Children's Attributions of Social Dominance from Facial Cues

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KEATING, CAROLINE F., and BAI, DINA L. *Children's Attributions of Social Dominance from Facial Cues.* CHILD DEVELOPMENT, 1986, **57**, 1269–1276. Ethological reports of animal dominance signals suggested that certain human brow and mouth gestures would influence the attributions of social dominance made by children. Stimulus photographs depicting adults with lowered brow expressions or without smiles were hypothesized to appear dominant relative to photographs showing adults with raised-brow expressions or with smiles, respectively. In addition, the cross-species record suggested that faces with physiognomic characteristics indicative of physical maturity would also look dominant. In tests of these hypotheses, children between 4 and 7 years of age heard stories describing social dominance interactions and chose photographs of adults who looked like the dominant characters described in the stories. The results confirmed predictions and indicated that human nonverbal dominance signaling may be patterned after that of other species.

Social dominance is mediated by nonverbal communication in both nonhuman primates and humans (Andrew, 1963). Some distinctly human dominance signals emerge only with experience and appear to have a cultural basis (Zivin, 1982). Other signals, however, are provocatively similar to those displayed by nonhuman primates and appear to be patterned after those of other species (Keating, 1985b; Lockard, 1980; Rajecki & Flanery, 1981). In particular, some of the facial gestures that human ethologists have observed during dominance interactions seem to have nonhuman primate counterparts (e.g., Blurton Jones, 1971; Brannigan & Humphries, 1972; Camras, 1980, 1982), but few experimental studies have been conducted to support these observations. The present study used an experimental approach to examine children's perceptions of human facial expressions designed to resemble the dominance gestures of nonhuman primate species. Perceptions of physiognomic cues were also explored.

Eyebrow and mouth movements are important components of the facial gestures that correspond to dominance and submissiveness in nonhuman primates. Lowered brows are typically displayed by dominant or threatening individuals and raised brows by submissive or deferential individuals (e.g., Andrew, 1963; Redican, 1975; van Hooff, 1967; cf. Bernstein, 1970). The grimace or "silent bared teeth" display has been identified as a submissive gesture among most higher primates (Camras, 1982; Redican, 1975; van Hooff, 1967) and may be the homologue to the human smile (van Hooff, 1972).

Human ethologists have observed gestural patterns in children that appear similar to those of nonhuman primates. Lowered-brow expressions correspond with assertiveness during free play (Blurton Jones, 1971; Brannigan & Humphries, 1972; Grant, 1969) and with successful resistance to the aggressive acts of others during staged competitive tasks in the laboratory (Camras, 1977). Children's raised-brow expressions correspond to withdrawal during disputes (Blurton Jones, 1971). Smiling also seems to signal "no contest" or deference, in that in children it is associated with nonaggressive interactions, such as friendly approach (Volkmar & Siegel, 1982).

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Brow and mouth positions are also aspects of emotional expressions that have been reliably identified from photographs by adults from a diversity of cultures. Lowered brows have been associated with anger and raised brows with fear or surprise (Ekman, Friesen, & Ellsworth, 1972). Smiles have been associated with happiness (Ekman et al., 1972; Keating, Mazur, Segall, Cysneiros et al., 1981). Researchers differ in their emphasis on emotions that may be manifested in facial expressions. Some ethologists even warn against such inferences (e.g., Andrew, 1972). The intent of the present study was not to specify the emotional content inherent in expressions. Taking a more functional approach, we sought to identify gestures that convey social dominance to children without the presumption of emotional correlates underlying these expressions. "Dominance" was construed as multidimensional and not unitary in nature (Bernstein, 1981) and associated with various aspects of "telling others what to do," establishing rules, leading and getting one's own way by being assertive (see Ellyson & Dovidio, 1985, for an overview of the ways in which dominance has been operationalized). Guided by the views of several primatologists, our notion of dominance presumed the ability to manipulate others directly through a complex of social skills and not solely through physical aggression (Mitchell & Maple, 1985).

