
The Intentionality of Word Learning: How to Learn a Word, Any Word¹

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ABSTRACT

Children learn language to share their beliefs, desires, and feelings through acts of expression and to share the contents of minds of other persons through acts of interpretation. *Intentionality* is central, therefore, for language and for acquiring language. Principles of relevance, discrepancy, and elaboration explain the dialectic transactions between a child's states of mind and the external social and physical contexts in which language is discovered by the child for learning. Invoking a child's intentionality in a model of language development places the essential agency of the child at the center of the developmental process and locates language within a nexus of developments in cognition, emotion, and social connectedness.

The central force in word learning is the mind of the child and its development rather than external mechanisms such as the social context, neural networks, or lexically specific constraints, principles, and biases. Early language is a succession of transformations of the adult target language by the child, under the child's control. The child's agency and directionality towards the target language apply to both its lexicon and grammar together in the course of acquisition, and the one is not learned apart from the other. Moreover, the acquisition of language is, itself, embedded in other cognitive, social, and emotional developments happening at the same time. Efforts to explain word learning, therefore, must involve broad principles that account for both developmental process as well as change in behaviors over time. I have proposed three such principles as explanatory concepts *that focus on the agency and action of the child as mechanism* (Bloom, 1993, 1997). These principles describe the moment-to-moment adjustments between a child's intentional states in consciousness and the child's perceptions of changing circumstances in the context—adjustments that are required for all development. Here, these principles are applied to language development, in general, and word learning, in particular.

According to the principle of *relevance*, language learning is enhanced when the words a child hears bear upon and are pertinent to the objects of engagement, interest, and feelings. Relevance is determined by the things children care about in the real world and provides the *direction* for word learning, determining the words children say and understand and, thereby, the words they learn. Relevance "is the single property that makes information worth processing" (Sperber and Wilson, 1986, p. 46).²

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² In the 1995 edition of their book, Sperber and Wilson make clear that their original intent was to highlight a "communicative" principle rather than a "cognitive" principle, and they distinguish between the two kinds of principles (see, especially, p. 271, ff). Neither reading of their principle of relevance, however, has to do with learning, with children, with acquisition, or with development. Instead, their principle of relevance is a theory of how "every act of ostensive communication communicates a presumption of its own optimal relevance"; it is explicitly a "pragmatic" principle having to do with the special connections between ostensive communicative signals and language. The principle of relevance I have proposed for word learning (and language learning more generally) (Bloom, 1993 and elsewhere) is a cognitive principle that has pragmatic (and other) consequences for how children acquire language. The principle of relevance proposed here incorporates Sperber & Wilson's notion of relevance as the "single property that makes information worth processing" but it is not the same principle of relevance they proposed.

According to the principle of discrepancy, a language has to be acquired when the child's contents of mind differ from what is already evident to other persons, and clues from the context are not available for shared understanding. As children become able to anticipate new events and recall past events not part of the here and now, they need to learn a language for expression and interpretation in order to resolve discrepancies between what they and others have in mind. Discrepancy provides the motivation for word learning, why children learn words and procedures for sentences in the first place.

According to the principle of elaboration, children will have to learn increasingly more of the language—its words and syntax—in order to express and articulate the increasingly elaborated contents of mind made possible by developments in the symbolic capacity and conceptual structure. Language must keep up with the increasing number of elements, roles, and relationships that are represented in intentional states for expression and interpretation. Elaboration of intentional states provides the impetus for propelling the progress of language acquisition forward.

Together, the principles of relevance, discrepancy, and elaboration have two essential consequences in the intentionality theory of language learning. First, other aspects of the child's development contribute to the process of language learning. Language emerges out of a nexus of developments in cognition, emotion, and social connectedness in the first 3 years of life, and its acquisition is not reducible to neural networks, lexical constraints and biases, or the actions of other persons. Second, word learning depends on the essential agency of the child. While general learning strategies such as discrimination and association are required, these are driven by the child's cognitive and affective processes. Language is learned by a child who is poised to act, to influence, to gain control—a child reaching out to a world of persons and objects to embrace the learning of language for the power of expression it provides.

In contrast, most theories of constraints on language learning that have been proposed depend on mechanisms for learning words that are isolated from the rest of language, particularly its grammar, and from the rest of a child's development. Explanatory principles are constraints, theories, biases, default assumptions, and the like that are presumed to guide the child through the word learning process, outside of a child's control and apart from the child's actions and interactions in the world (e.g., Markman, 1989). Moreover, the constraints that have been offered focus on how children learn the nouns of the language. To the extent that verbs, for example, are addressed, different explanatory principles specific to verbs (or other parts of speech) need to be invoked. But a child's lexicon is not simply lists of nouns, verbs, and adjectives. Rather, the lexicon has an inherent organization both with respect to itself and emerging knowledge of the syntactic constructions in which words are experienced. Lexical organization and word learning cannot be independent of what the child is also learning about syntax and morphological processes, and nouns are not privileged.

In social pragmatic theories, a language tutor/caregiver in the child's social context is the mechanism for word learning. Pragmatic theories are descended, at least tacitly, from socially driven theories more generally, notably Vygotsky (1962, 1978) and Bruner (1983). The major emphasis in social theories of language development is on the part adults play in constructing and guiding the interpersonal context, and how children learn to interpret what adults do for clues to what the adult might have in mind. In the ordinary give and take of activities of daily living, such ostensive signals as a caregiver's gaze, gesture, smiles, and the like point the child to things in the context that can offer clues to what an unknown word might mean. To be sure, the child is the novice—the child is the apprentice to the adult in language learning. But that fact cannot obscure the child's agency and actions in acts of expression and interpretation directed towards other persons—acts that embody, make manifest, express what *the child has in mind*.

The goal of this chapter is to present a model of language development that shifts the balance of influence from the adult to the child for the social dynamics of their interaction (Bloom, 1993, 1997). It is the *child's agenda* that creates the language-learning scenario more often than not, and that sets the pace for language learning in everyday interactions. It is *the child's contents of mind* that determine which words are learned and whether what an adult does is useful for word learning.

The chapters in this book by Hirsh-Pasek and Golinkoff and by Woodward marry pragmatic theories to constraints theories in the effort to contextualize the operation of lexically-specific principles or biases as mechanisms of word learning. In Hirsh-Pasek and Golinkoff's coalition model (2000), word learning principles operate in conjunction with pragmatic cues from the context to determine not only how words are learned but how the principles themselves develop over time. This view was echoed, more recently, by Woodward and Markman (1997). Still missing, however, in models of lexical principles-plus-pragmatics is the *internal* component: the child's contents of mind that prompt and exploit the pragmatic cues from a caregiver for word learning and that kindle and fuel the interactions in which such cues occur and words are learned.

Connectionist learning models invoke mechanisms that can, potentially at least, explain acquisition of morpho-syntactic processes and structures as well as word learning. The mechanism in connectionist models depends on the neurological architecture and functioning of the brain and is not far removed conceptually from the hard wiring in the "language acquisition device" Chomsky (1965) proposed more than 30 years ago, however much the two kinds of theories might differ in the specifics of what it is that is being acquired. In the world according to M.I.T., language is acquired by a device, not a child, and research begins with a theory of adult grammar and asks what aspects of that theory of grammar are learnable. In connectionist models, language acquisition is reduced to the neural connections in the brain that are the effects of linguistic experience, much as other kinds of experience are encoded in the brain. Both kinds of theory are specific to language learning, and both kinds of theory bypass the child, who is simply the vehicle in which such a device or connections work.

