Abstract

The emergence of language at the end of infancy has a profound effect on the individual’s development throughout the life span. In this chapter, we suggest a model to explain why and how infants acquire language, and present data from a research study demonstrating the usefulness of the methodology derived from that model. In our theory, we propose that children acquire the forms of speech for expressing the contents of states of mind. In our methodology, we use attributions of the contents of states of mind underlying children’s expressions for understanding how the one system of expression already available to infants, affect, is related to the acquisition of words as a new system for expressing meaning. Both affect and words expressed desires more often than beliefs, and desires for events that involved the child as actor more often than other persons. Whereas affect was the predominant form of expression to begin with, by the time of a vocabulary spurt toward the end of the single-word period, words expressed the majority of propositions in every category except one; the category of beliefs that involved other persons and their actions toward the child continued to be expressed more often with affect than with words.

This chapter introduces a theory of language development which departs from the commonly held view that language is acquired by children as a tool for achieving purposes and goals. We suggest that tool use should not be central to a theory of language development. We propose, instead, that children acquire the forms of speech for expressing the contents of states of mind and for interpreting the speech of others so as to attribute states of mind to them (see Bloom & Beckwith, 1986, for the full account of this theoretical perspective). In what follows here, we begin by summarizing the theory and its relation to other views of child language, and describe how the theory has been translated into the methodology of our research. We then describe that research project and report
results from one study that demonstrate the usefulness of the methodology and validate aspects of the theory.

Our investigation into the transition in language development from prelexical vocalizing to the use of conventional words has been concerned with two questions that have dominated efforts to explain the emergence of language in the last decade. One question concerns how developments in cognition contribute to developments in language. We know that certain properties of mentally represented objects and events develop in roughly the same period in which children begin to say words, in the second year of life, but the connections between developments in cognition and developments in language remain obscure (e.g., Bloom, Lifter, & Broughton, 1985).

The second question we have asked is how developments in affect relate to developments in language in this same period. Infants develop in their capacities for affective experience and expression (Campos, Barrett, Lamb, Goldsmith, & Stenberg, 1983; Lewis & Michaelson, 1983; Sroufe, 1979). Emotional expression and language are two communication systems available to the child for the transmission of meaning in the second year of life. Since some affective expressions are in place virtually from birth, and affective communication is developmentally prior to language, a reasonable question to ask is how the emergence of words might be related to communication with affect (e.g., Adamson & Bakeman, 1982; Bullowa, 1979; Stern, 1977). Our research project, then, has been concerned with how the two systems of expression, affect and language, relate to one another, and how both relate to cognition more generally.

I. Intentionality and Language Development

The research has been grounded in a theoretical model of Intentionality and language development (Bloom & Beckwith, 1986), which proposes that children acquire language in order to express what they are thinking about in their consciously active, mental states. We are calling these states of mind Intentional states in the philosophical tradition of Brentano, as followed by Dennett (1978), and Searle (1983), among others. While we have borrowed the term from philosophy, the construct that it represents is common to both philosophy and psychology. For example, because we argue that the child is operating on presently active states of mind to acquire language, we are talking about awareness (e.g., Klatzky, 1984; Yates, 1985) and children’s working memory (e.g., Case, 1974; Pascual-Leone, 1970); and because the contents of Intentional states are derived from the data of perception and memory, the developments which allow the child to have such mental states depend on developments in infant memory and recall (e.g., Mandler, 1983; Moscovitch, 1984).
We propose that any successful effort toward an understanding of language development must be grounded in a theory which takes an Intentional stance (Dennett, 1978), that is, a theory that explains behaviors as expressions of beliefs and desires, and a methodology that makes explicit the attributions of such states of mind to the actions of speaking and interpreting. This stance is already implicit in child language research, even though the emphasis is on observable behaviors most often. For instance, in speech act theory, the speech act that is observed is a linguistic expression (having a behavioral/physical aspect) of an underlying mental state. Hence, researchers concerned with speech acts can easily believe they are dealing with "objective," that is, non-mental phenomena. However, Intentional states are the "sincerity conditions" for their corresponding speech acts; for instance, making a statement about X expresses the belief in X; issuing a directive to do Y expresses the desire that Y be done. The direction of influence is from Intentionality to language (Searle, 1983).

The states of mind underlying expression include psychological attitudes and contents that those attitudes are about. Beliefs are basic to the psychological attitudes of mental states and encompass a range of epistemic attitudes (e.g., know, think, expect, wonder, guess), depending on ontological certainty/uncertainty. These enable a range of desires (e.g., want, need, hope, intend) (see Danto, 1973; Davidson, 1984). In infancy, the contents of awareness are constrained to the data of perception, but with developments in the knowledge store and in procedures for recalling aspects of knowledge from memory, the child can represent in awareness objects and events that are not available in perception. Thus, mentally present contents can include events and objects recalled from the past, perceived in the present, and/or anticipated in the future.

