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What Should I Do? Behavior Regulation by Language and Paralanguage in Early Childhood

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Abstract

This article explores the functional significance of affective messages for behavior in early childhood. Previous research indicates that children's affective judgments are influenced more by what is said than by how it is said. Of particular interest is the extent to which this tendency toward literal interpretation has real consequences for behavior. The effect of consistent and conflicting affective messages on child behavior was assessed in a social-referencing procedure. What was said had a stronger effect than facial and vocal paralanguage on children's exploration of novel objects. This suggests that the lexical bias evident in children's interpretations reflects a genuine developmental transition in the primary cues on which attributions are based, and these cues have direct consequences for behavior regulation.

In this article, I explore the functional significance of affective messages for regulating behavior in early childhood. The conceptual issue guiding this study is the presence of a developmental bias in young children's interpretations of affect when the explicit lexical content of a communication conflicts with the vocal expression (paralanguage) that accompanies it. By 4 years of age, children place greater weight on words than on vocal paralanguage when interpreting affect in these situations (Friend, 2000; Friend & Bryant, 2000; Morton & Trehub, 2001; Solomon & Ali, 1972). For example, when children hear "Oh good, you got them all" in an angry voice, they are most likely to attribute happy affect to the speaker. Similar effects were reported (Lacks, 1997) for children as young as 2 to 3 years of age even when the literal or lexical content of utterances conflicts with both facial and vocal paralanguage.

In practical terms, children's judgments of speaker affect are more influenced by what is said than by how it is said. This predominance of lexical content on children's judgments is striking because it appears to be a departure from the well-documented strength of affective paralanguage, particularly vocal paralanguage, for regulating behavior in infancy (Fernald, 1993). Further, in research on adults' affective judgments, paralanguage predominates over lexical content in determining affective meaning (Argyle, Alkema, & Gilmour, 1971; Morton & Trehub, 2001; Reilly & Muzekari, 1986; Solomon & Ali, 1972). In early childhood then, children's interpretations of affect are more dependent on what is said than on how it is said, and this contrasts with the primacy of paralanguage for determining

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affective meaning in infancy and in adulthood. These changes in the relative primacy of language and paralanguage have implications for the developmental integration of affect and language in the construction of meaning.

Children's attributions of speaker certainty and intent reveal a similar picture of developmental change in the primacy of language and paralanguage. Moore, Harris, and Patriquin (1993) found that 4-year-olds rely on lexical content as a cue to speaker certainty. Children believe speakers are more certain when they use the word *know* rather than *think* or *believe* even when speech is embedded in a rising intonation contour. In contrast, 5-year-olds used both what was said and how it was said as cues to a speaker's certainty, indicating better integration of language and paralanguage with age. In a study of children's understanding of speaker intent, Milosky and Ford (1997) found that 6- and 9-year-olds were more likely to attribute sarcasm when they heard sarcastic paralanguage than when they heard complimentary or ambiguous paralanguage. However, recognition of sarcasm was well below ceiling for both groups: Sarcasm was recognized by 6-year-olds approximately 30% of the time and by 9-year-olds approximately 50% of the time. More recently, Hancock, Dunham, and Purdy (2000) compared children's interpretations of two types of irony: ironic criticisms and ironic compliments. Five- to 6-year-olds correctly recognized ironic utterances less than 50% of the time compared to their near-perfect recognition of literal utterances. By 8 to 9 years of age, however, Capelli, Nakagawa, and Madden (1990) reported that children accurately identify speaker intent in a story when paralanguage conflicts with lexical and contextual information. Moreover, when queried about the basis of their attributions, children reported that they use paralinguistic rather than lexical or contextual cues. In early childhood, interpretations of speaker affect, certainty, and intent are based at least initially on the explicit lexical content of messages (Friend, 2000). The ability to utilize paralinguistic cues for each of these types of attribution appears to improve in early childhood between 5 and 9 years of age.

Studies that report a primacy of language in early childhood rely heavily on children's verbal report (Friend, 1995, 2000; Friend & Becker, 1987; Friend & Bryant, 2000; Lacks, 1997; Morton & Trehub, 2001; Solomon & Ali, 1972). In every study, verbal report measures reveal a significantly stronger effect of lexical content than of affective paralanguage on children's judgments. What is said is consistently more influential than how it is said. Arguably, however, verbal report reflects the outcome of a cognitive appraisal process rather than the immediate and direct effects of language and paralanguage on child behavior.

Of interest is whether the primacy of language evident in children's verbal reports has implications for behavior in a goal-relevant context. What are the real consequences of the tendency toward literal interpretation for behavior in early childhood? From a functionalist perspective (Campos & Barrett, 1984), the most immediate and direct meaning of language and paralanguage can be observed in their effects on behavior. Luria's (1961) classic work suggests that language comes to influence behavior only gradually during the period of early childhood. At 3 to 4 years of age, verbal instructions facilitate (e.g., "Clap your hands") but do not inhibit behavior (e.g., "Don't clap your hands"). Indeed, Saltz, Campbell, and Skotko (1983) found that intensifying an instruction to inhibit behavior to children under 5 years of age leads to a paradoxical intensification of the behavior. One need only consider the popular children's game "Simon Says" to appreciate the significance of the developmental achievement of inhibiting behavior (Strommen, 1973). These observations led Luria (1961) to conclude that language does not regulate behavior until at least 5 years of age. However, the recent literature on attributions of affect, certainty, and intent in early childhood suggests that this conclusion warrants revisiting.

Luria (1961) and Saltz et al. (1983) assessed the regulatory effect of language by contrasting instructions to initiate actions with negations of those instructions (e.g., "Squeeze the ball" vs. "Don't squeeze the ball"). Before 5 years of age, child behavior is regulated by instructions of the first but not of the second type. However, when a similar experiment used the affirmative *wait* ("Wait until I blow the whistle") rather than the negative *don't* ("Don't start the train"), even 2-year-olds' behavior was regulated by verbal instructions (Golden, Montare, & Bridger, 1977). Thus, in contrast to Luria (1961), there is evidence that language exerts regulatory effects on behavior in early childhood.

