

First steps toward a usage-based theory of language acquisition*

MICHAEL TOMASELLO

Abstract

Usage-based models of language focus on the specific communicative events in which people learn and use language. In these models, the psycholinguistic units with which individuals operate are determined not by theoretical fiat but by observation of actual language use in actual communicative events. This data-based approach makes these models especially congenial for the analysis of children's language, since children do not learn and use the same units as adults. In this paper I employ a usage-based model of language to argue for five fundamental facts about child language acquisition: (1) the primary psycholinguistic unit of child language acquisition is the utterance, which has as its foundation the expression and understanding of communicative intentions; (2) early in their language development children are attempting to reproduce not adult words but whole adult utterances; (3) children's earliest utterances are almost totally concrete in the sense that they are instantiations of item-based schemas or constructions; (4) abstractions result from children generalizing across the type variation they observe at particular "slots" in otherwise recurrent tokens of the same utterance; and (5) children create novel utterances for themselves via usage-based syntactic operations in which they begin with an utterance-level schema and then modify that schema for the exigencies of the particular communicative situation (usage event) at hand.

Keywords: language acquisition; usage based.

In usage-based models of language—for example, those of Langacker (1987, 1988, 2000), Bybee (1985, 1995), and Croft (2000)—all things flow from the actual usage events in which people communicate linguistically with one another. The linguistic skills that a person possesses at any given moment in time—in the form of a “structured inventory of symbolic

units”—result from her accumulated experience with language across the totality of usage events in her life. This accumulated linguistic experience undergoes processes of entrenchment, due to repeated uses of particular expressions across usage events, and abstraction, due to type variation in constituents of particular expressions across usage events. Given this focus on usage events and the processes of language learning that occur within these events, a crucial item on the research agenda of usage-based models of language is, or should be, the study of how human beings build up the most basic aspects of their linguistic competence during childhood.

From the point of view of research in child language acquisition, perhaps the most attractive feature of usage-based models is their openness on the question of what are the linguistic units with which people operate. For example, usage-based theories explicitly recognize that human beings learn and use many relatively fixed, item-based linguistic expressions such as *How-ya-doin?*, *Could you please ...*, *I'm simply amazed*, and *You keep out of this*—which, even when they are potentially decomposable into elements, are stored and produced as single units (see Bybee and Scheibman 1999 for psycholinguistic evidence focused on *I dunno*). On the other hand, people also operate with some highly abstract linguistic constructions such as, in English, the ditransitive construction, the resultative construction, and the caused motion construction—based on commonalities in the forms and functions of a whole host of different specific expressions (Goldberg 1995). Finally, people also control many “mixed” constructions that revolve around concrete and particular linguistic items but are partly abstract as well, for example, the “What’s X doing Y” construction, as in *What’s that fly doing my soup?* (Kay and Fillmore 1999)—which has its own distinctive linguistic form and communicative function (see Michaelis and Lambrecht 1996 and Fillmore et al. 1988 for other mixed constructions).

The important methodological point is that the psycholinguistic units with which people operate are identified through observation of their language use. Since it is obvious to all empirically oriented students of language acquisition that children operate with different psycholinguistic units than adults (Tomasello 2000), this theoretical freedom to identify these units on the basis of actual language use, rather than adult-based linguistic theory, is truly liberating. My procedure in this article, therefore, will be to examine children’s early use of language in an effort to identify what are the psycholinguistic units—in terms of both complexity and abstractness—with which the process of language acquisition begins. I will also seek to identify some of the developmental processes by means of which children’s use of language becomes more adult-like over time.

The emergence of language

Following the general strictures of cognitive linguistics, to identify the fundamental units of language use we must begin with basic processes of human cognition and communication. Following the general lead of many functionally oriented theorists, my candidate for the most fundamental psycholinguistic unit is the utterance (see especially Croft 2000). An utterance is a linguistic act in which one person expresses towards another, within a single intonation contour, a relatively coherent communicative intention in a communicative context.

Understanding communicative intentions

For current purposes, a communicative intention may be defined as one person expressing an intention that another person share attention with her to some third entity (Tomasello 1998a). This is not a trivial cognitive achievement, and indeed the expression and comprehension of communicative intentions is a species-unique characteristic of *Homo sapiens* (Tomasello 1999). It is thus interesting to note that there are currently no observations indicating that nonhuman primates use any vocalization to direct the attention of groupmates to any external entity such as a predator or food. (Vervet monkeys make different alarm calls for different predators, but a close inspection of the way they use these calls leads to the conclusion that “monkeys cannot communicate with the intent to modify the mental states of others because ... they do not recognize that such mental states exist” [Cheney and Seyfarth 1990: 310]). Nor are there any observations indicating that nonhuman primates use any facial or manual gesture to direct the attention of groupmates to an external entity; they do not point, hold up objects to show them to others, or even offer objects to others (chimpanzees raised by humans sometimes learn to point or use “symbols”, but only for imperative, not declarative, purposes—which suggests that they may be attempting to direct the behavior, not the attention, of others; Tomasello and Camaioni 1997). The simple fact is that nonhuman primates do not as a matter of course in their natural environment “express an intention that another share attention with them to some third entity”—perhaps because they do not understand that others have attention (Tomasello and Call 1997).