The word "intentionality" has been used in several contexts in language acquisition research. In the proposal that language development depends on mothers attributing intentions to their infants during interaction, intentions are desires for a goal or a change of state. By expressing these attributions for her child, the mother provides experiences with the kinds of language that can achieve the goal (Bruner, 1975, 1981; Ryan, 1974), and influence the behaviors of other persons (McShane, 1980). When speech act theory was applied to prespeech vocalizations and single-word speech, intention was invoked as the "primitive force" or purpose for uttering the word (Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979; Dore, 1975; as in the "illocutionary force" of Austin, 1962). In both of these views, children acquire language as a tool to use in their interactions with others and the model of language development that is suggested is an instrumental one.

Others have described the intentionality of the infant in terms of directedness, with directedness defined as repeated or sustained actions that incorporate other persons toward a goal in a communication event. Studies of directedness have
identified the development of communication with behaviors that are "intended" by the infant in the sense of being voluntary and purposive (Bates, 1976; Bruner, 1981; Dore, 1975; Greenfield, 1980; Harding & Golinkoff, 1979). They have, for the most part, proposed that children acquire language as a tool for achieving purposes and goals in communication, again suggesting an instrumental model of language development.

Desires to achieve a goal or to communicate are one sort of Intentional state; desires do not comprise all mental states nor do the actions resulting from desire comprise all actions. Many of the Intentional states that we can hold in mind are beliefs, and the actions of their expression reflect the way we believe the world to be rather than the way we desire it to be. Thus, language expresses, and the child acquires language in order to express, many sorts of mental states with a range of beliefs, including but not limited to the beliefs entailed in desires. When language is viewed as a tool for achieving goals, the focus is on end states and the effect the child's behaviors have on the context. Tool use, however, is subordinate to the general symbolic capacity of humans (Burke, 1935; Piaget, 1972/1973), and it is the symbolic capacity which allows us to recall and represent aspects of events from memory and anticipate new events. A focus on mental contents, then, allows us to inquire into the capacities that are required for expression. The theory of language development that results, in this view, is a mental theory rather than an instrumental one.

Introducing Intentionality into a model of language development is compatible with and, indeed, it functions to integrate the many theories that we have in child language. We have already noted studies that describe the attributions mothers make of their infants' desires for goals and intentions to communicate. The present theory is consistent with these and with other accounts that explain the development of communication in social contexts (e.g., Bates, 1976; Dore, 1975; Ervin-Tripp, 1973; Halliday, 1975), but with a shift in emphasis from end states to mental states. Because the contents of mental states derive from aspects of knowledge stored in memory, the theory is relevant as well to theories that argue for the importance of children's early conceptual development in the development of language (e.g., Bates et al., 1979; Bloom, 1970, 1973; Bloom et al., 1985; Clark, 1983; Gopnik & Meltzoff. 1985; Nelson, 1974; Nelson & Lucariello, 1985; Sinclair, 1970). And because expression is basic to the theory we are proposing, and children acquire language as the mode of expression par excellence, the theory embraces explanations of how children analyze formal properties of speech (e.g., Braine, 1976; Maratsos & Chalkley, 1980; Peters, 1983; Slobin, 1982).

But each of these theories deals with only one or another fragment of the acquisition process, and, by themselves, they are insufficient. The several aspects of learning addressed by separate theories come together in the child's construction and expression of Intentional states, and only together can they
explain the development of language. Intentionality, as the "leading edge" of the mind, intervenes between events in the context and knowledge about the world in memory. It is that aspect of cognition through which percepts and knowledge recalled from memory are related to one another, and both are related to words and sentences. In taking this stance, we offer a theory of language development which integrates the social interaction, cognitive, and linguistic theories that we have for understanding language development.

II. Translation between Theory and Method

Our use of Intentionality in a theory of language development was motivated by three basic assumptions. First, what individuals think about in their conscious states of mind underlies their actions (including actions of speaking and interpreting), which, in turn, determines their development (e.g., Brandstätter, 1984; Piaget, 1954). Second, children endeavor to express what they are thinking about, and to interpret the speech of others so as to discover what others are thinking about. And third, children actively engage in acquiring words and constructing the grammar of a language in that endeavor.

Expression, is basic to the theory we are proposing. We already know that language is expression, but other modes of expression are also available to the child, and are available to us as observers before language begins. We know from the work of others that infants’ actions can be interpreted as meaningful before words appear (Bates et al., 1979), so that actions are one sort of expression. Affect displays are in place before any words are acquired, and they allow us to say something more than simply that the display is apparent. At the least, we can say that the child is experiencing some emotional state or is feigning that state. The affect display is the public aspect of the constellation of things associated with the emotion, as a manifestation of that emotion. Given that the child has at least these three modes of expression—action, language, and affect—the question that concerns us has to do with what we are licensed to attribute to the child engaging in them. (We will not have anything to say here about action as expression, but see Lifter & Bloom, 1985, for another sort of analysis of children’s actions with objects.)