The relative contribution of language and paralanguage to behavior regulation in early childhood has not been systematically investigated. However, the findings of one early study (Volkmar, Hoder, & Siegel, 1980) are suggestive. Volkmar et al. investigated the influence of auditory (language and vocal paralanguage) and visual (gesture and facial paralanguage) signals on behavior regulation in 13- to 42-month-olds. Affective intent (approval or disapproval) conveyed by auditory signals had a significantly greater effect on children's approach to the experimenter than did affective intent conveyed by visual signals. However, because language and vocal paralanguage were confounded in this study, their relative contribution to behavior regulation is unclear. Further, whereas Volkmar et al. treated facial and vocal paralanguage as independent signals, these signals covary in nature. The configuration of the face contributes to the shape of the vocal cavity, the acoustics of the voice, and the perception of vocal affect (Tartter & Braun, 1994). To evaluate the relative influence of language and paralanguage, it is necessary to observe children's behavior regulation when facial and vocal paralanguage convey the same affective intent but conflict with lexical content.

Friend (2001) took this approach in a study of behavior regulation in 15-month-olds and found that the majority of these infants regulated their behavior in accord with the affect conveyed by facial and vocal paralanguage. However, some of these infants were better regulated by language than by facial and vocal paralanguage and this effect was positively associated with language comprehension. This suggests that language may begin to regulate behavior in concert with the development of a receptive lexicon as early as late infancy.

This research extends this approach, assessing the influence of consistent and conflicting affective messages on behavior in early childhood in a social-referencing procedure. Similar procedures have been utilized extensively in studies of behavior regulation by facial and vocal paralanguage from 12 to 42 months of age (Mumme & Fernald, 2003; Mumme, Fernald, & Herrera, 1996; Sorce, Emde, Campos, & Klinnert, 1985; Volkmar et al., 1980; Walden, 1991). The extension of this procedure to 4-year-olds provides a measure of the direct effects of language and paralanguage on child behavior.

In this study, 4-year-olds viewed videotaped messages in which an actress conveyed approval or disapproval while shifting her gaze between the child and an attractive, novel toy. Language and paralanguage were completely crossed to produce affectively consistent and discrepant messages. Children's delay to approach the novel toy and time spent playing with the toy following each message were dependent measures of the regulatory effect of the messages on behavior. Children were expected to approach the toy more rapidly and play longer when they perceived messages as approving than when they perceived them as disapproving.

The efficacy of the social-referencing procedure for 4-year-olds was evaluated in three ways. First, children's gaze shifts between the stimulus messages and the novel toys were coded to provide descriptive data on their association of the stimulus messages with the novel toys. The two other measures used to assess the efficacy of this procedure were approach and play behaviors in response to consistent affective messages. In the consistent condition, it was predicted that 4-year-olds' behavior would be regulated by the affective intent of stimulus messages. Specifically, it was predicted that they would approach a novel toy more quickly and play longer when messages were consistently approving than when they were consistently disapproving.

The primary issue of interest in this research was the extent to which a predominance of language over paralanguage would be evident in children's play in response to discrepant messages. Consistent with previous studies (Friend, 1995, 2000; Friend & Becker, 1987; Friend & Bryant, 2000; Lacks, 1997; Morton & Trehub, 2001; Solomon & Ali, 1972), it was predicted that 4-year-olds would approach toys more quickly and play longer when the lexical content of discrepant messages was approving than when it was disapproving. That is, these more direct measures of child behavior (approach and play) were expected to reveal the same predominance of language over paralanguage observed in verbal report measures.

METHOD

Participants

Participants were part of a larger study of social referencing in early childhood. Participants in this report were sixty-two 4-year-olds and their parents recruited from a database of parents interested in having their children participate in research at the University of California, Berkeley and San Diego State University. There was no compensation for participation. Of the initial sample, 6 participants were excluded for the following reasons: three for experimenter or equipment error, 1 for parental cueing, 1 for climbing out of the chair, and 1 for the presence of construction noise sufficient to preclude attention to the experimental stimuli. The final sample included 56 children: 31 girls (*M* age = 4 years, 5 months; range = 4 years, 0 months to 4 years 11 months) and 25 boys (*M* age = 4 years, 5 months; range = 4 years, 0 months to 4 years, 11 months).

Stimuli

Stimuli were audio/video speech segments recorded on high quality videotape using a JVC BR–S810E High Fidelity Editing Recorder (JVC) and a Panasonic SVHS NV–MS95

Camera (Panasonic). The audio portion of the stimuli was recorded from a Sennheiser MD422U Dynamic Studio Microphone (Sennheiser) placed approximately 65 cm from the speaker, a female graduate student and native speaker of American English. The stimuli were designed to either encourage or prohibit approach to an attractive, novel toy. In a modification of the Mumme & Fernald (2003) procedure, the speaker shifted her gaze referentially from the camera (looking toward the child) to the novel toy while delivering an approving (e.g., "good look") or a disapproving message (e.g., "bad stop"). Four speech segments, two approving and two disapproving, were selected based on the fact that they are simple utterances that are clearly comprehended prior to early childhood (Dale & Fenson, 1996): "good look," "nice play," "bad stop," and "don't touch."

The affective intent (approving or disapproving) of facial and vocal paralanguage was always consistent; however, facial and vocal paralanguage was completely crossed with the affective intent of lexical content. In this way, eight unique stimuli were generated: two consistently approving, two consistently disapproving, two approving paralanguage paired with disapproving lexical content, and two disapproving paralanguage paired with approving lexical content. Still-frame representations of the facial paralanguage accompanying each stimulus were digitized from the master videotape and appear in Figures 1A and 1B. The audio portion of each stimulus was digitized during production, and acoustic descriptions of the stimuli were produced from the resulting digital files. The acoustic characteristics (amplitude waveform and pitch contour) of stimulus paralanguage are presented graphically in Figures 2A–1, 2A–2, 2B–1, and 2B–2. Each stimulus was approximately 1 sec in duration (M = 1.028, range = .914–1.223).

