submissive and pleasant. Indeed, in a study where target age ranged from 5 months to 54 years, babyish facial features were found to correlate positively with impressions of target submissiveness (e.g., less social autonomy, greater physical weakness, greater naivete) and to correlate positively with impressions of target pleasantness (more warmth, more honesty) (Zebrowitz & Montepare, 1992, Table 3).

According to equation 5, rater pleasure enhances, and rater dominance (or target submissiveness) detracts from, judgments of another's attractiveness. Since the beta weight for pleasure (.40) exceeds the beta weight for dominance (-.24) by a small margin, a very weak positive relation between babyish facial features and attractiveness would be predicted on the basis of the emotion-based model. Consistent with the latter inference, only three of seven babyish facial features explored (i.e., larger eyes, thinner eyebrows, a smaller chin) yielded significant, though weak, positive relations with attractiveness in the present study.

Atypical Faces

Langlois and Roggman (1990) argued that attractive faces were average, whereas Alley and Cunningham (1991) contended atypicality of faces enhanced attractiveness. Although both arguments have merit, the generality of each is difficult to establish. In particular, the atypicality hypothesis is bound to have some limitations, insofar as very unusual features (e.g., blue hair, scars caused by accidents or burns, a missing limb) are apt to be judged as unattractive.

Our findings relating arousal to attractiveness, given in equation 17 and Figure 1, help resolve this controversy. Mehrabian and Russell (1974) used information theory to define stimulus "information rate" and showed it to include more complex, varied, unusual, or novel attributes of stimuli. Their factor analytic findings supported the definition. Also, additional findings bearing on their information rate/arousal hypothesis, showed that higher information rate of stimuli elicited greater arousal.

The concept of information rate can be used to describe physical features and to group and scale asymmetry of appearance (e.g., of hair style or clothing), unusualness or atypicality of face or body, expressiveness or variation of facial expressions and voice, and unusualness or complexity of clothing, grooming, or accessories. Furthermore, the information rate/arousal hypothesis suggests that physical features of higher information rate (including atypicality of physical features) elicit greater arousal from raters.

Although our findings in equation 5 showed a generally positive relation between a

target's attractiveness and the arousal he/she elicits from others, the more detailed curvilinear relation (given in equation 17 and depicted in Figure 1) is far more informative in the present context. Specifically, taking the differential of equation 17 shows that the slope of the attractiveness curve is (.24 - .36 Arousal) and that this slope equals zero (i.e., attractiveness attains a maximum value) when arousal has a z-score value of .67 (equivalent to a percentile score of 75). Thus, atypicality of physical features contributes to attractiveness up to a point where the arousal induced is moderate; however, when atypicality induces arousal exceeding the 75-th percentile level, then it detracts from judged attractiveness.

More importantly, within the PAD framework, atypicality is only one of many physical characteristics that can influence attractiveness. Generally, emotional responses to any physical feature (e.g., large eyes, prominent cheekbones or square jaw, large chin, bushy eyebrows, high-status clothing, asymmetrical hair styling) can be assessed using the PAD emotion scales. Attractiveness of each feature (or combination of features) can then be predicted using equation 5.

Generality of the +P+A-D Pattern as an Indicator of Attractiveness

Description of attractiveness in the PAD Model. The present findings identified a well-defined constellation of emotional reactions to attractive individuals that may remain unchanged despite changes and/or differences in physical cues that constitute attractiveness. Targets who inspired feelings of pleasure, arousal, and submissiveness (+P+A-D) in others were judged as attractive; conversely, those who elicited feelings of displeasure, low arousal, and dominance in others were considered unattractive.

In the PAD Emotion Model, the (+P+A-D) emotion pattern corresponding to attraction identified here is labeled "dependent." Other emotional states with the same PAD ratings are exemplified by "thankful," "in love," "loved," "impressed," "fascinated," "awed," "overwhelmed," and "sexually excited" (Mehrabian, 1995; Valdez & Mehrabian, 1994). All of these are emotions that commonly accompany or depict feelings of attraction and, thereby, provide construct validity for the present emotion-based findings.

