# MICHAEL TOMASELLO

# FIRST VERBS

## A CASE STUDY OF EARLY GRAMMATICAL DEVELOPMENT

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# Acknowledgments

This book has a longer and more checkered history than most. It is based on a diary of my daughter's early language kept in 1974; in my masters thesis and doctoral dissertation I analyzed selected portions of the data (Tomasello, 1977, 1980). A decade after its original compilation I computerized the diary, which made possible an analysis of the corpus as a whole. A few years later I found the time to analyze the data and write the monograph. I have large debts of gratitude at each of these three periods.

First and most important, I did not keep the diary alone. At least half of the observations were made by my late wife Susannah Ashley. She worked long and hard – without getting any academic degrees out of it – and proved to be a very sensitive observer. I could not have done it without her. Thank you, Susannah. And of course I could not have kept the diary without my daughter Travis. She worked long and hard too, although she may not have known it at the time, and has been very understanding in the years since about being treated as an experimental subject. Thank you, Travis, and I dedicate this book to you.

During the period in which the diary was kept I received financial support from the University of Georgia Follow Through Program and its director, the late Dr. Charles Smock. On more than one occasion I also received much-needed financial help from my mother, Duchess Tomasello, and much-needed moral and intellectual support from my friend and committee member, Stuart Katz. Thank you, Mother and Stu.

During the middle phase of the project, I was helped by a number of people at two different universities. At Emory University, Jeff Farrar and Becky Bailey typed the entries into the mainframe computer, and Lauri Monroe, Sharon Garson, and Sharon Duke all helped to transcribe the tapes and collate data. During a sabbatical year at Harvard University in 1987–1988, Joy Moreton helped me (to put it mildly) transfer the data to a format that could be used by the CHILDES programs on a

Language games are the forms of language with which a child begins to make use of words.... When we look at such simple forms of language the mental mist which seems to enshroud our ordinary use of language disappears. We see activities, reactions, which are clear-cut and transparent. On the other hand we recognize in these simple processes forms of language not separated by a break from our more complicated ones. We see that we can build up the complicated forms from the primitive ones by gradually adding new forms.

– Ludwig Wittgenstein, *The Blue Book*

Generative grammarians have made special attempts to argue, for example, that nouns and verbs have nothing whatsoever to do with objects and actions; that the subject of a sentence has nothing whatsoever to do with topic of conversation or focus of visual attention; and that the construction of a sentence from individual words has nothing whatsoever to do with the manual construction of hierarchically organized objects out of simpler objects. Instead, generative grammarians have chosen to focus exclusively on the supposedly autonomous aspects of formal syntax (changing the definition of syntax where necessary to preserve this autonomy; Lakoff, 1980), and then to describe these aspects in terms of "rules" of grammaticality that have nothing to do with human competencies or the way they are described in other cognitive domains. In all, for most psychologists there is a clear psychological reality to such things as symbols, concepts, and communicative intentions, but we are not so sure about such things as predicate raising, *wh*-movement, and empty categories.

Cognitive Linguistics is a much more psychologically based approach to linguistic competence. At its core is the cognitive commitment, which enjoins linguists to take advantage of, and to attempt to relate their findings to, research in the other cognitive sciences (Lakoff, 1990). Most radically, many cognitive linguists believe that languages are best described and explained *exclusively* in terms of more basic processes of human cognition and communication. Langacker (1987), for example, grounds his entire theory in symbols and cognitive processes for operating with symbols. On the basis of their shared experience and cognition and for purposes of communication, a group of human beings creates a "structured inventory of symbolic devices" – of which there are many types, serving many different functions including syntactic functions (cf. Wittgenstein's, 1953, analogy of a toolbox). To construct communicative messages, human beings take items from this inventory (and from their inventory of nonlinguistic means of communication) and integrate them into larger symbolic wholes. There is nothing else in human language other than the symbolic inventory and general cognitive processes for using it; that is to say, there are no hidden rules, principles, parameters, linguistic constraints, or deep structures – just as there are none of these things in other human skills.