Facial and vocal paralanguage were independently validated by 12 undergraduate psychology students who received course credit for their participation. The affective intent of facial paralanguage was evaluated by having students rate only the video portions of the stimuli (with no audio) as either *very approving, moderately approving, neutral, moderately disapproving*, or *very disapproving.* Similarly, the affective intent of vocal paralanguage was evaluated by having students rate only the audio portions of the stimuli (with no video) after they were low-pass filtered at 500 Hz to remove intelligible lexical content. Stimuli were selected by collapsing ratings into approving, neutral, and disapproving categories. Agreement by 10 of the 12 judges in the direction of the functional intent of both facial and vocal paralanguage was required for stimuli to be included in the study. In this way, facial and vocal paralanguage were evaluated independently of each other and of lexical content (see Table 1).

Apparatus

The experimental apparatus was a table on which a monitor stand and a 21 in. (53 cm) video monitor were mounted. Below the monitor, a curtained enclosure housed a pulley-guided tray and a small camera to record children's responses. Each session was recorded on high-quality super very high speed (SVHS) tape. These master data tapes were copied to VHS format and a vertical time code was inserted to facilitate subsequent analysis and coding.

Procedure

A research assistant contacted interested parents by telephone to schedule testing appointments. On arrival at the laboratory, children engaged in a warm-up period with the experimenter (E1) in which they drew pictures and played a game of Simon Says. Following the warm-up, each child was randomly assigned to either the consistent (lexical content = paralanguage) or discrepant (lexical content ≠ paralanguage) condition. Affective consistency/discrepancy was manipulated between, rather than within, participants to avoid potential carryover effects from one condition to the next. Within each condition, children received one of four stimulus orders. Both order and condition were completely counterbalanced across participants.

E1 invited the child to sit in a chair in front of the testing apparatus. The child was told that the parent would be nearby in a "reading corner" during the session. The parent was seated behind a partition next to the apparatus and was instructed not to talk to the child during the procedure to avoid potential cueing of the child's responses. A second experimenter (E2), not visible to the child, remained seated behind the apparatus and controlled the presentation of the stimulus messages and the novel toys. E2 initiated a practice trial to familiarize the child with the testing situation. The practice trial was initiated when a brightly painted toy was displayed via the tray and pulley from behind the curtain. When the child looked at the toy, E2 played a standardized, auditory message in engaging, child-directed speech:

> Hi! This is a very special table. Would you like to see how this table works? See, an object comes out from behind the curtain. Then it comes so close [E2 moves toy on tray within the child's reach] that you can reach it. Or you can just leave it on the table. Okay? Are you ready?

Children received no further instructions so that their behavior might be a direct measure of the regulatory function of language and paralanguage rather than of an appraisal process. Anecdotally, the instructions were effective in engaging the children in the task. Many children engaged in a spontaneous dialogue with the prerecorded instructions by responding to the initial greeting (e.g., "Hi!"), expressing interest as the toy was revealed (e.g., "Wow!"), and acknowledging readiness to begin (e.g., "Okay!").

The test trials followed the same format as the practice trial with the exception of the previous instructions and the fact that approach and play with the toy during the practice trial was not coded. Following the practice trial, each child completed four test trials. During each trial, E2 watched a video monitor to determine that the child was oriented toward the apparatus and attentive before presenting the novel toy and the affective stimuli. In each test trial, E2 placed a randomly selected novel toy on the tray and moved the toy beyond the curtain where it was visible to the child but remained out of reach. When the child looked at the toy, E2 played the first stimulus, which was followed by a blue screen. Next, while the child remained attentive and looking toward the apparatus, E2 moved the tray and novel toy toward the child. As the tray moved, the stimulus message was repeated. During each stimulus presentation, the speaker appeared to shift her gaze between the child and the novel toy (see Figure 1 for illustration). Following the second stimulus presentation, a blue screen appeared on the stimulus monitor and the novel toy remained within the child's reach for approximately 15 sec. At the end of this interval, E2 began withdrawing the tray and the toy. Sometimes because the child continued to play, it took several seconds to retrieve the toy. The average trial length from the time that the toy first appeared on the tray until the time that it was withdrawn behind the curtain was 23 sec (range = 17–37 sec). This procedure was followed for four trials. At the end of the final trial, E2 placed all of the toys on the tray and moved them within the child's reach. E1 joined the parent and child, invited the child to play with all of the toys, and conducted a brief exit interview with the child and parent.

Coding

Three dependent measures were coded from videotapes of the experimental sessions: gaze shifts, approach time, and manipulation time.

Gaze shifts—As a manipulation check, the number of times that each child shifted her gaze between the stimulus and the novel toy beginning with the presentation of the first stimulus was recorded in each trial. These looks involved a direct shift in visual focus from the novel toy to the stimulus monitor or from the monitor to the toy without any intervening foci. Gaze shifts that included any other aspect of the experimental situation (the table, camera lens, partitions, tray, child's hand, etc.) were not coded.

Delay to approach—The delay (in seconds) between the second stimulus and the time child touched the toy was recorded. If the child never touched the toy, the delay to approach was set to equal the trial duration. For an approach to be recorded, the child had to touch the toy following the presentation of the second stimulus. This insured that across children both stimulus presentations occurred before inferences were drawn about the relation between the message and child behavior. If the child touched the toy before the presentation of the second stimulus, the time of approach was set to equal the presentation of the second stimulus (i.e., no delay).

Play with novel toys—The length of time (in seconds) that the child's hand remained in continuous contact with the toy following the initial approach was recorded. If the child released the toy for less than 2 sec before reestablishing contact, this was coded as a single continuous manipulation.

These dependent measures were recorded by three trained, independent coders who coded approximately equal proportions of the experimental sessions. Each session was coded in a series of three passes. Prior to the first pass, I used the information contained in the audio portion of the tapes to code the timing of the stimulus and novel toy presentations and the duration of the trials.

The three passes were then coded without sound using microanalytic, frame-by-frame, as well as real-time, analysis. In the first pass, looks to the novel toy and to the stimulus monitor were coded for each trial. In the second pass, gaze shifts between the toy and the stimulus monitor were coded. In the third pass, approach and manipulation times were coded. Because stimulus and novel toy presentations were controlled manually, there was variability in the absolute duration of trials within and across participants. For this reason, approach and manipulation time measures were converted to proportions of total trial time for each child prior to analysis.

