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# Developmental Changes in Decoding Discrepant and Nondiscrepant Nonverbal Cues

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In this study we examined developmental changes in responses to consistent and discrepant video and audio nonverbal cues. A videotaped Nonverbal Discrepancy Test was administered to children aged 9–15 years. The discrepancy test measures (a) decoding accuracy—the extent to which subjects are able to identify affects (positivity and dominance) from visual (facial and body) cues and audio (content-filtered and random-spliced) cues—and (b) video primacy—the extent to which subjects are more influenced by video (face or body) than by audio cues. It was found that older children were more accurate at decoding affects than were younger children, particularly dominance–submission cues. Video primacy increased with age for facial cues (but not for body cues) and for cues of positivity (but not for cues of dominance). Relative to males younger female subjects showed more video primacy and older female subjects showed less video primacy, particularly for cues of dominance–submission. Relative to younger children older children showed less video primacy in decoding extremely discrepant audio and video cues than in decoding moderately discrepant audio and video cues. The development of nonverbal sensitivity to video and audio cues is discussed.

When do children develop the ability to decode (interpret) nonverbal cues? A review by Charlesworth and Kreutzer (1973) indicated that the ability to understand facial expressions appears during the first year of life and increases in a linear fashion during the preschool and grade-school ages. A similar developmental trend has been noted for the ability to decode vocal cues among 5- to 12-year-old children (Dimitrovsky, 1964). Recently, Rosenthal, Hall, DiMatteo, Rogers, and Archer (1979) found that age had a linear effect on decoding accuracy until accuracy starts to level off between ages 20 and 30.

The research by Rosenthal et al. (1979) focused on the ability to decode facial, body, and vocal cues and therefore provided an opportunity to compare sensitivity to different nonverbal channels. It was found that younger subjects showed a relative advantage in decoding tone of voice as opposed to video cues. Bugental, Kaswan, Love, and Fox (1970) also reported that video (but not audio) cues had less impact on young children (relative to adults), particularly in decoding women's positive affects. It is possible, then, that the ability to understand vocal intonations develops prior to sensitivity to other nonverbal channels, but this sensitivity decreases to some extent during socialization (cf. Rosenthal et al., 1979). That is, older children may either pay less attention to audio cues or discount the information they gain from these cues in favor of the information they gain from other channels.

The findings reported by Rosenthal et al. (1979) were based on a study of consistently communicated video and audio

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cues. In real life the audio and video channels often operate simultaneously, but their messages are not always consistent. Feelings of ambivalence, attempts at deception, and expressions of sarcasm may all lead the sender to express different emotions in different channels. The possibility of discrepancy among channels raises the question of which cues or channels the decoders "trust" more or weigh more heavily in their judgments. This question was addressed in the present study from a developmental perspective; that is, we examined responses to consistent as well as inconsistent audio plus video communications at different ages.

Adult subjects are more influenced by video cues—particularly facial expressions—than by audio cues. This effect, termed video primacy (DePaulo, Rosenthal, Eisenstat, Rogers, & Finkelstein, 1978), emerges whether the video and audio components of a message are consistent or discrepant. Specifically, research has shown that judgments of consistent multiple-channel video plus audio cues were more similar to judgments of single-channel video cues than to judgments of single-channel audio cues (Berman, Shulman, & Marwit, 1976; Levitt, 1964; Rosenthal, 1976). Similarly, judgments of inconsistent multiple-channel video plus audio cues were more in line with the video than with the audio component of the message (Bugental, Kaswan, & Love, 1970; DePaulo et al., 1978; Mehrabian & Ferris, 1967). The developmental aspects of video primacy, however, have not been previously assessed.

Several factors influencing the extent of video primacy effects in adult populations were examined by DePaulo et al. (1978). These factors include the video channel (face/body) that is examined, the affect (positivity/dominance) that is communicated, the sex of the subjects, and the degree of discrepancy between the video and audio components of the communication. They found that discrepancy between face and voice produced more video primacy than discrepancy between body and voice, perhaps because the body, like the voice, is less informative in comparison to the face. Video primacy was also greater for communication of positivity than for communication of dominance, suggesting that positivity may be more readily inferred from video cues (e.g., the smile) than may dominance. Indeed, several other studies have suggested that whereas the face is a better source of information about positive–negative affects, the voice is a relatively better source of information about dominance–submission (Burns & Beier, 1973; Scherer, Scherer, Hall, & Rosenthal, 1977; Zuckerman, DeFrank, Hall, Larrance, & Rosenthal, 1979).