Prelinguistic human infants are able to discriminate sounds and associate particular experiences with them (Haith and Benson 1997), but they do not comprehend and produce linguistic symbols until about their first birthdays. They do not do this quite simply because they do not yet understand communicative intentions. From about their first birthdays, however, infants begin to understand that when other persons are making

funny noises at them they are trying to manipulate their attention with respect to some external entity. This understanding is one manifestation of a momentous shift in the way human infants understand other persons—which occurs at around nine to twelve months of age, as indicated by the near simultaneous emergence of a wide array of joint attentional skills involving outside objects. This includes such things as following into the gaze direction and pointing gestures of others, imitating the actions of others on objects, and manipulating the attention of others by pointing or holding up objects to “show” them to others declaratively. The first language emerges on the heels of these non-linguistic triadic behaviors (involving you, me, and it) and is highly correlated with them—in the sense that children with earlier emerging skills of nonlinguistic joint attention begin to acquire linguistic skills at an earlier age as well (Carpenter, Nagell, and Tomasello 1998). Similarly, children with autism have problems with joint attention and language in a correlated fashion, that is, those who have the poorest nonlinguistic joint attentional skills are those who have the poorest language skills (Sigman and Capps 1997). When children begin to understand the actions of others as intentional in general, they also begin to understand the communicative actions of others as intentional in the sense that they are aimed at directing attention.

Even given the ability to understand communicative intentions in general, it is still far from straightforward to determine a specific communicative intention in a specific usage event. Wittgenstein (1953) in particular analyzed the many problems involved (e.g., he pointed out the fundamental indeterminacy of ostensive definitions; see also Quine 1960) and concluded that communicative intentions can only be comprehended if they are experienced within the context of some already familiar “form of life” that serves as their functional grounding. In language acquisition, these are what Bruner (1983) called joint attentional “formats”—mutually understood social interactions between child and adult that constitute the shared presuppositions and joint attentional framework of the usage event (see also Tomasello, *in press*). It is easy to see that over ontogenetic time the forms of life that structure early language acquisition turn into the wider knowledge bases that a number of cognitive-functional linguists have pointed to as crucial in the proper characterization of linguistic meaning. The frames, scripts, and other larger entities within which specific linguistic forms gain their communicative significance—as specified, for example, in Fillmore’s (1988) frame semantics and Langacker’s (1987) base–profile distinction—have their ontogenetic roots in the nonlinguistically learned and experienced joint attentional formats of child language acquisition. Within these larger

intersubjectively shared wholes, children come to understand utterances as attempts to manipulate or “window” the attention of other persons with respect to particular aspects of these interaction-encompassing background frames (Talmy 1996).

And so, if we take the understanding of communicative intentions as primary in the child’s initiation into linguistic communication, our fundamental unit of analysis must be the most complete and coherent communicative act, the utterance—which is most reliably identified by its simultaneous functional and prosodic coherence. Children come to understand utterances as they come to understand the intentional actions, including communicative actions, of others. They do this within the context of intersubjectively shared forms of life—joint attentional formats—which constitute the medium within which skills of linguistic communication function and grow. Thus, in the current view, utterances are the primary units of linguistic communication since they are used to express complete and coherent communicative intentions, and other smaller units of language are communicatively significant only by virtue of the role they play in utterances.

Holophrases and early word combinations

Children naturally want to understand all of what an adult is trying to communicate to them in an utterance, and so when they attempt to communicate with other people they attempt to produce (i.e., to reproduce) the entire utterance—even though they often succeed in (re)producing only one linguistic element out of the adult’s whole utterance. This kind of expression has often been called a “holophrase” since it is a single linguistic symbol functioning as a whole utterance, for example, *That!* meaning “I want that” or *Ball?* meaning “Where’s the ball?” (Barrett 1982). The child’s attempt is thus not to reproduce one component of the goal-directed communicative act but rather the entire goal-directed act, even though she may only succeed in producing one element. This element is often the one designating the “new” aspect of the situation (Greenfield and Smith 1986), and so it is possible to think of holophrases as kind of primitive predications, with joint attentional formats serving as a kind of topical ground (although young children are clearly not adult-like in explicitly establishing shared topics with an interlocutor and then predicating something about the topic that is new for *her*, the interlocutor).

Holophrases come in many forms; they do not just correspond to single adult words. Thus, most children also have in their early language some so-called frozen phrases that are learned as holophrases but will

at some point be broken down into their constituent elements, for example, *Lemme-see*, *Gimme-that*, *I-wanna-do-it*, *My-turn*, and many others (Lieven et al. 1992). This is of course especially true of children learning languages less isolating than English (e.g., Inuktitut; Allen 1996). And so what the holophrastic child needs to do to become a syntactically competent language user is to be able to move in both directions—from part to whole and from whole to part. She must be able either to “break down” or to “fill out” her holophrases so that she can express her communicative intentions in the more linguistically articulated way of adult speakers. Learning how to do this depends on the child’s ability to comprehend not only the adult utterance as a whole, but also the functional role being played by the different linguistic elements in that whole. This is the beginnings of grammar.¹

One could imagine that children learn holophrases, or perhaps even words disembodied from any particular speech act function, and then combine these in situations in which they both are relevant—with both words having roughly equivalent status. For example, a child has learned to name a ball and a table and then spies a ball on a table and says, “Ball table”. There may be some initial linguistic productions that are like this for some children, including both “successive single-word utterances” (Bloom 1973) and some word combinations. But in fact most of children’s early multiword speech shows a functional asymmetry between constituents, that is, there is one word or phrase that seems to structure the utterance in the sense that it determines the speech act function of the utterance as a whole (often with help from an intonational contour), with the other linguistic item(s) simply filling in variable slot(s). This kind of organization is responsible for what has been called the “pivot look” of early child language, which is characteristic of most children learning most of the languages of the world (Braine 1976; Brown 1973). Early multi-word productions are thus things like: *Where’s the X?*, *I wanna X*, *More X*, *It’s a X*, *I’m X-ing it*, *Put X here*, *Mommy’s X-ing it*, *Let’s X it*, *Throw X*, *X gone*, *IX-ed it*, *Sit on the X*, *Open X*, *X here*, *There’s a X*, *X broken*, and so on and so forth.

