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ABSTRACT

Prior to expressing language, infants have mastered many means for engaging in referential communication with others. This contention can be supported by reference to (1) developmental changes in the attentional structure of communication and (2) infants' use of affective expressions as they begin to master referential communication. In an effort to document communication development in infants 6 to 18 months of age, over 56 hours of videotapes were made in the homes of 28 subjects. Infants were observed in three playing conditions: alone, with mother, and with a familiar same-age peer. Three coding schemes were formulated to describe infant expressions, document infant attention, and detail the mother's actions. Results of coding focusing on infant attention and affect indicate that, regardless of the infant's partner, affective expressions become increasingly shorter with age, and coordinated joint engagement (an attention state in which the infant shares a mutual object-focus with a partner and attends to that partner's interpersonal moves) is achieved quite late in infancy. These and other results are discussed. (RH)

Affect and Deed: Developmental Changes in Infant Communication

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Today I want to report to you some findings of a study concerning early communication development that I performed in collaboration with Roger Bakeman. My primary aim is to convince you that prior to the onset of language, infants have mastered many of the means of engaging in referential communication with others.

There are at least two ways I might support this contention. First, I could focus on the development of an obviously referential behavior pattern such as the gesture of pointing. Such conventionalized behavior enters into the infant's communicative repertoire toward the end of the first year and, as many researchers have noted, it allows infants to explicitly direct their partners' attention toward an object.

Instead of focusing on the development of referential gestures, I have decided today to try to support my contention in a second, complementary way. I will point to aspects of early communication that, while less explicit than referential gestures like pointing, may serve as a critical function in the emergence of referential communication. In particular, I want to highlight developmental changes in the attentional structure of communication and in the use of affective expressions as infants begin to master referential communication.

Since both attention and affect might not immediately stand-out when you image an infant conversing about objects and events, I have decided to call upon a pair of infants for assistance. What I plan to do now is to show you two 18 month-old infants communicating referentially. Then I will present a summary of our research as it relates to developmental changes in attention

and affect. Finally, I will replay the videotape of the two infants and you can judge whether or not focusing on the phenomena of attention and affect increases your appreciation of the complex richness of preverbal communication.

Background to the videotape: 18-month-old boys; video-taped in the home of the child who will be facing fully forward. The children have been friends for several months prior to this observation. Voices in the background are their mothers' who were instructed to let the infants play without intervention unless it was needed for safety or comfort.

Play Video (approximately 70 seconds)

Summary of Method

The videotape you just saw was selected from the over 56 hours we taped in our effort to document communication development in infants 6 to 18 months of age. Twenty-eight infants participated in the study. Half of them were observed at 6, 9, 12, and 15 months of age; the other half at 9, 12, 15, and 18 months.

All the videotapes were made in our subjects' homes. During each session, we observed the infant in three conditions: while playing alone, while playing with the mother, and while playing with a same-aged, familiar peer. The order of the conditions was counter-balanced over sessions. We provided three sets of toys for the infant to play with. These were also counter-balanced over conditions.

As you can imagine, we now have a rather large corpus of videotapes. We are now in the midst of mining them systematically in hopes of arriving at a rich description of the development of communication over a year long time span.

Our basic coding procedure is as follows. First, we formulate a coding scheme that describes a single aspect of either the infant's or the partner's activity. For example, we have developed a coding scheme which describes infant affective expressions, one that documents infant attention, and a third that details the mother's actions. Coders do only one coding scheme or "run" at a time, going through the entire videotape collection in a predetermined randomized order. Each time they locate a codeable event, they note the appropriate code and the time it occurred, using the time code that was placed on one of the videotape's audio channels at the time of the recording. This time code then lets us merge the codes from one data coding run with codes derived from other runs. Using this strategy, we can gradually build fuller and fuller descriptions of our observations. Moreover, we have left the task of discerning relationships between different aspects of communication development to the data analysis phase of our research rather than requiring that this synthesis be done by overstressed coders. In what follows, I will illustrate the outcome of this strategy using the results obtained from two coding runs, one focusing on infant attention and the other on infant affect.

Infant Attention

The infants we just saw were performing quite an attentional feat. Both were attending to people and to objects simultaneously. That is, each was able to attend to the actions of his partner at the same time he was sharing with his partner an interest in objects and events that lay outside the immediate boundaries of their interpersonal relationship. In simpler words, they were engaged in "referential communication."

Our coders would record that our subject in this observtion was in a state of coordinated joint engagement. That is, he was sharing a mutual focus on an object with his partner and he was providing us with indications that he

was simultaneously attending to his partner's interpersonal moves. This state was selected from a coding scheme that includes five other engagement states: unengaged, engagement with another person, engagement with an object, onlooking (or watching the other person's actions), and passive joint engagement. This last state is similar to coordinated joint engagement in that it is clear that the infant is sharing a mutual object focus with the partner; it is different in that the infant is not providing the coder with any suggestion that he acknowledges his partner's activities.

We think that the emergence of the capacity of coordinate attention toward a social partner and an object of mutual interest is a very important milestone in early social development. It has been mentioned as such in several accounts of early communication development, such as Werner and Kaplan's (1963) classic theory of symbol formation and Bruner's (1975) more recent work concerning the preverbal roots of language. In our research we were especially eager to answer two questions about the development of coordinated joint engagement. First, we wanted to know when coordinated joint engagement first became fairly routine occurrence during free play. Second, we wanted to see if infants might engage with adult partners in ways that they might not with peers.