Video primacy was also greater among females than among males, particularly in decoding positive–negative affects. This sex difference is consistent with the findings (Rosenthal & DePaulo, 1979a, 1979b) that females are superior to males in decoding cues that are relatively informative and intended (e.g., facial expressions), but they lose some of this advantage in decoding less controllable and more subtle cues (e.g., tone of voice). Finally, video primacy was somewhat smaller for messages in which the video and audio components were extremely discrepant relative to messages in which the video and audio components were only slightly discrepant. DePaulo et al. (1978) speculated that people tend to perceive extremely discrepant messages as indicative of deception and consequently weigh the less controllable vocal cues more heavily. The reason behind this strategy is that when communication is considered deceptive, a less controllable channel such as the voice is more likely to leak information about the sender's true affect than a more controllable channel such as the face (cf. Ekman & Friesen, 1969).

In the present study video primacy was examined as a function of age and sex of subjects, the affective dimension (positivity/dominance) and channel (face/body) of the communication, and the degree of discrepancy between the video and audio components of the communication. In addition to video primacy, we also investigated effects of age on accuracy of decoding. In line with previous research (cf. Charlesworth & Kreutzer, 1973; DePaulo & Rosenthal, 1978; Dimitrovsky, 1964; Izard, 1971), it was expected that accuracy would increase with age, but that the increase might be moderated by sex of subject and dimension and channel of the communication.

## Method

### *Subjects and Experimenter*

The study was conducted in a summer camp, and an attempt was made to include all campers between the ages of 9 and 15 years. There were no campers older than 15, and pretesting established that children younger than 9 showed some difficulty in understanding the experimental task. The participants, 250 children (121 males and 129 females), came from homogeneous backgrounds, mostly middle- and upper-middle-class families. Data from 7 subjects, 3 males and 4 females, were discarded for certain of the analyses for which they provided incomplete data. (The left-hand columns in Table 1 present the distribution of the remaining 243 male and female subjects across the age levels.)

### *Materials*

Sensitivity to discrepant audio and video cues was measured by the Nonverbal Discrepancy Test (DePaulo et al., 1978). The items for the test were developed from 2-sec videotaped and audiotaped enactments of eight everyday life situations by a 24-year-old woman. The eight situations are categorized into four different types, each formed by the crossing of two affective dimensions, positive–negative and dominant–submissive. Thus there are two positive–dominant situations (admiring nature and talking to a lost child), two positive–submissive situations (expressing gratitude and expressing deep affection), two negative–dominant situations (criticizing someone for being late and expressing jealous rage), and two negative–submissive situations (talking about the death of a friend and asking forgiveness). The categorization of the situations into the four affective types or quadrants was determined by ratings of two independent samples of judges (Rosenthal et al., 1979).

The enactments of the eight situations were recorded in four channels. Two channels were video channels, showing only the body (neck to knees) or only the face; two others were audio channels, content filtered (Rogers, Scherer, & Rosenthal, 1971) and randomized spliced (Scherer, 1971). Content filtering removes from the voice the high frequencies on which word recognition depends. Randomized splicing is a technique whereby the audiotape is cut into pieces that are then spliced together in a random order. Either process renders the speech unintelligible, but whereas content filtering preserves sequences and rhythm, randomized splicing saves pitch and intensity.

In the discrepancy test each facial enactment of the eight situations is paired with four content-filtered voices (one from each quadrant) and four randomized-spliced voices (one from each quadrant), resulting in 64 ($8 \times 8$) face plus audio items. The eight body enactments are paired with the audio enactments in a similar way, resulting in another 64 items and creating a 128-item test. For one quarter of the items, the video (face or body) and the audio (content-filtered or randomized-spiced) cues are from the same affective quadrant; for example, a positive–dominant face might be paired with a positive–dominant voice. One quarter of the items consist of video and audio cues from exactly opposite quadrants; for example, a positive–dominant face might be paired with a negative–submissive voice. The video and audio components of the remaining items differ on only one of the affective dimensions; for example, a positive–dominant face might be paired with either a positive–submissive voice or a negative–dominant voice. In sum, one quarter of the items are consistent, whereas three quarters are either entirely or partially inconsistent. (For a more detailed description of the Nonverbal Discrepancy Test, see DePaulo et al., 1978).