These early word combinations serve the same kinds of functions as early holophrases (indeed many begin their life in one way or another as a holophrase); they simply have a bit more grammatical structure in the sense that they have constant linguistic material that (i) has some internal complexity in some cases (in adult eyes and perhaps the child’s as well), and (ii) they have at least one open slot in which many different lexical items and phrases may be placed. Because of this wholistic, utterance-level organization along with open slots, we may call these utterance schemas (see Wray and Perkins 2000 for a similar proposal).

The emergence of grammar

Because young children are learning a particular natural language, their early utterances will for the most part be describable with the traditional, adult-based structural categories of that language. But from a psycholinguistic point of view, it is not at all clear that children are actually operating with adult-like categories. Thus, when the child says something like “Wanna play horsie”, it is possible that she understands infinitival clauses in general; it is possible that she understands something like *Wanna* + ACTIVITY WANTED; and it is possible that this is an undifferentiated holophrase. The only way to begin to resolve the issue is to look at this particular child’s usage of the word *want* or *wanna*, her use of the word *horsie* and related terms, and her use of other apparent complement clause constructions with other words. In syntactic analyses based on generative grammar and its offshoots this is never done—the child’s utterance is simply treated as if it were an adult utterance—and in more functionally based analyses it is often not done with enough critical rigor (e.g., with attention to issues of data sampling).

The issue at stake here is the nature of children’s underlying linguistic representations. Do they consist primarily of concrete, item-based utterance schemas and other constructions, or do they consist of more abstract linguistic “rules” (plus a lexicon to fill out the rules with semantic content)? Methodologically, the key issue is children’s productivity or creativity with language. To the extent that they are operating with concrete words, phrases, and utterance schemas, children’s productivity will be tied to this specific linguistic material (e.g., filling in slots in item-based utterance schemas). To the extent that they are working with highly abstract syntactic rules they should be much more productive, while still being canonical, with all structures of their language. Choosing between these alternatives is, or should be, an empirical matter based on distributional analyses (and experiments) of the language use of particular children during particular developmental periods—just as the structures of particular languages are, or should be, determined through distributional analyses (and experiments) of their speakers’ actual language use (Croft 2000; Dryer 1997).

Verb islands and other item-based constructions

Early work in developmental psycholinguistics, such as that of Braine (1976) and Bowerman (1976), found many highly concrete, highly local, item-based patterns in corpora of many different children learning many different languages. The conclusion was thus that child language was not fully adult-like. But these researchers seemingly could not believe their

own eyes and so maintained that whereas children learned some item-based formulae early on (some children more than others), most children also possessed a number of more abstract linguistic representations from early on as well. Other researchers at this time spent some effort trying to discover whether there were other kinds of abstract schemas underlying children's early utterances, such as nonlinguistic sensory-motor cognition (e.g., Brown 1973).

Recent research suggests, however, that most of young children's early language is not based on abstractions of any kind, linguistic or otherwise—with the exception that they control from early on some item-based structures with highly constrained “slots”.² For example, in a detailed diary study Tomasello (1992) found that most of his English-speaking daughter's early multi-word speech revolved around specific verbs and other predicative terms. That is to say, at any given developmental period each verb was used in its own unique set of utterance-level schemas, and across developmental time each verb began to be used in new utterance-level schemas (and with different TAM morphology) on its own developmental timetable irrespective of what other verbs were doing during that same time period. There was thus no evidence that once the child mastered the use of, for example, a locative construction with one verb that she could then automatically use that same locative construction with other semantically appropriate verbs. Generalizing this pattern, Tomasello (1992) hypothesized that children's early grammars could be characterized as an inventory of verb-island constructions (utterance schemas revolving around verbs), which then defined the first syntactic categories as lexically based things such as “hitter”, “thing hit”, and “thing hit with” (as opposed to subject/agent, object/patient, and instrument; see also Tomasello and Brooks 1999). Lieven, Pine, and Baldwin (1997; see also Pine et al. 1998) found some very similar results in a sample of 12 English-speaking children, namely, they found that 92 percent of their children's earliest multi-word utterances emanated from one of their first 25 lexically-based patterns, which were different for each child (see also Pine and Lieven 1997).

A number of systematic studies of children learning languages other than English have also found basically item-based organization. For example, in a study of young Italian-speaking children Pizzuto and Caselli (1992, 1994) found that of the six possible person-number forms for each verb in the present tense, about half of all verbs were used in one form only, and an additional 40 percent were used with two or three forms. Of the ten percent of verbs that appeared in four or more forms, approximately half were highly frequent, highly irregular forms that could only have been learned by rote—not by application of an abstract rule. In a similar study

of one child learning to speak Brazilian Portuguese, Rubino and Pine (1998) found adult-like subject-verb agreement patterns only for the parts of the verb paradigm that appeared with high frequency in adult language (e.g., first-person singular), not for low frequency parts of the paradigm (e.g., third-person plural). The clear implication of these findings is that Romance-speaking children do not master the whole verb paradigm for all their verbs at once, but rather they only master some endings with some verbs—and often different ones with different verbs. (For additional findings of this same type, see Serrat [1997] for Catalan; Behrens [1998] for Dutch; Allen [1996] for Inuktitut; Gathercole et al. [1999], for Spanish; Stoll [1998] for Russian; and Berman and Armon-Lotem [1995] for Hebrew.) It should also be noted that syntactic overgeneralization errors such as *Don't fall me down*—which might be seen as evidence of more general and categorical syntactic knowledge—are almost never produced before about two-and-a-half to three years of age (see Pinker 1989).