Although human ethologists have found that specific brow and mouth movements accompany dominant and deferential/receptive behavior, another question remains: Would individuals interpret or decode these expressions in a fashion consistent with the behavioral reports? Kindergarten children may, in that they associate photographs of brow frowns with resistance to relinquishing a desired object (Camras, 1980). Data based on adult perceptions, however, are only partially consistent with the ethological reports. For example, Keating, Mazur, Segall, Cysneiros et al. (1981) found both cross-cultural similarities and differences in responses when adults from eight countries judged facial photographs for dominance. The photographs depicted faces posed with either raised or lowered brows and smiling or not smiling. In all but one country, faces without smiles were perceived as more dominant looking than smiling faces. This result was consistent with both the human and cross-species behavioral data for mouth gestures and thus supported van Hooff's (1972) contention that the human smile and the primate grimace are homologous. However, only among the Western-culture samples were lowered-brow poses generally perceived as more dominant looking than raised-brow poses. The latter finding suggested that Westerners acquired the lowered-brow/dominance association through enculturation rather than through phylogenetic constraints (Keating, Mazur, Segall, Cysneiros et al., 1981).

The present study was conducted in the United States and explored children's perceptions of the same brow and mouth gestures shown to adults in the cross-cultural study. Would young children from the United States interpret the brow gestures as Western-culture adults did? Because dominance behaviors appear so readily (e.g., Strayer & Strayer, 1980), even among preverbal children (Brownlee & Bakeman, 1981), it was expected that the decoding of brow gestures by 4–7-year-old children would corroborate the results found previously for adults in Western societies. It was predicted that children would perceive individuals posed with lowered brows as more dominant than the same individuals posed with raised brows. Children's responses to mouth gestures were expected to confirm the pancultural association between nondominance and smiling previously reported for adult observers. Specifically, it was predicted that individuals would appear less dominant to children when they display a smile than when they do not.

Adult observers who participated in the cross-cultural study revealed universal or near-universal choice preferences for certain facial physiognomies as well as gestures. Regardless of gesture, faces characterized by receded hairlines, thin lips, large jaws, and relatively greater facial width were disproportionately chosen as dominant looking by the adults from the cultures sampled (Keating, Mazur, & Segall, 1981). These traits accompany physical maturation and, perhaps by that fact, are universally associated with social dominance in humans (Guthrie, 1970; Keating, 1985a) because, in virtually all human societies, social dominance belongs to the mature (van den Berghe, 1973). It was hypothesized, therefore, that the responses of young children to physiognomies associated with maturity would be consistent with the cross-cultural response pattern found previously for adults (Keating, Mazur, & Segall, 1981).

Method

Subjects.—The subjects were 56 children between 4 and 7 years of age who were enrolled in a private school in Washington, D.C. The children were predominantly

middle-class, black Americans. Data from two children were omitted when they responded incorrectly to items designed to check for task comprehension. Data from three more children were dropped when examination of their protocols revealed a response bias of all left-hand or all right-hand choices. Thus the final sample consisted of 51 subjects. There were 12 girls and 13 boys in the 4–5-year-old age category (mean ages: girls = 4.38 years, boys = 4.42 years) and 13 girls and 13 boys in the 6–7-year-old category (mean ages: girls = 6.9 years, boys = 6.3 years).

Stimuli.—The stimulus photographs used in the present study comprised a subset of those used in the earlier, cross-cultural investigations of facial gestures and physiognomy (see Keating, Mazur, & Segall, 1981; Keating, Mazur, Segall, Cysneiros et al., 1981, for details). Portrait photographs of adults were used. Each adult "model" was photographed with a direct gaze in two different poses. Some were instructed to pose with brows lowered and raised, and others posed with mouths relaxed and smiling (closed mouth). The photographing of two poses for each model permitted comparisons of observers' responses to different poses of the same models rather than to poses of different models and thereby avoided the confounding of facial pose with physiognomy.