The issue of what we are licensed to attribute to displays of emotions is likely to be as problematic as the dissension surrounding rich interpretation of child language (e.g., Bloom, Capatides, & Tackeff, 1981; Golinkoff, 1981; Howe, 1976), which is, indeed, an argument concerning the license to attribute. Rich interpretation involves assigning semantic-conceptual categories to the words in an expression based on the conditions under which the expression was uttered. If certain categories are attributed some criterial number of times, then the category is considered to have psychological reality for the child. The categories assigned in rich interpretation are based on our understanding of language qua language,
child language, and cognitive development. What understanding can we bring to attributions based on affect expressions?

Affect expressions are often seen as expressions of such discrete emotions as disgust, joy, and happiness (as in Darwin). As such, we should be capable of attributing at least these discrete emotions to the displays in question. Whether individual expressions of these discrete emotions would relate in any interesting ways to language development, we do not know, and we are not familiar with any theoretical or empirical work that makes such claims. And so this attribution, while possible, may not be interesting.

Another possibility, and the one which we pursue here, is to attribute what these emotions are about in the same way that we attribute what the child’s words are about. The object of an emotion must have been the occasion for that emotion, and hence its expression. In observing contextualized affect displays it is often possible to know what caused the emotion; for example, negative emotions are often caused by discomfort and pain. But discomfort and pain do not exhaust our resources; as any actively involved care-giver knows, all possible sources of discomfort can be removed and yet the child will express a negative affect. We know from the theoretical work of Campos et al. (1983) and Stein and Jewett (in press), among others, that there are many other causes of emotion. For example, negative emotions are often associated with negative outcomes of plans or perceived obstacles to plans. Conversely, positive emotions are often associated with positive outcomes of plans. A child’s emotion may be disgust about a pie, or fear about a snake, or joy about achieving some goal. The point is that the things the child’s emotions are about are frequently part of the context so that thought about those things can be attributed to the child.

Affect can serve as an index according to which planfulness may be attributed, and in a given context, the elements that comprise the plan may also themselves be evident and thus attributable. In other contexts, our understanding of emotions and observations of the objects that cause emotions will guide the attributions that we make.

These assumptions led us to devise a coding scheme for ascribing mental contents underlying infants’ expressions through affect and words. No doubt other schemes are equal to the task, but the one that we present here has allowed us to inquire into developmental relations between these different forms of expression. The format we devised for coding attributions of mental states underlying both word and affect expression is schematized in Fig. 1.

The first level, Level I, is an attribution of the child’s psychological attitude, and Level II is an attribution of the contents of mind toward which the psychological attitude, either belief or desire, was directed. These contents were coded as propositions. Thus, using the child’s expression and the context of the expression, we endeavored to attribute (I) the child’s psychological attitude, either a desire or belief; and (II) the contents of these desires and beliefs.
The fact that we coded the contents of mental states in propositional form, that is, as predicate argument structures, should not be construed as our holding a propositional theory of mind. We chose to maintain certain relationships within a propositional format for coding onto a computer, and this was not limiting since an effable system can be implemented in propositions. That is, anything that one can be conscious of can be represented in propositions and this holds whether the conscious material, itself, is in propositional form. We do not suppose that our attributions are replicas of any sort; that is, they need not look like what underlies the expressions on which we base our attributions.

The two psychological attitudes we attributed to the children were beliefs and desires—whether the child desired the event to be the case or believed the event to be the case. We coded belief and desire because they are the most fundamental of the psychological attitudes, and expressions based on belief or desire are relatively easy to distinguish and therefore to code. A belief marks reality as it is from the child’s point of view; that is, a belief matches the world as the child sees or imagines it to be. A desire marks an intention to make some change in the world; that is, a desire matches the way the world ought to be according to the child (see Searle, 1983). For example, we attributed a desire to the child if the child appeared to be thinking about doing an action, obtaining an object, or fulfilling some other kind of goal (and also coded whether the child was considering the desire in terms of achieving or failing to achieve the goal). We attributed a belief to the child if the child was considering an object or action without trying to influence or change the events in the context.

The contents of what the child was thinking about were coded as propositions, with the three predicates be (static state), do (dynamic state), and go (locative change of state), in relation to persons (self and other), objects, and actions as arguments. Be was attributed if the child appeared to be thinking about a static event, for example, as when the child noticed the mother smiling, or looked up at the clock on the wall. Do was attributed to the contents of the child’s mental state if the child appeared to be thinking about a dynamic event, for example, giving the doll a kiss, or sliding on the slide. Go was attributed if the child seemed to be
thinking of a dynamic event that resulted in a change of location (or possession), for example, walking across the room to the snack table, or giving the doll to the mother. Thus, *be*, *do*, and *go* named static, dynamic, and change of place events.