Finally, experiments using novel verbs have also found that young children's early productivity with syntactic constructions is highly limited. For example, Tomasello and Brooks (1998) exposed two- to three-year-old children to a novel verb used to refer to a highly transitive and novel action in which an agent was doing something to a patient. In the key condition the novel verb was used in an intransitive sentence frame such as *The sock is tammimg* (to refer to a situation in which, for example, a bear was doing something that caused a sock to "tam"—similar to the verb *roll* or *spin*). Then, with novel characters performing the target action, the adult asked children the question: *What is the doggie doing?* (when the dog was causing some new character to tam). Agent questions of this type encourage a transitive reply such as *He's tammimg the car*—which would be creative since the child has heard this verb only in an intransitive sentence frame. The outcome was that very few children produced a transitive utterance with the novel verb, and in another study they were quite poor at two tests of comprehension as well (Akhtar and Tomasello 1997). As a control, children also heard another novel verb introduced in a transitive sentence frame, and in this case virtually all of them produced a transitive utterance—demonstrating that they can use novel verbs in the transitive construction when they have heard them used in that way. Moreover, four- to five-year-old children are quite good at using novel verbs in transitive utterances creatively, demonstrating that once they have indeed acquired more abstract linguistic skills children are perfectly competent in these tasks (Pinker et al. 1987; Maratsos et al. 1987; see Tomasello 2000 for a review). Finally, Akhtar (1999) found that if 2.5- to 3.5-year-old children heard such things as

The bird the bus meeked, when given new toys they quite often repeated the pattern and said such things as *The bear the cow meeked*—only consistently correcting to canonical English word order at 4.5 years of age. This behavior is consistent with the view that when two-to-three-year-olds are learning about *meeking* they are just learning about *meeking*; they do not assimilate this newly learned verb to some more abstract, verb-general linguistic category or construction that would license a canonical English transitive utterance.

The general conclusion is clear. In the early stages, children mostly use language the way they have heard adults using it. This leads to an inventory of item-based utterance schemas, with perhaps some slots in them built up through observed type variation in that utterance position. The reason that children do not operate with more abstract linguistic categories and schemas is quite simply because they have not yet had sufficient linguistic experience in particular usage events to construct these adult-like linguistic abstractions.

Imitative learning, entrenchment, and abstraction

If children are acquiring mainly item-based constructions early in development—and children acquiring different languages acquire different item-based constructions—an important part of the process must be some form of imitative learning. Imitation has been almost banished from the study of child language because it is most often defined as the child repeating verbatim what an adult has just said without understanding its meaning, and indeed this process very likely does not play a central role in language acquisition. But, there are forms of social learning called cultural learning in which the learner understands the purpose or function of the behavior she is reproducing (Tomasello et al. 1993). Thus, Meltzoff (1995) found that 18-month-old infants attempted to reproduce the intentional action they saw an adult attempting to perform, even when that action was not carried through to completion, Carpenter, Akhtar, and Tomasello (1998) found that 16-month-old infants attempted to reproduce an adult's intentional, goal-directed actions, but not her accidental actions. In the case of language, if they are to use a piece of language in an adult-like way, children must understand and reproduce both its surface linguistic form and its underlying communicative function—in the sense of using it in connection with the same communicative intention (Tomasello 1998a, 1999).

Cultural learning of this type works simultaneously on multiple hierarchical levels, and indeed it must work in this way if the child is to become creative with conventional, culturally based skills. As

a nonlinguistic example, a child may see an adult use a stapler and understand that his goal is to staple together two pieces of paper. In some cases, the child may understand also that the goal/function of placing the papers inside the stapler's jaws is to align them with the stapling mechanism inside the stapler, and that the goal/function of pressing down on the stapler is to eject the staple through the two papers—with both of these sub-actions being in the service of the overall goal/function of attaching the two sheets of paper. To the extent that the child does not understand the sub-functions, she will be lost when she encounters some new stapler, for example, one whose stapling mechanism works differently (e.g., does not require pressing down). Only to the extent that the child understands the relevant subfunctions, will she be able to adapt to this new situation creatively (e.g., adjusting her behavior to effect the same outcome with the new stapling mechanism). The comparable linguistic example is that the child hears an adult say “I stapled your papers” and comprehends not only the utterance and its overall communicative intention, but also, for example, the word *stapled* and its communicative subfunction in the utterance (the contribution it is making to the utterance as a whole), along with the phrase *your papers* and its communicative subfunction in the utterance—with *your* serving a subfunction within that phrase. Again, only if the child performs some “functionally based distributional analysis” of this type will she be able in the future to use these linguistic elements creatively in novel utterances.

Reconceptualized in this way to include intention reading, my claim is that cultural (imitative) learning is more important in language development, especially in the early stages, than has traditionally been recognized. This is clear in the data reviewed in the foregoing, which revealed that before their third birthdays children use individual verbs and syntactic constructions in just the way they have heard and understood them being used—with only very limited abilities to go beyond what they have heard. Interestingly, there are two phenomena of child language acquisition that are often taken to be evidence against imitative learning, but which are actually evidence for it—if we look at exactly what children do and do not hear. First, many young children say things like “Her open it”, an accusative subject which they supposedly have not heard from adults. But children hear things like “Let her open it” or “Help her open it” all the time, and so it is possible that when they say these things they are simply reproducing the end part of the utterances they have heard. Very telling is the fact that children almost never make the complementary error “Mary hit I” or “Jim kissed she”—the reason being that they never hear anything like this anywhere. A similar account can be given for some of the findings going under the general rubric of optional infinitives

(Rice 1998). Children hear a very large number of nonfinite verbs right after nominative nouns, especially in questions such as “Should he open it?” and “Does she eat grapes?” The child might then later say, in partially imitative fashion: “He open it” and “She eat grapes”.

It is also important that children seem to have special difficulties in going beyond what they have heard when they have heard it multiple times, that is, it is entrenched. Thus, Brooks, Tomasello, Lewis, and Dodson (1999) modeled the use of a number of fixed-transitivity English verbs for children from 3;5 to 8;0 years—verbs such as *disappear* that are exclusively intransitive and verbs such as *hit* that are exclusively transitive. There were four pairs of verbs, one member of each pair typically learned early by children and used often by adults (and so presumably more entrenched) and one member of each pair typically learned later by children and used less frequently by adults (less entrenched). The four pairs were: *come–arrive*, *take–remove*, *hit–strike*, *disappear–vanish* (the first member of each pair being more entrenched). The finding was that, in the face of adult questions attempting to induce them to overgeneralize, children of all ages were less likely to overgeneralize the strongly entrenched verbs than the weakly entrenched verbs; that is, they were more likely to produce *I arrived it* than *I comed it*. This finding suggests not only that children say what they hear, but that the more they hear it the more it seems to them that this is the only way it can be said.