To control the number of times subjects viewed models, the two photographs for each model were separated into two different stimulus series, A and B. By viewing either series A or B, subjects saw each model once, in only one pose. To simplify the judgment task, each portrait was paired with another in which the counterpart brow (or mouth) position was posed by a different model. By asking subjects to select the more dominant-looking individual of a pair, the task became a two-choice judgment procedure.

Each portrait pair was printed on a 35.6 × 19-cm card in black-and-white halftones. Heads measured roughly 17 cm from chin to crown. Twelve of the original 19 portrait pairs used in the cross-cultural study were selected as stimuli for the children's version of the study in order to create a task of a more reasonable length. The 12 pairs selected were those that produced the most consistent results in the cross-cultural gestures study. In both stimulus series A and B, each of the 12 portrait pairs compared the same two models shown in the same randomly determined serial order and left/right position on the card. Six pairs with contrasting mouth poses were interspersed among six pairs with contrasting brow poses. Portrait pair mates were members of the same sex (there were five female and seven male pairs), age group (ranging between 20 and 55 years), and ethnic background (eight Caucasian and four non-Caucasian pairs). Head size, eye level, and facial hair were similar within pairs. Thus, the only difference between stimulus series A and B was that models reversed poses. For instance, if a pair in series A showed "Jane" smiling and "Kate" without a smile, then in series B Jane appeared unsmiling with Kate smiling. Representative stimuli appear in Figure 1.

FIG. 1.—Representative stimulus faces. Models shown are posed with lowered- and raised-brow expressions. Reprinted with permission from the American Psychological Association.

Procedure.—The subjects were seated individually across a table in a room near their class by a female experimenter. After establishing rapport, the experimenter introduced the subjects' task with a five-item comprehension check requiring them to make a selection of one of two practice faces based on deliberately obvious criteria (like size) by pointing either to the face on the right or the left. The subjects, who had been randomly assigned to view either stimulus series A or B, were then shown a pair of faces and read one of six stories describing a dominance interaction. (The six stories are listed in the Appendix.) Each story was used twice by pairing it with two different stimulus face pairs. Randomly determined pairings of stories with

face pairs produced a standard stimulus set for all observers.[1]

Subjects' responses were recorded by the experimenter immediately following each stimulus presentation. The way in which successive stimuli were presented prevented the experimenter from tracking and cueing the children's performances. By sitting opposite subjects and orienting the stimulus cards toward them at eye level, the experimenter could not see which face pair was shown. Subsequent stimulus presentations merely involved placing a stimulus card at the end of the pile, thereby revealing the card with the next face pair.

Results

Facial gestures.—Facial pose or, equivalently, stimulus series (A or B), sex of subject, and subjects' age (4–5 years; 6–7 years) comprised a 2 × 2 × 2 factorial design. There were two dependent variables for each child: one based on responses to mouth gestures and the other based on responses to brow gestures. Each measure comprised a "score" indicating a percentage of models selected as dominant. Analyses compared the average score of subjects who viewed one pose (i.e., the mean percentage of nonsmiling or lowered-brow poses chosen from series A) with that from the other group of subjects who viewed the counterpart pose exhibited by the same subset of models in the alternative series (i.e., the mean percentage of smiling or raised-brow poses chosen from series B). By comparing responses to poses displayed by the same models (rather than by different models), the effects of models' physiognomy were controlled (Keating, Mazur, Segall, Cysneiros et al., 1981). This scoring procedure also means that the analyses were based on only half the models (i.e., one model from each face pair). Given our two-choice judgment task, analyses based on responses to the other half of models would merely duplicate the results reported here.

The responses to brow and mouth gestures were analyzed separately. An analysis of variance based on responses to brow gestures revealed the predicted main effect for stimulus series, $F(1,43) = 21.87$, $p < .001$. Children viewing series A whose scores were based on their selections of models with lowered-brow poses chose those models as dominant more often than did children who viewed series B and saw the raised-brow poses of the same model subset. Overall, series A children chose an average of 62% of the models posed with lowered brows, while series B children chose an average of 29% of the same six models shown with raised brows. There were no significant interactions between stimulus series and subject sex, stimulus series and age, subject sex and age, and no significant triple interaction, all F's$(1,43) < 1$.