Putting together novel [linguistic] expressions is something that speakers do, not grammars. It is a problem-solving activity that demands a constructive effort and occurs when linguistic convention is put to use in specific circumstances. Creating a novel expression is not necessarily different in fundamental character from problem-solving activity in general, and the speaker's knowledge of linguistic convention is but one of the many resources he brings to bear in finding a solution. (Langacker, 1987, p. 65)

A major piece of evidence for this point of view comes from recent linguistic analyses (e.g., Lakoff, 1987; Taylor, 1989) and research in experimental psycholinguistics (e.g., the studies reported in Bates & MacWhinney, 1989, and Corrigan, Eckman, & Noonan, 1989). These analyses and findings strongly suggest that linguistic categories of all types – from words to syntactic categories such as "sentence subject" – display prototypical structure. This is the same structure displayed by other types of human categories: graded structure with more central and more peripheral properties, no one of which is essential. The fact that linguistic categories are structured prototypically indicates that they are formed via general cognitive processes and accounts quite naturally for the fact that many, if not most, of the linguistic structures with which human beings operate involve figurative extensions of more basic cognitive categories (Lakoff, 1987). Prototypical structure is fundamentally incompatible with the essentialistic categories (defined in terms of necessary and sufficient conditions) required by formal grammars.

The second reason for my choice of a Cognitive Linguistics framework is that it is much more congenial to developmental analyses. Because it uses essentialistic categories and rules, Generative Linguistics is not only not congenial to development analyses, it is fundamentally hostile. Chomsky (1986) makes this very clear in his claim that Generative Grammar *requires* an assumption of instantaneous learning:

Irrespective of questions of maturation, order of presentation, or selective availability of evidence, the result of language acquisition is as if it were instantaneous: In particular, intermediate states attained do not change the principles available for interpretation of data at later states in a way that affects the state attained. (pp. 53–54)

Learnability theorists claim something very similar. The Logical Problem of Language Acquisition is basically how children can acquire the unique and abstract structures of Generative Grammar from "unordered strings" of linguistic data. Their solution is the "continuity assumption," that is, the assumption (following Chomsky) that indeed children cannot acquire these abstract structures in any direct way and, as a result, they must be innately given and unchanging (continuous) throughout development (e.g., Pinker, 1984). To save the formalism, Learnability theorists must attribute to children's earliest language precisely the kinds of structures it would seem to be lacking.

To developmental psychologists this whole approach is, in a word, backward. The developmental approach, as employed by most developmental psychologists, begins with an attempt to describe children's language, or any other of their skills, in terms of concepts and structures that are (*ex hypothesis*) a part of their, not our, experience. Developmentalists then try to determine each of the steps in the development

of this skill, from origins to full maturity. *Contra* Chomsky, the intermediate steps in the process are absolutely crucial because some steps cannot be taken until others have been completed (e.g., Gottlieb, 1983, 1990). Thus, for example, by the time children are ready to learn the embedded clauses that Learnability theorists are so fond of, they are not faced with an unordered string of symbols. Their linguistic systems by this point in their preschool years allow for the formulation of a variety of sophisticated linguistic structures. The new skill of embedded clauses then requires not a huge logical leap but only a small empirical step beyond existing linguistic skills. Through a complex of developmental processes, the structure of language changes in fundamental ways during human ontogeny (cf. Bamberg, Budwig, & Kaplan, 1991; Bloom, 1991).

Cognitive Linguistics is much better suited to the developmental approach. First, it relies on general cognitive structures and processes that allow investigators to consult research in other domains of cognitive development. This approach helps to determine the nature of the child's competencies at particular development levels and provides an additional "constraint," if you will, on children's early language. Second, and moreover, the prototypically organized concepts and categories of Cognitive Linguistics are much more open to the possibility of true developmental change. Categories that do not have essential properties can evolve naturally and gradually, sometimes into very different entities. This provides researchers with the possibility of reconstructing the many intermediate steps required in the acquisition skills as complex as those involved in linguistic communication.

None of this is to deny, of course, the existence of biological prerequisites for language acquisition. It is just that in the Cognitive Linguistics view, this does not include an innate, specifically linguistic module. Infants come into the world prepared to act on objects and form concepts of them and their properties, and to form concepts of the actions themselves and their properties (Piaget, 1954). They come into the world prepared to learn and use conventional symbols, and to construct categories of these symbols (Bates, 1979). They come into the world prepared to use the vocal–auditory channel for communication (Kuhl, 1979). They come into the world prepared to interact with, to attend jointly with, and to imitate other human beings (Trevarthen, 1979). They are prepared in other ways as well. The point is that children then bring this preparedness to their social encounters with other human beings, who interact with them using a system of symbolic communication that has evolved over thousands of years of cultural evolution. They learn their linguistic skills in and from these interactions, with what they learn at any particular time both depending on and helping to change their current developmental level. The quarrel between Cognitive Linguistics

and Learnability approaches is thus not whether there is a biological preparedness for language acquisition, but the nature of this preparedness. Cognitive Linguistics would claim that the structure in children's language comes not directly from their genes but rather from the structure of adult language, from the structure of children's cognitive and social–cognitive skills, and from the constraints on communication inherent in expressing nonlinear cognition into the linear channel provided by the human vocal–auditory apparatus (Bates, Thal, & Marchman, 1991).