### *Instructions*

The discrepancy test was administered in group sessions with the number of subjects per session ranging from 15 to 25 ($Mdn = 18$). The experimenter explained to the subjects that they were going to see a series of film clips showing a face or a body accompanied by a voice. The subjects were told that sometimes they would get very similar impressions from the voice and from the face or body, but that other times the impressions from the voice and from the face or body would be different. For each scene subjects were required to indicate their overall impression based on both the voice and the face or body. Specifically, they judged each scene on two affective dimensions (positive–negative and dominant–submissive) and also indicated the extent to which the audio and the video components were discrepant. To facilitate the judgment task, we used the following 9-point rating scales, with endpoint labels that were familiar to children: *sad* (1)–*happy* (9) for the positive–negative dimension, *weak* (1)–*bossy* (9) for the dominant–submissive dimension, and *not different* (1)–*different* (9) for ratings of discrepancy. None of the rating scales was labeled at the midpoint.

Care was exercised to ascertain that the subjects, particularly the younger children, understood the experimental task. Thus the experimenter repeated the instructions twice or more, gave examples of consistent and discrepant messages, and answered all questions. Although it took more time to explain the instructions to the younger children, all children in the study seemed to understand the procedure.

### *Dependent Variables and Data Analysis*

Subjects' ratings of the scenes in the discrepancy test yielded video primacy scores and accuracy scores. Video primacy scores reflect the extent to which subjects were more influenced by video than by audio cues. A subject who is more influenced by the video channel would rate more positively (a) scenes in which the video cues were positive and the audio cues were negative than (b) scenes in which the audio scenes were positive and the video cues were negative. Thus video primacy scores for positivity ratings were computed by subtracting the mean of a subject's positivity ratings of all audio–positive/video–negative scenes from the mean of his or her positivity ratings of all video–positive/audio–negative scenes. These primacy scores were computed separately for scenes in which the video cue was a face and for scenes in which the video cue was a body. The video primacy scores for ratings of dominance were computed in a similar way. Thus there was a video primacy score for each combination of Channel (face/body) × Dimension (positivity/dominance), as well as marginal totals for channels and dimensions, and a total score. Higher primacy scores reflect more influence by video than by audio cues.

There were two types of accuracy scores, accuracy of decoding affect and accuracy of decoding discrepancy. People who are accurate at decoding affect should rate the positive scenes as more positive than the negative scenes and the dominant scenes as more dominant than the submissive scenes. Hence accuracy for positivity ratings was defined as the difference between subjects' mean positivity ratings of the positive scenes and their mean ratings of the negative scenes.[1] Accuracy scores for dominance ratings were computed analogously. Both positivity and dominance accuracy scores were computed for the *consistent items only* and therefore were completely independent of the video primacy scores. All consistent items in the discrepancy test had an audio component that was paired either with the body or with the face. Thus there was an accuracy score for each combination of Channel (face + voice/body + voice) × Dimension (positivity/dominance), as well as marginal totals for channels and dimensions, and a total score. Higher scores reflect higher accuracy of decoding affects. It should be noted that for both video primacy and accuracy of decoding affect, the expected value under the null hypothesis of no primacy and/or no accuracy is zero, and individual differences in the use of rating scales (e.g., a tendency to rate scenes as extremely positive or as extremely negative) have no effect on this expected value.

Accuracy of decoding discrepancy reflects subjects' ability to recognize the degree of discrepancy between audio and visual cues. Accurate judges of discrepancy should rate as more discrepant the scenes that actually are more discrepant. Thus this type of accuracy was computed from subjects' discrepancy ratings (1 = not different, 9 = different) according to the following formula: ($M$ of discrepancy ratings of the very discrepant scenes × 2) + ($M$ of discrepancy ratings of the slightly discrepant scenes) − ($M$ of the ratings of the nondiscrepant scenes × 3). Higher scores reflect a higher accuracy in decoding discrepancy. In this formula as in the other accuracy formulas, the expected value under the null hypothesis of no accuracy is zero.