These efforts to understand the mechanisms of word learning focus on one or another version of the "mapping problem": how children attach the forms of language to concepts of objects, events, and relations in the world. This focus on the mapping problem has, by and large, been product-oriented rather than process-oriented. The products emphasized in research and theory are concepts, the forms of language, connections between concepts and language forms, and how those connections are represented in the brain/mind. In fact, I think it's fair to say that most language study, with adults as well as children, is not ordinarily concerned with process—with the on-line, moment-to-moment thinking that goes into actually saying and understanding words and sentences.

A focus on the mentally constructed, unobservable representations that individuals express when they talk and that result from interpreting the speech of others connects a theory of language development to theories of intentionality in philosophy (in the sense of Brentano, 1966; Danto, 1973; Searle, 1983, and Taylor 1985, among others). Intentional states are the representations we construct in consciousness as we talk and listen, and they are the critical aspect of thinking for language and for the process of language acquisition. These representations are cognitive not linguistic constructions, but "language does not come without them" (Fauconnier, 1985, p. 1). However, most theories of word learning bypass the intentionality of the child.

Theories of word learning have ignored the essential fact about what language is and what it does. Language exists in a society to embody and make public our intentional states—the goals and plans, beliefs and desires, and the feelings we have that are, themselves, unobservable but that determine how we connect to one another in everyday events. "*What comes about through the development of language in the broadest sense is the coming to be of expressive power*" (Taylor, 1985, p. 238, emphasis added). The power of expression comes from using the conventional, linguistic meanings of words and grammar to express the private, personal meanings in a mind. These personal meanings—the contents of our beliefs, desires, and feelings—are unobservable unless we can somehow embody them and make them manifest. The focus in this perspective is squarely on the mind of the child, to be sure, but that is not to deny the critical part played by the social world. Children learn language for acts of expression, in the effort to make known to others what their own thoughts and feelings are about, and for acts of interpretation, in the effort to share the thoughts and feelings of other persons.

INTENTIONALITY AND LEARNING

Virtually all developmental accounts of children's word learning have noted the strong association between word and object, word and action, or word and event. A century ago, Thorndike (1898) pointed out that the importance of words comes from "their connections with real things, qualities, acts, events, and relations. . . . The[se]

connections operate in a mental 'set' and under the influence of more or less of the hearer-reader's entire mental equipment." He was the original 'connectionist': The title of an anthology of his papers published in 1949, the year that he died, is *Selected Writings from a Connectionist's Psychology*. He pointed to the strength or weight of connections in terms of their "potency," and the resulting probabilities with which they influence what animals, including children and other persons, actually do. The relative ease with which connections are formed depend upon three basic facts: the frequency with which an act is done, the attention the individual gives to the action, and, perhaps even more important, the intention in the act or what he called "the impulse to act." Invoking attention and intention in a theory of learning anticipated the principle of relevance.

Good old-fashioned associative learning has to play a fundamental role in almost anybody's theory of how words are learned (Bloom, 1993), and associationism is the centerpiece of the chapter in this book by Smith (2000). While association clearly contributes to the process of learning, it is just one component of the word learning process. Still missing are the affective and motivational components of word learning captured by the principle of relevance, which determines the particular words a child learns, and the principle of discrepancy, which determines why words are learned. Also missing is the cognitive impetus captured by the principle of elaboration, which propels a child's progress in language development forward and determines why more words and eventually a grammar must be acquired.

I have described the part played by associations in word learning in Bloom (1973, 1993) and pointed out, in particular, that children experience words (or signs) as one part of a complex event. When a child hears a word (and perhaps a larger speech unit like a phrase or sentence), the linguistic units are entered in memory along with other perceptual and personal data about their circumstances of use. The data for these associations come from the perceptual and functional contingencies experienced with the word, and these can include very many things in addition to an object in the context. Hearing a word is invariably only one element in an episode along with other elements that include persons, objects, actions, and the relations between them.

At first, the word is not separate from the episode in which it was first encountered and enters the memory system as a virtual fusion of form and content—a "word-image representation" that provides the basis for proceeding to consolidate the word's meaning in subsequent encounters (Bloom, 1973). Because word and episode are at first linked in memory, recalling the word is interdependent with recalling other aspects of the episode. I described how the earliest words can be highly restricted in their use, for example the word "car" said only when cars go by under the bedroom window and not extended to cars seen in any other circumstances, and cited similar examples of such underextensions from the early diary studies (see, more recently, examples reported by Dromi, 1987). Thus, when some aspect of the same or similar episode reappears, these reencounters are cues for reactivating and recalling the word/episode compound from memory. Because the word is represented in memory along with something of the circumstances of its first encounter, early words are strongly 'context-bound'. Repeated encounters with a word in other contexts sharpen the boundaries of the word's meaning and broaden its extension to like circumstances. Thus, words are not mapped to isolated representations as the typical word-learning experiment would have it.

The importance of ostensive naming and association has always figured in descriptions of early language learning, beginning at least with St. Augustine in the 4th century, who professed to recall and recount his own personal history of language acquisition (see Bloom, 1993). Ostensive-inferential pragmatic signals—a glance, a shrug, a frown—are pervasive, and language does not occur without them (Sperber and Wilson, 1986). Both infants and their caregivers depend on these signals before language. The pragmatic signals available to the language-learning child figure prominently in several theories of word learning (e.g., Baldwin, 1993, and Tomasello, 1992a) and have been incorporated into theories of lexical principles and constraints (Hirsh-Pasek & Golinkoff, 1991; Woodward & Markman, 1997). But these signals go in both directions, and the adult in an interaction depends as much on the cues that the child provides. Ostensive learning depends upon a speaker and listener having the same thing in mind, and both child and caregiver provide relevant cues for creating shared contents of mind. Children do not "wait around for someone to name what they have in mind" (as someone pronounced in criticism of the intentionality model), but neither do they wait around for other persons to point things out to them and name them. Indeed, much of language acquisition occurs outside of ostensive episodes,

at least as these have been typically described, and extends far beyond the paradigm case in child language research of 'pointing out' (see Gopnik and Meltzoff, 1987, for discussion).

Children begin to acquire words slowly at first, in the second year, and their early words are fragile, tentative, and imprecise as they grope to find the associations that connect the different circumstances in which words are experienced (Bloom, 1973). But some time toward the end of the second year they begin to use many different words and to use words more frequently and more easily. The words learned in the 2nd year do not replace the pragmatic signals and emotional displays which had served the younger infant so well in the 1st year. Children continue to express their feelings through displays of emotion as they learn the words to articulate what their feelings are about: the words which name the objects and circumstances of their emotional experiences, words like "more," "gone," "Mama," "cookie," "fall down" (Bloom, 1993). Because these words give public expression to a child's private meanings, other persons can know them, share them, and perhaps do something about them.