Agreement—Consistency of measurement was established on one third of the sessions. Each coder coded one third of the total number of sessions as the primary coder and one third of the reliability sessions as the secondary coder. For gaze shifts, agreement was assessed on the absolute number of looks coded during each trial. For the approach and manipulation time measures, agreement was assessed based on a criterion window of 200 ms. Estimates of approach and manipulation that fell within this window for both primary and secondary coders were considered reliable. Interrater agreement for gaze shifts ranged from .74 to 1.00 across trials and participants ($M = .87$). Interrater agreement for approach and manipulation time was 1.00 across trials and participants.

RESULTS

Gaze shifts

Four-year-olds alternated their gaze repeatedly between the affective stimulus and the novel toy on each trial suggesting an association of the message with the toy. This interpretation assumes that the majority of gaze shifts occurred around the time that the stimulus message was presented. To evaluate this assumption, the timing of children's gaze shifts relative to stimulus presentations was inspected for a random subset of the sample. As expected, the majority of gaze shifts occurred just before, during, and just after the presentation of the affective stimulus. Children alternated their gaze rapidly and frequently between the stimulus message and the novel toy during this period. Interestingly, however, even after the stimulus stopped playing and there was only a blue screen in view, children appeared to check back occasionally throughout the trial. In fact, children sometimes pushed the tray away when they finished playing and looked toward the stimulus monitor saying things like, "Okay, come on," presumably indicating that they were ready to proceed with the next trial. A Condition × Order multivariate analysis of variance (MANOVA) with stimulus as a repeated measure revealed that there were no effects of stimulus, order, or condition on children's gaze shifts (see Table 2). Converging evidence of the effectiveness of the stimulus messages comes from children's responses to an exit interview. Of those children who responded to the interview (60%), 82% thought that the stimulus actress was speaking to them, 72% thought that she could see them, and 55% thought that she could hear them if they spoke to her.

Delay to approach

Across conditions, 25 children (44%) played with the novel toys on every trial, 16 children (29%) played more selectively on at least one but no more than three trials, and 15 children (27%) never played with the toys. Social-referencing studies in infancy yield comparable proportions of participants (usually around 30%) who do not regulate their behavior in the experimental context (J. Campos, personal communication, September 14, 2000). These data were asymmetric with respect to condition ($\chi^2(df = 2, N = 28) = 10.68$, $p < .05$; see Table 3). Specifically, a substantial minority of children in the consistent condition did not approach on any trial, whereas a majority of children in the discrepant condition approached on every trial.

A Lexical Content (approving or prohibiting) × Condition × Sex × Order ANOVA was conducted on the proportion of the trial between the second stimulus presentation and the time the child touched the toy. The four stimulus messages ("good look," "nice play," "bad stop," and "don't touch") in each condition served as repeated measures. In this way, the effect of the affective intent of lexical content as well as the extent to which this effect generalizes across different word combinations (messages) could be evaluated. Nominal alpha was set at .05. Means are reported as proportions of total trial length. The analysis revealed main effects of lexical content, $F(1, 40) = 7.302$, $p < .05$; condition, $F(1, 40) = 11.54$, $p < .05$; and a Message × Sex interaction, $F(1, 40) = 6.52$, $p < .05$. Lexical content and condition did not interact, $F(1, 40) = 0.253$, $p > .05$.

The main effect of lexical content reflected that, as predicted, children approached the novel toy more rapidly when lexical content was approving ($M = .543$, $\sigma = .432$) than when it was disapproving ($M = .671$, $\sigma = .418$; see Figure 3). This effect provides support for two hypotheses in this study. First, in conjunction with the gaze shift data, it supports the efficacy of the social-referencing procedure with children up to 4 years of age. Second, because this effect was obtained for discrepant as well as for consistent messages, it supports the hypothesis that language predominates in influencing children's approach behavior when language and paralanguage conflict.

The main effect of condition reflected an unexpected tendency for children to approach the novel toy more rapidly when language and paralanguage were discrepant ($M = .438$, $\sigma = .335$) than when they were consistent ($M = .776$, $\sigma = .367$). This effect is due to the fact that more children approached the novel toys in the discrepant than in the consistent condition overall. Bonferroni-corrected post hoc tests of the Message × Sex interaction did not reach significance.

Play with novel toys

A Lexical Content × Condition × Sex × Order ANOVA was conducted on the proportion of the trial following the second stimulus presentation that children played with the toy. The four stimulus messages in each condition served as repeated measures. There were no effects of message, sex, or order, and these terms were dropped from the analysis. The resulting Lexical Content × Condition ANOVA yielded a main effect of lexical content, $F(1, 54) = 5.03$, $p < .05$. However, the main effect of condition observed for delays to approach was not significant for children's play, $F(1, 54) = 3.64$, $p > .05$, and lexical content and condition did not interact, $F(1, 54) = 0.03$, $p > .05$. As predicted, children played longer when the lexical content of messages was approving ($M = .241$, $\sigma = .287$) than when it was disapproving ($M = .176$, $\sigma = .231$), regardless of the affective intent of the paralanguage with which it was paired (see Figure 4). When language and paralanguage conflicted, children's play with a novel toy was influenced more by lexical content than by facial and vocal paralanguage. These data, like the approach data, demonstrate the efficacy of the social-referencing procedure with 4-year-olds and support the hypothesis that, in conflicting messages, language predominates over paralanguage in influencing children's play behavior.

Individual differences

The previous analyses indicate that 4-year-olds, as a group, took longer to approach a novel toy and played less when lexical content was disapproving regardless of the affective intent of the paralanguage with which it was paired. This leaves open the question of the relative salience of language and paralanguage for behavior regulation in individual children. When the affective intent of the linguistic and paralinguistic components of messages conflict, to what extent is a predominant regulatory effect of language exhibited in individual children?