Video primacy and accuracy of decoding affect were examined in unweighted-means analyses of variance in which age (9–15 years) and sex (male/female) were the between-subjects factors and channel (face/body) and dimension (positivity/dominance) the within-subjects factors (repeated measures). The video primacy scores examined in the preceding analysis were collapsed across degree of discrepancy and the content-filtering versus randomized-splicing factors. (A separate analysis examined effects of degree of discrepancy, and the difference between content filtering and randomized splicing was not of interest in the context of the present study.) The accuracy scores were based only on consistent items and also were collapsed across the content-filtering/randomized-splicing factor. For both video primacy and accuracy scores, main effects and/or interactions involving age were further examined in linear contrasts. For main effects the contrast weights assigned to the seven successive age levels were −3, −2, −1, 0, 1, 2, and 3. For interactions of age with another variable—for example, Sex × Age—the contrast weights for the age levels ranged from −3 to 3 under one level of the other variable (e.g., −3 to 3 weights would be assigned to males) and from 3 to −3 under the second level (e.g., 3 to −3 weights would be assigned to females).[2]

## Results

### *Accuracy of Decoding Affect*

Before presenting the analyses of video primacy, it is important to examine whether the present study replicated the linear effect of age on decoding accuracy and the extent to which this effect was moderated by the affective dimension and channel of the communication. Mean decoding accuracy scores for the positivity and dominance dimensions are presented in Table 1. It should be noted first that the overall mean

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[1] In the basic standardization data of the Profile of Nonverbal Sensitivity test, accuracy of face, body, content filtered voice, and randomized spliced voice were all substantially greater than chance (Rosenthal et al., 1979).

[2] Similar analyses were conducted for accuracy of decoding discrepancy. There were no significant age effects for this measure. (Starting with the youngest age, mean scores per age level were .17, .87, .56, .23, .82, 1.30, and .59.) The overall mean score of accuracy at decoding discrepancy ($M$ = .65), however, was significantly above chance level, $t(246) = 3.33$, $p < .001$, $d = .21$ ($d$ is an estimate of the effect size [Cohen, 1977] defined conceptually as $[M_1 - M_2]/\sigma$ and computed as $2[F]^{\frac{1}{2}}/[df]^{\frac{1}{2}}$ in this article). Because of the lack of age effects, this measure will not be discussed further.

Table 1
*Decoding Accuracy for Positivity and Dominance Dimensions for Seven Age Levels*

| Age level[a] | *n* | | Dimension | | | |
|---|---|---|---|---|---|---|
| | Females | Males | Positivity | Dominance | *M* | Difference |
| 9 | 18 | 8 | 1.04 | 1.23 | 1.14 | −.19 |
| 10 | 25 | 26 | 1.31 | 1.49 | 1.40 | −.18 |
| 11 | 34 | 25 | 1.50 | 1.64 | 1.57 | −.14 |
| 12 | 18 | 20 | 1.62 | 1.93 | 1.77 | −.31 |
| 13 | 14 | 17 | 1.18 | 1.84 | 1.51 | −.66 |
| 14 | 8 | 10 | 1.62 | 2.57 | 2.09 | −.95 |
| 15 | 9 | 11 | 1.66 | 1.99 | 1.83 | −.33 |
| *M* | | | 1.42 | 1.81 | 1.62 | −.39 |

*Note.* Higher-scores indicate higher decoding accuracy.
[a] In years.

accuracy score ($M = 1.62$) differed significantly from zero, $t(229) = 18.19$, $p < .001$, $d = 1.20$ (in addition the mean accuracy score of each age level also differed significantly from zero, $p < .001$), indicating that decoding accuracy was higher than chance. More important, it can be seen that mean accuracy increased with age; linear contrast for age, $F(1, 229) = 25.61$, $p < .001$, $d = .67$. In addition dominance cues were more accurately decoded than positivity cues, $F(1, 229) = 33.39$, $p < .001$, $d = .76$, particularly for older children. The linear contrast of the Age × Dimension interaction, equivalent to the linearity of the differences between dominance and positivity across age levels, was $F(1, 229) = 6.86$, $p < .01$, $d = .35$. Examination of the means shows that there was an increase with age in accuracy of decoding dominance, whereas there was little increase in accuracy of decoding positivity.