Everyone is agreed that we cannot hope to understand the acquisition of language until we understand something of the structure of language. But just as developmental psychologists have come to recognize that the Piagetian formalization of cognition in terms of mathematical group theory is a hindrance rather than a help (Overton, 1990), it may now be time to recognize that the formalizations of Generative Grammar/ Learnability theory are not so helpful either. Cognitive Linguistics would seem to be a much more promising approach for researchers interested in the *psychology* of language and its development.

## 1.2. The importance of verbs

A key to the Cognitive Linguistics approach to language development is the child's acquisition of verbs. Verbs are linguistic symbols used to designate events that in many cases are highly complex: one or more entities undergoing one or more changes of state. The verb *give*, for example, is used to designate an event involving at least three entities with well-defined roles – giver, thing given, and person given to – each of which undergoes a specific change of state. Because conceptual roles such as these are an integral part of verb meaning, the conceptual situations underlying verbs can be seen as providing a kind of "frame" for structuring larger linguistic expressions such as sentences. The semantic structure of verbs thus contains what have been called "grammatical valences," and verbs are therefore responsible for much of the grammatical structure of a language. This obviates the need in many cases for more abstract syntactic principles and rules (e.g., Fillmore, 1982; Langacker, 1987; and even Bresnan, 1982; cf. Boland, Tannenhaus, & Garnsey, 1990, for experiments demonstrating the point).

The other key element of grammatical structure is of course syntactic devices for linguistically marking the conceptual roles that verbs create (e.g., word order and case markings). These may be seen as basically second-order symbols because they indicate how the first-order symbols are to be construed (e.g., *John* is the initiator of the action or the recipient of the action). This is typically a small, closed class of items designating

a highly constrained set of syntagmatic relations. In Talmy's (1978) formulation, contentives such as nouns and verbs specify the elements of a "cognitive scene," whereas syntactic devices operate on these to specify its structure. It is important also that syntactic devices may in many cases come to operate "schematically" – that is, they may operate not on individual linguistic symbols (e.g., *John*) but on linguistic categories of various sorts (e.g., agent, subject). Together, verb-argument structure and the syntactic marking of arguments and argument categories form the backbone of human grammatical competence.

In the study of child language acquisition, the importance of verbs is becoming more widely recognized. Bloom has been most prescient in this regard (see 1981 for an early review, 1991 for a later review). She and her colleagues have investigated a number of ways in which verbs structure early grammars, most especially their role in leading children to the acquisition of complement clauses and other elements of complex sentences (e.g., Bloom, Lifter, & Hafitz, 1980; Bloom, Rispoli, Gartner, & Hafitz, 1989). From a very different theoretical point of view, Pinker (1989) has more recently investigated a number of interesting phenomena involving the predicate-argument structure of early verbs, and constraints on how these are generalized to novel verbs. And in a recent study of early grammatical development, Bates, Bretherton, and Snyder (1988) have argued and presented evidence that children's initial verb vocabularies are very good predictors of other aspects of their early grammatical competence.

The specific idea of most importance for current purposes – implied by all of these researchers but fully explicated by none of them – is that the acquisition of verbs as single-word lexical items during the 2nd year of life is the major turning point in children's transition to adultlike grammatical competence. The grammatical valences contained in children's first verbs simply "beg" to be completed into sentences. The important theoretical point is that a focus on the role of verbs as conceptually complex lexical items is essential if we are to account for children's early grammatical competence in terms of basic cognitive and social–cognitive skills, without resorting to adultlike linguistic categories and rules.

## 1.3. Plan of the monograph

The study reported in this monograph is an attempt to explore more fully the idea that children's first verbs are key organizing elements in their early grammars – using a Cognitive Linguistics approach. The data come from a diary of my daughter's earliest verbs and sentences during her 2nd year of life. I will attempt to provide analyses of these data that

*movement word, social word,* and *personal–social word.* Some of these focus
on the referent of the term and others focus on the role of the term in
the child's linguistic system; some rely on the status of the word in adult
language while others do not. To make matters even more complicated,
many of children's early "words" are not words at all because they are
not symbolic (Bates, 1976). Some of these are embedded and only exist
in particular contexts, and thus are more a part of the event than a
representation of it. These presymbolic forms (also called such things
as *protolanguage* and *prelexical forms*) may be used on different occasions
in association with any of a variety of referents, including both actions
and objects, before the child settles on a more univocal usage (Bloom,
1973; Dromi, 1987).