To address this issue, a difference score was constructed for each measure for each child in the discrepant condition. First, for the approach measure, delays following messages with disapproving lexical content were subtracted from delays following messages with approving lexical content. Negative values on this variable reflect greater delays for disapproving than for approving lexical content and are consistent with a primary influence of lexical content on children's approach behavior. These data are presented in Figure 5.

The majority of children in this study (71%) exhibited a tendency to be more regulated by language than by paralanguage when these sources conflicted. They approached the toys more rapidly when lexical content was approving than when it was disapproving (as indicated by negative difference scores). However, there was individual variation in the magnitude of this effect, and a minority of children were not regulated by lexical content. Further, the distribution of difference scores on the approach measure was continuous, revealing that lexical content has a graded rather than a discrete, all-or-none, effect on behavior.

To determine whether this pattern of individual performance was observed for the play as well as the approach measure, a second difference score was calculated. The time spent in play following messages with disapproving lexical content was subtracted from the time spent in play following messages with approving lexical content. Positive values on this variable reflect longer play for approving than for disapproving lexical content and are consistent with a primary influence of lexical content on children's play. These data are presented in Figure 6.

Play with a novel toy was better regulated by language than by paralanguage for a majority of children in this study (54%). They played longer when lexical content was approving than when it was disapproving (as indicated by positive difference scores). However, the play behavior of a considerable minority of children was not regulated by lexical content. The relative primacy of language in regulating the behavior of individual children was more robust for the approach than for the play measure.

DISCUSSION

In this study, the social-referencing approach was extended to the assessment of the regulatory effect of language and paralanguage in 4-year-old children. Children alternated their gaze repeatedly between an affective message presented on a video monitor and a novel toy. These gaze alternations were most frequent when the toy was in view and a stimulus was being presented on the monitor. Children's gaze shifts, in conjunction with their spontaneous dialogue and responses to the exit interview, suggest that they perceived a relation between the stimulus messages and the novel toys and that the messages exerted a regulatory effect on children's behavior.

Children's behavior regulation following consistent affective messages provided additional support for this conclusion. Overall, on both approach and play measures, stimulus affective intent was a good predictor of children's behavior. They approached a novel toy more rapidly and played longer when messages were consistently approving than when they were consistently disapproving. This is congruous with findings from the infant literature indicating that behavior with objects is regulated by affective messages directed toward those objects. For example, Repacholi and Gopnik (1997) showed that 18-month-olds will offer broccoli to an experimenter when she appears to like rather than dislike broccoli. Similarly, others (Mumme & Fernald, 2003; Mumme, Lariviere, Fuchs, & Bushnell, 2002) have shown that 12-month-olds prefer to play with objects toward which an approving rather than a disapproving expression has been directed. The results in this study extend these findings to behavior regulation in 4-year-old children.

One surprising result was that children showed shorter latencies to play with a novel toy for discrepant than for consistent messages. In an earlier study (Morton & Trehub, 2001), children showed shorter latencies to produce a verbal response for consistent than for discrepant messages. Arguably, this difference in the pattern of latencies across studies may reflect real differences in the execution of verbal relative to behavioral responses. Given a complex stimulus such as a discrepant message, it may take longer to think about what to say to an experimenter than it does to initiate a behavioral response. The apparent facilitative effect of discrepant messages is interesting, however, in light of previous research indicating that verbal instructions facilitate the initiation of behavior but do not inhibit an already initiated behavior (Luria, 1961). Further, the intensification of inhibitory instructions leads to a paradoxical amplification of both new and already initiated behaviors (Luria, 1961, Saltz et al., 1983). The results of this study reveal that verbal instructions can be effective in both facilitating and inhibiting the initiation of behavior in early childhood. However, consistent and discrepant messages appear to have different effects on children's propensity to initiate behavior. A possible explanation, consistent with Saltz et al. (1983), is that discrepancy modulates the intensity of both approvals and disapprovals. For example, disapproving paralanguage intensifies “Nice play,” facilitating approach to the novel toy. It is less obvious how approving paralanguage might facilitate approach for disapproving messages such as “Don't touch.” Additional studies are needed to clarify the relation between verbal appraisal and behavior regulation and the facilitative effect of discrepancy on the initiation of play.

In the remainder of the discussion, I focus on the relative influence of lexical content and paralanguage on behavior regulation at the group and individual levels and consider the implications of children's tendency toward literal interpretation for their behavior in goal-relevant contexts. Previous research has documented that verbal reports of speaker affect, certainty, and intent in early childhood are influenced more by words than by paralanguage (Friend, 1995, 2000; Friend & Becker, 1987; Friend & Bryant, 2000; Hancock et al., 2000; Lacks, 1997; Milosky & Ford, 1997; Moore et al., 1993; Morton & Trehub, 2001; Solomon & Ali, 1972). The data in this study on children's behavior regulation in a social-referencing procedure are consistent with this earlier research. When 4-year-olds viewed and listened to messages in which the words were discrepant with facial and vocal paralanguage, words were a more powerful determinant of children's actual behavior than was paralanguage. As predicted, children took longer to approach a novel toy when they saw and heard a message in which the words were disapproving than when the words were approving. Children also played longer when words conveyed approval rather than disapproval.

At the group level, words had a stronger effect than facial and vocal paralanguage on children's exploration of a novel object. To the extent that this effect generalizes to other goal-relevant contexts, it suggests that the lexical bias evident in children's interpretations of speaker affect, certainty, and intent is not trivial. Rather, it reflects a genuine developmental transition in the primary cues on which attributions are based, and these cues have direct consequences for behavior regulation.

The literatures on speaker affect and intent indicate that children from about 5 to 9 years of age are not wholly dependent on lexical cues as the basis for their attributions, however. At least some children are able to utilize paralinguistic cues to affect and intent to inform their interpretations at least some of the time (Capelli et al., 1990; Friend, 2000; Friend & Bryant, 2000; Hancock et al., 2000; Lacks, 1997; Milosky & Ford, 1997). Of interest in the individual differences analysis was the extent to which the bias to be regulated by lexical content observed at the group level would be borne out at the individual level. Children's approach and play with novel toys in the discrepant condition reveals variability in the relative influence of language and paralanguage on the behavior of individual children.