The imitative learning and entrenchment of particular linguistic forms cannot be the whole story of language acquisition, however, since children do at some point go beyond what they hear from adults and create novel yet canonical utterances. As noted above, they do this first by creating “slots” in otherwise item-based schemas (Tomasello et al. 1997). It is not known precisely how they create these slots, but one possibility is that they observe in adult speech variation in that utterance position and so induce the slot on the basis of “type frequency”. In general, in usage-based models the token frequency of an expression in the language learner’s experience tends to entrench an expression—enabling the user to access and fluently use the expression as a whole (Langacker 1988; Krug 1998; Bybee and Schiebman 1999)—whereas the type frequency of an expression (i.e., the number of different forms in which the language learner experiences the expression or some element of the expression) determines the creative possibilities, or productivity, of the construction (Bybee 1985, 1995). Together, these two types of frequency—along with the corresponding child learning processes—may explain the ways in which young children acquire the use of specific linguistic expressions in specific communicative contexts and then generalize these expressions to new contexts based on

various kinds of type variations they hear—including everything from type variation in a single slot to type variation in all of the constituents of a construction. The extent of type variation needed for different kinds of productivity is not known at this time, and indeed after a certain point in development it may be that type variation in the slots of constructions becomes less important as these slots come to be more precisely defined functionally.

Another possibility—not mutually exclusive but rather complementary to the foregoing—is that abstract constructions are created by a relational mapping across different verb-island constructions (Gentner and Markman 1997). For example, in English the several verb-island constructions that children have with the verbs *give*, *tell*, *show*, *send*, and so forth, all share a “transfer” meaning and they all appear in a structure: NP + V + NP + NP (identified by the appropriate morphology on NPs and VPs). The specific hypothesis is thus that children make constructional analogies based on similarities of both form and function: two utterances or constructions are analogous if a “good” structure mapping is found both on the level of linguistic form and on the level of communicative function. Precisely how this might be done is not known at this time, but there are some proposals that a key element in the process might be some kind of “critical mass” of exemplars, to give children sufficient raw material from which to construct their abstractions (Marchman and Bates 1994).

In either case, the main point is that young children begin by imitatively learning specific pieces of language in order to express their communicative intentions, for example, in holophrases and other fixed expressions. As they attempt to comprehend and reproduce the utterances produced by mature speakers—along with the internal constituents of those utterances—they come to discern certain patterns of language use (including patterns of token and type frequency), and these patterns lead them to construct a number of different kinds of (at first very local) linguistic categories and schemas. As with all kinds of categories and schemas in cognitive development, the conceptual “glue” that holds them together is function; children categorize together things that do the same thing (Mandler 1997). In this case, children understand as instances of the same kind of linguistic units those that serve “the same” or “similar” communicative functions in utterances.

Usage-based syntactic operations

Given that children are acquiring linguistic constructions of various shapes and sizes and degrees of abstraction throughout early development

(i.e., building their linguistic inventories), we may now ask about their ability to put these constructions together creatively in order to adapt to the exigencies of particular usage events. Tomasello, Lieven, Behrens, and Forwergk (to appear) addressed this issue in a naturalistic study of one two-year-old child learning English. The novelty was that this child's language was recorded using extremely dense taping intervals. Specifically, the child was recorded in linguistic interaction with her mother for one hour per day, five days per week, for six weeks—making the taped data roughly five to ten times denser than most existing databases of child language, and accounting for approximately eight to ten percent of all of the child's utterances during this six-week period. In order to investigate this child's syntactic creativity, all of her 500+ utterances produced during the last one-hour taping session at the end of the six-week period were designated as target utterances. Then, for each target utterance, there was a search for "similar" utterances produced by the child (not the mother) in the previous six weeks of taping. Was it an utterance she had said before exactly? Was it an utterance based on some highly frequent schema from before but with a new linguistic item in the slot? Was it an utterance pieced together from previously mastered language in some more creative way? Or did the target utterance have no previous precedents in the child's productive language at all?

The main goal was thus to determine for each utterance recorded on the final day of the study what kinds of syntactic operations were necessary for its production, that is to say, in what ways did the child have to modify things she had previously said (her "stored linguistic experience") to produce the thing she was now saying. We may call these operations "usage-based syntactic operations" since they explicitly take into account that the child does not put together each of her utterances from scratch, morpheme by morpheme, but rather, she puts together her utterances from a motley assortment of different kinds of pre-existing psycholinguistic units. And so, following the usage-based models of Bybee (1995), Langacker (2000), and Croft (2000), the question was how this child was able to "cut and paste" together her previously mastered linguistic constructions in order to create a novel utterance in a specific usage event. What was found by this procedure was:

- Of the 455 intelligible utterances produced, 78 percent were utterances that this child had said before during the previous six weeks of sampling—in exactly this same form as whole utterances. Many of these were utterance routines like *Thank-you*, *There-you-go*, etc., but many were simply frequently used multi-word utterances such as *Where's Daddy?*.