I do not wish to become bogged down in terminological wrangling,
but it is important to be explicit about how I refer to the phenomena
of current interest. First, I refer to words that are a part of the event
rather than a representation of it (i.e., they are nonreferential) as *pre-
symbolic forms.* For the child's words that are truly referential, I use a
variety of terms that focus on the referents of words, not on their func-
tioning in a grammatical system – such nontechnical terms as *object labels,
proper names, property words,* and so forth. Most important for current
purposes is the term *verb.* The problem is that there is really no good
substitute for this adult term, which sometimes implies functioning in a
grammatical system, which I do not mean to imply. Other possibilities
such as *action word* and the like carry other unwanted connotations and
fail to imply the grammatical valences that are such an important part
of verb meaning. And so, reluctantly, I simply use the term *verb,* being
ever mindful that child verbs may differ in important ways from adult
verbs.

In adult language verbs are distinguished by two characteristics, one
functional and one semantic. First, verbs function as predicates in larger
symbolic expressions, that is to say, they are about something else. An
action or state or change of state assumes some entity that performs or
undergoes the process (Gentner, 1982); a verb is thus predicated of that
entity. But not all predicates are verbs; adjectives, for example, also
designate properties that can be predicated of things. The second char-
acteristic is therefore semantic (notional). Verbs designate processes,
which have as an integral part of their conceptualizations a temporal
dimension (McShane, Whittaker, & Dockerell, 1986), and this temporal
dimension actually plays itself out in the cognitive processing of the word.
In Langacker's (1987) terms, verbs require "sequential scanning." Thus,
while the nouns *parade* and *skiing* refer to temporally extended events,
in this noun form they are processes treated as though they were things
(no sequential scanning). When used as verbs, on the other hand, these

same words now make their processual nature salient ("He paraded around the house" or "He is skiing"). In their verb form these words require a sequential processing in a way that nouns do not; the noun is a snapshot, the verb is a moving picture. It is important that this analysis applies also to states such as *remain* and *know,* which involve durative states; neither of these could be identified from a snapshot alone (which distinguishes them from words for simple properties).

I use these same two criteria for identifying children's early verbs: I call a verb any word that the child uses to predicate a process of something, regardless of that word's status in adult language. I have already followed this procedure in previous work, for example, in Tomasello (1987) in which I argued that adult prepositions such as *off* are functioning for the child as verbs in such sentences as the request "Hat off" (meaning "Take the hat off"). Conversely, if an adult verb is used in some nonprocessual or nonpredicative way by the child, it is not considered a verb for her.

### 2.1.1. *Cognitive bases of early verbs*

The only two models for the semantic representation of early verbs are those of Antinucci and Parisi (1973, 1975), who employ a generative semantics model, and Gentner (1975, 1978), who uses a model from cognitive psychology. (Pinker's [1989] model is aimed at later development but in any case is of the same type as these two.) In both of these approaches children's early predicates are analyzed in terms of certain primitive predicates of the type used in predicate logic (first-order predicate calculus). For example, *kill* might be analyzed as $X$ "CAUSE" $Y$ "BECOME" "NOT" "ALIVE" or *sell* as $X$ "CAUSE" $Y$ "TRANSFER" to $Z$ [and at the same time] $Z$ "CAUSE" \$ "TRANSFER" to $X$. Neither of these theorists has a cognitive–developmental theory underlying the attributions of such structures to children, but merely take the analyses of adult language and modify them slightly (or in Pinker's case, not at all). For example, in analyzing one child's use of the word *give*, Antinucci and Parisi attributed to her the representation $X$ "CAUSE" $Y$ "BECOME" "COINCIDE" $Z$. In adult language, *give* would be analyzed not with "BECOME COINCIDE" but with some type of change of possession. But since Antinucci and Parisi do not believe that their subject really understood possession, they attribute to her the simpler notion of someone moving something to within the spatial proximity of another person.

