Perceiving Character in Faces: The Impact of Age-Related Craniofacial Changes on Social Perception

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Despite considerable evidence indicating that our perceptions of people's psychological attributes are strongly tied to their facial appearance, there has been almost no systematic and theoretically guided research on this topic. The ecological approach to social perception (McArthur & Baron, 1983) holds that facial characteristics may influence impressions if they typically reveal psychological attributes whose detection is important for adaptive functioning. For example, the facial characteristics that identify infants should reveal their helplessness. The ecological approach further predicts that a strong attunement to adaptively significant facial characteristics may be overgeneralized. In particular, it is hypothesized that adults with immature facial qualities are perceived to have childlike psychological attributes. The research we review provides strong support for this prediction. More specifically, adults with various childlike facial qualities are perceived to afford more warmth, more submission, more honesty, less physical strength, and more naiveté than those with more mature faces. Implications of the ecological approach for further research on face perception are discussed.

The countenance is the reflection of the soul. (Cicero)

Although most modern psychologists eschew the belief that character can be read from the face, this view has an ancient and distinguished history. It is found in the works of ancient philosophers like Aristotle, who described at length the facial signs of strength and weakness, genius and stupidity, timidity and boldness. It is also found in the works of great writers like Shakespeare, whose extensive use of physiognomic description attests to his conviction that the face reveals the inner person as well as his confidence that his readers would understand these correspondences.

Although we have no evidence concerning how common the belief in facial cues to character was in Shakespeare's time, in modern times this supposition seems to be quite widespread. The reliance on physical appearance in descriptions of others occurs at an early age (Livesley & Bromsley, 1973) and although psychological descriptions increase as a person matures, physical qualities continue to play a central role in our judgments of character. For instance, Liggett (1974) reported a survey of university students that revealed that over 90% believed there are important facial guides to character. Fiske and Cox (1979) further demonstrated that the belief in facial guides to character has an impact on behavior. When people were asked to describe another person, appearance was typically the first category of description used. Moreover, the tendency to begin by describing the person's appearance rather than other attributes occurred whether people were describing a familiar or an unfamiliar person, and it was observed even when people had been instructed to describe the person so that someone else would know what it is like to be around him or her.

The prominent role of physical appearance in descriptions of others is paralleled by its role in attraction to others. Not only is there considerable evidence indicating that people prefer to socialize with physically attractive members of the opposite sex (Berscheid & Walster, 1974), but it has been also found that people cite a variety of physical characteristics in addition to attractiveness as their reason for wanting to get to know a person. More specifically, Lyman, Hatlelid, and Macurdy (1981) found that when people gave reasons for wanting or not wanting to get to know someone whom they had seen engaging in a videotaped social interaction, they not only cited a variety of physical characteristics but these characteristics were better predictors of the desire to affiliate than were observed behaviors, inferred behaviors, or personality traits.

Further evidence for the impact of appearance on our impressions of others comes from research that has examined descriptions of people as a function of variations in their facial appearance. Kassin (1977) found that perceivers are more likely to ascribe stable personality traits to a person whose appearance is constant than to one whose appearance noticeably changes. Bowman (1979) found that perceivers were more apt to change their trait ascriptions to a person whose behavior changed if his or her facial appearance also changed than if it remained constant. Finally, Secord and his associates (Secord, Dukes, & Bevan, 1954; Secord & Muthard, 1955; Stritch & Secord, 1956) conducted a number of studies in which subjects were shown photographs of faces and were asked to rate the physiognomic
features as well as their impressions of the personality traits of those pictured. The results revealed that people who were rated similarly on facial features were also rated similarly in personality—that is, people who physically resembled each other were perceived to have similar traits, whereas those who looked different from one another were perceived to have different traits.

To summarize, it appears that our perception of people's character is strongly tied to their facial appearance. When asked to describe what someone is like, we begin by describing their appearance, and when asked why we want to get to know someone we cite aspects of their appearance. People who look alike are judged to be alike. When a person's appearance varies a lot, we do not perceive stable personality characteristics. Furthermore, we more readily ascribe personality changes to people if their appearances also changed.

Although people's facial appearances clearly influence our impressions of their psychological qualities, the question remains as to what facial characteristics communicate what psychological qualities and why they do so. Early physiognomists addressed both of these issues, albeit unsatisfactorily. In response to the "what" question, they generated many colorful hypotheses that were neither organized into a coherent theoretical framework nor subjected to empirical verification. In response to the "why" question, they argued that people believe that facial appearance and behavior are related because facial appearance is in fact an accurate indication of character (e.g., Lavater, 1783). Although this may prove true for at least some face/behavior associations, most psychologists today are rightly skeptical of the notion that a facial feature like the length of a person's nose or the size of a person's eyes could really be directly related to his or her character. Given that one rejects this view, the question then becomes "What do people believe to be the correspondences between facial appearance and character and why do they hold these beliefs?"

Although modern psychologists find this question more reasonable than the views of the physiognomists, they have not proided insights into this version of the problem. Their failure cannot be attributed to a lack of interest in how we perceive faces. Indeed, Goldstein (1983) has pointed out that a surprising number of influential psychologists have, at some point in their career, published work in the area of face perception. However, Goldstein noted that "what makes face research different from other equally circumscribed areas of psychology is that not one of these famous scientists ... performed important systematic [italics] studies on face-related matters" (p. 243). The fact that there has been no systematic, theoretically guided program of research on this topic can explain our limited understanding of what specific facial characteristics communicate what psychological qualities and why they do so. For example, Secord and his associates (Secord et al., 1954; Secord & Muthard, 1955; Stritch & Secord, 1956) tried to answer the first question, but their empirical approach failed to identify clear correspondences between particular facial features and particular traits. Similarly, researchers have repeatedly demonstrated that attractive faces create positive impressions on a variety of trait dimensions (e.g., Berscheid & Walster, 1974), but, lacking theoretical guidance in identifying the facial characteristics that are attractive, they have not identified the specific facial characteristics that produce these positive impressions.

Despite the dearth of theoretically guided research on face perception, there are some theoretical conceptualizations that warrant attention. One explanation that some might offer for the perceived correspondences between facial appearance and character is a self-fulfilling prophecy effect. Perhaps people with certain facial features actually do behave in distinctive ways because others expect them to and, consequently, interact with them in a manner that elicits the expected behavior. Evidence for such an effect has been documented by Snyder, Tanke, and Berscheid (1977), who found that people expect physically attractive individuals to be more socially adept than unattractive people, and that social interactions with attractive people elicit the very behaviors that are expected. Although such self-fulfilling prophecy effects may occur, two crucial questions remain: What facial characteristics elicit the self-fulfilling reactions in perceivers, and why do perceivers have these reactions to begin with?

Secord (1958) proposed three general principles that could account for perceivers' reactions to particular facial qualities: functional associations, metaphorical associations, and temporal extension. According to Secord (1958), a functional association occurs when "the perceiver infers that some aspect of the object person functions in a particular manner; from this he assumes that the individual possesses an associated attribute" (p. 313). For example, the finding that people wearing glasses are perceived as more intelligent than those not wearing glasses (e.g., Thornton, 1943, 1944) may derive from associations to the functional properties of glasses: they help one read, and such bookish behavior is associated with intelligence. In a metaphorical association, "the perceiver makes an abstract generalization based upon an analogy between some denotable characteristic of the object person and a personality attribute" (Secord, 1958, p. 314). For example, the stereotype that people with red hair are excitable may reflect the metaphor "hothead," because the hair on their heads is a fiery color.

Temporal extension occurs when "the perceiver regards a momentary characteristic of the person as if it were an enduring attribute" (Secord, 1958, p. 307). For example, a temporary smiling face may create the impression that the stimulus person has the more permanent traits of friendliness and a good sense of humor. McArthur (1982b) proposed a generalization of the principle of temporal extension, namely that when a stimulus person's permanent, nonexpressive, facial physiognomy resembles certain emotionally expressive states, the observer may perceive the "state" in these facial features and, via temporal extension, the associated "trait." For example, people with large mouths may be perceived as friendly because smiling mouths are large. Although Secord's postulates seem intuitively plausible, and can be used post hoc to account for various appearance–trait associations, they have not been systematically tested by empirical research.