- Another 18 percent of the target utterances were things the child had said before but with one minor change, that is, they consisted of an established utterance schema plus other linguistic material “filled in” or “added on”. For example, the child had said many scores of times previously *Where’s X*, but on the target tape she said *Where’s the butter?*, which was new (*butter* having been said on five occasions previously in other linguistic contexts). As another example, the child said *I got one here*, which was new. But she had said *I got one* seven times previously, and she had added *here* onto the end of utterances many scores of times previously.
- Only four percent of this child’s target utterances were different from things she had said before in more than one way. These mostly involved the combination of “filling in” and “adding on” to an established utterance schema. For example, the child said creatively *I want tissue lounge*, which seemingly derived from the utterance schema *I want OBJECT* (which she had said over 50 times previously), with a slotting in of the word *tissue* (which she had said nine times previously in other contexts), and adding on of the word *lounge* (which she had said three times previously in other contexts).
- There were exactly three utterances (less than one-half of one per cent) that could not be accounted for in a relatively straightforward application of this procedure, and two of these were heavily scaffolded by the immediate discourse context (i.e., the child took some of her utterance not from her stored linguistic experience but rather from her mother’s immediately preceding speech).

It is thus clear that in the vast majority of cases, this child’s creative utterances were based directly on things she had said before many times previously. Moreover, in the vast majority of cases, one of the pieces of language on which the child’s creative utterance was based was what we called an utterance schema. Utterance schemas were things the child had said before as full utterances with some variation in one (or, infrequently, more than one) slot—such things as *Where’s the X?*, *I wanna X*, *More X*, *It’s a X*, *I’m X-ing it*, *Put X here*, *Mommy’s X-ing it*, *Let’s X it*, and so forth. Importantly, these utterance schemas were things that the child had said before, on average, an estimated 150 times during the previous six weeks, and the other language used in these creative utterances (e.g., to fill the slot) had been said before, on average in one or another context, an estimated 70 times during the previous six weeks (these estimations are aimed at reflecting the child’s total experience as projected from our ten-percent sample). Further evidence for the psychological reality of these utterance schemas derives from the fact that there were virtually no

insertions of linguistic material into previously invariant sequential strings within the schemas (e.g., the child never put adverbs or other modifiers into the middle of an established utterance schema) or substitutions of linguistic material into places that did not already have established slots. It is also important that there was almost perfect functional consistency across different uses of these utterance schemas; the child filled the slot with the same kind of linguistic item or phrase (e.g., an object word or a locative phrase) across the six-week period of study.

The usage-based approach is also quite revealing in the case of more complex constructions. For example, Diessel and Tomasello (in press) looked at seven children's earliest utterances with sentential complements and found that virtually all of them were composed of a simple sentence schema that the child had already mastered combined with one of a delimited set of matrix verbs (see also Bloom 1992). These matrix verbs were of two types. First were epistemic verbs such as *think* and *know*. In almost all cases children used *I think* to indicate their own uncertainty about something, and they basically never used the verb *think* in anything but this first-person, present tense form; that is, there were virtually no examples of *He thinks ...*, *She thinks ...*, etc., virtually no examples of *I don't think ...*, *I can't think ...*, etc., and virtually no examples of *I thought ...*, *I didn't think ...*, etc. And there were almost no uses with a complementizer (virtually no examples of *I think that ...*). It thus appears that for many young children *I think* is a relatively fixed phrase meaning something like *Maybe*. The child then pieces together this fixed phrase with a full sentence as a sort of evidential marker, but not as a "sentence embedding" as it is typically portrayed in more formal analyses. The second kind of matrix verbs are attention-getting verbs like *Look* and *See* in conjunction with full finite clauses. In this case, children use these "matrix" verbs almost exclusively in imperative form (again almost no negations, no nonpresent tenses, no complementizers), once more suggesting an item-based approach not involving syntactic embedding. Thus, when examined closely, children's earliest complex sentences look much less like adult sentential complements (which are used most often in written discourse) and much more like various kinds of "pastiche" of various kinds of established item-based constructions.

The findings of both of these studies are best explained by a usage-based model in which children's early linguistic competence is organized as an inventory of item-based constructions, many of which are best characterized as utterance schemas since they structure whole utterances. Fluency with a construction is a function of its token frequency in the child's experience (entrenchment); creativity with a construction emanates from the child's experience of type variation in one or more of its constituents

(abstraction). In this way, children build up in their linguistic inventories a very diverse set of constructions—concrete, abstract, and mixed—to call upon as needed in particular usage events. Putting together a creative utterance then involves usage-based syntactic operations in which the child in some way integrates already mastered constructions and elements of various shapes, sizes, and degrees of abstraction in some way that is functionally appropriate for the usage event at hand.

Conclusion

The study of language acquisition has always tagged along behind models from linguistics—because to study how children acquire something we should first know what that something is. The new usage-based models of cognitive and functional linguistics offer some exciting new perspectives for developmentalists because they are concerned with the actual psychological processes by means of which individuals comprehend and produce utterances. But cognitive and functional linguists have something to learn from developmental psycholinguists as well. If we are interested in people's "stored linguistic experience", and how they use that experience in acts of linguistic communication, it would seem relevant to investigate systematically the processes by which linguistic experience is built up and used in human ontogeny.

The general picture that emerges from my application of the usage-based view to problems of child language acquisition is this: When young children have something they want to say, they sometimes have a set expression readily available and so they simply retrieve that expression from their stored linguistic experience. When they have no set expression readily available, they retrieve linguistic schemas and items that they have previously mastered (either in their own production or in their comprehension of other speakers) and then "cut and paste" them together as necessary for the communicative situation at hand—what I have called "usage-based syntactic operations". Perhaps the first choice in this creative process is an utterance schema which can be used to structure the communicative act as a whole, with other items being filled in or added on to this foundation. It is important that in doing their cutting and pasting, children coordinate not just the linguistic forms involved but also the conventional communicative functions of these forms—as otherwise they would be speaking creative nonsense. It is also important that the linguistic structures being cut and pasted in these acts of linguistic communication are a variegated lot, including everything from single words to abstract categories to partially abstract utterance or phrasal schemas.