No matter how plausible such modifications may be, the problem is that they begin from the wrong direction; the attempt is to impose adult linguistic models on the child, with some ad hoc modifications. Howe

(1976) criticized such a process, stressing that we should not begin with adult meanings and "simplify" them in a way that seems plausible for the child. Howe's suggested alternative is as follows:

This [alternative] approach would begin with the possibility that the ... utterances of young children refer to situations to which adults would never refer, because the situations children can conceive of are different from the situations adults can conceive of. Research would begin by specifying the situations children can conceive of and investigating how they make reference to these situations. ... It would be a mistake to resolve the ambiguities in their speech by any strategy that reconstructs the reference-situation through adult eyes. Reconstruction should proceed from the child's point of view. (p. 45)

It is legitimate to question whether this is a feasible alternative (Rodgon, 1977). Because we cannot study children, or anyone else, completely from their point of view without the influence of our own conceptual structures, we are faced with Quine's (1960) problem of "radical translation." The problem may not be escaped entirely, but we may at least attempt to lessen its impact by proposing a relatively explicit cognitive–developmental theory in terms of which we may characterize precisely how the child construes events at various stages of her development – in the same way that an anthropologist formulates a theory of a culture's world view in order to help in understanding its language. This will not eliminate our "adultocentric" tendencies altogether, but it will at least constrain them in principled ways and lead to formal semantic representations closer to the child's point of view than do approaches that begin with adult models and subtract away components in an unprincipled way.

I begin, therefore, with the observation that children live in a dynamic conceptual world, as both Piaget (1952, 1954) and Nelson (1985) have emphasized. Concepts of all types, including both objects and actions, must be extracted as invariants from larger, temporally extended structures. These may take the form of sensory–motor schemes based on concrete actions, or event structures involving culturally organized activities in which the child participates. (I use the term *event structures* to refer to both of these manifestations of temporally extended structures.) In the Cognitive Linguistics account, verbs carve out "processes" (Langacker, 1987), which I identify with event structures of various shapes and sizes. (In chapters 7 and 8, I spell out more directly the connections between verbs as the basic organizational elements of early grammar and event structures as the basic organizational elements of early cognition.)[1]

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[1] The characterization of children's conceptual world in terms of objects in motion neglects their knowledge of other persons and their intentional states. This knowledge is clearly crucial in the learning process, as will be discussed in section 2.1.2. It also comes into

Following Edwards (1973) – and many linguists before him – I would like to distinguish two types of verb–event concepts: change of state and action. Change of state concepts concern those processes in which the defining feature is something relatively abstract happening to an experiential entity, for example, an object moving, or opening, or disappearing. This can happen to a variety of objects in any number of ways. In some cases an agent may cause the change of state – someone gives something to someone or puts something somewhere – but still the defining feature of the concept is what happens to the object without regard for the agent's actual behaviors (e.g., giving can occur in many ways). Action concepts, on the other hand, concern those processes defined by the actual behaviors of some animate or inanimate being – for example, someone runs, or licks, or looks, or rolls a ball. In many cases an object of some type is involved in the action and it sometimes changes state – someone throws something or eats something or an object is spinning. But the defining feature of these concepts is in all cases the specific action involved, not any state changes in the object. This is not because changes of state and activities are different classes of events, of course, but because they are different construals of experience, in many cases of the same event. The same event might be described, for example, as either "giving him the pen" (change of state) or "throwing him the pen" (action) depending on whether we wish to focus on the change of state that the object underwent or the action of throwing. Langacker (1987) refers to these as two different "profiles" of the same event.

It is important to distinguish these two types of process because the cognitive structures that underlie them are different. In the case of change of state words, we must begin by recognizing that child and adult concepts are clearly not the same. Would anyone argue that the basic concepts underlying the child's use of *give* and *more* are the same as the adult's? This means that we must be very careful to specify the concepts in terms of which the child conceptualizes the meanings of these words. To begin with, we have Piaget's (1954) Kantian theory that the child's sensory–motor world is composed of objects and their spatial, temporal, and causal relations. More specifically, we have research documenting how these sensory–motor structures are manifest in children's behavior with objects at the developmental period during which they are learning their first change of state words.