Next, a 2 (stimulus series) × 2 (sex of subject) × 2 (age group) analysis of variance was conducted based on responses to mouth gestures. This analysis revealed the predicted main effect for stimulus series (equivalently, mouth pose), $F(1,43) = 19.75$, $p < .001$. On average, subjects viewing series A chose 72% of the nonsmiling models, while series B subjects picked only 44% of these models when they posed with smiles. In general, girls and boys responded similarly to the mouth gestures. There was no effect for subject sex, $F(1,43) < 1$, no significant interaction between subject sex and series, $F(1,43) < 1$, and no significant triple interaction, $F(1,43) = 2.92$, $p > .10$. There was a marginally significant interaction between subject sex and age, $F(1,43) = 3.84$, $p < .06$, that was not investigated further as it did not involve the effects of facial gestures.

Were smiling models chosen as the dominant members of face pairs less than would be expected by chance if gesture had no impact? Were models with lowered brows selected at a rate greater than chance? Across both series A and B combined, subjects chose an average of 36% of the models posed with smiles as dominant, which was significantly less than an expected value of 50% in this two-choice situation, $t(50) = 4.29$, $p < .001$. Of the models from both series who posed with lowered brows, an average of 66% were selected as dominant, and this figure was also significantly different from 50%, $t(50) = 4.88$, $p < .001$.

With respect to the predicted meaning of brow and mouth position, the children were consistent in their ability to identify dominance gestures. Consistency was evident in both age groups. The correlations between brow and mouth scores for the younger group, $N = 26$, $r = .44$, and the older group, $N = 25$,

[1] For a separate group of 21 children, different randomly determined pairings of dominance stories with portrait stimuli were presented. When compared with a subgroup of the children who viewed the standardized order, face-pair by face-pair analysis revealed no significant differences in the percentages of left-right choices between the groups (all p's $> .05$).