Table 2
*Video Primacy for Face and Body for Seven Age Levels*

| Age level[a] | Channel | | Difference |
|---|---|---|---|
| | Face | Body | |
| 9 | 1.25 | .23 | 1.02 |
| 10 | 1.43 | .23 | 1.20 |
| 11 | 1.38 | .31 | 1.07 |
| 12 | 1.63 | .36 | 1.27 |
| 13 | 1.17 | .15 | 1.02 |
| 14 | 1.72 | −.02 | 1.74 |
| 15 | 1.86 | .15 | 1.71 |
| *M* | 1.49 | .20 | 1.29 |

*Note.* Higher scores indicate greater video primacy.
[a] In years.

In addition to the effects presented in Table 1, the analysis of variance showed that the increase in decoding accuracy with age was somewhat greater for facial than for body cues; linear contrast of the Age × Channel interaction, $F(1, 229) = 3.35$, $p = .068$, $d = .24$. The linear contrast of the Age × Channel × Dimension interaction, however, was not significant ($F < 1$). Overall, it appears that abilities to decode different affective dimensions and channels do not develop at the same rate.

### *Video Primacy*

Analyses of the video primacy scores showed no overall main effects for age. Several significant interactions showed, however, that the effects of age were moderated by the video channel (face/body), the affective dimension (positivity/dominance), and the sex of subjects. Video primacy scores for face and body for the seven age levels are presented in Table 2. It should be noted, first, that the overall mean primacy score ($M = .845$) differed from zero, $t(229) = 11.44$, $p < .001$, $d = .75$, indicating that, overall, subjects were more influenced by video than by audio cues. In accordance with previous findings (DePaulo et al., 1978), video primacy was greater for facial expressions than for body cues, $F(1, 229) = 474.68$, $p < .001$, $d = 2.88$. More important, however, the results show that video primacy increased with age more for face than for body; linear contrast for Age × Channel interaction, $F(1, 229) = 13.87, p < .001, d = .49$. Clearly the rise of the face as a major source of nonverbal information relative to the voice is, at least to some degree, a developmental phenomenon.

Since the face delivers particularly strong cues of positivity (e.g., the smile) and also accounts for the bulk of the video primacy effect, it was not surprising to find that video primacy was greater for expressions of positivity than for expressions of dominance, $F(1, 229) = 145.42$, $p < .001$, $d = 1.59$ (see Table 3). Parallel to the increase of face primacy with age, the results show a greater increase in video primacy for positivity than for dominance; linear contrast for Age × Dimension interaction, $F(1, 229) = 8.26$, $p = .004$, $d = .38$. Thus the results indicate that older children showed more video primacy for face and for cues of positivity.

Sex differences in video primacy are presented in Tables 4 and 5. Table 4 indicates that at younger ages females showed more video primacy than males, whereas at older ages males showed more video primacy than females; linear contrast for Age × Sex interaction, $F(1, 229) = 4.33$, $p < .05$, $d = .27$. These sex differences, however, depended on the affect that was communicated. As can be seen in Table 5, the changes in video primacy from female superiority at young ages to male superiority at older ages were obtained for the dominance but not for the positivity dimension; linear contrast for the Age × Sex × Dimension interaction, $F(1, 229) = 3.95$, $p < .05$, $d = .26$. The results suggest that males may develop a particularly pronounced sensitivity to facial expressions of dominance–submission.

Table 3
*Video Primacy for Positivity and Dominance Dimensions for Seven Age Levels*

| Age level[a] | Dimension | | Difference |
|---|---|---|---|
| | Positivity | Dominance | |
| 9 | 1.08 | .40 | .68 |
| 10 | 1.16 | .50 | .66 |
| 11 | 1.20 | .48 | .72 |
| 12 | 1.30 | .70 | .60 |
| 13 | 1.05 | .27 | .78 |
| 14 | 1.53 | .16 | 1.37 |
| 15 | 1.57 | .44 | 1.13 |
| *M* | 1.27 | .42 | .85 |

*Note.* Higher scores indicate greater video primacy.
[a] In years.