The writings of ethologists provide a second way to conceptualize perceivers' reactions to particular facial qualities. Based on considerable evidence that morphological traits in infrahumans may convey social messages to conspecifics, ethologists have speculated that certain morphological characteristics may also operate as social signals among humans. For example, Lorenz
(1943) has suggested that a range of appearance variables commonly found in both human and animal infants combine to elicit responses from adults that increase the infant's chance of survival. In particular, the tendency for adults to respond to infants with positive affect, protection, and a decreased likelihood of aggression indicates that the infant's appearance signals cuddliness, helplessness, and "nonthreateningness." Guthrie (1976) has made a similar argument regarding the appearance variables that communicate a person's social status. In particular, Guthrie argues that because it is the general rule among vertebrates that dominant individuals tend to be experienced large, older males (p. 12), dominance is signaled by qualities that are associated with size, age, and sex. Although a number of studies have documented positive responses to infantile appearance characteristics, as predicted by Lorenz (e.g., Alley, 1983; Hildebrandt & Fitzgerald, 1979; Sternglanz, Gray, & Murakami, 1977), most of the support for Guthrie's postulates is anecdotal. However, there is some systematic research demonstrating that a broad jaw or a receding hairline, each of which is associated with older males, creates the impression of dominance (Keating, Mazur, & Segall, 1981).

A third conceptual framework that attempts to explain differential reactions to various faces is the ecological approach to social perception proposed by McArthur and Baron (1983). Based on Gibson's (1979) ecological theory of perception, this theoretical framework provides a more comprehensive treatment of human social perception than Secord or the ethologists. However, it incorporates some features of each. According to the ecological approach, a person's directly perceptible attributes—movements, vocal qualities, and facial appearance—provide useful knowledge about that person's behavioral propensities. Like the ethologists' theory, the ecological approach offers a functional rationale for these links between appearance and behavior. More specifically, it assumes that such social perceptions must have an adaptive function either for the survival of the species or for the goal attainment of individuals. The latter part of this assumption allows the ecological approach to address the issue of differences among perceivers better than the ethologists can. In particular, it holds that the appearance-personality links that will be perceived depend on the perceiver's attunement, which in turn depends on perceptual learning, social goals, and actions.

Like Secord, the ecological approach considers the issue of erroneous appearance-personality associations. However, these errors are viewed within a framework that seeks to explain their adaptive significance as well as to specify the necessary conditions for accurate perception. More specifically, the ecological approach holds that configural, dynamic, and multimodal stimulus information is often necessary for accurate social perceptions, such that perceptual errors frequently reflect impoverished stimulus information. An additional hypothesized source of error is the overgeneralization of perceptions that are usually adaptive. The three principles proposed by Secord may actually be viewed as exemplifying such overgeneralization. Many functional associations are adaptive—such as associating the functional properties of breasts with the nurturant attributes of mothers. Metaphorical associations may also be adaptive—such as associating heat with the color red. In addition, temporal extension can be seen as a manifestation of object permanence (Piaget, 1954), which imparts a necessary stability to our perceptual world. The ecological framework not only can incorporate Secord's principles, but it can also generate additional hypotheses regarding appearance-trait associations. In particular, it holds that any physical appearance variables may influence impressions if they typically reveal psychological attributes whose detection is important for the survival of the species or for the adaptive functioning of the individual.

Among those attributes whose detection is clearly essential for adaptive behavior are age-related behavioral affordances. The ecological approach stresses the perception of "affordances," because these properties are relevant to the perceiver's actions and goals. More specifically, affordances are opportunities for acting or being acted on that are provided by the environment (Gibson, 1979). Koffka (1935) captured this aspect of affordances more poetically: ""Each thing says what it is—a fruit says 'eat me'; water says 'drink me'; thunder says 'fear me'; and woman says 'love me.'," (p. 7). Age-related affordances are those opportunities for acting or being acted upon that vary with the age of the person with whom one might interact. Thus, for example, infants afford training, nurturing, and protecting. In Koffka's language, a baby says "teach me," "cuddle me," and "help me." Mature individuals, on the other hand, are more apt to afford sexual pleasure, wisdom, or harm. Only the adult says "love me," "ask me," or "fear me." Because the detection of age-related affordances such as these is clearly important for adaptive functioning, the ecological approach, like the ethologists, predicts that those facial characteristics that distinguish infants from more mature organisms are sufficient to reveal them. The ecological approach further predicts that a strong attunement to facial information that identifies infants and their related affordances may be overgeneralized to adults who in some way resemble the young. This raises the question of what facial characteristics distinguish infants from mature adults.

Ethologists have identified a variety of facial characteristics that distinguish infants from adults. At the most global level, Lorenz (1943) noted that an infant has a large head in relation to its body, and Guthrie (1976) has noted that an infant's face is relatively hairless, smooth skinned, and with fuller cheeks than an adult. Another general difference between infants and adults is the placement of the facial features. The vertical placement of features is lower on the infant's face, yielding a relatively larger forehead and a shorter chin. The chin not only elongates with increasing age, but also becomes more angular and prominent, jutting forward rather than receding.

In addition to the foregoing age differences in the overall configuration of the face, distinguishing characteristics of individ-

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1 The proposition that perception is adaptive is a metatheoretical or primitive assumption that is not directly falsifiable. It does, however, yield empirical hypotheses that can be disconfirmed, such as those tested in the research reported in this article.

2 Although traditional theories of social cognition also deal with the topic of impression formation, such approaches typically focus on what happens to knowledge about other persons after it is obtained. As the perceptual support for social cognition receives limited attention within these perspectives, they offer little guidance to researchers interested in perceptions of faces.
ual features have also been identified by ethologists. The eyes of
the infant are larger and the eyelashes longer relative to the rest of
the face. Young children have very fine eyebrows until pu-
berty, when longer, thicker brow hair develops, particularly
among boys. Also, because children typically look up at adults,
raising their eyebrows, high eyebrows are another sign of youth
(Guthrie, 1976). Other age differences related to the eyes in-
clude larger pupils in infants and young children than in adults,
and a greater tendency for the infant's iris and sclera to be blue.
Differences in hair color are also found, which is more often
blond in young children. The mouths and noses of infants can
also be distinguished from their adult counterparts. "Children's
lips are redder and proportionately larger than lips of adults .
. [and] the nose changes size and shape with age" (Guthrie,
1976, p. 106). More specifically, a baby's nose is typically small,
wide, and concave, with a sunken bridge; adult noses, particu-
larly men's, are proportionally larger, narrower, and convex,
with a prominent bridge (Liggett, 1974).

Although ethologists have identified the facial qualities that
distinguish children from adults, the question remains as to
which of these characteristics communicate an individual's age
to lay perceivers and which, if any, communicate an individual's
behavioral affordances. It is expected that persons with childlike
facial characteristics will be perceived as being younger than
those with more mature faces. It is also expected that those with
a childlike appearance will be perceived as affording more
warmth and cuddliness, more submission, less strength, less
danger, less wisdom, and more naivety than those with a mature
appearance.

It should be noted that within the ecological approach these
perceptions are assumed to reflect a direct response to a child-
like facial appearance rather than a response mediated by label-
ing the person as “child” versus “adult.” Indeed, this is the ex-
planation this approach offers for the persistent belief in corre-
spondences between adults' facial appearance and their
character. To test this assumption, we examine not only impres-
sions of faces that vary in age, but also impressions of faces
that vary in "babyishness," albeit not in chronological age. We
anticipate that impressions of people who vary in the maturity
of their appearance will parallel perceptions of those who vary
in actual maturity.