Hancock et al.'s (2000) analysis of 5- to 6-year-olds' difficulty inferring speaker intent from ironic compliments suggests one possibility for reconciling individual variability in this study with performance at the group level. Hancock et al. suggest that the period of early childhood is one of transition in complexity of reasoning and that this transition underlies changes in children's ability to make inferences about speaker intent. This transition may also be realized in children's behavior regulation. As children become more sophisticated in attending to multiple aspects of communication simultaneously, they may shift from responding to isolated message components (e.g., face, voice, and words) to responding to messages as communicative wholes. The presence of such a shift, although tenable, remains speculative until further research is conducted.

In general, the social referencing approach yielded a picture of the regulatory effect of affective messages that is remarkably consistent with earlier verbal report data (Friend, 2000; Friend & Bryant, 2000; Lacks, 1997; Morton & Trehub, 2001; Solomon & Ali, 1972). There is an interesting developmental story here considering the literature on infant responsiveness to paralanguage (Fernald, 1993; Friend, 2001) on the one hand and the findings of this study on the other. Sometime between the 2nd and 4th years of life, children appear to shift from behavior primarily influenced by paralanguage to behavior primarily influenced by language proper. This transition is interesting and perhaps less surprising than it seems at first blush, as it appears to parallel the acquisition of formal language. However, this cannot be the entire story, as it is clear that paralanguage serves as an important cue to adults' affective attributions (Argyle et al., 1971; Morton & Trehub, 2001; Reilly &

Muzekari, 1986; Solomon & Ali, 1972). Indeed, Freire, Eskritt, and Lee (2002) reported that as early as 4 to 5 years of age children begin to incorporate both language and paralanguage as cues to deception. The transition to a flexible induction of affective intent, one that is not strictly literal, has implications for children's behavior as well as for their cognitive appraisals. The elucidation of the timing of these transitions in children's utilization of language and paralanguage and the mechanisms that underlie them is an exciting new direction for research in language and social-emotional development.

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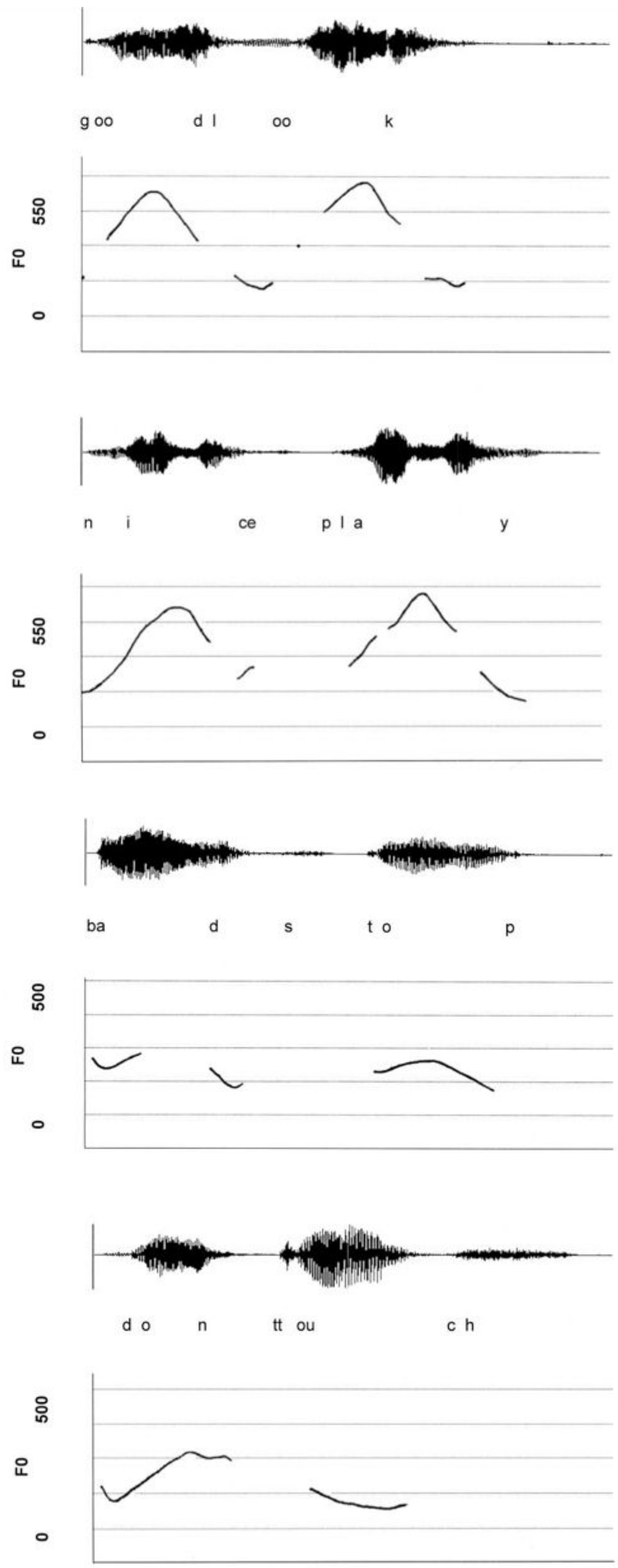
Good Look
Nice Play
Bad Stop
Don't Touch

FIGURE 1.

A Still-frame representations of facial paralanguage in the consistent condition.