THE CHILD'S INTENTIONALITY AND LANGUAGE DEVELOPMENT

The intentionality model shown in Figure 1 (from Bloom & Tinker, 1999) has at its core the tri-partite model of language content, form, and use that Margaret Lahey and I introduced more than 20 years ago. Linguistic forms—sounds, words, syntax—are only part of what language is. *Form* requires *content*, because language is always *about something*. And form and content require the pragmatics of language *use*, because language is used differently in different situations according to pragmatic circumstances and communication goals. Only one or the other of these components, notably form alone, cannot by itself be a language—rather language is, necessarily, the *convergence* of content, form, and use (Bloom and Lahey, 1978). The child's theory of language is always directed at the target language, but what the child knows and is learning about language at any point in time is contextualized in everything else the child knows and is learning about the world of persons, objects, and events.

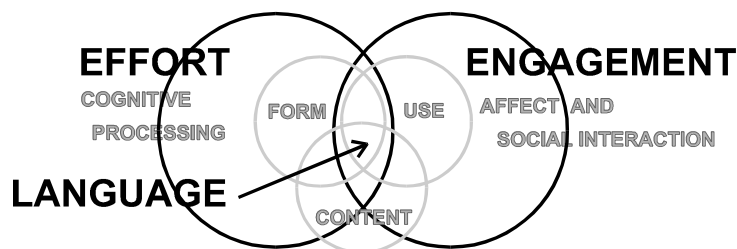


Figure 1. Model of developmental processes for language learning (Bloom & Tinker, 1999).

A model of language that encompasses language content and use as well as linguistic form means that language will never be acquired, in the first place, without *engagement* in a world of persons, objects, and events—the world that language is about and in which language is used. A model of language development, therefore, needs to embrace the part played by the social and emotional factors in language learning that are conceptualized here as engagement. Children are engaged, from the beginning of life, with other persons, and the intersubjectivity that develops between infant and caregivers in the first year is the foundation for a child's social connectedness throughout life. Emotional expressions are available for sharing and for creating and maintaining intersubjectivity, virtually from birth. By the time language begins toward the end of the first year, infants' emotional expressions are well-established for sharing what they and others feel and think.

However, the result of cognitive developments in the first year is that children have contents of mind that are increasingly elaborated and discrepant from what other persons can see and hear in the context. As infants remember past events and anticipate new events, they have intentional states with beliefs, desires, and feelings about things which other persons cannot yet know and which cannot be expressed by emotional expressions. A child will have to acquire a language when emotional expressions cannot be explicit enough, and caregivers cannot exploit clues from the context for understanding—when the objects of the child's belief, desire, and feeling are not already evident. Language can not only express contents of mind but can also articulate the objects, roles,

and relationships represented in intentional states in ways that emotional displays cannot. Children learn language, therefore, because they strive to maintain intersubjectivity with other persons, language has to be learned when what the child has in mind differs from what someone else has in mind and must be expressed in order to be shared.

While engagement encompasses the child's emotional and social directedness for learning a language, the component of *effort* captures the work it takes to learn a language and the cognitive processes that are required. Learning and using words for interpretation and expression put demands on a young child's essentially limited cognitive resources. For example, at a minimum, *learning a word* requires that the child construct an intentional state representation out of data from perception and data recalled from memory; associate the word with an element or elements in that representation; and encode the word and its associated contingencies in memory. At a minimum, *using a word* requires that the child both construct and hold in mind an intentional state representation; retrieve the word from memory for expressing an element or elements in the intentional state; and articulate the word in an expression.

These processes for word learning and expression often happen together, which compounds the effort that each requires. And, in addition, because words are not expressed apart from a child's emotional responses and other actions or interactions in the world, the cognitive resources available for words must be shared between, among other things, emotional expression, learning about objects and relationships between objects in play, responding to what someone else says in conversation, and so forth. Such effort that learning and using the units of language require tends to be overlooked, especially when the processes involved are attributed to mechanisms external to the child, such as the social context, or a language acquisition device, or neural networks, or lexical principles, constraints, and biases.

In sum, language is learned in a dialectical tension between engagement and effort. *Engagement*, which provides the motivation for learning language, together with the cognitive *effort* required for language, draw on the young child's affective and cognitive resources. The principles of relevance, discrepancy, and elaboration mediate between engagement and effort. Relevance determines the things that capture a child's engagement for linguistic learning and interaction. Discrepancy between what the child and others have in mind determines the need to exert the effort required to learn and use language. And increasing elaboration of the contents of mind causes effort to be extended towards learning and using increasingly more complex and abstract language forms and functions.

Engagement and Word Learning

A word the child hears is relevant when its target is part of what the child has in mind, a part of the representation in consciousness that is the child's intentional state at the time. Children surely hear many words that are not relevant to what they have in mind, but the words they will learn are those that are relevant to the things (persons, objects, events, actions, states, and relations between them) they do care and know about and that are, therefore, the objects of their engagement.

Relevance is not the same as salience. For example, the Empire State building at 34th Street in New York City is salient to people riding the 5th Avenue bus downtown, but not necessarily *relevant* unless they are reminded to meet someone on the corner of 34th Street. What is salient in the context becomes useful to the child only when it is pertinent and bears upon the elements, roles, relations in the configuration in the child's mind, that is, when it is "information worth processing." To be sure, what the child has in mind changes on hearing words and when the child's attention is drawn to something new, but that is the consequence of all acts of interpretation.

A recurrent claim in the literature, following Quine (1960), is that a new word could theoretically mean many things in the situations in which a child hears it: How is the child to know that "rabbit" does not mean hop, ears, tail, furry or any one of the things it could mean? When the child sees a 2nd rabbit hop by and hears "more," why should the word *more* mean something other than "rabbit"? The answer is that the principle of relevance narrows the range of possible meanings the word could have on the occasion of the child hearing it. Relevance in word learning scenarios is determined by three things. One is the child's *engagement* in whatever is the focus of attention. The extent to which a child finds a task interesting will determine the level of engagement that the child

brings to the task (Renninger, 1990; Renninger & Wozniak, 1985). The second determiner of relevance is *conceptual structure* in the knowledge base and the concepts of objects (like rabbits), and relations (like recurrence), that the child is also learning. Children more readily learn words that name things they are learning about, and they are more likely to be engaged in learning something new than when presented with what is already familiar and well-known. The third determiner of relevance is the child's *focus of attention* and the extent to which an adult shares that focus of attention when saying words. If the child's focus is on the whole object, then the child will provide signals to an adult to assure a connection between the word and the whole object, so that is what the child will take the word "rabbit" to mean. But if the focus is the rabbit's ears, then the child will assume the word "rabbit" means ears until persuaded otherwise when, in another situation, the focus is not on the ears but on the object, and the child hears "rabbit" again.

Invoking the Quinean dilemma simply does not fit the typical situations for either word learning by infants (Nelson, 1988) or language use by adults: "The speaker-listener does not consider all the interpretations of a sentence and then discard the inappropriate ones. . . . starting from the [mental] configuration already available . . . the potential of a sentence is always far less than its general potential for all possible configurations. (A brick could theoretically occupy any position in a wall, but at any stage of the actual building process, there is only one place for it to go)" (Fauconnier, 1985, pp. 168-169). Fortunately, like Fauconnier's brick, the word a child hears will already have its target in the child's mind, more often than not, because caregiver speech to children is overwhelmingly *responsive* (Bloom, Margulis, Tinker, & Fujita, 1996). In actually occurring word learning scenarios, a child hears words that name elements, roles, and relations already in mind. Children aren't depending on adults to direct their attention to an object and then name it, as in the typical word learning experiment.