Impact of Age-Related Craniofacial Changes
on Social Perception

Craniofacial Profile Shape

Perpendicular foreheads . . . are certain signs of weakness, little
understanding, little imagination. Retreating foreheads in general
denote superiority of imagination and acuteness. (Lavater, 1783,
pp. 381-382)

One important source of age information is the shape of the
head when seen in profile. As an individual ages, the maturation
of the facial structure combined with the influences of external
forces such as gravity produce a distinctive remodeling of the
cranium. One result of this change, as seen from a side view,
involves a lessening of the predominance of the brain capsule
with increasing age. Evidence that sufficient information for the
identification of aging and growth is provided by this style of
change has been supplied by research investigating the effects
of the application of a growth-simulating cardioidal strain
transformation to standard profiles (cf. Todd, Mark, Shaw, &
Pittenger, 1980). This transformation, which has been demon-
strated to be a highly accurate approximation of real growth
(Todd & Mark, 1981), is spontaneously perceived as such
(Mark, Todd, & Shaw, 1981), and influences age estimates in a
systematic manner (McArthur, 1982a; Pittenger & Shaw, 1975).
In addition, research has indicated that such age-related varia-
tions in cephalic shape systematically influence the perception
of age-related affordances.

Alley (1983) reported two experiments in which subjects
were asked to identify the member of a stimulus pair they would
feel the most compelled to defend from a physical beating. In
one study (Experiment 1), these stimulus pairs consisted of pro-
files derived from a series of frontal cephalic X rays taken of a
girl at 3, 57, 105, and 180 months. Subjects chose the younger of
the pair as the most defense-provoking significantly more often
than the older member. In another study (Experiment 1), sub-
jects performed the same task with stimulus profiles in which
shape was varied by applying various levels of cardioidal strain
to a standard. Again, subjects chose the younger profile (in
terms of level of strain) as the most defense-provoking. This
indicates that information about a person's need for physical
protection may be conveyed by age-variant profile shape cues.
Moreover, these results were both powerful and consistent de-
spite the subtle and abstract nature of the shape manipulations,
suggesting that subjects were responding to the stimulus con-
figuration itself rather than relying on a process of age labeling
to make their choices.

McArthur (1982a) found further evidence that profile shape
may influence impressions of a stimulus person's affordances.
Seven profiles representing different levels of cardioidal strain
(Figure 1) were shown to subjects one at a time in random order,
and subjects were asked to rate each on a series of 7-point biop-
lar trait scales. After all seven profiles were rated on one dimen-
sion, they were again presented in a different random order, and
rated on the next dimension. After the profiles had been rated on
all trait dimensions, they were presented one final time and
subjects were asked to estimate the age of each profile. These
procedures were adopted in order to weaken any carryover
effects of one trait rating of a profile onto another, and to reduce
the likelihood that an explicit age label attached to each profile
would influence the subjects' trait ratings. It should be noted
that when the profiles are shown singly in a random order, the
differences between those that are most similar in cardioidal
strain are very subtle. Nevertheless, profile shape had a strong
effect on subjects' impressions (Table 1).

As the craniofacial profile decreased in maturity, the stimulus
persons were perceived as increasing in dependency. More spe-
cifically, they were rated as decreasing in alertness, reliability,
intelligence, and strength. Decreasing craniofacial profile ma-
turity was also associated with increases in approachability, as
the more immature profiles were rated as less threatening,
kinder, more flexible, and more lovable than were older profiles.
The only rating of approachability that decreased as profile ma-
turity decreased was that of sexiness. Although the foregoing
linear effects were highly significant, it should be noted that rat-
ings of alertness, reliability, intelligence, and sexiness also
Table 1
Mean Ratings of Craniofacial Profiles Varying in Cardioidal Strain

<table>
<thead>
<tr>
<th>Affordance</th>
<th>Level of cardioidal strain (k)</th>
<th>Judged age</th>
<th>Dependency</th>
<th>Approachability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-.25</td>
<td>-.10</td>
<td>0</td>
<td>.10</td>
</tr>
<tr>
<td>Judged age</td>
<td>4.43</td>
<td>11.57</td>
<td>15.47</td>
<td>22.70</td>
</tr>
<tr>
<td>Alert</td>
<td>3.40</td>
<td>4.50</td>
<td>5.10</td>
<td>5.57</td>
</tr>
<tr>
<td>Reliable</td>
<td>4.37</td>
<td>4.90</td>
<td>5.20</td>
<td>5.53</td>
</tr>
<tr>
<td>Intelligent</td>
<td>4.20</td>
<td>5.07</td>
<td>5.50</td>
<td>5.13</td>
</tr>
<tr>
<td>Strong</td>
<td>1.40</td>
<td>3.23</td>
<td>3.30</td>
<td>4.43</td>
</tr>
<tr>
<td>Nonthreatening</td>
<td>6.80</td>
<td>6.30</td>
<td>5.80</td>
<td>5.00</td>
</tr>
<tr>
<td>Kind</td>
<td>5.43</td>
<td>5.63</td>
<td>5.30</td>
<td>4.87</td>
</tr>
<tr>
<td>Flexible</td>
<td>5.20</td>
<td>4.63</td>
<td>4.90</td>
<td>4.76</td>
</tr>
<tr>
<td>Lovable</td>
<td>5.70</td>
<td>5.33</td>
<td>5.13</td>
<td>4.60</td>
</tr>
<tr>
<td>Sexy</td>
<td>2.53</td>
<td>3.53</td>
<td>4.20</td>
<td>4.60</td>
</tr>
</tbody>
</table>

Note. All ratings were made on a 7-point scale, N = 30 in each cell. Critical F = 2.42 for p < .05. Whereas craniofacial growth is typically completed during the 20s, the last two profiles in this series were judged to represent people in their 30s. Thus, it may be that these two levels of this version of the cardioidal strain provide information in addition to growth. Indeed, perceivers often called these two profiles "ape men." As such, the reader should be aware that ratings of the last two profiles may not really reflect age perceptions.

showed strong quadratic trends, reflecting a curvilinear relation with craniofacial maturity.

The impact of craniofacial profile shape on trait ratings in this study and on defense-provokingness in the Alley studies suggests that adults' perceptions of a person's social affordances vary as a function of age-related physical information. Moreover, the direction of these effects is consistent with ecological hypotheses. It seems quite adaptive to perceive immature profiles as more dependent and approachable, but less sexy than mature ones. Such perceptions are fundamental to behavior geared toward protecting and nurturing, but not molesting, the young.

Research conducted by Montepare and McArthur (1985, Study 2) investigated the sensitivity of preschoolers to the age information available in the shape of the craniofacial profile. Varying levels of cardioidal strain were applied to a standard schematic profile to produce three age-variant stimuli, which adults judged to be 4-, 16-, and 30-year-olds. When children as young as 3 years were asked which profile in a pair was the "baby," the "boy," and the "man," they chose the correct profile at greater than chance levels.

Montepare and McArthur also assessed the influence of profile shape on the behavioral affordances that children perceived in the stimulus persons. For this purpose, a storybook was constructed in which four behavioral affordances were described in a concrete manner. The story involved a child's encounters with various people who might help to retrieve a kite caught in a tree. It described four different behaviors and the child's task was to decide which of two pictured individuals had manifested each behavior. The behaviors were: (a) knowing the answers to a lot of questions and being smart enough to figure out a way to retrieve the kite; (b) being a boss who makes the rules and tells people what to do, and who advised the child not to fly the kite close to the trees; (c) being unable to run very fast or jump very high and being too weak to climb the tree and get the kite; and (d) being mean and saying "Go away and don't bother me." For each behavior, children were shown pairs of profiles that varied in cardioidal strain and were asked to point to the person they thought would exhibit that behavior. Children chose the older of the profiles as the "mean" one at a greater than chance level, but profile shape had no consistent effect on any of the other dependent measures.