B Still-frame representations of facial paralanguage in the discrepant condition.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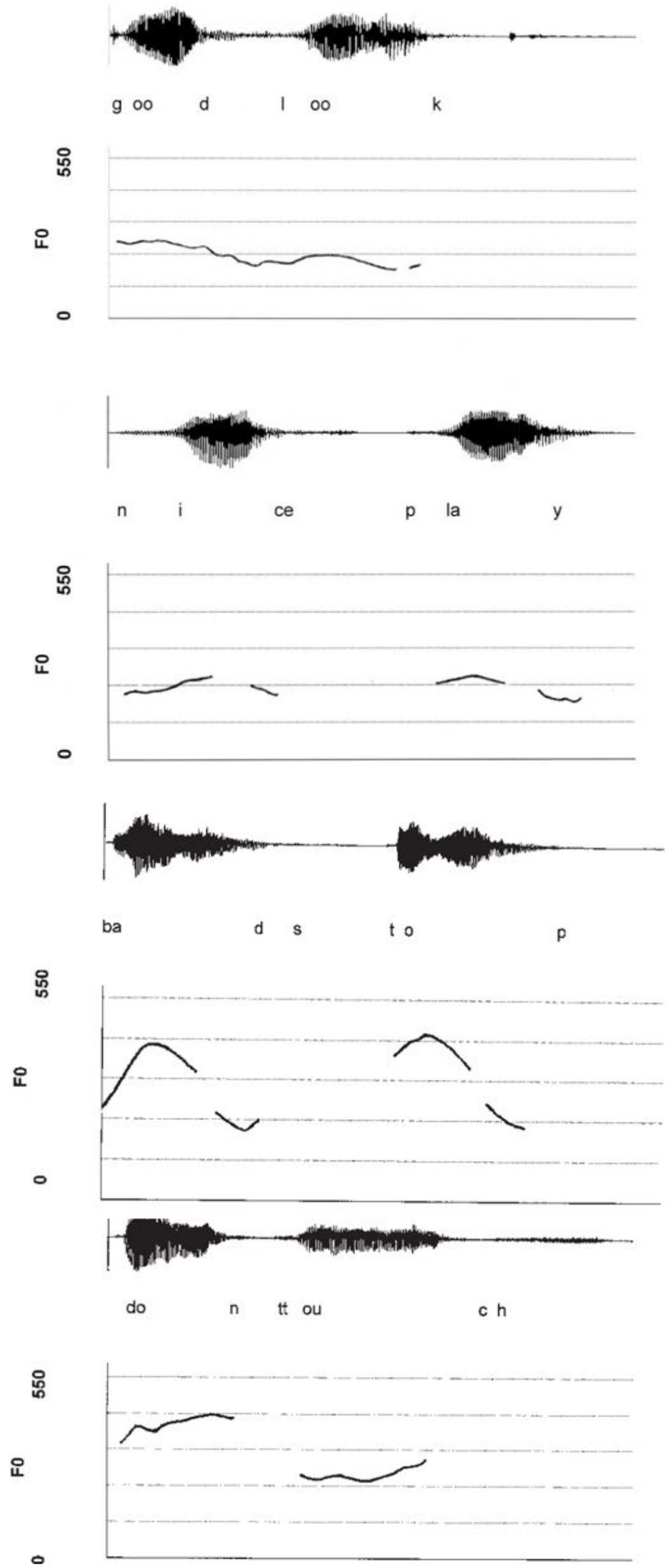
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FIGURE 2.

A–1 Amplitude waveforms and fundamental frequency (F_0) contours for consistent messages.

A–2 Amplitude waveforms and fundamental frequency (F_0) contours for consistent messages.

B–1 Amplitude waveforms and fundamental frequency (F_0) contours for discrepant messages.

B–2 Amplitude waveforms and fundamental frequency (F_0) contours for discrepant messages.

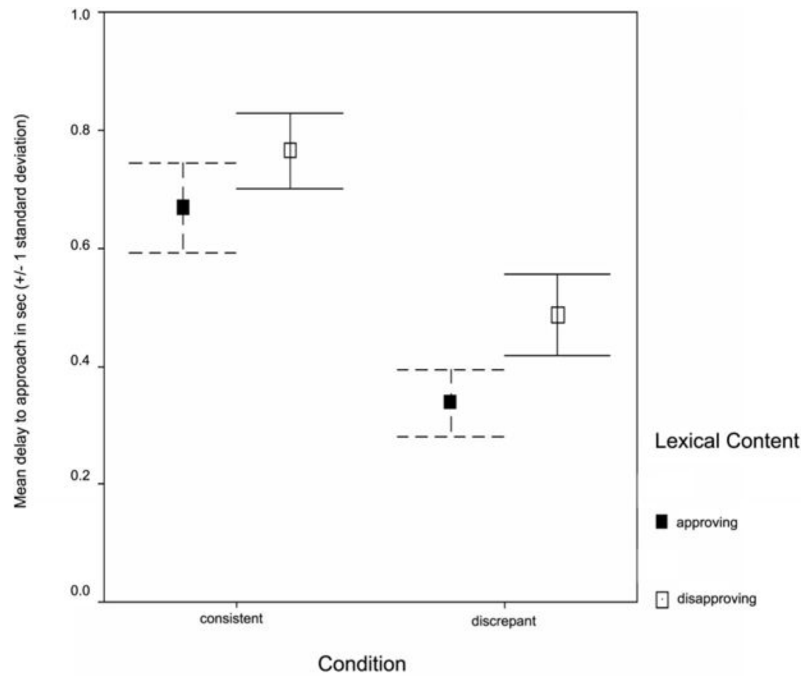

FIGURE 3.
Mean to approach (sec) as a function of lexical content and condition.