Evidence for the principle of relevance for word learning is abundant enough in the literature as to make its assertion virtually self-evident. Studies of infants and mothers have revealed again and again that communication between them occurs in contexts of "joint attention" (Bruner, 1977; Tomasello, 1992a) that assure the adult's contribution to the exchange will be relevant. The extent to which caregivers name the object that a child is attending to determines the words a child learns and subsequent vocabulary growth. Children evidently learn more words when caregivers tune into and say something about the objects of attention (Masur, 1982; Tomasello & Akhtar, 1995). Similarly, an optimum occasion for learning language forms is provided when caregivers fail to understand an infant's expression and "negotiate" the form of the message in subsequent exchanges (Golinkoff, 1986). When this happens, infants are presented with the forms that can more successfully articulate what they have in mind.

However, the focus in studies of joint attention between child and caregiver is rarely on the importance of attentional processes for language development *from the child's point of view*. Rather, the emphasis in studies of joint attention is typically on the part played by the adult, who does or does not take the child's attentional focus into account in the interaction, rather than the child, who provides the signals that direct the adult's attention. It is the child's intentional state that determines joint attention more often than not, as children invariably take the lead in their everyday conversations with adults (Bloom, Margulis, Tinker, & Fujita, 1996; Harris, 1992; Howe, 1981) and in their play activities as well (Bloom & Tinker, 1999). Even mothers' efforts at setting up routines, games, and formatting in the exchanges that occur between them (the prototypical kinds of scaffolding events) are prompted most often by something a child looks at, touches, or says (Maher, Lucariello, & Bloom, 1999). Evidence is now accumulating to show that it is a caregiver's *responsiveness* to a child rather than the adult's direction or external 'scaffolding' of the interaction that determines the interaction between them (Bloom, 1993, 1997; Bloom, Margulis, Tinker, & Fujita, 1996). Moreover, the extent to which caregiver speech is responsive is a much stronger predictor of word learning than is the mere quantity or amount of speech a child hears (Bornstein, Tamis-LeMonda, & Haynes, 1999).

Since feelings and emotions are central to engagement with the personal and physical world, we might expect children to talk about those things they have feelings about, and this expectation was borne out in a study of the timing relation between saying words and expressing emotion (Bloom & Beckwith, 1989). When compared to their baseline rates of emotional expression—how often they might be expected to express emotion at any

particular time—children were most likely to be expressing emotion immediately after the moments when they were talking). However, they were not naming the individual emotions and learning emotion labels, but talking about the objects, causes, and circumstances of their feelings. They used words *to express what their feelings were about* while they continued to express how they were feeling through displays of positive and negative affect. They were, therefore, talking about those things they cared about, providing evidence of their engagement, consistent with the principle of relevance. However, the results of this study also showed the effects of effort: The engagement evident when children expressed more emotion around speech, than predicted by their baseline rates, was qualified by the effects of the effort that both saying words and expressing emotion can require.

Effort and Word Learning

The mental processes for saying a word or sentence begin with a plan (in the sense of Miller, Galanter, and Pribram, 1960). That mental plan entails several things (at least), including constructing an intentional state, which is the child's mental meaning, and then accessing the words, syntax, and procedures for articulating and expressing the mental meaning. In an earlier study, we saw the effects of the effort required for this on-line processing in the variable length and completeness of two-year-olds' early sentences (Bloom, Miller, & Hood, 1975). When a child's sentence included words that were newly learned, or certain kinds of complexity like negation or prepositions in a verb complement, or the sentence did not have support in the accompanying discourse, the effect was an increase in cognitive load. Children said sentences like "Mommy read book" and "no read book," but not the complete sentence "Mommy no read book." Negative sentences, or sentences with newly learned words, or sentences without discourse support were shorter, because negation and using new words in a sentence 'cost' the child extra cognitive effort. And the converse was also true: Using frequent, earlier-learned words, with accompanying discourse support and without added complexity, increased the probability that sentences would be longer and more complete (Bloom, Miller, & Hood, 1975; see, also, P. Bloom, 1989; Valian, 1991).

Thus, learning something of the language doesn't mean that access for expression is automatic; far from it. Rather, the probabilities of saying words and sentences in one or another situation are determined, at least, by the ability to construct a mental meaning, by how familiar and frequent the linguistic forms and their meanings are, and by either support or competing demands from accompanying discourse. There is considerably more to language development, therefore, than just acquiring the words and procedures for sentences.

Engagement is required to begin with. Children will be guided in their language learning by what is relevant in the input to what they have in mind, and motivated to learn the language in order to express contents of mind that cannot otherwise be known by other persons—the principles of relevance and discrepancy that build on corresponding developments in emotionality and social connectedness. But effort is required as contents of mind become increasingly elaborated, requiring the child to learn increasingly more complex and abstract aspects of the language for expression and the articulation of more elements, roles, and relations represented in intentional states.

However, the original study by Bloom, Miller and Hood (1975) and other, subsequent studies of such 'competition' effects looked only at aspects of linguistic behavior: lexicon, syntactic complexity, and discourse. More recently, we have studied children's early word learning in relation to non-linguistic behaviors and actions, including emotional expression (Bloom & Beckwith, 1989), play with objects (Bloom & Tinker, 1999), and conversations with mothers (Bloom, Margulis, Tinker, & Fujita, 1996). The relation between these several kinds of behavior to a child's language, on-line in the moment-to-moment temporal contingencies of everyday events, showed the effects of both effort and engagement and provided evidence to support the centrality of the child's intentionality for word learning.

EVIDENCE FOR THE INTENTIONALITY MODEL OF LANGUAGE DEVELOPMENT

The evidence for the Intentionality Model includes, in particular, the generality of the principles that guide word learning, the child's agency in word learning, and the engagement and effort entailed in the process of learning words.

Generality of Word Learning Principles

Children learn different kinds of words, not just object names, and for many 1-year-olds, more than half the different words they know are not object names. However, with rare exceptions, the principles, biases, or predispositions that have been offered to explain word learning are, first, not only language-specific and, more particularly, *lexically* specific because they have to do only with learning words, but lexical principles and constraints are typically *object* specific, having to do only with how children learn names for objects. Important examples are the "Whole Object Assumption" (Markman, 1989, 1992) and the "Principle of Object Scope" (Golinkoff, Mervis, & Hirsh-Pasek, 1994; Golinkoff, Shuff-Bailey, Olquin, & Ruan, 1995): On hearing a new word, a child will assume it names a whole object rather than a part of the object, or one of its properties, or something related to it. Object-specific lexical principles (constraints, biases, or assumptions) are consistent, however, with much of the history of research in word learning in their emphasis on object names, since nouns are the largest syntactic class of words in the adult language, and they are relatively easy to study experimentally.

The importance of words in children's early vocabularies that are not names of objects was first described by Bloom (1973), for relational words and person names, and by Nelson (1973) with respect to individual differences. These early results have since been confirmed by many others (e.g., Bates et al., 1994; Gopnik, 1982; Hampson, 1989; Lieven, Pine, & Barnes, 1992; McCune-Nicolich, 1981). In our study of children's early vocabulary, the words of 14 children were sampled every month, beginning when the children said their first words in our playroom observations (at about 13 months, on average) and continuing through the succeeding months until one month after they showed a vocabulary spurt (at about 20 months, on average) (Bloom, Tinker, & Margulis, 1994).