Emergence of the first change of state words is associated quite strongly with the last two stages of object permanence development. McCune-Nicolich (1981) was the first to discover such a link as she reasoned that

play in the cognitive representations of certain words such as mental state verbs and perhaps some others for which intention is a key element (which I represent as a type of causality – see chapter 3).

performance on the Stage 6 object permanence task – the successful tracking of an object through several spatial displacements, some of which are invisible – requires being able to conceive of the "dynamic states of objects," that is, changes of state or transformations that objects undergo. She found that children learn their first relational words (e.g., *more, down, gone*) in association with entry into Stage 6 object permanence development. Tomasello and Farrar (1984) found something slightly different, and demonstrated an even closer link in the process. At the same time children were beginning to solve Stage 5 object permanence tasks – the successful tracking of visible displacements – they were beginning to use words to refer to the visible movements of objects: *up, move, fall-down,* and so on. It was not until they began solving Stage 6 tasks, involving invisible displacements, that the children began using words to refer to invisible states and movements: *gone, away, no-more,* and so on. Tomasello and Farrar (1986a) corroborated these results experimentally, and helped to rule out alternative explanations of these correlational results, by finding that children could be taught to use visible movement words during Stage 5 object permanence (as well as object labels) but they could not be taught to use invisible movement words until they were solving Stage 6 invisible displacement tasks.

There is thus solid empirical research documenting something of the nature of the conceptualizations underlying children's early change of state words: These words depend on the child's ability to conceive of the movements of objects through various spatial transformations. Following Langacker's (1987) general approach, I believe that we can formally represent the child's experience of such events by modeling iconically objects and their states (mostly involving basic spatial relations) at various steps in the constituent sequence. Each step in the sequence is conceived of psychologically as a single "moment of attention" (snapshot), each of which designates a single state (no step contains within it a designation of a process; von Glasersfeld, 1972). And so, for example, a formal representation of *move* might be something involving at least two snapshots in sequential order: the first with an object (*o*) at location *X*, and the second with that same object at location *Y,* as in the diagram below. States such as *stay* also require at least two sequential steps in order to establish that they are indeed enduring and not momentary snapshots of a change of state; that is to say, a single snapshot of an object at location *X* does not allow us to determine if it is staying or moving. States other than locative "at" states may also be represented, for example, locative states involving such specific locations as "on," "off," "in," "out"; possessive states; perceptual presence and absence; and various other nonlocative states. All of these are variations on the basic theme of objects in various spatial–temporal–causal relations.

which the verbs participate, and Gleitman claims that, in adult language at least, each verb participates in a unique set of syntactic contexts.

While acknowledging that later in development syntactic cues are very important in learning words of all types, few theorists believe that syntactic bootstrapping can be the whole story of early verb learning (not even Gleitman in her most recent formulations, e.g., 1990). Two-year-old children simply show no evidence of being as syntactically sophisticated as they would need to be for Gleitman's theory to work. Although 2-year-old children may use syntactic cues to make global distinctions such as transitive–intransitive (the only kind so far studied empirically), these cues will not help in distinguishing the many individual verbs within these classes. And children use many of their verbs in identical sets of syntactic contexts in early production, which gives at least some indication that they do not differentiate them syntactically. Regardless of their later syntactic abilities, it would seem that in the early stages young children clearly must be relying to some degree on associating the novel verb they hear with some aspects of their nonlinguistic experience.

The other approach to lexical acquisition is through the social–communicative context (e.g., Bruner, 1983; Nelson, 1985, 1988). In this view, children learn new words by hypothesizing what adults are attempting to do with them. They do this both at the level of distinguishing general classes of referent (as do Markman's and Gleitman's constraints) and in determining the particular referents of particular words (as constraints do not). In this view, young children do not in any case experience the indeterminacy of philosophers. This is because they hear a novel linguistic expression not in a laboratory, where nonlinguistic cues are carefully controlled, but rather in a social context replete with information about the new expression's reference. Of particular importance in early development is the referential information provided for children in their routine nonlinguistic interactions with adults (Bruner, 1983; Snow and Goldfield, 1983). In many cases children know that the adult is referring to a particular object because they understand from previous experience what the adult is doing in this situation (e.g., hiding an object, getting food from the refrigerator). More generally, Tomasello and Farrar (1986b) have argued and presented evidence that beginning language learners learn new words *only* when they are participating in a joint attentional interaction (nonlinguistically defined).