The arguments of these predicates were specified from a finite list of the persons, objects, and common actions that occurred in the playroom. Persons included the child, mother, and research assistants. The objects included the toys, the furniture, and the snack items which were always introduced into the playroom. Since the same groups of toys were introduced during each playroom visit and since the children interacted only with these known objects, we were usually able to specify accurately both the objects and the actions in our attributions.

So, in research with children on the threshold of language, we suggest keeping in mind that several modes of expression are available to the young child and we are licensed to make attributions on the basis of each of them. To make these attributions, our research practices do not need to change significantly. We need only acknowledge and make explicit the practice of making attributions based on language as expression and then to expand the conditions under which we engage in this practice. Our coding scheme is just one way in which to implement such a strategy but it is only through this strategy that we are capable of looking at some of the relations between diverging forms of expression.

Our inclusion of Intentionality in a model of language development, and our proposal that changes in the contents of mental states of awareness drive the construction of language, lead to the following assumptions. The first is that children will acquire words and language structures as the contents of their mental states become increasingly *discrepant* from the data of perception. In infancy, the contents of awareness are constrained to the data of perception; with developments in knowledge and procedures for retrieval and recall, the infant can access objects and events from memory for the contents of mental states that do not match the data from perception, so that expression becomes necessary for interpretation by others. For example, the child holding out a bottle to a caregiver can depend on the shared perception between them for understanding. But in a situation when the child’s mental contents include a bottle that is not also available to perception, saying the word becomes necessary for communication.

The second assumption is that as the contents of Intentional states become increasingly *complex*, the child will require correspondingly more complex language for their expression. That is, the more complex the contents of mental states become, the more the child will need to know of the language for both expressing and interpreting the expressions of others. One of the clearest examples of this is in the acquisition of complex sentences which generally begins between 2 and 3 years of age. With development of the ability to hold the content underlying two sentences in mind, the child searches for the forms of the lan-
guage for expressing these contents and the connections between them (Bloom, Lahey, Hood, Lifter, & Fiess, 1980).

The third assumption, and the one that is relevant to the purpose of the study reported here, is that different contents of Intentional states will require different modalities of expression. That is, qualitative differences in the contents of mental states—as opposed to changes in discrepancy and complexity—will underly the difference between expression through words and expression through an affect display.

III. Affective and Linguistic Expression

Two of the modes of expression available to the young child—words and affect displays—were the subject of the study presented here. We have asked how attributions of the contents of mind expressed through affect, were related to those that were expressed with words, in the period when words first emerged and as the children’s vocabularies increased.

A. THE RESEARCH PROJECT

Subjects. Our subjects are 14 infants—7 girls and 7 boys—from a range of ethnic and economic backgrounds. Our selection criteria were that the children were first-born, from English-speaking families, with mothers who were not employed outside of the home when they began their participation in the study.

The most striking thing about our subject population is the diversity among the infants and their mothers. We are confident that we have tapped a wide range of the general population in metropolitan New York. Ten of the children are white; three are black; and one is of mixed ethnicity (Dominican Hispanic and Native American). Four families earned less than $10,000; three earned between $10,000 and 30,000; and seven earned more than $30,000. (The threshold of poverty in the United States in 1981 was an income of $9287 a year for a family of four, and the median income for 1981 was $22,390; Herbers, 1982).

Data Collection. The data were collected through monthly playroom observations, from 8 to 26 months; home visits monthly from 8 to 15 months and at 3-month intervals thereafter; and parents’ diaries. Both the playroom sessions and home visits were video-recorded and the primary data for this analysis were the child/mother interactions in the playroom.

The playroom was furnished with a child-size table and two chairs, and a plastic slide. The video camera was mounted on a movable tripod 3 feet high, and one of the investigators followed the activities, moving the camera as needed. Each mother was asked to play with her child as she would if she had a
free hour at home. A group of toys was in place in the middle of the floor when
the mother and child entered the room. A different group of toys was brought
into the room every 10 minutes thereafter. The same toys were presented with the
same schedule to all of the children; the toys were chosen so as to counter-balance: (1) possible boy/girl interest (e.g., truck, doll); and (2) potential for
manipulative/enactment play (e.g., stacking blocks, miniature cutlery). After the
first half-hour, if the child had not already requested it, a snack of juice and
cookies, with coffee or tea for the mother, was brought in. The fact that only one
month’s observation with one subject was missed (due to a family vacation) in
the entire course of data collection attests to the fact that both the mothers and the
children looked forward to and enjoyed these sessions.

Data Processing. We identified two developmental reference points in these
children’s transition from infancy to language for the study reported here. Both
were defined for the children individually on the basis of their language develop­
ment: First words, which was operationalized as the first use of one conventional
word at least two times; and a vocabulary spurt, which was a sharp increase in
the number of different words from one month to the next, and operationalized as
the first increase of at least 12 new words in a 4-week period, after the child had
already acquired at least 20 words. Imitations of mothers’ words and self-repeti­
tions were not used in identifying the language achievements. Each of the devel­
opmental reference points consisted of three sessions: the target session during
which the criterion for either first words or vocabulary spurt was met, the
preceding session, and the following session. Thus, the two developmental refer­
ence points: first words and vocabulary spurt each extended over 3 months. The
children’s ages at each of the target sessions were 13.7 months (mean; range =
10–18 months) for first words, and 19.2 months (mean; range = 13–25 months)
for vocabulary spurt.