If object-specific lexical principles help get word learning off the ground, as has been claimed, then we might expect more object words to be learned early in this period, followed by a relative decline in object names as children learn to "override" a constraint like the Whole Object Assumption (Markman, 1992). However, plotting the average percent of object names among the new words the children learned from one month to the next revealed that object names made up less than 40%, on average, of new words each month. Object names also made up less than half of all the words, new and old words, in the children's total vocabularies each month. Even after removing the one child who consistently had the lowest percentage of object words, the result was the same: On average, 30% to 39% of the different words (word types) said each month by the remaining 13 children were object words.

A similar result was obtained for the more than 11,000 word tokens the children said in this period; only 33.3% of tokens were object names. The continuum of word learning was divided into two periods, one period encompassing the months up to and including the month before the vocabulary spurt, and the other period encompassing the month of the vocabulary spurt and one month after. In the two periods before and after vocabulary spurt, 34.8% and 32.5% of word tokens respectively were object names, on average, consistent with the rates of object names among word types reported overall. Thus, object words were not more likely to be learned earlier or later in the period of word learning and also not more likely to be learned either before or after the vocabulary spurt.

When person names (including 'Mama' or its equivalent) were included along with object words, both object words and person names together accounted for 40.6% of word types and 43% of word tokens of all the children's words up to and including the month after vocabulary spurt. A 50-word vocabulary is often used as a milestone in word learning. When the size of the children's vocabularies reached 50 words, the mean percent of object words was 36.3%, with a range from 10% to 50% for the individual children, and object names represented 50% of the first 50-words of only one child (Bloom, Margulis, Tinker, & Fujita, 1996). These findings are consistent with many other studies of early vocabulary, whether the result of observing spontaneous speech or mother report

(e.g., Bates, Bretherton, & Snyder, 1988; Bloom, 1973; Fenson et al., 1994; Gopnik, 1982, 1988; Gopnik, Choi, & Baumberger, 1996; Hampson, 1989; Hampson & Nelson, 1993; McCarthy, 1930; Nelson 1973; Pine, 1992; Tardiff, 1993).

Neither do object words necessarily become more important as children learn procedures for sentences. We have now extended the analysis to the children's vocabularies at the time they made their transition to multi-word speech (the month in which MLU reached or passed 1.5 words); the findings are presented in Figure 2 along with the original results reported by Bloom, Tinker, & Margulis (1994). Most of the words in the children's spontaneous speech are still not the names for objects—in fact, an even smaller percentage of their vocabularies consist of object nouns. In the 3-month window around VS, object names represented about 37% of the new words that appeared each month, on average. But at the time the children were making their transition to sentences, object words represented only about 26% of the new words they were using. Evidently, the children had a lot to learn about the language, and learning object names was not necessarily their top priority. See Figure 2.

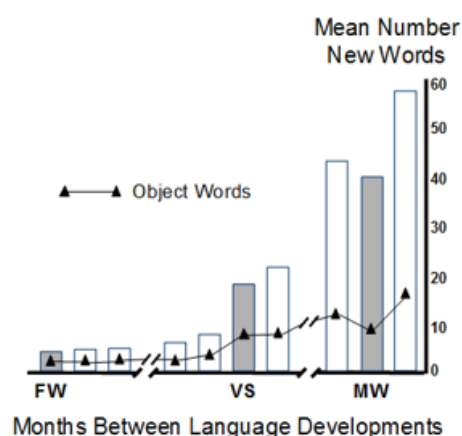


Figure 2. Number of new words each month and the number of new words that were object names, from First Words (FW) through Vocabulary Spurt (VS), to the month after the transition to Multi-Word speech (MW). The breaks in the continua indicate differences among the children in the number of months between the language achievements. Data are shown from FW through VS+1 for 14 children (Bloom, Tinker, & Margulis, 1994) and 11 of the same children in the 3-month window around MW (unpublished data).

The mean number of words in the children's vocabularies through MW+1 was 204. In the normative data based on the CDI (Bates et al, 1994), a decline in the proportion of object names also occurred when total vocabulary was about 200 words, which may well have coincided with the transition to syntax by the children in that study. Many studies have reported the increase in verbs relative to nouns at about this time. Learning object names, therefore, seems to become less, not more important as acquisition progresses. If we had used the CDI and asked the mothers which words they thought their children knew, then we expect they would have reported many more object names in their children's vocabularies (and also more of other kinds of words as well). In some studies, particularly those using mother-report measures, the proportion of nouns reported has been as high as 60%. However, even when mothers report that 60 or even 70% of the words their children know are object names, a theory of word learning has to account for how those children learned 30 to 40% of their words. In sum, theories of word learning need to be considerably more general, because children are not just learning object names. Principles of word learning have to explain how a child can learn any kind of word.

The representation of object names in the vocabularies of the one-year-olds we studied was also consistent with the relative frequency of object names in the speech these children heard from their mothers in the same observation sessions (Beckwith, Tinker, & Bloom, 1989). Moreover, the distribution of nouns in both the child and mother speech is the same as reported by Hudson (1994), from analyses of a variety of written and spoken texts from both adults and children, showing that common nouns make up about 37% of all word tokens. It

doesn't seem to matter, evidently, whether one is sampling the words used in adult or child texts, or in written or spoken texts, the relative frequency of common nouns is less than 40%.

The message is clear: Object names represent less than half of the words in the everyday texts of either spoken or written discourse, from both adults and children. How, then, could object-specific lexical principles explain word learning? If many or most of the words children acquire, and most of the words they use in their running speech are not names of objects, then more general principles are required to explain how a child will learn any kind of word, not just object words (Bloom, 1993, 1997).

Invoking object-specific principles to explain word learning also separates the acquisition of the lexicon from the rest of the language a child is learning, particularly the procedures for sentences. Grammar is inherently relational in that its function is to specify the relations within and between objects, states, and events. Before children begin to use syntax, words such as *more*, *up*, *on* that name relations figure prominently in their single-word vocabularies. Verbs, which are quintessentially relational, increase in frequency and number toward the end of the single-word period in anticipation of the transition to syntax (e.g., Bates, Bretherton, & Snyder, 1988; Bloom, 1973, 1993; Gentner, 1982; Goldin-Meadow, Seligman, & Gelman, 1976; Tomasello, 1992b). We have proposed repeatedly that acquiring the structures of grammar goes together with learning the words of the language, its verbs in particular (e.g., Bloom, 1981, 1991; Bloom, Lifter, & Hafitz, 1980; Bloom, Lightbown, Hood, 1975; Bloom, Merkin, & Wootten, 1982; Bloom, Rispoli, Gartner, & Hafitz, 1989); see, also, Pinker, 1984, 1989; Tomasello, 1992b). Thus, children need to learn different kinds of words for their early vocabularies, not just object names, and general principles of language learning are required, such as the three principles of the intentionality model of language development described here.