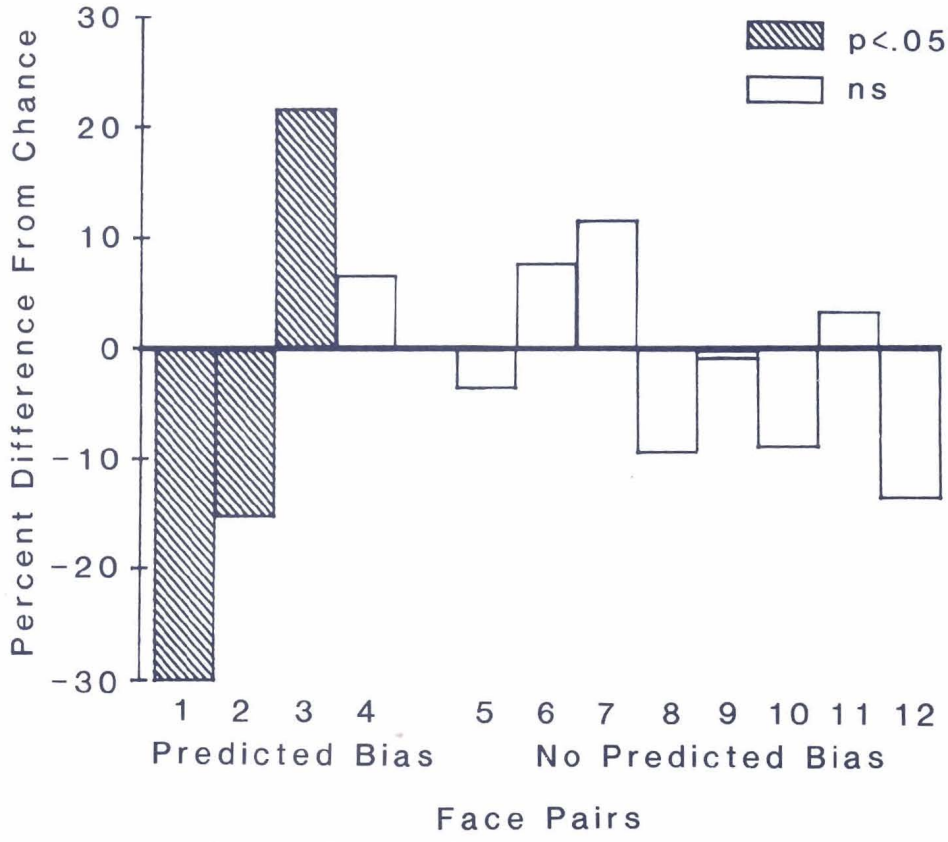

FIG. 2.—Children's biases for selecting one face from a pair as dominant looking. Bars indicate the percent discrepancy from chance selections (0%) for faces on the left of pairs.

r = .41, were statistically significant (p's < .02). These correlations tentatively suggest that there may be reliable individual differences in the ability to perceive nonverbal status messages.

Facial physiognomy.—Were children's perceptions of dominance affected by models' physiognomic characteristics as well as gestures? By weighting equally and combining the percentage of subjects from series A and B who selected a given model regardless of gesture, we effectively "controlled" for the influence of facial pose. If facial physiognomy had no effect, the percentage of subjects picking a particular model (arbitrarily, the model on the left of each pair) should be equal to the percentage picking the model's pair mate. To the degree that physiognomy engenders an impression of dominance or submissiveness above and beyond that of gesture, mean percentages will stray from the fifty-fifty (chance) split.

The responses for girls and boys were combined for this analysis after a 2 × 2 analysis of variance (subject sex × age category) revealed that, across all 12 model pairs, boys and girls of both age categories chose "left" about equally as often. There was no main effect for subject sex, $F(1,47) < 1$, or age, $F(1,47) < 1$, and no interaction, $F(1,47) = 1.56$, $p > .20$.

For each of the 12 face pairs, the percentage of children choosing left was compared with the percentage expected to pick left if facial physiognomy has no impact (Bruning & Kintz, 1968). Figure 2 depicts the results for these analyses by indicating the percent discrepancy from chance (set at 0%) for each of the 12 face pairs. There were four "predicted choice" biases: choices of the face on the right for pairs labeled 1 and 2 and the left for pairs designated 3 and 4 in Figure 2. These predictions were derived from the significant pancultural choice biases that resulted from a previous study with adults (see Keating, Mazur, & Segall, 1981). Adult choice biases were found to correspond with the presence of physiognomic dominance cues that characterized either the right face (pairs 1 and 2) or

left face (pairs 3 and 4) of a pair. Because there was no significant pancultural choice bias for the remaining eight face pairs, no predictions were made for the children's responses.

Figure 2 shows that the children's choices were biased in the hypothesized directions for each of the four face pairs with predictions. These biases were statistically significant for three of the four face pairs (Z's were 4.3, $p < .001$; 2.19, $p < .05$; 3.08, $p < .001$; and 0.93, N.S.; all two-tailed tests). For the eight pairs without predicted choice biases, none were found (Z's were 0.53, 1.09, 1.65, −1.36, 0.04, 1.42, 0.46, 1.94, all p's $> .05$, two-tailed). Thus, the children's responses were generally consistent with those of adult observers from the earlier cross-cultural study.

Discussion

Young children in the United States responded to brow and mouth expressions in a manner consistent with that for adults from their culture. The children associated photographs of adults displaying lowered- rather than raised-brow poses with stories of socially dominant behavior—telling others what to do, looking tough, leading trips, winning conflicts, settling disputes, deciding rules for a game. Previous cross-cultural studies revealed that Western culture adults (i.e., from the United States, Germany, and Spain) also associated lowered brows with social dominance, defined as "tells(s) other people what to do and is usually respected" (Keating, Mazur, Segall, Cysneiros et al., 1981). Adults from non-Western cultures (e.g., Thailand, Zambia, and Kenya) did not have similar impressions. Taken together, these findings suggest that socialization involving the decoding of dominance gestures begins early in life and may be in place by age 4.