When the social–pragmatic theory is invoked to address the acquisition of verbs, it becomes clear that there are at least two main differences between the acquisition of concrete nouns and verbs. The first difference is in what might be called the "packaging problem." Whereas a concrete noun almost invariably maps onto a whole object (Markman, 1989), in the case of a verb it is much more uncertain what aspects of a situation

are relevant for its meaning. As Talmy (1985) and Gentner (1982) have pointed out, a verb may be defined in diverse ways, for example, by the manner of motion (e.g., *to float*), by the instrument involved (e.g., *to hammer*), by the result achieved (e.g., *to empty*), or by the action performed (e.g., *to wave*), depending on the particular language involved. And there are other semantic elements, such as the causative, that may or may not be a part of a verb's meaning; for example, we do not say "He disappeared his boot" because the verb *disappear* does not contain a causative element, but we say instead "He hid his boot" (or "He made his boot disappear") because the verb *hide* does contain a causative element (cf. Bowerman, 1982). The packaging problem thus seems much more difficult in the case of verbs than in the case of object labels – not only because there is more conceptual complexity to package, but also because there would seem to be few linguistic generalizations across verbs to help narrow the packaging options in a particular case.

The second difference is that the actions and changes of state to which verbs refer are mostly transient. This means that, unlike the case of object labels, the referent situation in the case of verbs is quite often not perceptually available to the child when the word is uttered (over half the time; Tomasello & Kruger, in press), nor can it be located by visual or other perceptual inspection of the immediate context. Instead, the child mostly hears verbs when the adult requests an action of her, labels an event that either the child or adult is about to perform, or names an event that has already been completed. One- to two-year-old children learn verbs nonetheless, and in fact they learn better in these nonostensive contexts than in the ostensive contexts that most researchers think of as canonical in early lexical development (Tomasello & Kruger, in press).

One reason why children might learn verbs better in some nonostensive contexts is that these contexts provide more and better information to help with the packaging problem – in particular, information about the speaker's intentions (cf. Gopnik, 1982; Huttenlocher, Smiley, & Charney, 1983). Thus, in learning an object label the child's task is most often to pick out one of the many perceptually available objects an adult intends to indicate; a simple point by an adult, or even consistent visual regard, will usually be sufficient for this task. In the case of verbs, the task is most often not picking out (there are usually not multiple actions present) but packaging. Pointing is in many cases not sufficient for this purpose, and thus the added information provided by the adult's non-linguistic behavior in many nonostensive situations is needed – for example, mother pushes the child to the car saying "Let's go," or struggles with the child saying "Let me wipe your face." We are a long way from knowing all of the factors involved in this process, but it is clear that children are learning their language not by mapping words onto per-

ceptual experiences, but rather by attempting to understand what the adults with whom they are interacting are doing with their language.

None of this is to ignore the powerful role played by the child's knowledge of language as another source of information about a verb's meaning. At some point in development they make use of the linguistic context surrounding a novel verb and in some cases this may even be necessary. Also, in the early stages at least, this linguistic context contains not just syntactic information à la Gleitman but also knowledge of the referents of the nouns involved (e.g., if an adult says "Ball roll," knowing the word *ball* cannot hurt the comprehension process). In addition, at this early stage children also make extensive use of contrast information (Clark, 1988, 1990) such that their knowledge of other verbs helps them to narrow down the aspects of the current situation relevant to the new verb's meaning (e.g., if an adult says "Pass the salt," the child will need to determine why the adult did not choose the expected *give*).

It is important to be clear that in the social–pragmatic view of language acquisition, all sources of information are used for one thing: to determine the speaker's intentions. Tomasello, Kruger, and Ratner (1991) argue, in fact, that determining intentions is a basic form of cultural learning, as distinct from social learning more broadly defined, and that such learning is necessary for the acquisition of novel linguistic forms. Cultural learning as a basic acquisitional process will be discussed in more detail later (chapters 7 and 8), but for now the important point is that we know very little about the different kinds of situations in which children learn their early verbs and the learning processes that these might imply. In fact, my discussion of the two differences between object label and verb acquisition could be taken to imply that the acquisition of verbs is more difficult than the acquisition of nouns. But I take it as a fact, as argued at the beginning of this chapter, that children learn words of both types early in development and without special efforts. This merely underscores our ignorance in these matters and sets a challenge for theories of lexical acquisition. In any case, a major goal of this study will be to make an inventory of the communicative situations in which my daughter learned her early verbs, and in this way to take a first step toward making the social–pragmatic theory more explicit in the case of verbs.

The overall point is that the acquisition of verbs is different from the acquisition of nouns in two important ways. First, the concepts underlying early verbs are not static and permanent but dynamic and transient. They are events that may be construed either as actions or as changes of state. Second, children do not always learn their early verbs by mapping them onto ongoing events in their perceptual world ostensively (as is often the case with the acquisition of object labels). Rather, they use

social–pragmatic cues and abilities of cultural learning to determine the adult's intended reference in various ways in a variety of communicative contexts. In both of these ways, then, verbs require an approach that is different from the approach usually employed in the study of concrete nouns, whose study has dominated the theoretical agenda. Ultimately, of course, a comprehensive theory of lexical acquisition should explain with a common set of principles the cognitive structures and the learning processes involved in the acquisition of all types of words.