The principles of relevance, discrepancy, and elaboration explain other phenomena of word learning in addition to the variation in the kinds of words that children learn. For the children in our studies, developments also occurred from first words to vocabulary spurt in the mental meanings their words expressed (Bloom, Beckwith, Capatides, & Hafitz, 1988). If the principle of elaboration is correct, then development ought to occur in the expression of intentional states with multiple elements, roles, and relations between elements such as mental meanings that include an action. Dynamic meanings directed at actions have several elements with different roles and relations between them according to the details of the action. These can include an actor or agent of the action, an object affected by the action, an instrument for the action, the place to which an object is moved, and so forth. Static, stative meanings without an action, other than one of 'picking out,' usually have a focus on only the single element that the child has in mind while showing, giving, pointing, or otherwise presenting. Expression of both sorts of meaning increased in the period from first words to vocabulary spurt. But the development that occurred at vocabulary spurt was in the relatively greater increase in expression of dynamic, action meanings compared to presentational, stative meanings. This increase in expression of action meanings anticipated the subsequent transition to simple sentences.

Thus, one development in the single-word period was an increase in number of elements, roles, and relations attributable to mental meanings directed at actions, consistent with the principle of elaboration. We looked also at whether the elements attributed to mental meanings expressed by the children's words were already evident in the circumstances in which the words were said. According to the principle of discrepancy, children will acquire words and the grammar of a language as their mental meanings become increasingly discrepant from the data of perception and must be expressed in order to be shared. Development in mental meanings ought to proceed in the direction of expressing what is anticipated rather than what is already evident in the context. Most of the children's words expressed meanings that were evident, directed as they were to things already present or in progress. The greater frequency of evident expression overall, at both first words and vocabulary spurt, was what one might expect from the often cited 'here and now' characterization of children's early speech. However, development occurred from first words to vocabulary spurt in the relative frequency of anticipated expression, with a greater increase in words expressing something about imminent actions and events.

In sum, development in the single-word period was in words that expressed mental meanings that were both increasingly elaborated, having multiple objects, roles, and relations between them, and also increasingly discrepant—meanings that could not otherwise be known to a listener because they were anticipated by the child,

imminent but not yet evident. Thus, the general principles of relevance, discrepancy, and elaboration account for the meanings that children's words express in addition to differences in the kinds of words they are learning. Lexical- and object-specific principles of word learning can account for neither.

Child Agency in Word Learning: Who's in Charge?

By themselves, lexical principles (biases, or constraints) as well as theories based on neurological architecture and brain function imply an essentially passive child, one who is depending on external mechanism rather than active mental and affective process in the course of development. A cornerstone of the intentionality theory of language development is that word learning is the product of the active mind of a child. Children strive to learn the words that can express what they have in mind. They work hard at interpreting the social and pragmatic cues in contexts of everyday living, first, to be able to attribute intentional states to other persons for sharing what others have in mind and, second, so they can 'read' the cues to things associated with a word that can yield its linguistic meaning. However, young children provide a rich array of cues to their own intentionality, so that other persons can make attributions of what they have in mind, and, indeed, caregivers depend on these cues for their interactions with infants and toddlers.

Recognizing inherent limitations on lexically specific learning principles or constraints, theorists have now acknowledged that such principles alone cannot account for word learning. Young children's impressive ability to make use of pragmatic cues in their social interactions have now been acknowledged and incorporated into lexical principles theories (Hirsh-Pasek & Golinkoff, 1991, 2000; Woodward and Markman, 1997; Woodward, 2000). The importance of pragmatic cues for word learning cannot be underestimated and was, in fact, a dominant influence on theories of language acquisition a generation ago (e.g., Bates, 1976; Bruner, 1975, 1983; Dore, 1975; Ervin-Tripp, 1973; McShane, 1980; Ryan, 1974) as well as more recently (e.g., Clark, 1991; Tomasello, 1992a; Zukow, 1990). The fact is that children depend on hearing words as one part of a complex interpersonal event. The circumstances of word use in everyday events are rich in visual and auditory cues--gazes, gestures, emotional displays, intonation, and the like--that point a child to understanding the significance of the words they hear (Bloom, 1973). Most recently, such pragmatic cues have been validated in experimental studies that richly demonstrate children's interpretive abilities (Baldwin, 1993; Tomasello & Akhtar, 1995).

Most research on the importance of pragmatic cues for word learning has assumed that it is the adult in an interaction who is responsible for constructing the word learning scenario and supplying the necessary cues to the child. To be sure, interested others are sensitive to the child's cues and tune into the child's focus of attention, but it is the child who provides the lead more often than not.

We've demonstrated the child's agency in the typical word learning scenario in two recent studies of one-year-olds and their mothers, one a study of the temporal and functional relationship between child and mother messages in their spontaneous conversations (Bloom, Margulis, Tinker, & Fujita, 1996), and the other a study of those interactions, in particular, that included mothers' formatting routines (Maher, Lucariello, & Bloom, 1999). The structure of the discourse context has long been invoked as the basis for word learning, but the typical assumption has been that word learning depends on the caregiver for both constructing the discourse and scaffolding the child's participation in it. We have shown, however, that conversations between children and their mothers are generated by the children from the beginning of word learning, and neither the interactions themselves nor learning the words in an interaction depend on adults' creating the dialog between them.

Child-Mother Conversations. In the study of the on-line temporal contingencies between child and mother speech, the tendencies for each to be talking before, during, and after the other said something were compared to the respective baseline rates of child and mother speaking overall. The results of lag sequential analyses at the time of the vocabulary spurt (mean age about 19 months), for the 12 children and mothers we studied, are presented in Figure 3. The horizontal line in the figure represents the baseline rates of either child or mother speaking. Baseline rate was the incidence of either child or mother speech as it was distributed throughout the entire observation and was, therefore, the chance probability of either one speaking in any given 1-sec interval. The vertical line in the figure represents the target speech events, when either mother or child was speaking. The data points represent deviations from baseline rates (in standard deviation units) during the target event and in

each of the 5 1-sec intervals before and after the target (averaged here for the 12 child-mother pairs). Data points above baseline meant that the observed speech was greater than was expected given mother or child tendencies to be speaking overall in the playroom. Data points below baseline meant that the observed speech (in this case, during intervals of speaking) was less than expected.

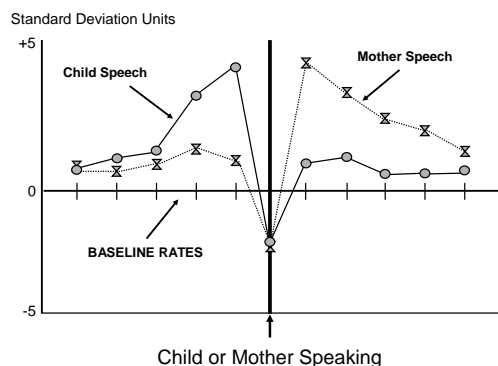


Figure 3. Temporal Patterns of Child-Mother Conversations: Tendency for child or mother to be speaking during the other's speech, and in the 5 1-sec intervals before and after, relative to their respective baseline rates of speech overall, shown as differences from baseline rates in standard deviation units (Bloom, Margulis, Tinker, & Fujita, 1996).