Irrespective of the accuracy of the current proposals, there can be no doubt that it is time for cognitive functional linguistics and the study of child language acquisition to come together (Tomasello 1998b). The view I am espousing here is that the most promising theoretical frameworks in which this might be done are the new usage-based models in which (i) the units of language with which people operate are not presupposed or prejudged, (ii) there is an explicit concern with processes of communication in usage events, and (iii) the primary research questions are how human linguistic competence has evolved historically and how today it develops ontogenetically.

Received 15 February 2000

Max Planck Institute for Evolutionary

Revision received 30 August 2000

Anthropology, Leipzig, Germany

Notes

- * Thanks to Holger Diessel and Elena Lieven for comments on a previous version of the manuscript. Author's e-mail address: tomas@eva.mpg.de
1. One could argue that holophrases are already in a sense grammatical since in many instances the child seems to control an intonational contour and to combine it productively with some phonologically expressed linguistic symbol. But it is in fact unknown the degree to which young children productively combine intonation and phonology, and indeed it is just as likely that in the beginning children use each linguistic symbol in the same way as adults (although in some cases the adult, and so the child, uses it in more than one way, e.g., both *Ball!* and *Ball?*).
 2. It could be argued that repeated tokens of *I'm sorry* represent an abstraction of a single utterance type, with the same reasoning also applying to the constant segment of formulae such as *Wanna _____*. However, I am focusing, as is common, on possible abstractions across utterance types, not tokens.

References

- Akhtar, Nameera
1999 Acquiring basic word order: Evidence for data-driven learning of syntactic structure. *Journal of Child Language* 26, 339–356.
- Akhtar, Nameera and Michael Tomasello
1997 Young children's productivity with word order and verb morphology. *Developmental Psychology* 33, 952–965.
- Allen, Shanley
1996 *Aspects of Argument Structure Acquisition in Inuktitut*. Amsterdam: John Benjamins.
- Barrett, Martin
1982 The holophrastic hypothesis: conceptual and empirical issues. *Cognition* 11, 47–76.
- Behrens, Heike
1998 Where does the information go? Paper presented at MPI workshop on argument structure, Nijmegen.

- Berman, Ruth and S. Armon-Lotem
1995 How grammatical are early verbs? Paper presented at the *Colloque International de Besançon sur l'Acquisition de la Syntaxe*. November, Besançon, France.
- Bloom, Lois
1973 *One Word at a Time*. The Hague: Mouton.
1992 *Language Development from Two to Three*. Cambridge: Cambridge University Press.
- Bowerman, Melissa
1976 Semantic factors in the acquisition of rules for word use and sentence construction. In Morehead, D. and A. Morehead (eds.), *Normal and Deficient Child Language*. Baltimore: University Park Press.
- Braine, Martyn
1976 Children's first word combinations. *Monographs of the Society for Research in Child Development* 41, no. 1.
- Brooks, Patricia, Michael Tomasello, Lawrence Lewis, and Kelly Dodson
1999 Children's overgeneralization of fixed transitivity verbs: The entrenchment hypothesis. *Child Development* 70, 1325–1337.
- Brown, Roger
1973 *A First Language: The Early Stages*. Cambridge, MA: Harvard University Press.
- Bruner, J.
1983 *Child's talk*. New York: Norton.
- Bybee, Joan
1985 *Morphology*. Amsterdam: John Benjamins.
1995 Regular morphology and the lexicon. *Language and Cognitive Processes* 10, 425–455.
- Bybee, Joan and Joanne Scheibmann
1999 The effect of usage on degrees of constituency: The reduction of *don't* in English. *Linguistics* 37, 575–596.
- Carpenter, Malinda, Nameera Akhtar, and Michael Tomasello
1998 14- through 18-month-old infants differentially imitate intentional and accidental actions. *Infant Behavior and Development* 21, 315–330.
- Carpenter, Malinda, Katherine Nagell, and Michael Tomasello
1998 Social cognition, joint attention, and communicative competence from 9 to 15 months of age. *Monographs of the Society for Research in Child Development*, volume 255.
- Cheney, Dorothy and Robert Seyfarth
1990 *How Monkeys See the World*. University of Chicago Press.
- Croft, William
2000 *Explaining Language Change: An Evolutionary Approach*. London: Longmans.
- Diessel, Holger and Michael Tomasello
in press Why complement clauses do not have a *that*-complementizer in early child language. *Proceedings of Berkeley Linguistic Society*.
- Dryer, Mathew
1997 Are grammatical relations universal? In Bybee, Joan, John Haiman and Sandra Thompson (eds.), *Essays on Language Function and Language Type*. Amsterdam: John Benjamins.