The fact that children could correctly identify the baby, the boy, and the man based on the information provided by the

![Figure 1. Stimulus profiles varying in cardioidal strain. (This transformation may be described in polar coordinates \( \theta = \theta, R' = R [1 + k(1 - \cos \theta)] \), where \( k \) is a constant representing the level of strain. From left to right, these profiles were produced by levels of strain \( k \) of \(-.25, -.10, 0, .10, .25, .35, \) and \(.55, \) respectively. [From "Aging Faces as Visual-Elastic Events: Implications for a Theory of Nonrigid Shape Perception" by J. B. Pittenger and R. E. Shaw, 1975, Journal of Experimental Psychology: Human Perception and Performance, 1, p. 376. Copyright 1975 by the American Psychological Association, Inc. Reprinted by Permission.)](image-url)
cardioidal strain indicates that even quite young children are sensitive to subtle and abstract age cues. However, children showed minimal ability to perceive age-related behavioral affordances. Although their perception of who would meanly say “don’t bother me” was influenced by profile shape, their impressions of other affordances—the ability to climb a tree, to figure out how to get the kite, and to advise against flying the kite near the trees—were not.

The role of perceiver attunement in detecting behavioral affordances may help account for these findings, as individuals differ in their sensitivity to available information as a function of its usefulness for action. It may be that information about “meanness” is most readily extracted by children because this knowledge plays a more useful role in their daily lives than the detection of such attributes as tree-climbing or problem-solving ability. This interpretation is supported by the findings of Fisher, Hand, Watson, Van Parys, and Tucker (1984), who reported that meanness is a primary dimension along which children initially base their impressions of others.

**Vertical Placement: Forehead and Chin Size**

A small deficient chin stands for weakness of will and physical endurance...the strong, large but well-proportioned chin stands for mental backbone...and also tremendous physical energy and endurance. (LeFevre, 1922, pp. 73-74)

The growth process simulated by the cardioidal strain also has an impact on facial appearance as viewed from a frontal position (Mark & Todd, 1983), and these changes have been demonstrated to have an impact on perceptions of both age and craniofacial maturity. More specifically, advancing age is accompanied by a raising of facial features on the vertical plane of the face, which yields a decrease in relative forehead size as well as an increase in relative chin size. Evidence that these facial changes communicate a person’s age to perceivers has been provided by McArthur and Apatow (1983/1984), who found that as the vertical placement of the features on schematic adult faces was lowered, the estimated age of the person decreased.

Variations in the vertical placement of features and the associated changes in forehead and chin size have an impact on people’s perceived affordances, as well as on their perceived age. Alley (1983, Experiment 2) applied the strain transformation to a frontal drawing of an infant’s face to produce five schematic faces. One consequence of this transformation was a variation in the vertical placement of the facial features, with the most babyish version exhibiting the largest forehead, the smallest chin, and the lowest feature placement. Subjects were shown the five drawings and were asked to rank order them in terms of which type they would feel the most compelled to defend from a beating. As predicted, the lower the vertical placement of the features, the higher the ranked defense-provokingness of the face.

McArthur and Apatow (1983/1984) have provided additional evidence that the vertical placement of facial features communicates age-related affordances. Subjects in this study rated the social dominance, physical strength, intellectual naivete, and physical appeal of male and female adult schematic faces. The dependent measures included both traditional bipolar trait scales (e.g., strong/weak) and behavioral affordance questions (e.g., “Does this look like someone who would be able to move several boxes of your heaviest books?”). Persons with a lower (“younger”) placement of features and a corresponding large forehead and small chin were perceived as physically weaker, more socially submissive, and more naive than those with a higher (“older”) placement of features. In addition, female faces with low placement were rated as cuter and warmer than those with high placement. It should be noted that partial correlation analyses indicated these relations cannot be attributed to differences in the perceived age or physical attractiveness of faces with a low versus high vertical placement of features. Thus, it cannot be argued that the impact of vertical placement on impressions resulted from stereotypic personality prototypes elicited through changes in the age label applied to the faces or through halo effects produced by variations in their attractiveness.

Berry and McArthur (1985) considered the impact of forehead and chin size on perceived social affordances using a sample of photographed adult men as stimuli. A narrower (“younger”) chin created impressions of warmth, honesty, kindness, and naivete. However, these ratings were not predicted by measures of forehead height, width, area, or measures of vertical placement. Although limited variability in the sizes of the foreheads in this sample of faces seems sufficient to account for the failure of these characteristics to influence impressions, the results do indicate that chin size, in and of itself, provides sufficient information for the detection of age-related affordances. Moreover, these results suggest that variations in chin size alone may have been responsible for the effects of the vertical placement manipulations used by McArthur and Apatow (1983/1984) and Alley (1983, Experiment 2). The impact of chin size on such judgments is also consistent with Keating et al.’s (1981) finding that persons with large jaws are perceived as more dominant than those with small jaws.

Using a methodology similar to that used in their study of children’s impressions of faces varying in cardioidal strain, Montepare and McArthur (1985, Study 3) have investigated the impact of the vertical placement of features on children’s age perceptions. Two different male faces were created by selecting two different sets of hairstyles, eyebrows, eyes, mouths, ears, and chins from a police “identi-kit.” For each face, the vertical placement of internal features was varied while keeping their relation to one another constant, to produce faces of a baby, a boy, and a man. When children as young as 3 years were shown pairs of these faces and asked which was the baby, boy, and man, their choice of the correct face was significantly greater than chance. Thus, very young children are sensitive to the age information provided by feature placement.

In addition to assessing children’s ability to use vertical placement information to identify a person’s age, Montepare and McArthur assessed the impact of such facial information on the perceived affordances of the stimulus person. For this purpose, they used a storybook that was identical to that described previously (Montepare & McArthur, 1985, Study 2) except for the addition of two behaviors: (a) sitting with the child for awhile and telling him a nice story that made him feel better about the kite that was caught in the tree, and (b) telling the child that he would buy him a brand new kite. As in the study of the affordances perceived in craniofacial profiles, the chil-
Figure 2. A sample stimulus face in which vertical feature placement has been varied from low (left) to high (right). (From Montepare & McArthur [1985].)

Like craniofacial profile shape, feature placement had little impact on the perception of age-related affordances. Meaningfully saying “Go away and don’t bother me” was once again the only behavior to show systematic effects. More specifically, this behavior was attributed more often than chance to the face with the lower vertical placement of features. As argued earlier, the failure of vertical placement to communicate any of the other behavioral affordances may be due to the lesser significance of the other affordances in the children’s everyday life. More difficult to explain is the fact that the “older” of the two craniofacial profiles was perceived as affording the mean behavior, whereas the “younger” of the two feature placements was perceived as affording the same behavior. This latter finding, which was contrary to predictions, may have been due to the tendency for the facial expression to appear more unpleasant as the vertical placement of the features was lowered (Figure 2). If so, then children’s impressions of the behavioral affordances of faces varying in feature placement may have nothing to do with the apparent age of these faces. Evidence consistent with this argument is provided by the finding that children judged the face with the lower placement of features as the meaner of the two whether or not they could accurately identify it as the younger of the two. In the case of the craniofacial profiles, on the other hand, children judged the face with the more mature profile as the meaner of the two only when they could also accurately identify the ages of the two profiles.

Whereas the foregoing studies have examined the impact of forehead and chin size on social perceptions, a provocative study by McCabe (1984) examined the relation between children’s craniofacial proportions and their risk for maltreatment. McCabe found evidence in four different samples that children who have been physically abused display “older” craniofacial proportions (i.e., a higher vertical placement of features) than nonabused children matched on such variables as age, gender, and race. There are various explanations for these results. For example, as noted earlier, Lorenz (1943) proposed that physical characteristics typical of the young inhibit aggression and elicit caregiving from adults. Perhaps infants or children who exhibit unusually mature feature characteristics do not adequately inhibit aggression or elicit caregiving and are thus at a higher risk for abuse or neglect than those who have a more “babyish” appearance. Another possibility is that an age-inappropriate craniofacial appearance may elicit perceptions of the child that are discrepant with his or her true needs and abilities. This might produce parental expectations of behaviors and accomplishments that are beyond the child’s capabilities. As a consequence, the child may be punished for failing to live up to expectations. Obviously, child abuse is a complex and multifaceted problem that involves a variety of factors. Nonetheless, the McCabe study provides evidence that age-variant physical traits may exert an influence not only on social perceptions, but also on social behaviors.