Table 4
*Sex Differences in Video Primacy for Seven Age Levels*

| Age level[a] | Female | Male | Difference |
|---|---|---|---|
| 9 | .84 | .64 | +.20 |
| 10 | .91 | .75 | +.16 |
| 11 | .87 | .82 | +.05 |
| 12 | .94 | 1.05 | −.11 |
| 13 | .43 | .89 | −.46 |
| 14 | .66 | 1.03 | −.37 |
| 15 | .98 | 1.04 | −.06 |
| *M* | .80 | .89 | +.09 |

*Note.* Greater scores indicate greater video primacy.
[a] In years.

As previously noted, a separate analysis of variance compared video primacy for moderately discrepant scenes versus extremely discrepant scenes. In the moderately discrepant scenes, the audio and video components differed on one affective dimension (off by one), whereas in the extremely discrepant scenes, they differed on both affective dimensions (off by two). In addition to degree of discrepancy, the analysis of variance included channel as another within-subjects factor and age and sex as between-subjects factors. Table 6 presents the relevant video primacy scores for the seven age levels. It can be seen that younger children tended to show more video primacy for the extremely discrepant than for the moderately discrepant scenes, whereas older children showed the reverse pattern; linear contrast of the Age × Degree of Discrepancy interaction, $F(1, 229) = 3.68$, $p < .06$, $d = .25$. Although the 15-year-old group showed the same degree of video primacy for the two types of discrepant scenes, other data (DePaulo & Rosenthal, 1979b) indicate that the tendency to show less video primacy for more discrepant cues has been obtained in older ages. The three-way Age × Degree of Discrepancy × Channel interaction was not significant.

Table 5
*Sex Differences in Video Primacy for Positivity and Dominance Dimensions for Seven Age Levels*

| Age level[a] | Positivity | | | Dominance | | |
|---|---|---|---|---|---|---|
| | Females | Males | Difference | Females | Males | Difference |
| 9 | 1.06 | 1.09 | −.03 | .61 | .18 | +.43 |
| 10 | 1.17 | 1.16 | .01 | .65 | .35 | +.30 |
| 11 | 1.14 | 1.26 | −.12 | .59 | .37 | +.22 |
| 12 | 1.31 | 1.28 | .03 | .57 | .82 | −.25 |
| 13 | .85 | 1.25 | −.40 | .01 | .53 | −.52 |
| 14 | 1.37 | 1.70 | −.33 | −.04 | .36 | −.40 |
| 15 | 1.65 | 1.49 | .16 | .30 | .58 | −.28 |
| *M* | 1.22 | 1.32 | −.10 | .38 | .45 | −.07 |

*Note.* Greater scores indicate greater video primacy.
[a] In years.

## Discussion

In this study we examined developmental changes in responses to consistent and discrepant audio and video cues. Two specific measures were examined—the accuracy with which subjects decoded affects from face and body and the extent to which subjects were more influenced by video than by audio cues (video primacy). Of course the overall level of both accuracy and video primacy were partially a function of the stimulus materials that were used in the Nonverbal Discrepancy Test. It is likely that a different set of materials would produce a different level of accuracy and a different magnitude of video primacy. It is less likely, however, that a different set of materials would produce different developmental changes. Therefore it is important to focus, not on the overall level of accuracy, but on the question of how accuracy changed as a function of age, channel, and affective dimension. Similarly, the fact that subjects were more influenced by video than by audio cues is of much less interest than the fact that video primacy changed as a function of other experimental factors.

Table 6
*Video Primacy for Two Levels of Discrepancy for Seven Age Levels*

| Age level[a] | Level of discrepancy | | |
|---|---|---|---|
| | Off by one | Off by two | Difference |
| 9 | .62 | .84 | −.22 |
| 10 | .80 | .88 | −.08 |
| 11 | .91 | .79 | −.12 |
| 12 | 1.07 | .90 | .17 |
| 13 | .70 | .60 | .10 |
| 14 | .91 | .76 | .15 |
| 15 | 1.01 | .99 | .02 |
| *M* | .86 | .82 | .04 |

*Note.* Higher scores indicate greater video primacy.
[a] In years.

In accordance with results of previous work (cf. Rosenthal et al., 1979), age had a linear effect on the ability to decode nonverbal cues. The fact that the increase in decoding ability was greater for dominance than for positivity cues may indicate that ability to decode positivity develops and reaches its peak earlier than the ability to decode dominance. This speculation is consistent with the suggestion (DePaulo, Rosenthal, Finkelstein, & Eisenstat, 1979) that since the evaluative positive–negative dimension has been shown to be central to a wide variety of psychological domains, sensitivity to positive–negative affects should develop prior to sensitivity to other dimensions, including dominance–submission.