- Fillmore, Charles
1988 Toward a frame-based lexicon. In Lehrer, A. and E. Kittay (eds.), *Frames, Fields, and Contrast*. Hillsdale, NJ: Erlbaum.
- Fillmore, Charles, Paul Kaye, and Mary O'Connor
1988 Regularity and idiomaticity in grammatical constructions: The case of *let alone*. *Language* 64, 501–538.
- Gathercole, Virginia, Eugenia Sebastian, and Pilar Soto
1999 The early acquisition of Spanish verbal morphology: Across-the-board or piecemeal knowledge? *International Journal of Bilingualism* 3, 133–182.
- Gentner, Dedre, and Arthur Markman
1997 Structure mapping in analogy and similarity. *American Psychologist* 52, 45–56.
- Goldberg, Adele
1995 *Constructions: A Construction Grammar Approach to Argument Structure*. University of Chicago Press.
- Greenfield, Patricia and Joshua Smith
1986 *The Structure of Communication in Early Language Development*. New York: Academic Press.
- Haith, Marshall and Janet Benson
1997 Infant cognition. In Kuhn, D. and R. Siegler (eds.), *Handbook of Child Psychology*, vol. 2. New York: Wiley.
- Kay, Paul and Charles Fillmore
1999 Grammatical constructions and linguistic generalizations. *Language* 75, 1–33.
- Krug, Manfred
1998 String frequency: A cognitive motivating factor in coalescence, language processing, and language change. *Journal of English Linguistics* 26, 286–320.
- Langacker, Ronald
1987 *Foundations of Cognitive Grammar*, vol. 1. Stanford University Press.
1988 A usage-based model. In B. Rudzka-Ostyn (ed.), *Topics in Cognitive Linguistics*. Amsterdam: John Benjamins.
2000 A dynamic usage-based model. In Barlow, M. and S. Kemmer (eds.), *Usage-Based Models of Language*. Stanford: SLI Publications.
- Lieven, Elena, Julian Pine, and Helen Dresner Barnes
1992 Individual differences in early vocabulary development. *Journal of Child Language* 19, 287–310.
- Lieven, Elena, Julian Pine, and Gillian Baldwin
1997 Lexically-based learning and early grammatical development. *Journal of Child Language* 24, 187–220.
- Mandler, Jean
1997 Representation. In Kuhn, D. and R. Siegler (eds.), *Cognition, Perception, and Language*, vol. 2. *Handbook of Child Psychology*. New York: Wiley.
- Maratsos, Michael, Ronald Gudeman, Patricia Gerard-Ngo, and Ganie DeHart
1987 A study in novel word learning: The productivity of the causative. In Mac Whinney, B. (ed.), *Mechanisms of Language Acquisition*. Hillsdale, NJ: Erlbaum.
- Marchman, Virginia and Elizabeth Bates
1994 Continuity in lexical and morphological development: A test of the critical mass hypothesis. *Journal of Child Language* 21, 339–366.

- Meltzoff, Andrew
 1995 Understanding the intentions of others: Re-enactment of intended acts by 18-month-old children. *Developmental Psychology* 31, 838–850.
- Michaelis, Laura and Knud Lambrecht
 1996 Toward a construction-based theory of language function: The case of nominal extraposition. *Language* 72, 215–247.
- Pine, Julian, and Elena Lieven
 1997 Slot and frame patterns in the development of the determiner category. *Applied Psycholinguistics* 18, 123–138.
- Pine, Julian, Elena Lieven, and Carolyn Rowland
 1998 Comparing different models of the development of the English verb category. *Linguistics* 36, 4–40.
- Pinker, Steven
 1989 *Learnability and Cognition: The Acquisition of Verb-Argument Structure*. Cambridge MA: Harvard University Press.
- Pinker, Steven, David Lebeaux, and Laura Frost
 1987 Productivity and constraints in the acquisition of the passive. *Cognition* 26, 195–267.
- Pizutto, Elena and Christina Caselli
 1992 The acquisition of Italian morphology. *Journal of Child Language* 19, 491–557.
 1994 The acquisition of Italian verb morphology in a cross-linguistic perspective. In Levy, Y. (ed.). *Other Children, Other Languages*. Hillsdale, NJ: Erlbaum.
- Quine, Willard
 1960 *Word and Object*. Cambridge, MA: MIT Press.
- Rice, Mabel (ed.)
 1998 *Toward a Genetics of Language*. Mahwah, NJ: Erlbaum.
- Rubino, Rafael and Julian Pine
 1998 Subject-verb agreement in Brazilian Portuguese: What low error rates hide. *Journal of Child Language* 25, 35–60.
- Serrat, Elisabet
 1997 Acquisition of verb category in Catalan. Unpublished dissertation.
- Sigman, Marian and Lisa Capps
 1997 *Children with Autism: A Developmental Perspective*. Cambridge: Harvard University Press.
- Stoll, Sabine
 1998 The acquisition of Russian aspect. *First Language* 18, 351–378.
- Talmy, Leonard
 1996 The windowing of attention in language. In Shibatani, M. and S. Thompson (eds.), *Grammatical Constructions: Their Form and Meaning*. Oxford: Oxford University Press.
- Tomasello, Michael
 1992 *First Verbs: A Case Study of Early Grammatical Development*. Cambridge University Press.
 1998a Reference: Intending that others jointly attend. *Pragmatics and Cognition* 6, 219–234.
 1998b The return of constructions. *Journal of Child Language* 75, 431–447.

- 1999 *The Cultural Origins of Human Cognition*. Cambridge, MA: Harvard University Press.
- 2000 Do young children have adult syntactic competence? *Cognition* 74, 209–253.
- in press Perceiving intentions and learning words in the second year of life. In Bowerman, Melissa and Steven Levinson (eds.), *Language Acquisition and Conceptual Development*. Cambridge University Press.
- Tomasello, Michael, Nameera Akhtar, Kelly Dodson, and Laura Rekau
1997 Differential productivity in young children's use of nouns and verbs. *Journal of Child Language* 24, 373–387.
- Tomasello, Michael and Patricia Brooks
1998 Young children's earliest transitive and intransitive constructions. *Cognitive Linguistics* 9, 379–395.
- 1999 Early syntactic development: A Construction Grammar approach. In Barrett, M. (ed.), *The Development of Language*. Psychology Press.
- Tomasello, Michael and Josep Call
1997 *Primate Cognition*. Oxford University Press.
- Tomasello, Michael and Luigia Camaioni
1997 A comparison of the gestural communication of apes and human infants. *Human Development* 40, 7–24.
- Tomasello, Michael, Ann Kruger, and Hiliary Ratner
1993 Cultural learning. *Behavioral and Brain Sciences* 16, 495–552.
- Tomasello, Michael, Elena Lieven, Heike Behrens, and Heike Forwegk
to appear Early syntactic creativity: A usage based approach. Submitted for publication.
- Wittgenstein, Ludwig
1953 *Philosophical Investigations*. New York: MacMillan.
- Wray, Alison and Michael Perkins
2000 The functions of formulaic language: An integrated model. *Language and Communication* 20, 1–28.