Facial Shape

The man of action type [whose] face ... resembles a square ... resorts primarily to his physical strength. The ... “let George do it” type is recognized by the round face ... he is always good tempered, jolly, pleasant. (LeBarr, 1922, pp. 24-27)

In addition to the impact of chin size on the perception of age and age-related affordances, some research has suggested that the shape of the chin and face may exert an influence on such judgments. Berry and McArthur (1985) found that male faces rated as highly angular were perceived as less warm, less honest, and more mature than those rated as softer in shape. McArthur, Lipnick, and Rudin (1984) further investigated the impact of facial shape cues on impressions. Subjects made trait ratings for a series of schematic faces constructed from a police identi-kit. These included four male faces with identical features but differing jaws. The manipulation of jaw shape created two angular jaws (a rectangular and a square version) and two curved jaws (an oval and a round version). The results revealed that faces with angular jaws were perceived as older than identical faces with curved jaws. Angularity also influenced the perceived affordances of the faces. More specifically, those with an-
angular jaws were perceived as more dominant than those with curved jaws. An additional finding in this study was that the impact of angularity on perceptions of the age and dominance of a human face was paralleled by its impact on perceptions of geometric shapes. A separate group of subjects rated a series of geometric shapes that corresponded to the shapes of the experimental faces—a rectangle, a square, an oval, and a circle. Like angular faces, angular objects were perceived as older and more dominant than curved ones. Interestingly, the impact of shape on these ratings was stronger for objects than for faces.

The finding that faces with angular jaws are perceived as older than those with curved jaws is consistent with Berry and McArthur’s (1985) report that angular faces are perceived as more mature than softer faces. The finding that this “mature” characteristic increases ratings of dominance is consistent with research indicating that faces featuring a mature-appearing chin are often judged to be dominant (Keating et al., 1981). The observation that the shape of an inanimate object has the same impact on perceived affordances as the shape of a person’s face could reflect a tendency to overgeneralize impressions of persons to objects that resemble them in some manner. This finding further suggests that both age and affordances may be specified by abstract geometric information regardless of the entity it characterizes, a result consistent with research that has applied the cardioidal strain transformation to inanimate objects (Pittenger, Shaw, & Mark, 1979).

Eye Characteristics

Brilliant, wide-open eyes denote sincerity, honesty, trustworthiness, and frankness. If carried to the extreme, they denote credulous and trustworthy individuals, those who take everything for granted and are easily led and often cheated by the unscrupulous. (LeBarr, 1922, pp. 63-64)

A higher arch of the brow [gives] a fixed air of attentiveness and receptivity. In a sense, this creates a stimulus of mild subordination. (Guthrie, 1976, p. 53)

Both eye and eyebrow characteristics have been proposed as influences on age perceptions. As noted earlier, round eyes and pupils that are large relative to the size of the face are typical of infants (Hess, 1970; Lorenz, 1943). In addition, the eyebrows of the young are lighter, finer, and characteristically higher than those of adults (Guthrie, 1976). Some empirical evidence that age information is available in the eyes is provided by the finding that eye size is positively associated with ratings of the “cuteness,” “attractiveness,” and “babyishness” of an infant’s face (e.g., Hildebrandt & Fitzgerald, 1979; Maier, Holmes, Slaymaker, & Reich, 1984; Sternglanz et al., 1977). More direct evidence for the role of eye size in age perception has been provided by the finding that as the size of the eyes in real and schematic adult faces increased, the estimated age of the persons decreased (Berry & McArthur, 1985; McArthur & Apatow, 1983/1984).

In addition, eye size and eyebrow height are negatively associated with the rated facial maturity of adult men (Berry & McArthur, 1985). Finally, Jones and Smith (1984) have reported that children make significantly more errors in rank ordering the ages of photographed persons when the eye area is masked than when other areas of the stimulus faces are occluded.

Eye size, eye roundedness, and eyebrow height influence the perception of age-related affordances as well as perceived age. McArthur and Apatow (1983/1984) demonstrated that increasing the size of the eyes in adult male and female schematic faces increased perceptions of the stimulus persons’ physical weakness, intellectual naivete, social submissiveness, warmth, and honesty. Furthermore, partial-correlation analyses revealed that these effects were independent of any differences in the perceived age and physical attractiveness of faces with large versus small eyes. Consistent with these results is the work reported by Keating (1985), who found that eyes that made male and female adult schematic faces appear mature also increased their perceived dominance, and Berry and McArthur (1985), who found that perceptions of warmth, kindness, honesty, and naivete were positively correlated with eye size in a sample of adult male faces.

Berry and McArthur found that eyebrow height as well as eye size influenced perceptions of social affordances. More specifically, higher eyebrows were associated with impressions of an adult man’s greater warmth, kindness, and naivete. Similarly Keating, Mazur, and Segall (1977) reported that schematic cartoon faces characterized by low eyebrows were identified as dominant more often than similar stimuli with high eyebrows. Additionally Keating, Mazur, Segall, et al. (1981) reported that photographed adults are perceived as more dominant when their eyebrows are lowered than when they are not.

Skin Qualities

It is known to the scientific world that wrinkles indicate the trend of character. (LeBarr, 1922, p. 59)

A variety of skin qualities have been observed to covary with age. For example, Guthrie (1976) noted that children’s skin is softer and smoother than that of adults. Although no research has considered the impact of skin texture on perceived age and affordances, some recent work suggests that facial wrinkling is a powerful conveyer of age information. Mark et al. (1980) asked subjects to estimate the ages of a series of profile drawings of adult male faces in which wrinkling and cranial shape were independently manipulated in an age-variant manner. It was found that increased wrinkling yielded linear increases in perceived age. In addition, when the age levels specified by profile shape and wrinkling were inconsistent, wrinkle information tended to have a somewhat stronger impact on age estimates than did cranial shape.

Two studies conducted by Montepare and McArthur (1985) have recently investigated the impact of facial wrinkling on children’s age identification and social perceptions. In the first study, 35-, 55-, and 75-year-old versions of two faces were created by varying the degree of wrinkling in each. In the second, wrinkling was varied to create faces judged by adults to be 19- and 53-years old. When children were shown these faces in pairs that varied only in the extent of wrinkling, they correctly identified the older of the two at a rate significantly greater than chance. In addition, the storybook described earlier was again used in this research to assess the impact of the wrinkles on the perceived affordances of the faces. As was true for craniofacial profile shape and feature placement, facial wrinkling had a systematic impact on one perceived affordance: Meanly saying “Go away and don't bother me” was attributed more often than chance to the face in the pair with more wrinkles.
Feature Length

The long line from the root of the nose to the tip stands, as a rule, for great energy, both mental and physical. (LeBarr, 1922, p. 67)

Another consequence of facial growth is that some features become longer with increasing age. Some evidence that feature length may convey age information to the perceiver is provided by the finding that infant faces characterized by short ears and a short nose also tend to be perceived as "cuter" than those exhibiting longer features (Hildebrant & Fitzgerald, 1979). More direct evidence that feature length can convey age information has been supplied by the finding that as the ear and/or nose length of schematic adult faces decreased, the estimated age of the persons also decreased (McArthur & Apatow, 1983/1984).

Feature length has also been found to have an impact on the social affordances perceived in a stimulus person. Faces with shorter ("younger") features were perceived as physically weaker, more socially submissive, and more intellectually naive than those with longer features (McArthur & Apatow, 1983/1984). Again, partial-correlation analyses revealed that these relations were not attributable to variations in either the physical attractiveness or the perceived age of faces with short versus long features.