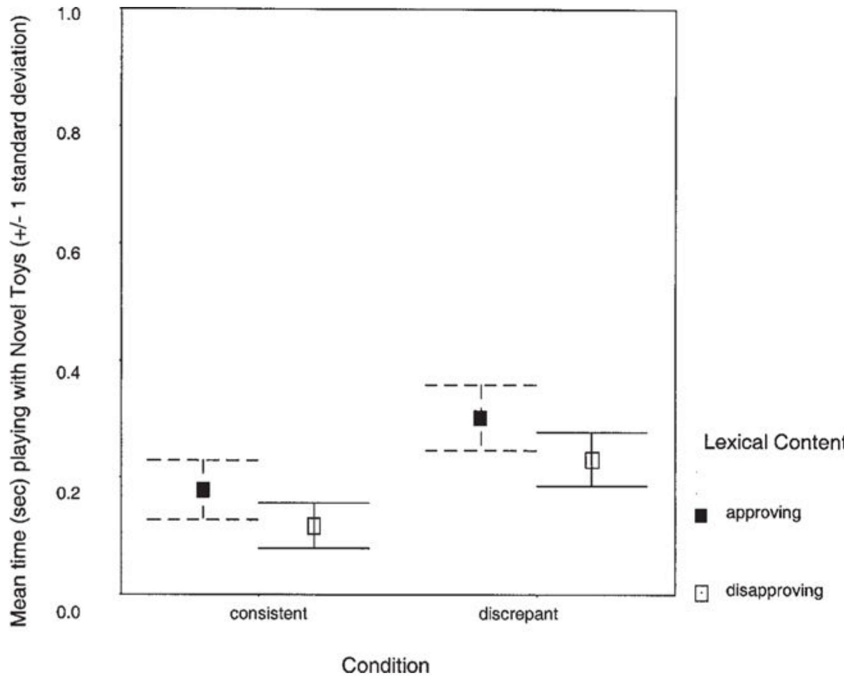

FIGURE 4.
Mean time (sec) playing with novel toys as a function of lexical content and condition.

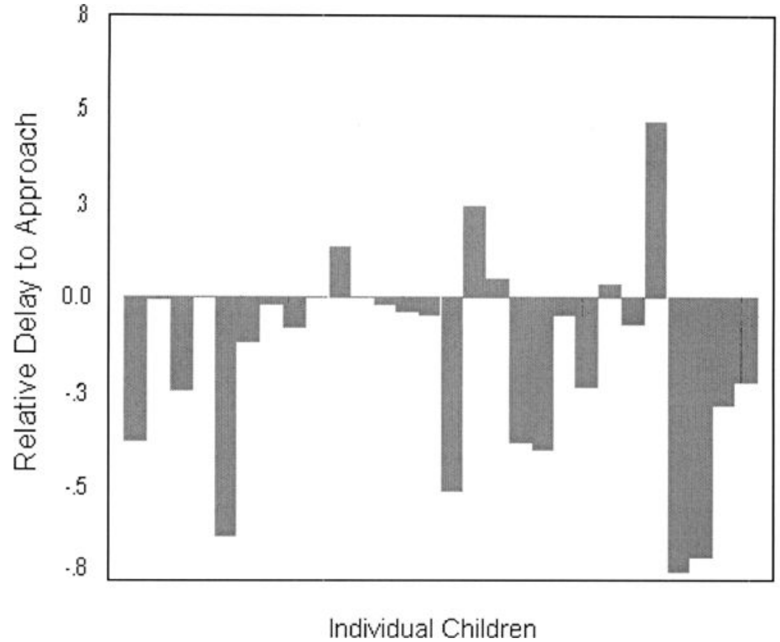

FIGURE 5.

Relative delay to approach (sec) for approving minus disapproving lexical content.

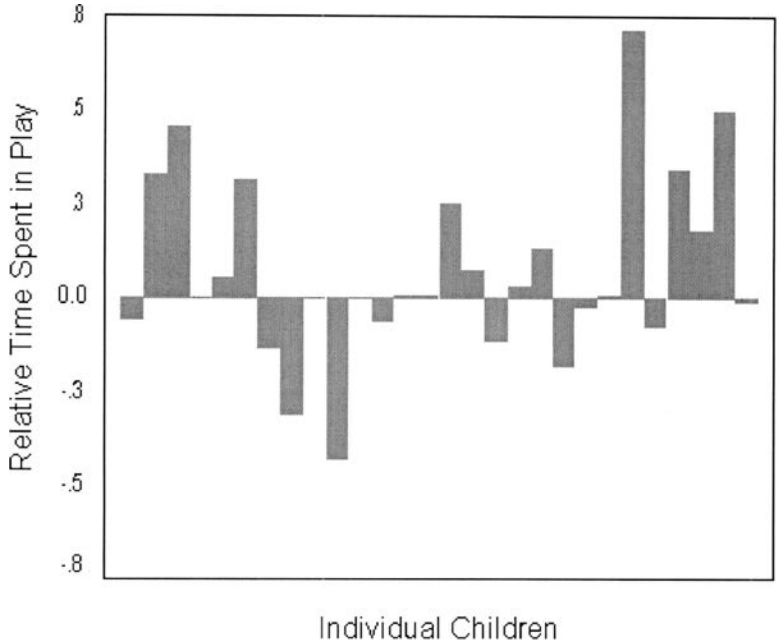

FIGURE 6.
Relative time spent in play (sec) for approving minus disapproving lexical content.

TABLE 1

Average Independent Ratings and Standard Deviations of Facial and Vocal Paralanguage

		Consistent Condition			
		Face Rating		*Voice Rating*	
Lexical Content	***Paralanguage***	***M***	***SD***	***M***	***SD***
Good look	approving	1.4	0.70	1.1	0.32
Nice play	approving	1.1	0.32	1.2	0.42
Bad stop	disapproving	4.2	0.79	3.9	0.57
Don't touch	disapproving	3.8	0.57	3.8	0.42
		Discrepant Condition			
Good look	disapproving	3.8	0.42	3.8	0.42
Nice play	disapproving	3.9	0.57	3.8	0.42
Bad stop	approving	1.2	0.42	1.1	0.32
Don't touch	approving	1.6	0.70	1.7	0.42

Note. Ratings were collected on a 5-point scale ranging from 1 = *very approving* and 5 = *very disapproving.*

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TABLE 2

Mean Gaze Shifts and Standard Deviations by Stimulus and Condition

	Stimulus							
	Bad Stop		***Don't Touch***		***Good Look***		***Nice Play***	
Condition	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Consistent	7.50	3.39	7.75	3.55	7.68	3.04	8.07	3.41
Discrepant	7.00	3.28	7.82	3.03	7.00	2.94	7.93	3.12
Total	7.25	3.32	7.78	3.27	7.34	2.99	8.00	3.24

Note. $N = 56$ (28 in each condition).

TABLE 3

Number of Children Approaching the Novel Toys in Each Condition

	Total Number of Approaches Across Trials		
Condition	***0***	***1 to 3***	***4***
Consistent	12	10	6
Discrepant	3	6	19

Note. Values represent number of children (N = 28 in each condition).