In the table on your handout, you will find a summary of our results from our coding of infant engagement states. Let me highlight four results:

1) Coordinated joint engagement increased with age, regardless of the infant's partner. Note also that even at 18 months of age, it was a fairly rare occurrence, especially when the infant was playing with a peer. Nevertheless, we did observe at least one instance of this state by each 18-month-old in the mother condition and by all but one 18-month-old in the peer condition. In contrast, at 12 months of age, coordinated joint engagement proved very unlikely, regardless of partner.

2) As coordinated joint engagement became more common, two other engagement states became less so. Babies spent less time unengaged with age. And, more interestingly, they spent less time engaged only with their partner ("person engagement").

3) Three states did not show any age trends. From the table you can see that object engagement, onlooking, and passive joint engagement do not change systematically with age. Note that all three of these states involve the infant focusing primarily on the object world, either doing some deed or watching his partner act upon objects.

4) Finally, note that passive joint engagement was affected markedly by who the infant was playing with. In fact, it occurred at least four times more often when the infant was with mother than with peer. The absolute level of coordinated joint engagement, as well, was significantly influenced by parnter although less strikingly so.

These results lead us to conclude that the attention state we term coordinated joint engagement was a developmental accomplishment achieved quite late in infancy, after certain referential actions such as pointing gestures have already entered the baby's reprtoire. Moreover, we conclude that the mother may foster its occurrence but only after the infant has reached a certain developmental level. Before this time, the baby six months and older seems to be most invested in performing deeds within the object world, an exploration that the mother might join as the unacknowledged partner in the infant's state of passive joint engagement.

Infant Affect

From the analyses we have just considered, it is evident that infants during the age range we observed spend increasingly less time playing solely with partner. Yet during the first months of infancy, face-to-face social

interaction is clearly the norm. It is within this attentional frame that infants and their caregivers construct those delightful dances of excitement that have received so much recent research attention. Moreover, during these "dances," affect clearly plays a dominant role as both infants and adults modulate their expressions of interest and glee to engage in a self-contained conversation about their interpersonal relationship. Once the infant is able to manipulate objects, however, these purely social exchanges clearly diminish.

One question we are now pursuing in our research is what happens to the use of affective expressions as person engagement declines. Our main hypothesis is that they begin to serve new communicative functions. No longer center stage as the main focus of a purely interpersonal interaction, they begin to play a supportive role, providing brief comments on the new topic of mutual concern, objects and events that lie beyond the immediate boundary of the communicators' relationship. To test this hypothesis, we coded when positive affective expressions were displayed by our infant subjects and we then noted systematic changes in the rate of these expressions as a function to infant age, infant partner, and infant engagement state.

Our findings can be very briefly summarized as follows. Regardless of the infant's partner, affective expressions do become increasingly shorter with age, supporting our notion that they are being used more and more as comments--and less as central topic--during object-focused conversations. The rate of affective expression is higher with mother than with peer with one every 49 seconds, on the average, in the mother condition, one every 72 seconds in the peer condition. With both partners, the rate is quite high during person play and coordinated joint engagement and considerably lower during object play. Finally, an interesting partner by engagement state

interaction is apparent. With peers, rates of positive affect are very low during passive joint engagement (which you may recall occurs rarely). With mothers, the rates were much higher, approaching the rates which occurred during person and coordinated joint engagement.

From these findings, we conclude that infants 6 to 18 months of age will continue to display affect during periods of person engagement, much as they have since the early months of infancy. As infants gradually begin to coordinate their attention to both people and objects, they often express affect within this attentional context as well. These affective expressions may, in addition, serve the function of comments on more focally located referential actions. It takes several months, however, for babies to routinely engage in coordinated joint attention. And before they do, the infant's partner may influence both the infant's attention state and use of affect. In particular, perhaps only a sophisticated, attentive communicator like a mother will foster passive joint engagement and, as the adult does so, he or she may be assisting the infant's first coordinations of affect and deed, of person and object, well before infants can actively structure this coordination on their own.

Before closing, let us return to our initial observation. As delightful as these two infants are, it is now apparent that they have each travelled a quite lengthy developmental course to be able to communicate as skillfully as they do with each other. They have not only mastered certain object-related actions. They have also developed the capacity to attend to each other while attending to objects. And they comment affectively as they join in object-focused deeds. Moreover, they have accomplished all this before either has begun to master language.

Play Video Again.

References

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Table 1

Percent of Time in State

State and Condition	Age in Months				
	6	9	12	15	18
Unengaged					
Mother	20.9	13.3	13.1	6.1	2.9
Peer	27.3	25.1	31.4	16.4	9.7
Onlooking					
Mother	11.9	13.5	12.9	14.0	7.5
Peer	24.7	10.3	12.5	15.5	9.8
Passive Joint					
Mother	16.6	16.9	19.3	23.1	21.5
Peer	3.4	3.4	3.2	1.9	4.3
Coordinated					
Mother	2.3	2.0	3.6	11.2	26.6
Peer	0.3	1.7	1.8	4.2	7.2
Persons					
Mother	11.7	12.2	7.6	4.6	4.6
Peer	11.8	8.2	4.6	5.3	3.3
Objects					
Mother	36.7	42.1	43.4	40.7	35.9
Peer	32.1	50.0	44.9	51.5	50.8

Note.--Based on 14 infants at 6 and 18 months, 27 infants at 15 months in the peer condition, and 28 infants otherwise.

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