***All 12 of the child-mother pairs in this study showed the same profile as the group. Compared to their baseline rates of talking overall, children were most likely to be talking before mothers' speech, less likely to be talking after, and least likely to be talking at the same time. Mothers, in contrast, were more likely to be talking relative to their baselines immediately after a child said something and less likely to be talking before. The result is shown here for the vocabulary spurt; the same pattern of interaction occurred at first words, but with greater excursions from baseline rates at vocabulary spurt than at first words. The temporal contingency of turn-taking, a highly relevant dimension of conversational interaction, was already evident at first words but was consolidated in the period of word learning between first words and vocabulary spurt. Other research has also shown that mothers are more likely to respond than to initiate conversations (Harris, 1992, with infants 16 months old and younger, and Howe, 1981, with 20- to 25-month-olds). One-year-old Swiss French speaking children initiated the majority of talk about immediate past events in a study by Veneziano and Sinclair (1995), while talk about distant past events was more often initiated by adults, who might be expected to have more prior knowledge (Lucariello & Nelson, 1987, and Sachs, 1977).

When mothers shared the child's topic in responding, they typically just repeated or otherwise acknowledged or clarified what the child had just said, and they were more likely to make a statement than to ask a question. Thus, while the mothers of these one-year-olds were taking a turn to keep the conversation going, they were not likely to make "extended replies," such as has been described with older children by Howe (1981). Children, in turn, shared the topic most often when mothers' prior speech functioned as discourse commentary and less often when mothers encouraged or discouraged their actions. Only about one third of child speech occurred in response to something mothers said.

This study of early conversations provided evidence of the kinds of experiences with language that young children have in their spontaneous, everyday interactions for learning words. Participation in these earliest conversations was motivated largely by a child's own cognitive agenda to express something in mind, and conversations functioned to allow the children to direct the flow of the interaction in order to express and thereby share what was relevant to them. Mothers, in turn, were primarily responsive. Thus, the results support a model of language development that takes a young child's intentional states as the starting point for conversations in particular and word learning more generally and depends on responsivity as an important contribution mothers make to their interactions with young children. Most recently, Bornstein, Tamis-LaMonda, & Haynes (1999) have shown that

the extent to which mothers responded to their young children in this same developmental period was the most important influence on word learning and more important than the number of words the mothers said.

Formats and Routines. We concluded from our study of conversations in the second year that the children were the ones who set the pace and controlled the agenda of their interactions; they were not depending on their mothers to set up linguistic formats and scaffold their exchanges. However, the scaffolding model has been an important one in language acquisition theory, and mothers' linguistic formatting has been considered vital to word learning in particular (e.g., Ninio and Bruner, 1978; Snow and Goldfield, 1983). For this reason we've recently looked at just those interactions that could be considered as "scaffolding" in the by-now classic sense in which the term is used: episodes that consisted of games, routines, songs, and play themes in which mothers might be deliberately or otherwise 'teaching' their children words (Maher, Lucariello, & Bloom, 1999).

The analysis used the data at first words and the vocabulary spurt for 8 of the same children in the conversations study. In spite of the liberal definition of scaffolding that we used, formatting episodes represented only 18% of the interactions at first words and 15% at vocabulary spurt. The frequency of mothers' formatting was simply related to how frequently mothers talked—mothers who talked more also produced more formatting episodes. However, formatting did not encourage children to talk more: The frequency of child speech was unrelated to frequency of formatting episodes. Formatting also did not play a leading role in word learning, because the children of those mothers who formatted least often said proportionally more of the target words in format episodes than children of mothers who formatted more frequently. Most important, however, formats were effective for word learning to the extent that they were child-driven. Approximately 2/3rds of the successful format episodes, in which a child eventually said a target word in an episode, were initiated by a child either looking at, touching, acting on, or saying something. Finally, 1/3rd of the words the mothers targeted in format episodes at the vocabulary spurt had already appeared in the children's speech in the earlier months—they were not new words. Thus, if formats contribute to word learning, it might function to consolidate the vocabulary of words the children have already learned instead of teaching new words.

Mothers differ in how well or how often they pick up on a child's cues and the extent to which they act on a child's cues and respond. But it is mothers' *responsiveness* rather than prior scaffolding that influences word learning. Whatever social, interpersonal, or affective function that routines, games, and other formatting interactions might have, scaffolding is not the engine of word learning. Rather, word learning is driven by the agency and action of the child in the expression of intentionality.

Our studies of conversations and formatting were based on naturally occurring, spontaneous interactions in our laboratory playroom between children and their mothers, who were provided with groups of toys and a snack and given the opportunity to do what they do in everyday situations. Mothers were not asked to engage in picture book reading or scripted activities like a tea party, and mothers were not asked to 'teach' a child how to perform a task (as in the typical study of formats and scaffolding). While such activities are the sorts of scripted activities in which mothers have the upper hand, and might well be expected to initiate and direct the activity, they can be expected to make up only a small part of what happens between caregivers and young children during a typical day. Studying activities in which mothers did not necessarily have an advantage in the exchange revealed the importance of their children's contribution to their interactions. The picture that emerged differed from traditional accounts of scaffolding and conversational asymmetry. Both child and mother contributed to the architecture of the early conversations between them, but, in fact, it was the children who were "in charge."

Engagement and Effort: Getting It Together

Everyone by now recognizes the importance of the larger linguistic contexts and social exchanges in which words occur, as well as the critical contribution from conceptual development to word learning. However, little attention has been given to the dynamic processes of a child's thinking, or to how other developments in cognition, affect, and social connectedness contribute to a child's thinking for learning and using language. We have looked, therefore, in our most recent research, at the on-line convergence of several behaviors in the stream of a child's activities to see how linguistic expression converges with other things going on at the same time. We looked in the second year at both the on-line, microgenetic relations between different kinds of behavior in real time and

changes in the patterns of these relationships across developmental time. Three achievements in language provided the window we used on development: first words (FW), vocabulary spurt (VS), and early sentences or multiword speech (MW).

If a target behavior, such as saying a word, was unrelated to a second behavior, such as expressing emotion, then the emotional expression should not differ around a child's words from the baseline rate of occurrence of emotional expression overall. Instead, we should see an essentially random interaction between expressing emotion and saying words. I have already reported above that was not the case and that result (from Bloom & Beckwith, 1989) is reproduced in Figure 4. The children were most likely to be expressing emotion, relative to their baseline rates of expression, immediately after and during the interval of time in which they said words, with the same pattern at both of the language achievements.

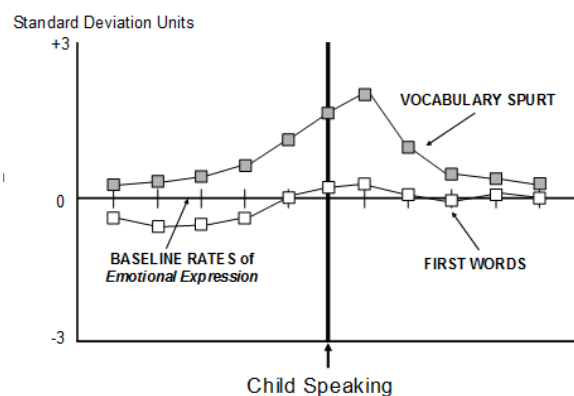


Figure 4. Tendency for the children to express emotion when speaking and in the 5 1-sec intervals before and after, relative to baseline rates of emotional expression overall, at First Words and Vocabulary Spurt, shown as differences from baseline rates in standard deviation units (Bloom & Beckwith, 1989).