Overall Facial Configuration

Babyfacedness

Billy Budd . . . or Baby Budd as . . . he at last came to be called . . . in aspect looked even younger than he really was, owing to a lingering adolescent expression . . . he showed in his face that humane look of reposeful good nature . . . had . . . almost an incapacity of plumply saying no . . . none of that intuitive knowledge of the bad . . . the impulsive aboveboard manner of the frank. (Melville, 1948, pp. 44, 50, 81, 86, 106)

Most of the work discussed to this point has concentrated on the impact of isolated feature variations on the perception of age and age-related affordances. A more complex issue involves the impact of these physical characteristics when they appear in combination, as is typically the case. As McArthur and Baron (1983) have pointed out, it is likely that we extract social knowledge from complex higher order configurations of stimulus information. Therefore, overall variations in the holistic facial configuration are likely to have the greatest impact on social perception.

McArthur and Apatow (1983/1984) simultaneously manipulated feature length, vertical placement, and eye size in schematic adult faces to produce "babyish" (low-placed, short features and large eyes), control (medium-placed, medium-length
Table 2
Percentage Variance in Perceived Affordance Measures Accounted for by Facial Feature Manipulations

<table>
<thead>
<tr>
<th>Affordance</th>
<th>All features</th>
<th>Vertical placement</th>
<th>Eye size</th>
<th>Feature length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical weakness</td>
<td>74</td>
<td>46</td>
<td>26</td>
<td>4</td>
</tr>
<tr>
<td>Social submissiveness</td>
<td>50</td>
<td>20</td>
<td>36</td>
<td>0.04</td>
</tr>
<tr>
<td>Intellectual naivete</td>
<td>40</td>
<td>23</td>
<td>28</td>
<td>13</td>
</tr>
</tbody>
</table>

Note. Percentages are averaged across two measures for each affordance and across two male and two female stimulus faces.

Berry and McArthur (1985) investigated the simultaneous impact of a variety of facial characteristics on perceptions of age, facial maturity, and age-related affordances in a sample of real adult male faces. Subjects were asked to judge 20 faces on their physical attractiveness and rate them on several trait dimensions. In addition, subjects estimated the chronological age of the faces, and rated them on craniofacial maturity (as measured by a 7-point scale with endpoints of mature face and baby face). The impact of this overall manipulation on perceived age and affordances was stronger than the impact of individual variations in any of the three facial characteristics. More specifically, the simultaneous manipulation of these characteristics accounted for 74% of the variance in perceptions of physical strength, 50% of the variance in impressions of social submissiveness, and 40% of the variance in ratings of intellectual naivete. As Table 2 shows, in every case, individual feature variations accounted for less variance in these perceptions than did the overall manipulation.

Berry and McArthur (1985) investigated the simultaneous impact of a variety of facial characteristics on perceptions of age, facial maturity, and age-related affordances in a sample of real adult male faces. Subjects were asked to judge 20 faces on their physical attractiveness and rate them on several trait dimensions. In addition, subjects estimated the chronological age of the faces, and rated them on craniofacial maturity (as measured by a 7-point scale with endpoints of mature face and baby face).
attractive, they also found that highly mature male faces were judged to be the most attractive. Variation in facial maturity also influenced perceptions of compositional attractiveness, with intermediate maturity faces being judged the most attractive. A weighted linear physiognomic composite was derived from two measures that predicted facial babyishness, and regression analyses revealed that this composite exerted a strong positive impact on social perceptions.

A second study (Berry & McArthur, 1986) was conducted to examine whether facial babyishness would continue to exert an impact on social impressions when meaningful behavioral information was provided to subjects. More specifically, this study investigated the impact of a defendant's craniofacial maturity on judgments of his guilt or innocence in a simulated trial. Subjects read copies of fictitious pretrial reports in which a young person was charged with some offense. The reports described the incident as either resulting from negligence (e.g., forgetting to warn a customer about a potential hazard) or intentional deception (e.g., misleading a customer about such dangers in order to make a sale). The facial maturity of the defendant was manipulated by attaching a photograph to the report. The photographed faces used in this study were adult men who had previously been judged to be either "babyish" or "mature" in facial appearance and who differed in terms of the physiognomic features found to predict these ratings: namely, chin size, eye size, eye shape, and eyebrow height. These faces did not differ in perceived age or physical attractiveness. Based on the findings that adults with babyish facial features are perceived as more naive and more honest than persons with more mature features (Berry & McArthur, 1985; McArthur & Apatow, 1983/1984) it was predicted that information indicating negligent criminal behavior would be more believable when the defendant was babyfaced, whereas intentional criminal behavior would be more believable when the defendant was maturefaced. As expected, subjects more often recommended the conviction of babyfaced men for crimes of negligence, whereas maturefaced men were more often perceived as guilty of intentional crimes (Figure 4).

Physical Attractiveness

Infantilism [of appearance] in women is attractive to men. (Guthrie, 1976, p. 77)

Although craniofacial maturity has been documented to exert an impact on social perception that is independent of attractiveness, variations in facial maturity also influence ratings of physical appeal. More specifically, the evidence indicates that facial babyishness has a divergent impact on the perceived attractiveness of men and women. Although McArthur and Apatow (1983/1984) found that male and female schematic faces that were intermediate in maturity were judged to be the most attractive, they also found that highly mature male faces were judged to be more attractive than babyish ones, whereas the reverse was true for female faces. These results held true when facial maturity was manipulated by feature length, vertical placement, or both together with eye size. Also, although large (babyish) eyes increased the judged attractiveness of both male and female schematic faces, large eyes tended to enhance the attractiveness of females more than males. Keating (1985) reported similar results for schematic faces. Moreover, two studies using photographed faces have corroborated the differential impact of facial maturity on the attractiveness of men and women. Berry and McArthur (1985) examined correlations between various measurements of a sample of male faces. The physiognomic measures that predicted facial babyishness in this sample (large and rounded eyes, high eyebrows, and a small chin) were not related to ratings of the men's attractiveness. On the other hand, a study by Cunningham (1984) found that immature features of high and wide eyes, high eyebrows, and a small chin (as measured by length rather than width) did correlate significantly with the judged attractiveness of a sample of 50 female faces.

The divergent impact of babyish facial characteristics on the perceived attractiveness of male and female targets is consistent with the findings of McArthur and Apatow (1983/1984) and Keating (1985), as well as the observation that a youthful appearance is a more important determinant of female than male sexual attractiveness (e.g., Deutsch, Clark, & Zaleski, 1983). It is interesting to note that the actual morphological differences between male and female faces reflect a greater retention of infantile characteristics in the adult woman than in the adult man (Gray, 1973; Liggett, 1974). Thus, the finding that a "baby face" is more appealing on a woman than on a man may reflect an aesthetic preference for faces that are prototypical for their gender.

Summary and Implications

Liggett (1974) found that the vast majority of university students believe there are important facial guides to character. The research reviewed in this article indicates there is a strong consensus regarding what personality traits are associated with what facial qualities. Interestingly, this consensus bears a striking resemblance to the pronouncements of early physiognomists, who were quoted throughout this article. In keeping with the predictions derived from McArthur and Baron's (1983) ecological theory of social perception, adults with childlike facial qualities are perceived to afford different social interactions than those with a more mature appearance. More specifically, people with low strain in the craniofacial profile, low vertical placement of features, a small and rounded chin, large and rounded eyes, high eyebrows, smooth skin, or a short nose are perceived as affording more warmth, more submission, less physical strength, more naivete, and/or less threat (more honesty) than those with more mature versions of these facial characteristics. It should be noted that although ethologists' observations were crucial in identifying childlike facial qualities, the findings reported are not readily accounted for by ethological theories, which focus on reactions to real infants rather than to adults who resemble infants. Also, although one might derive predictions regarding some of the documented appearance-be-
Table 3
Results of Multiple Regression Analyses Predicting Trait Ratings From the Physiognomic Composite, Physical Attractiveness, and Perceived Age