Results obtained here regarding emotional reactions to attractive persons may be even more important than our physical feature factors for studies of attractiveness and, particularly, for investigations of cross-cultural aspects of attractiveness. Also, our results regarding the mediating role of emotions in judgments of another's attractiveness correspond to findings in related areas of research noted below.

Attractive names. Results given in equation 5 corroborated findings by Mehrabian (1992) in a study of first names. Participants in that study inferred temperament characteristics of another from that person's name. For instance, they were given the name "Leland" and asked to describe the temperament of that individual based on subjective impressions derived from the name only. A different, and nonoverlapping, sample of participants provided ratings of desirability or attractiveness of all the names employed in the study. Regression analysis yielded the following equation for name desirability

(or attractiveness) as a function of temperament traits inferred from the names. The multiple-correlation coefficient for equation 18 was .52.

Name desirability (attractiveness) = .57 Target Pleasantness
+ .67 Target Dominance   (18)

A person's name is yet another feature or characteristic of that person. Results in equation 18 show that names that connoted more pleasant and more dominant temperaments of targets were judged as more attractive. Paraphrased in terms of rater reactions, equation 18 shows that target names that induced more pleasure and more submissiveness in raters were judged as more desirable.

Thus, findings in equation 18 are consistent with the two strongest effects (+P-D) obtained in the present study with physical features. Mehrabian's (1992) results with names and those obtained here with physical features were thus conceptualized in a parsimonious, yet highly general, form when emotional reactions were employed as mediating variables.

Situationally induced arousal and attraction. Findings obtained by Allen et al., (1989) are also relevant to the present results bearing on arousal and attraction. Fear induced by expectations of painful shocks (in their Study 1) and exercise in the form of running in place for two minutes (in their Study 2) increased male participants' arousal levels, and both experimental manipulations enhanced participants' sexual and general attraction to an attractive female confederate. Furthermore, arousal enhanced attraction even when participants' attention was drawn to the source of their arousal.

Fear involves displeasure, high arousal, and submissiveness; exercise involves high arousal. Apparently, then, in Study 1, the effects of high arousal and submissiveness outweighed those of displeasure, thereby increasing attraction. In Study 2, which involved a less confounded manipulation of arousal, high arousal induced by exercise was sufficient to increase attraction. In short, both studies and, particularly, Study 2, provided results consistent with the arousal/attraction findings obtained here and depicted in Figure 1.

Dominant features and attractiveness. Findings, obtained here, showed that rater emotional response of submissiveness (or, conversely, target dominance) was a positive correlate of rated attractiveness of a target. This result was consistent with findings by Cunningham, Barbee, and Pike (1990) showing that men wearing high-status clothing were more attractive to women. However, our findings appear to be contradictory to findings for female faces obtained by Keating (1985). On an a priori and conceptual basis, Keating grouped and labeled jaw prominence, jaw squareness, and bushy or thick eyebrows as components of facial maturity or dominance and large eyes and thick or pudgy lips as components of facial immaturity or submissiveness. Her findings purportedly showed that dominant features were more attractive in men, whereas submissive features were more attractive in women.

Careful reading of Keating's results, however, shows that the latter inference was an artifact of her conceptual and a priori grouping of cues. Indeed, Keating's findings bearing on facial features, *taken singly rather than in arbitrary groupings*, showed that

her particular grouping and labeling of facial features as indicators of dominance were not supported for female faces. For female faces, none of the facial features, taken singly, affected judgments of dominance (Keating, 1985, p. 66). As for attractiveness ratings of facial features, taken singly, Keating's results showed that thinner lips and more prominent jaws were more attractive for male faces and thinner lips and larger eyes were more attractive for female faces.