The main question of interest concerned developmental changes in differential sensitivity to various channels of nonverbal cues. It was found that video primacy increased when face was contrasted with voice, but not when body was contrasted with voice. This pattern is consistent with the finding of greater increase in decoding accuracy for facial, relative to body, cues.

It seems that the face develops into a major communication channel, relative to both the voice and the body. Since the face appears to convey positivity better than other channels (DePaulo & Rosenthal, 1979b), it was not surprising to find that the increase in video primacy was greater for positive, relative to dominance, cues.

In a study of sensitivity to consistent nonverbal communications, DePaulo and Rosenthal (1979a) found that nonverbal decoding skills became increasingly differentiated with age. In the present study, too, the results indicate that the profile of nonverbal skills is less differentiated at younger ages. That is, the differences in sensitivity to different affects (positivity and dominance) and to different channels (face and voice) are less emphasized than they are at an older age. The increase in sensitivity to facial cues with age suggests that in comparison to older children, youngsters are more influenced by "leaky" and uncontrollable channels, such as the body and the voice, and less influenced by controllable channels, such as the face. In contrast, adults are not only more accurate decoders but also more likely to be influenced by controllable channels such as the face, relative to leaky channels such as the body. It seems almost ironic that because of greater sensitivity to controllable channels, the adult may lose some of his or her ability to identify more subtle, leaky messages. If controllable channels are the channels we are supposed to attend to according to the norms of polite interpersonal transactions (cf. Rosenthal & DePaulo, 1979a), then it is particularly interesting that the clearest increment in sensitivity to facial cues occurs at ages 14 and 15—a time when it may be becoming especially important to do the "right" thing in social interaction.

In the present study, females (compared to males) showed more video primacy at the younger age levels. Consideration of earlier reports (DePaulo et al., 1978; DePaulo & Rosenthal, 1979b) suggests that the true relation across a wider age range may be curvilinear rather than linear. Those reports describe four samples in which video primacy was greater for females than for males. One of those samples was a high school sample of subjects who were older ($M$ age = 16.4 years) than the oldest subjects in the present study, and the other three were college samples. Further research is needed to determine whether the true relation is in fact curvilinear, and if so, what might account for the reversal in sex differences in the young adolescent age groups.

The development of sensitivity to facial cues of dominance also showed sex differences. Males were more likely to develop sensitivity to these facial expressions than were females. Since dominance cues mark the hierarchy of power, they may be more important for the male in a Western culture. Of course the male who becomes more sensitive to the face of authority may lose, in the process, some of his ability to decode the more subtle (e.g., vocal) cues of dominance and submission.

Finally, the present results also showed some indication that relative to younger children, older children treat extremely discrepant messages with some caution. Specifically, whereas children below the age of 12 showed greater video primacy when the video and audio messages were extremely discrepant, children older than 12 did not show this pattern (see Table 6). As previously mentioned, DePaulo et al. (1978) speculated that people perceive extremely discrepant messages as indicative of deception and therefore may attend relatively more to the audio cues. It could be expected that this pattern would be emphasized more for older children, and the present results indicate such a trend. Older children, it appears, have developed some degree of distrust toward facial expressions when the expressions are accompanied by discrepant vocal cues.

The present results raise the question of the cognitive processes underlying increases in video primacy for facial expression. It is not clear from the data whether older children actually attend less to the voice than to the face or whether they attend equally to both but weigh the facial information more heavily. It is possible to suggest a two-stage model; that is, as children grow up they first attach smaller weights to leaky channels (voice and body) but eventually learn to pay less attention to them. After all, it does not make sense to acquire information that is not going to be used. At present this suggestion is primarily a challenge for future research.

Several other factors also remain for future research. First, it is necessary to examine sensitivity to discrepant messages among younger ages. Second, it would be interesting to compare the developmental trends of various nonverbal channels in terms of sending abilities. The relation between sending and receiving across channels also remains to be examined. For example, does the person who is particularly sensitive to the voice also send particularly clear vocal messages? Finally, and perhaps most important, we need to examine the factors that facilitate or inhibit the development of abilities to send and receive nonverbal cues in specific channels.

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