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Predictor variable</th>
<th>Partial correlation</th>
<th>Standardized beta</th>
<th>T</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warmth*</td>
<td>Composite</td>
<td>.63</td>
<td>.58</td>
<td>3.26</td>
<td>.004</td>
</tr>
<tr>
<td></td>
<td>Attractiveness</td>
<td>.70</td>
<td>.58</td>
<td>3.97</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>.04</td>
<td>.03</td>
<td>0.14</td>
<td>.888</td>
</tr>
<tr>
<td>Honesty*</td>
<td>Composite</td>
<td>.71</td>
<td>.70</td>
<td>4.06</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Attractiveness</td>
<td>.73</td>
<td>.60</td>
<td>4.30</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>.24</td>
<td>.18</td>
<td>1.01</td>
<td>.328</td>
</tr>
<tr>
<td>Naivete*</td>
<td>Composite</td>
<td>.66</td>
<td>.67</td>
<td>3.48</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>Attractiveness</td>
<td>.12</td>
<td>.08</td>
<td>0.49</td>
<td>.630</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>-.20</td>
<td>-.16</td>
<td>-0.81</td>
<td>.431</td>
</tr>
<tr>
<td>Kindness*</td>
<td>Composite</td>
<td>.72</td>
<td>.66</td>
<td>4.20</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Attractiveness</td>
<td>.72</td>
<td>.55</td>
<td>4.26</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>.03</td>
<td>.02</td>
<td>0.14</td>
<td>.893</td>
</tr>
<tr>
<td>Responsibility*</td>
<td>Composite</td>
<td>.33</td>
<td>.34</td>
<td>1.38</td>
<td>.185</td>
</tr>
<tr>
<td></td>
<td>Attractiveness</td>
<td>.61</td>
<td>.64</td>
<td>3.12</td>
<td>.007</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>.29</td>
<td>.32</td>
<td>1.38</td>
<td>.236</td>
</tr>
</tbody>
</table>


- A $F(3, 16) = 11.87, p < .0002, R^2 = .69$.
- B $F(3, 16) = 13.41, p = .0001, R^2 = .72$.
- C $F(3, 16) = 9.36, p = .0008, R^2 = .64$.
- D $F(3, 16) = 16.85, p < .0001, R^2 = .76$.
- E $F(3, 16) = 3.57, p < .037, R^2 = .40$.

Perceiver Attunements

One unexplored issue involves potential differences among perceivers in their responses to age-variant physical characteristics. As Gibson (1979) and McArthur and Baron (1983) stress, the pickup of useful information in the environment is in part guided by a perceiver's own needs, goals, and abilities. For example, although a babyish or immature appearance may communicate information about a particular individual's physical strength, the meaning of this information will vary as a function of a perceiver's own physical abilities. Thus, the proverbial "98-lb weakling" on the beach does not provide the same behavioral affordances for another 98-lb person as he does for the 175-lb person. Similarly, the implications of the information provided in age-variant physical characteristics differ for perceivers of different ages. Although a 35-year-old may readily perceive the affordance of sexual receptivity in another adult, a child would not be expected to readily extract this knowledge. The importance of perceiver characteristics in the process of detecting such adaptive information emphasizes the need for additional research focusing on developmental differences in the perception of age-related affordances.

In addition to focusing attention on individual and developmental differences in responses to age-related facial characteristics, the ecological emphasis on species-wide attunements has implications for cross-cultural research. In particular, if the responses to babyish facial characteristics documented in this article derive from their significance for species survival, then there should be panchultural generality in responses to "babyfaced" adults. Preliminary results from a series of studies conducted in Korea suggest that impressions of babyfaced adults do indeed replicate across diverse cultures (McArthur & Berry, 1986).

Information in Events

Another hallmark of the ecological approach is the recognition that a great deal of knowledge about the world, especially the social world, can only be revealed in dynamic events that occur over time (Gibson, 1982). This is especially true in the domain of social perception. We rarely perceive persons or faces as static stimulus displays, for they are dynamic and constantly changing by nature. The influence of such dynamic information has not been adequately considered in the research reviewed in this article. Rather, most of the reported findings are derived from experiments in which static facial appearance provided the only information on which to judge a person's affordances. It was necessary to limit the information available to perceivers in order to isolate the impact of particular feature variations on social perception. However, in our everyday experiences the information conveyed by a facial feature such as large eyes appears in a moving face, on a person who walks and talks. Research is needed to investigate the impact of age-related craniofacial characteristics on social perception when they appear in an animate person.

Another question that needs to be addressed is whether parameters of facial movement can, by themselves, convey knowledge about age and age-related affordances. Research has indicated that characteristics of body movement can communicate important social information. For example, Cutting and his as-
associates have demonstrated that point-light displays of a walking person, which retain only the dynamic information available in biological motion, provide sufficient information for the identification of gender and personal identity (see Cutting & Proffitt, 1981, for a review of this work). In addition, Runeson and Frykholm (1981, 1983) have demonstrated that information about deceptive intent can be extracted from these displays. More recently, Montepare, McArthur, and Amgott-Kwan (1984) have demonstrated that point-light gait displays also provide sufficient information for the identification of a stimulus person's relative age, and have an impact on the perception of age-related social affordances. Do parameters of facial movement influence social knowledge in a similar manner? Bassili (1978, 1979) adapted the point-light technique for use with facial motion, and demonstrated that perceivers can indeed identify emotion on the basis of movement cues alone. Whether such movement is also a source of knowledge about age and related social affordances is an open question.

Naturalistic Social Situations

In addition to the need to test the generalizability of the reported findings to impressions of moving, talking stimulus persons, there is also the need to test their generalizability to situations other than the “first impression” paradigm used in most of the research reviewed in this article. Some evidence that age-related facial characteristics do in fact have an impact on social perceptions in other contexts was provided by Berry and McArthur’s (1986) finding that a defendant’s facial maturity had an impact on judgments about his guilt or innocence in a simulated trial, and McCabe’s (1984) report that abused children had more mature craniofacial proportions than nonabused children of the same age. The latter study is unique in its assessment of the effect of craniofacial maturity on behavioral interactions rather than verbal descriptions. Although the data suggest that facial appearance does have a predictable impact on perceivers’ overt reactions in informationally complex social situations, there is clearly a need for additional research to investigate the generalizability of appearance effects to a variety of social situations and perceiver reactions.

Accuracy

The finding that immature facial characteristics have a strong impact on social perception even when the perceived age of the face is held constant (e.g., Berry & McArthur, 1985; McArthur & Apatow, 1983/1984) supports the ecological view that these perceptions reflect a direct response to the feature configuration rather than a response that is mediated through a process of age labeling. Although the differential perceptions of adults who vary in facial babyishness was thus anticipated by this perspective, these data must be reconciled with another assumption of ecological theory: that perception is adaptive in nature. If perception provides adaptive information to the perceiver, it would seem that perceptions should be accurate. Perceiving different affordances in individuals who differ in age is clearly accurate. Infants do require more nurturance and protection than adults to insure their survival. Children are not appropriate recipients of sexual advances. Adults are more physically and intellectually capable than children. On the other hand, there is no reason to assume that adults who differ in craniofacial maturity actually provide different affordances. Yet, the research reviewed in this article clearly reveals that they are perceived to do so. The ecological theory of social perception deals with this fact in several ways.

First, because we cannot possibly process all available information, the assumption of adaptive perception suggests that people will detect the most ecologically significant information. Because detecting the affordances communicated by an immature facial appearance is so important, these perceptions may be overgeneralized to adults who in some way physically resemble the young. Moreover, although a predisposition to pick up a particular appearance–affordance relation may sometimes result in an inaccurate perception, it can be argued that it is more adaptive to overdetect than to undertake such a covariance. (See McArthur, 1980, for a discussion of the adaptive value of illusory correlation effects.) In short, even if impressions of babyfaced adults are erroneous, these errors reflect the functioning of a perceptual system that is basically adaptive.

A second way in which the ecological theory of social perception can account for the apparently erroneous affordances perceived in babyfaced adults is to attribute them in part to the meager stimulus information provided to perceivers in most of the existing research. As noted previously, the ecological approach holds that dynamic, multimodal stimulus displays yield information beyond that available in static stimuli. It is further assumed that social affordances will be most accurately detected when such stimulus information is provided. Thus, one would expect that the tendency to perceive childish affordances in babyfaced adults would be attenuated when dynamic multimodal stimulus information is provided to perceivers. This does not obviate the importance of the existing data inasmuch as initial impressions, based on inadequate stimulus information, can affect the course of social interactions in a manner that confirms those impressions (Snyder et al., 1977).