These results provided evidence of both engagement and effort. The increased likelihood of emotional expression relative to baseline, particularly at VS, was described earlier as evidence of *engagement*. The children were learning to talk, in general, about those things they cared about, that were *relevant* to them. However, the two systems of expression came together with certain constraints that indicated the effort involved. First, the emotion expressed when saying words was primarily positive emotion at low levels of intensity, rather than negative emotion. Expressions of positive emotion are about the attainment of a desired end state and require less cognitive effort than do the negative emotions, which require constructing a plan to either remove an obstacle to a goal (in the case of anger) or construct a new goal (when a desired end state is lost, as with sadness) (Stein & Levine, 1989).

Second, the words said with emotional expression were the words the children knew best: the earliest learned and/or most frequent words in their vocabularies that were presumably more 'automatic,' therefore requiring less *effort*. The excursions above baseline increased significantly at the Vocabulary Spurt, a time of consolidation in word learning compared to First Words, a time of transition. The smaller deviations above baseline at first words, along with the suppression of emotional expression below baseline rates in the 2-5 secs before saying words, indicate the greater effort required to coordinate the two forms of expression at the beginning of word learning.

We have now extended this analysis to the later transition to saying sentences, in the studies reported in Bloom & Tinker (1999). In contrast to the vocabulary spurt, when the children had been much more likely to be expressing emotion relative to baseline around speech, emotional expression was suppressed and below baseline levels when the children were beginning to say sentences, providing evidence of the effort that the transition to sentences required. Moreover, when the group of 12 children was divided according to their ages at the time of the transition to sentences, with 6 children older than the mean age (the later learners) and 6 children younger than the mean (the earlier learners), the two groups differed significantly. The emotional expression of the younger learners did not differ from their baseline rates, but the emotional expression of the children who were older when they started to say sentences was substantially below their baselines. Greater effort was evidently required to coordinate the two kinds of expression, emotion and speech, for children who made the transition to saying sentences somewhat later and perhaps with some difficulty (Bloom & Tinker, 1999).

All these analyses concerned the children's words and emotional expressions throughout a half-hour of play and interaction with their mothers, regardless of what else they were doing. We have now looked at the convergence of child speech and emotional expression along with the occurrence of their mothers' speech in the moments around episodes of object play that were identified in the study by Lifter & Bloom (1989). The target events in these lag sequential analyses were episodes in which the children constructed thematic relations between objects (like putting one block on another, connecting train cars, or feeding a doll with a spoon). The results consist of the temporal relations between mothers' speech, child speech, and child emotional expression during constructing activities in object play and in the 5 1-sec intervals before the start and after completing the construction. (The results of this study can only be described briefly here, but they are reported in full in Bloom & Tinker (1999). The findings provided evidence of the effort required to coordinate saying words, expressing emotion, and attending to what their mothers are saying at the same time the children were also learning to construct thematic relationships between objects in their spontaneous play.

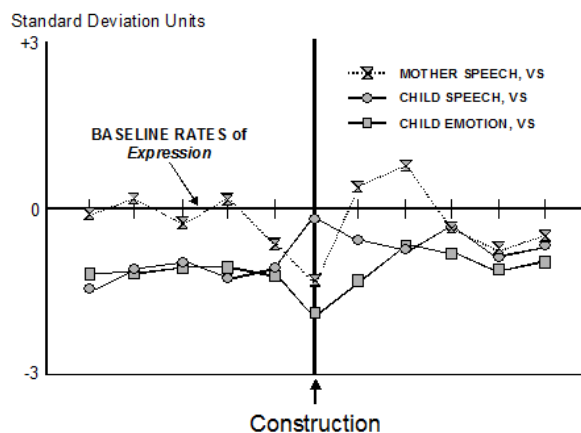


Figure 5. Mothers' speech, and children's speech and emotional expression during object constructions (from onset to offset) and in the 5 1-sec intervals before and after, relative to baseline rates of their speech and emotional expression overall, at Vocabulary Spurt, shown as differences from baseline rates in standard deviation units (Bloom & Tinker, 1999).

As with the previous studies, data consisted of the likelihood of mother speech, child speech, and child emotion relative to the respective baselines of each, during and around target episodes of object play: a child putting objects together to construct a thematic relationship between them. Evidence of effort was apparent in two ways. First, the children were speaking and expressing emotion less often than expected in these play episodes, given their baseline rates of expressing emotion and saying words overall. Speech and emotional expression were both below baseline, indicating a need to conserve affective and cognitive resources for the attention and thinking required to construct thematic relations between objects in the same window of time. And second, effort was also evident in a "trade-off" between the two forms of expression, with the children more likely to be talking than expressing emotion during the act of constructing (between its times of onset and offset). Thus, saying words and expressing emotion were dissociated during constructing activity, even though the children were much more likely to express emotion during and immediately after saying words in general, regardless of whatever else was going on (as shown in Figure 4).

Mothers, whom we've already seen were primarily responsive to their children in their conversations, were also more likely to be responsive in play as well: Relative to their baseline levels of speech, mothers were least likely to be saying something during the child's constructing activity and most likely to be talking 1 and 2 secs immediately after. In sum, the results of these studies of on-line temporal contingencies revealed the intricate adjustments required between engagement and effort for at least some of the different kinds of behaviors and activities that provide the contexts for word learning. Word learning is integrated in the stream of expression and other behavior. It is not an isolated activity, and no one would argue that it is. Nevertheless, most explanations offered to explain word learning ignore how the other things going on in the affective and cognitive life of the child at the same time contribute to the process.

CONCLUSIONS

Language is created by a child in the dynamic contexts and circumstances that make up the child's world, and the *heart of language acquisition* is in the dialectical tension between the two psychological components of effort and engagement. A language will never be acquired without *engagement* in a world of persons, objects, and events. The concept of engagement embraces the social and affective factors that figure in language learning. Other persons and the *social* context are required for language development, not only as the source of the linguistic objects to be acquired, but also because the motivation for learning a language is to express and interpret intentional states so that child and others can share what each is thinking and feeling (the principle of discrepancy). *Affect* and emotional expression are required for establishing intersubjectivity and sharing between child and caregiver before language, and for motivating a child's attention and involvement with people, objects, and events for learning language. Language is learned when the words a child hears are about the objects of engagement, interest, and feelings—about what the child has in mind (the principle of relevance).

Finally, language will never be required without effort. Our studies have only begun to tap the complex ways in which word learning is an effortful activity. The young language-learning child is an essentially limited information processor, and available cognitive and affective resources must be distributed among competing demands on those resources for, among other things, saying words, actions with objects in play, and attending to what other persons say at the same time.

All words are not equally accessible for learning, and all a child's cognitive and affective resources are not readily available for learning. The principles of relevance, discrepancy, and elaboration mediate between the engagement and effort that are required. While the principle of relevance provides the direction for word learning, and the principle of discrepancy provides the motivation, the principle of elaboration propels the process of language learning forward. Children have to learn more words and the procedures for sentences in order to keep pace with their increasingly elaborated, complex, and abstract representations in intentional states as a consequence of development. It is the child's intentionality, therefore, that is the driving force for acquiring language and learning words, any word.

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