Computerized Coding. The equipment we use is schematized in Fig. 2. The
hardware itself is, for the most part, commercially available. Only their com­
bination is unique. We use Apple II Plus computers, Sony Betamax SLO–383
stereo-editing decks, FOR.A TCR–3100 SMPTE time-code readers, and a sim­
ple multiplexing circuit made to interface the 32-bit time-code readers and the
8-bit Apples. We also use a FOR.A SMPTE time-code generator to record a
discrete audio signal 30 times every second, 1 for each frame, on track one of the
videotape.

The coded input is stored in a file from which data can be retrieved sequen­tially according to the time code. These files are then transferred from the Apple
to an IBM–XT for analysis. For this analysis, each of three observations (the
first word, first word + 1 month, and vocabulary spurt target) was coded accord­
ing to three independent coding schemes, each in a separate pass. The computer—
video interface enabled these successive passes to be merged according to time code, preserving the temporal relations in the data. First, all of the child’s words and non-word vocalizations were transcribed; second, all instances of shifts in affect expression were identified and coded for their valence and intensity; and third, all words and all nonneutral affective expressions (i.e., positive and negative affect shifts) were coded for attributions of underlying intentional state.

Coding Expression of Affect. Because affect is always present, every change in expressed affect was recorded in the stream of the child’s behavior. The coding scheme that we devised for this study yielded a continuous record of changes in expressed affect or what we are calling affect shifts, and the duration of affect states from one shift to another. An affect shift was defined as any observable change in the child’s affect expression, which included changes in facial expression, body tension and posture, and affective vocalization (whining, laughing, and the like). These affect expressions were coded for their valence, whether neutral, negative, positive, mixed positive/negative, or equivocal hedonic tone. A neutral expression was defined by the face being in a resting or baseline position without any facial movement, as described by Ekman and Friesen (1975, 1978). A mixed affect display included elements of both positive and negative valence; equivocal affect was neither positive, negative, nor neu-
tral, as happened with expressions of surprise or excitement. Nonneutral affect expressions were also coded for intensity, with three levels of nonneutral affect: one, two, and three degrees of intensity, indicating the fullness of display of an expression. Thus, the coding scheme for describing the quality of expressed affect included the three levels of intensity (1, 2, 3) and five categories of valence (neutral, negative, and positive valence, mixed and equivocal).

The emotional signal carries two kinds of information, categorical and gradient (Stem, Barnett, & Spieker, 1983). Categorical information is the particular emotion being expressed, such as joy, sadness, or anger; gradient information includes such properties of the expression as hedonic tone and intensity. The coding scheme used in this study captured the gradient properties of emotional expression and did not identify or label discrete emotional categories. This does not preclude coding for categorical information at a subsequent time.

An emotion is a multidimensional construct that includes, at least, a representation of an eliciting situation, and an internal physiological state, feeling, and experience (e.g., Lewis & Michaelson, 1983). When we describe the affect expressions of the children in this study, we are actually describing that aspect of their emotions that is public. The public expression of emotion provided information that is well suited to our purposes. Our concern is with affect and its expressive properties. Caregivers respond to their children on the basis of the affect expressions that they observe and the attributions that they make. The valence and intensity of facial and vocal expressions are readily apparent to an observer; they are not so microscopic that they require extensive training in order to be identified. In effect, they are the kind of attributions that naïve observers (e.g., caregivers) make in the interactions of daily life. Thus, we believe that the scheme we devised was psychologically real for the observers, as well as for the children whom they observed.

The photographs reproduced in Figs. 3, 4, 5, 6, 7 were coded according to this scheme for coding affect. They are reproduced here for purposes of illustration only, they were not part of the actual data of this study. The photos were taken informally for another purpose and they are included here to provide examples that are as good as static photos can be of each of the affect shifts that were coded from the video display. In actuality, the dynamic video display, with repeated viewings, provided many more cues for the coding decisions than could be captured with still photos. Examples of negative affect (−1, −2, and −3) are presented in Fig. 3; examples of positive affect (+1, +2, and +3) are presented in Fig. 4; and four examples of neutral affect, two from each of two children at different ages, are presented in Fig. 5.

Examples of mixed affect, in which the child’s expression included elements of both positive and negative valence are presented in Fig. 6; and examples of equivocal affect, in which the affect was neither positive, negative, nor neutral, are presented in Fig. 7.
Fig. 3. Examples of negative affect expression.
Fig. 3. (continued)

Fig. 4. Examples of positive affect expression.
Fig. 4. (continued)

PLUS TWO (\(+\ 2\))

PLUS THREE (\(+\ 3\))
Fig. 5. Examples of neutral affect expression.