Two different socialization trends are possible. First, children in the United States may acquire the association between dominance and lowered brows through exposure to adults, the media, and other conveyors of culture. The brow-dominance association may simply be a Western cultural convention, as is the case for other brow gestures (Ekman, 1979). A second possibility is that an existing, phyletically based correspondence between brows and dominance may never be socially constrained in the West but may be discouraged and therefore altered in certain non-Western countries. Explanation of the nature of the brow-dominance association hinges on cross-cultural comparisons of age trends in the decoding and encoding of brow expressions within different cultures.

The children in the present study chose adults' unsmiling poses as conveying dominance when these expressions were contrasted with smiling ones. The children's responses were consistent not only with findings for Western adults but also with those collected in non-Western places (Keating, Mazur, Segall, Cysneiros et al., 1981). Given the consistency of the children's interpretations of mouth gestures, the robustness of the no-smile/dominance association among adults across cultures (Keating, Mazur, Segall, Cysneiros et al., 1981) and other reports of the apparent social functions of smiling in infants (e.g., Power, Hildebrandt, & Fitzgerald, 1982), children (Blurton Jones, 1971), and adults (Kraut & Johnston, 1979; Lockard, Fahrenbruch, Smith, & Morgan, 1977), the readiest explanation for human smiling may be an evolutionary one. Consistent with van Hooff's (1972) arguments, social perceptions of smiling and not smiling may originate from underlying phyletic constraints giving rise to the primate submissive grin. Nevertheless, investigations examining the precise form and function of smiling across ages and cultures are needed to properly assess the alternative possibility of a universally learned association between mouth gestures and dominance perceptions.

When making dominance choices, the children revealed selection biases for certain models in a manner consistent with the cross-cultural pattern of results reported by Keating, Mazur, and Segall (1981). For each of the four face pairs generating significant cross-cultural selection biases, the children revealed face preferences in the same direction. Three of these choice biases were statistically significant.

The physiognomies of the three models disproportionally selected by children as appearing dominant were each distinguished by relatively greater facial width, larger jaws, and more receded hairlines than those of pair mates. Human and nonhuman dominance relationships are typically age-graded (van den Berghe, 1973), and among nonhuman species, at least, there is evidence that age-related morphological traits function as social signaling devices for social dominance and non-dominance (Geist, 1971; Guthrie, 1970; Lorenz, 1943). This evidence suggests that human traits may act as dominance cues by heralding the status of seniority as well. Thus receding hairlines may have universal value as a status cue because of an association with

age (Guthrie, 1970). A broad face may imply a larger body and the dominance associated with physical development and strength (Keating, Mazur, Segall, Cysneiros et al., 1981). Jaw size increases with maturing dentition and thus is also linked to maturation. However, many characteristics varied among stimulus faces, and there is no assurance that the children's choice biases were elicited by the traits we were able to identify. Research using stimulus materials designed for better control over facial feature variations suggests that physiognomies provide potent social messages for adults (Keating, 1985a; McArthur & Apatow, 1983–1984), but whether these findings extend to children's perceptions remains to be explored.

Appendix

Six Dominance Stories Read to Children

Look at these two people. They are going on a trip together. Which person looks like the leader of the trip and tells the other person what to do?

Look at these two people. They want to play a game together. Which person will say what the rules for the game are?

Look at these two people. They want to watch T.V. but they like different T.V. shows. So they begin to argue and fight about what to watch on T.V. Who looks tougher and fights about it the hardest?

Look at these two people. They work at the same office. One person is the boss and tells the other person what work to do. Which person looks like the boss?

Look at these two people. They want to play with the same game but only one can play, so they start to fight with each other. Who looks like they are going to fight the most and get what they want?

Look at these two people. Tomorrow they are going to buy a car together. One person wants a green car. The other person wants a yellow car. Here they are fighting about it. Who looks like they are making the other one give up the fight?

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