Dominant behaviors and attractiveness. Sadalla, Kenrick, and Vershure (1987) investigated effects of a target's dominant behaviors, rather than a target's dominant physical characteristics, on target attractiveness; nevertheless, their findings may be deemed relevant to results, obtained here, relating submissiveness of a rater (or, conversely, dominance of a target) to attraction. Sadalla et al. only employed opposite gender pairs and consistently found that dominant behaviors of male targets increased their attractiveness, whereas dominant behaviors of female targets had no effect on their attractiveness. Corresponding findings, obtained in the present study and reported in equations 15 and 16, corroborated findings obtained by Sadalla et al.: more dominant men were more attractive to women; however, more dominant women were not significantly more attractive to men.

Attractive Physical Features and Behaviors

The distinction between static physical characteristics versus behaviors as determinants of attractiveness requires emphasis and has important implications regarding limited generality of the present findings. Physical attractiveness is not limited to static physical characteristics, but also includes characteristic postures (e.g., erect-slumped, athletic-weak), movement and gesture patterns (e.g., active and expressive versus uncommunicative; decisive-hesitant; fluid, staccato, or slowpaced; determined-hesitant), facial expressions (e.g., smiling or pleasant versus frowning, worried, or unpleasant; active or expressive versus uncommunicative; self-assured or assertive versus submissive), and speech mannerisms (loud-soft, fluent-hesitant, rapid-slow, determined-hesitant). In this respect, the present study as well as many related studies referenced here lack the general behavioral context that can enhance or detract from a person's attractiveness. In short, a much needed area of additional research effort is study of the differential and interactive effects of behaviors and static physical characteristics on judgments of physical attractiveness. Here again, as has been demonstrated in studies of nonverbal communication (e.g., Mehrabian, 1972; 1981), consideration of emotions should help the analysis and integration of a myriad of physical and behavioral cues.

Cultural Differences

Although all proposed hypotheses were supported, it is important to note that the hypotheses and supporting findings given here were limited because they were based primarily on data obtained from U.S. university student samples. Compensating, in part, for the above limitation, the participant sample used here reflected the consider-

able cultural and ethnic diversity of the Los Angeles population. The Los Angeles campus of the University of California contains a rich mixture of Far Eastern, Middle Eastern, South American, Eastern European, and Western European students. First-generation immigrants and foreign visitors have composed 20–30% of UCLA student samples tested in our laboratory. Thus, even though our hypotheses and results can be applied only with some confidence to the young adult segment of the U.S. population, the heterogeneous composition of our sample also suggests that the present findings may be heuristic in investigating the determinants of physical attractiveness in other cultures.

Possible generality of the (+P+A-D) emotional constellation as a concomitant of physical attraction to another could be investigated in different cultures, irrespective of the specific physical cues that constitute physical attractiveness in each of the cultures. Also, our factor-based summaries of results may be useful for analyzing certain inter-cultural differences and passing intra-cultural fads in the features that constitute attractiveness. The voluptuous women of Rubens's time were considered highly attractive, whereas the almost emaciated-looking models of today represent the ideals of feminine beauty. The apparent contradiction of a voluptuous figure (or a long skirt) being considered attractive for women in one culture (or during one period of one culture) versus a thin figure (or a short skirt) being considered attractive in a different culture (or during a different period of one culture) can be resolved by noting the common denominator of both: Femininity. Thus, depending on culture or the times, a voluptuous or thin figure (or a short or long skirt) may heighten femininity, thereby enhancing attractiveness. Similarly, although components of the Self-care factor may differ from one culture to another, the positive relation of Self-care to attractiveness could possibly be stable across cultures.

Applications

Physical attractiveness has a substantial impact on individual lives. Movies, commercials, and fitness centers repeatedly reinforce the importance of looking good. Those who consider themselves unattractive are bound to suffer because of lower self-esteem and less assurance in dealing with interpersonal and work-related situations. In this connection, the present findings can provide some guidance to those who attempt to achieve greater physical attractiveness. Many of the predictors of attractiveness identified here were changeable factors: attire, hair color, facial expression, posture, makeup, or weight. Thus, our results offer a way to understand how physical appearance influences others and provide a means to alter these so as to achieve specific interpersonal objectives.

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