11 months
Fig. 5. (continued)
Fig. 6. Examples of mixed affect expression: both positive and negative elements.
Fig. 7. Examples of equivocal affect expression: neither positive, negative, nor neutral.
Reliability for coding was high. Coders were trained in pairs and after training their accuracy was assessed by calculating the agreement of each pair with a segment of data that had been coded by the two senior research assistants who were responsible for implementing the code (J. Capatides and J. Hafitz). The reliability (Pearson product–moment correlation) ranged from .98 to 1.0 for the three pairs. After working in pairs for several weeks, reliability was assessed for the individual coders working independently, and agreement ranged from .98 to .99 between the members of the pairs. Thereafter, coders worked independently.

**Coding Attributions of Intentional States.** A separate pass was made through the data for coding attributions of the contents of the children’s intentional states, according to the scheme presented earlier (see Fig. 1). Attributions were made and coded for every word and every nonneutral affect shift. Coding the contents of mental states would be an unreasonable task—that is, we would never be able to verify what the child was thinking of at any one point in time. But it was possible to do what care givers do routinely when they interact with children. For instance, when a baby whimpers, the care giver might attribute desire for a bottle or an inability to obtain a toy. We have made the same sorts of attributions to the children, attributions of what the child is thinking about when the child displays a shift in affect or says a word. In coding these attributions we use the kinds of cues that care givers use: what the child says, what the child does, what has been said or what is subsequently said, what is observable in the context, and what we know of the child from past experience. Moreover, we can do what the care giver cannot do. We can use our videotapes to watch and listen to the moments that surround an expression, over and over, and we can look ahead as well as backwards for relevant cues (Hafitz & Bloom, 1985).1

Coders were initially trained in pairs and worked together until reliability between them was obtained. This was done by having each member of the pair code a portion of the data separately, then comparing the codings, and then resolving differences. For the reliability measures for the final analyses, the percentage of agreement between independent coders ranged from .79 to .93 for each of the coding decisions in the attributions (i.e., attitude, progress toward achieving a goal of a desire, the predicate, the objects specified in the argument, 1

1We did not have the mothers of the children view the video records and attribute meaning to their own children’s words and affect expressions for several reasons. For one, we wanted our mothers to be naïve with respect to the purposes of the study and so avoided including them in any interpretive procedures which might have influenced their interactions with their children in the recording sessions (or at home, between visits to our laboratory). For another, the time required (away from their children) would have placed unreasonable demands on the mothers; they were already contributing two days each month to the project (one laboratory session and one home visit). In addition, the mothers would have differed in their accuracy and objectivity and reliability among them could not have been assessed.
the number of propositions attributed, time, and directedness). Several analyses of how the children’s words expressed these attributions are under way. The study presented here concerns the qualitative comparisons between the contents of these attributions as expressed through words and affect.

Each expression of affect in the first 30 minutes of the first word and vocabulary spurt target observations; all of the words in the 2 hours that made up the first word target and subsequent first word + 1-month observations; and all of the words in the first half-hour of the vocabulary spurt target observation, were coded for attributions of intentional states. Because words were sampled for 2 hours in the two first word observations (because words were infrequent in the first words and first words + 1 observations) and for only 1 half-hour in the vocabulary spurt observation, the following measures were taken to control for the differences in sampling time. The frequencies of words and attributions for words from the two first word observations were divided by four, so that results are presented here for 30 minutes of interaction for words and for affect, at each time (first words and vocabulary spurt). In addition, when word and affect occurred in the same expression, the attribution was counted twice, that is, added to the frequencies of both word and affect.²

The attributions that were made of the children’s intentional states provided us with a heuristic for comparing the profiles of meaning that were conveyed with affective expressions and with words, at two times in the children’s single-word period—when words first emerged, and at the time of a precipitous increase in the number of different words.

IV. Results

The numbers of words and affect shifts that occurred at the two different times are presented in Table I. The numbers of propositions in the attributions that were made of the mental states underlying these words and affect shifts are also presented in Table I. Each expression could have had one or more propositions (along with a psychological attitude) attributed to it. For example, when a child tried to put the cow into a block and turned to the mother for help saying “cow,” two propositions were coded: the desire that the child put the cow in (failing to achieve the goal), and the desire that mother do it (with the expectation that she would achieve the goal). Thus, in the analyses that follow, the numbers of propositions are compared for expression by words and affect, at two times, first words and vocabulary spurt. Each of the coding passes was performed independently of the others; persons doing the coding for attributions of Intentional states

²The incidence of words occurring at the same time as a positive/negative affect display was low; words occurred with neutral affect primarily (.76 at first words and .64 at vocabulary spurt; Bloom, Capatides, & Beckwith, in preparation).
TABLE I