There is a third consideration that can reconcile the apparently erroneous affordances perceived in babyfaced adults with the accuracy assumption of the ecological theory. This involves variations that may occur in the facial appearance of a given adult.

Accuracy

As we go about our daily rounds we symbolically move up and down the age scale, depending on the situation. A young woman teacher in her late 20's speaks in medium high tones with her husband, growls in low guttural tones at the kids, . . . At school she speaks (to her class) in a medium-deep well-metered and enunciated tone with her head, back, and shoulders erect. . . . at lunch with the girls, her voice rises and her shoulders and hands are mobile . . . with the superintendent her voice is high and soft, brows up and shoulders slumped slightly forward. (Guthrie, p. 143, 1976)

Although the foregoing examples emphasize variations in vocal and gestural maturity as a person moves from one social interaction to another, there is reason to expect analogous variations in facial appearance. People may widen their eyes when they are feeling sincere or credulous. They may narrow their eyes or lower their eyebrows when they feel dominant. Through such intraindividual variations in social maturity, people may consciously or unconsciously modulate the social affordances they present to others. Consequently, perceivers may sometimes be
accurate when they detect honesty and naivete in wide-eyed adults, when they detect submission in adults with high eyebrows, and when they detect dominance in adults with protruding chins.

Additional Craniofacial Characteristics

The work on facial babyishness reviewed in this article is based on the hypothesis that the detection of an infant's affordances is so important for adaptive functioning that perceivers may "overdetect" such affordances when the facial information that identifies infants appears in other contexts, such as adult faces. As noted earlier, the ecological approach holds that any physical appearance variables may influence impressions if they typically reveal psychological attributes whose detection is important for the survival of the species or for the adaptive functioning of the individual. Therefore, it would seem important to investigate the impact on impressions and social interactions of craniofacial qualities other than those that are age-related.

The recognition of emotions such as anger and fear clearly has adaptive value, and the rapid and accurate identification of such emotional states from facial expressions appears to be a universal phenomenon that develops at an early age. (See Ekman, Friesen, & Ellsworth, 1982, for a comprehensive review of relevant research.) As McArthur (1982b) initially suggested, our strong perceptual attunement to the transient facial configurations that communicate emotions may be overgeneralized to permanent physiognomic characteristics that resemble these emotional states, an effect that is related to Secord's (1958) principle of temporal extension. Thus, the person whose facial structure in some way resembles an angry face may be perceived as having a hostile personality; one whose facial structure resembles a happy face may be perceived as warm and optimistic. Some evidence consistent with such an effect has been provided by Laser and Mathie (1982), who found that both the perceived emotions and traits in schematic faces were influenced by such variations in facial structure.

Another characteristic whose recognition has adaptive value is an individual's state of health. Although there is no pertinent research on the topic of health perception, the ecological approach would predict that perceivers are sensitive to the transient facial indicators of illness, such as jaundiced skin, pale skin, or watery eyes. If so, then the perceived weakness and infectiousness of people with these temporary facial qualities may be overgeneralized to those who have a sallow complexion, fair skin, or chronic allergies. Systematic research to test these and other overgeneralization hypotheses may help elucidate the strong consensus regarding what character traits are associated with what facial qualities.

In addition to providing hypotheses about the impact on impressions of facial qualities not yet investigated, the ecological approach may contribute to our understanding of existing research on attractiveness. A significant question generated by this research is "Why does attractiveness have such a strong positive impact on social perceptions?" A possible answer is suggested in the writings of ethologists and evolutionary biologists, who have proposed that attractiveness may be related to reproductive fitness (Eibe-Eibesfeldt, 1970; Guthrie, 1976). If so, then the ecological approach would predict a positive halo effect in impressions of people with facial qualities that typically reveal reproductive fitness. More specifically, positive impressions should accrue to faces that appear healthy, receptive, of reproductive age, and prototypical for their gender. Moreover, these impressions should be more marked in heterosexual perceivers who are the opposite sex to the face in question.

Some evidence consistent with the foregoing argument was provided by Cunningham (1984), who found a strong positive correlation between men's ratings of women's attractiveness and perceptions of their general health and fertility, as well as researchers who have found that the perceived attractiveness of men and women across the lifespan corresponds with their reproductive capacity (e.g., Deutsch et al., 1983). In particular, although the attractiveness of both men and women increases from puberty through adulthood, women's physical appeal decreases sharply at middle age and men's gradually declines with advancing years. As noted earlier, there is also some evidence that faces prototypical for their gender are more attractive than those that are not. In particular, babyish features are perceived as less attractive in adult male faces than in adult female faces, which typically retain more infantile characteristics (Keating, 1985; McArthur & Apatow, 1983/1984). Finally, it has been demonstrated that transient facial characteristics indicative of receptivity are positively related to perceived attractiveness. For example, Cunningham (1984) reported that heightened eyebrows, dilated pupils, and wide smiles increased the attractiveness of female faces. Similarly, permanent physiognomic features paralleling these transient indicators of receptivity may also increase attractiveness. Although there is some evidence that those facial features indicative of reproductive fitness are indeed attractive, further research is needed to determine whether or not these features account for the well-documented halo effect in impressions of attractive individuals.

The ecological approach may offer some insights into another existing body of research: gender stereotypes. These stereotypes might reflect perceivers' reactions to gender-related facial characteristics; these include a tendency for the male forehead to protrude just above the eye and then slope backward, whereas the female forehead is smoother and more vertical, as well as a tendency for the male jaw to be more angular and prominent than the female jaw. As noted earlier, the net effect of these gender differences is that adult women retain more infantile facial characteristics than do men (Enlow, 1982; Gray, 1973). Consistent with this is the finding that babyish faces of either gender are perceived as more feminine than those with mature features (McArthur & Berry, 1986). Because it has been amply documented that we overgeneralize childlike affordances to adults who exhibit babyish facial features, gender stereotypes may reflect the attribution of more childlike psychological characteristics to women than to men. Indeed, there is a striking resemblance between the traits attributed to women and those attributed to babyfaced adults of either sex: submissiveness, weakness, naivete, and warmth (e.g., Broverman, Vogel, Broverman, Clarkson, & Rosenkrantz, 1972).

Rather than arguing that gender stereotypes reflect the overgeneralization of perceptions of infants to women, whose facial structure is more infantile than that of men, one could conceivably argue the reverse: Perceptions of women are overgeneral-
ized to infants and babyfaced adults who look more feminine than maturefaced adults. However, according to the ecological approach, overgeneralization effects derive from a tendency to “over respond” to information that is veridical when seen in its proper context. Therefore to accept this alternative explanation, one must assert that women are in fact more submissive, naive, weak, and warm than men. Furthermore, for this overgeneralization to occur, the detection of these affordances in women must be vital to adaptive functioning. This seems unlikely. On the other hand, infants do indeed differ from adults along these dimensions, and their survival would be threatened if such differences were not perceived.

This article illustrates an application of the ecological approach to the analysis of a particular area of social knowledge, the impact on social perception of age-related variations in craniofacial appearance. In it we argue that the ecological approach may be applied to research investigating the impact of other facial variations on social perceptions. In addition to providing empirically testable predictions as to what facial qualities are likely to produce what impressions, this perspective provides us with an explanation of the prevalent belief that “the countenance is the reflection of the soul” (Cicero).

References


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John C. Masters, Editor-elect for *Psychological Bulletin*, has appointed the following two Associate Editors for the journal: Larry V. Hedges, Department of Education, University of Chicago; and Nancy E. Cantor, Institute for Social Research, University of Michigan. Note: Authors should continue to submit all manuscripts directly to the Editor-elect, as specified in the Instructions to Authors on the inside front cover of this issue.