Frequency of Expressions and Attributed Propositions*

<table>
<thead>
<tr>
<th></th>
<th>Expressions</th>
<th>Propositions</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Words</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age: $\bar{X} = 13.7$ months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range: 10–18 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affect</td>
<td>1029 (.88)</td>
<td>1448 (.85)</td>
</tr>
<tr>
<td>Words</td>
<td>135 (.12)</td>
<td>265 (.15)</td>
</tr>
<tr>
<td>Vocabulary Spurt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age: $\bar{X} = 19.2$ months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range: 13–25 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affect</td>
<td>1023 (.48)</td>
<td>1688 (.43)</td>
</tr>
<tr>
<td>Words</td>
<td>1092 (.52)</td>
<td>2251 (.57)</td>
</tr>
</tbody>
</table>

*30 minutes of interaction at first words and vocabulary spurt.

were unaware at the time that the number of propositions in these attributions would be the unit of analysis for this study.

At the most global level, one can compare the frequencies of words and affect shifts, and the propositions that were attributed to them, at the two times. At the time of first words, a total of 1713 propositions were attributed and 85% of these were attributed to expressions of affect. By the time of the vocabulary spurt, the relative contributions from affect and words to the expression of propositions had shifted, and only 43% of the propositions were attributed to expressions of affect. This shift reflected the approximately eightfold increase in both the numbers of words and the numbers of propositions attributed to words. At the same time, however, the numbers of affect shifts and propositions attributed to affect shifts increased only slightly. Thus, expression per se increased in the period, but only with the children’s emerging use of words.

The frequency in these attributions of the two psychological attitudes, beliefs and desires, are compared in Table II. The relative frequency of beliefs and desires was the same for both kinds of expression at the time of the vocabulary spurt: Approximately two-thirds were desires, while one-third were beliefs. This finding was the same at first words for affect, when affect expressions predominated, but words, which were just beginning to emerge, tended to express beliefs somewhat more.

The relative frequency with which different categories of propositional content were attributed to words as compared with affect shifts is presented in Table III. The categories of propositions included persons, either child or mother (or, on occasion, an investigator) in their arguments. Because of the exploratory nature of this analysis and the lack of independence between word and affect expression
TABLE II

Frequency of Beliefs and Desires Attributed to Children’s Expressionsa

<table>
<thead>
<tr>
<th>Belief</th>
<th>Desire</th>
<th>n</th>
<th>Belief</th>
<th>Desire</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affect</td>
<td>.33</td>
<td>.67</td>
<td>1448</td>
<td>.32</td>
<td>.68</td>
</tr>
<tr>
<td>Words</td>
<td>.43</td>
<td>.57</td>
<td>265</td>
<td>.36</td>
<td>.64</td>
</tr>
</tbody>
</table>

N = 14  
a"n = Number of propositions attributed.

(given that propositions attributed to concurrences were counted twice), these data are treated here only descriptively.

At the time of first words, affect expressed the greater proportion (.84 overall) of each category of proposition, which reflected the preponderance of affective expressions over words. Two categories diverged from this overall relative frequency. One was the child’s expression of BELIEF with the contents [be, do, go/child]—the belief category in which the proposition included an event that did

TABLE III

Distribution of Contents of Beliefs and Desires Attributed to Children’s Expressionsa

<table>
<thead>
<tr>
<th>Belief</th>
<th>Desire</th>
</tr>
</thead>
<tbody>
<tr>
<td>be, do, go/mother</td>
<td>be, do, go/mother</td>
</tr>
<tr>
<td>do/mother say</td>
<td>do/mother</td>
</tr>
<tr>
<td>be, do, go/child</td>
<td></td>
</tr>
</tbody>
</table>

First Words  
n = 386  
n = 155  
n = 50  
n = 174  
n = 948  
1713
Favor | .90    | .65    | .57    | .83    | .87    | .84    |
| Words | .10    | .35    | .43    | .17    | .13    | .16    |

Vocabulary Spurt  
n = 459  
n = 733  
n = 152  
n = 478  
n = 2117  
3939
Affect | .56    | .32    | .30    | .39    | .45    | .43    |
| Words | .44    | .68    | .70    | .61    | .55    | .57    |

N = 14  
a"n = number of propositions attributed.

Note. The categories of content are abbreviated here; they should be read: predicate (either be, do, go) “in relation to” content (that includes mother or child). The category mother say represents the child acknowledging or otherwise taking into account what someone has just said; n = 0 under desire.
not involve another person. Examples included the following: A child accidentally dropped a block, and said “uhoh;” a child fell down, and whimpered; and a child looked up at the clock on the wall and said “ticktock.” Thus, contents in this category, which was the least frequent category, included fortuitous events with the child as actor, and objects that the child noticed and attended to (underlying commenting and naming utterances). The second was the category [BELIEF[do/mother say]], the proposition attributed when the child acknowledged or otherwise took into account the mother saying something (as happened with an imitation or contingent responding).

At the vocabulary spurt, however, words expressed the greater proportion of each category of propositions except one, reflecting the increase in the number of words compared with number of affect shifts. The exception was the category [BELIEF[be,do,go/mother]], in which the proposition was a belief that included an event that did include another person (the mother most often). For example, a mother smiled at her child and the child smiled back or the child watched the mother rolling the truck down the slide and said “down.” Desires, in contrast, were expressed relatively more often with words than with affect, whether the desired event in the proposition included the child or the mother as actor.

V. Discussion

The data presented here are surely insufficient to validate the theory we propose, and represent only one of several analyses currently in progress. However, this study does elucidate the methodology we have devised and can validate certain aspects of the theory. The two questions that motivated our research concerned how (1) developments in cognition contribute to developments in language, and (2) the two systems of expression, affect, and language, relate to one another, and both relate to cognition more generally.

Affect displays and language both permit an observer to make an attribution of the state of mind of the expressor. In the present study, we used the contents of the attributions of these states of mind as a heuristic for comparing the meanings that the children expressed with affect and with words.

The same propositional contents could be attributed to both affect displays and words; both had to do with similar kinds of events. We suggest that this result was due to certain developments in the children’s cognition which determined contents of states of mind in general. In the model that we have constructed, the cognitive developments that are required for the child to have such states of mind occur in the contents of memory, and in the ability to recall elements of knowledge in memory in relation to the data of perception (Bloom & Beckwith, 1986). These developments in cognition make possible the mental contents underlying both affect and words.

However, the model also predicts that the two forms of expression develop to
express qualitatively different contents. While the same categories of contents were attributable to both affect and words, we interpret differences between them in their relative frequencies as qualitative differences. While words came to assume most of the responsibility for expressing the contents of intentional states at the vocabulary spurt, the children continued to express their beliefs about other persons and their actions toward the child primarily through expressions of affect.

Two other findings in Table III deserve mention. One is that more than half the propositions attributed to the child were in the category [DESIRE[be,do,go/child]], at both times. The children’s expressions—affect shifts primarily at Time 1 and words primarily at Time 2—most often concerned desires for themselves to be, to do, or to go. Thus, the children in this study did not acquire words as tools for manipulating actions by other persons; overwhelmingly they expressed their own desires to act in achieving purposes and goals.

In addition, the second least frequent category at Time 1 became the second most frequent category at Time 2: [BELIEF[do/mother say]], attributed when the child acknowledged or otherwise took into account the adult saying something. For example, a mother said “You’re a funny bunny” and the child smiled; or the mother said “Let’s put the baby on the slide” and the child said “slide;” or the mother said “We have to go home now” and the child said “no.” The shift in the relative frequency of this category indicated that the children acquired words in this period for interpreting and responding to the speech of others as well as for expressing their own contents of mind.

A major result of this study was that the frequency of affect displays, and propositions attributed to them, did not increase appreciably over time, while the frequency of words and propositions attributed to words increased substantially. We interpret this stability in affect expression as an indication that the children were already able to express how they felt about the contents of mental states—through their facial expression, body posture, and affective vocalizations—before words appeared. Words, in contrast, were acquired in order to express what those contents were. Thus, words did not replace affect, but emerged as a new system for expressing aspects of the contents of mental states—with names of persons, objects, and actions primarily—while affect continued to express the children’s feelings about those contents.

We conclude that affect and language coexist as complementary systems of expression. The forms of the two systems are fundamentally different (e.g., Sapir, 1921), and their developmental histories differ as well. Some forms of affect are available from birth, and in early infancy an affect display is virtually a symptom of the emotion it is an expression of. The units of language, in contrast, have to be learned and they are arbitrary. Affective expression was already in place and was the far more frequent form of expression at the time that first words appeared. The number of affect shifts and number of propositions at-
tributed to these affect shifts increased only slightly, while words and the propositions attributed to them increased eightfold. Thus, while affective expression was developmentally prior to language, it was surpassed by the expressive power of words by the time of the vocabulary spurt.

We conclude that cognition, affect, and language are related to one another by virtue of the relevance of developments in each to the contents of awareness in the developing mind of the child. The child’s cognition encompasses all the elements of memory. The ability to access elements of memory in relation to the data of perception determines the contents of mental states. These contents, in turn, underlie the child’s expressions through affective displays and language. The instrumental function of language, like many of its functions, happens in the interaction between persons. Words are the tools of such interaction only in light of the influence they have on the actions of other persons. But the origins of these end states are in the minds of the participants.

Introducing Intentionality in a theory of language development emphasizes the mind of the child and its development. In this view, the control of language development is in the mind and action of the child, rather than in the events of the external context, or the support that the child receives in familiar interactions with adults. The theory that we are proposing places the emphasis on how the development of the child’s cognitive capacities influences the contents of mental states, which, in turn, determine what the child expresses and interprets of what others express. Events in the context and interactions with others are vital to this development, but it is the child’s understanding of these external events that is the critical explanatory factor.

Acknowledgments

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