## 2.2. Children's first sentences

Not long after producing their first words, many children also begin to produce word combinations. The approaches to children's early combinatorial speech that have emphasized abstract adultlike structures, either syntactic or semantic, have been adequately criticized by researchers such as Braine (1976), Bowerman (1973), Howe (1976), and Edwards (1978). In essence, these critics argue that we have no evidence that children operate with adultlike categories or rules in formulating their early sentences, and thus we should not posit them.

One of the reasons that we do not have to posit abstract structures is that work in theoretical linguistics is doing away with many of these in adult analyses. Much recent work has focused on how powerful are linguistic structures based on individual lexical items, especially verbs (e.g., Bresnan, 1982; MacWhinney, 1987). Whereas it is obvious that verbs are not a necessary component of all grammatical structures – children might form relational categories such as *possessive* between two objects – the transition to anything resembling adultlike syntax clearly depends on the child's acquisition of verbs and their associated argument structures (Bates et al., 1988; Bloom, 1981). I discuss these issues first with regard to the cognitive bases of early syntax, and then with regard to the developmental processes that result in grammatical categories.

### 2.2.1. Cognitive bases of early syntax

Braine (1976) provides the most ambitious attempt to characterize children's early grammars without the use of abstract, adultlike structures. He analyzed the earliest word combinations of 11 children, each learning one of five languages. As in his previous theory of pivot grammar (Braine, 1963), he argues that children learn positional patterns – that is, word order patterns – with a special prominence being given to verblike predicative words. Thus, a child might have a *more* + *X* formula in which the thing of which more is desired is placed after the word *more*. Other relational words may have either similar positional patterns (e.g.,

*play* + *X*) or different patterns (e.g., *X* + *stuck*). The question becomes whether there is any higher-order category that might group similar patterns into a single, higher-order pattern (e.g., pivot + *X* or *X* + pivot). Braine's answer is that in some cases there may be, but we cannot assume it ahead of time, nor can we attribute it to the child based solely on adult categorizations, nor can we anticipate how wide its scope will be. For example, he finds that his son began constructing two-word sentences with *big* and *little* at around the same time. In both cases the positional pattern placed these words in the first position, they expressed similar semantic content, and they each were combined with a variety of object labels. We might thus posit a "size" + *X* pattern to generate both of these types of utterance. *Hot, cold,* and *hurt* were learned soon afterward and showed similar positional patterns (all in first position) and were combined with object labels as well. Are we now in a position to posit "property" + *X*? Braine says no because this child had several other property words (e.g., *wet*) that did not show consistent positional patterns. In addition to a pattern based on size, Braine found for other children "limited scope formulae" based on words referring to "oral consumption" (*eat* and *drink*), "the movement of vehicles," and so forth.

Bowerman (1976) gives similar yet different examples from her daughter Eva. For instance, Eva began combining *want* with a variety of object labels and activity words at around 17 months of age (e.g., "Want juice," "Want see"). At that same time she had approximately 25 other verbs in her vocabulary that were only used as single-word utterances (e.g., *push, have*), thus indicating that she was not using a general combinatorial rule that applied to all verbs or even to all stative verbs. Along similar lines, a month later, *more* + *X* constructions became frequent while Eva continued to use *again, all-gone,* and other semantically similar relational words only as single-word utterances. Bowerman concludes that "each word was treated as a semantic isolate, in the sense that the ability to combine it with other words was not accompanied by a parallel ability to make two-word utterances with semantically related words" (p. 156). This lexically based pattern persisted for about 2½ months, after which Eva proceeded to "a much more mature system in which words of virtually all semantic subtypes were dealt with fluently" (p. 158). In contrast, Bowerman reports that her other child Christy, who began combining words later in development than Eva, seemed to show evidence practically from the beginning of combining whole classes of items in similar ways, for example, all the locative particles *up, down, on, off, back* began to be combined in a similar fashion at around the same time.

Both Braine and Bowerman thus conclude that children just beginning to learn language are working at a very concrete level (cf. also Bloom, Lightbown, & Hood, 1975). Some of the child's first word combinations

for this is that nascent language learners do not have any adultlike syntactic categories or rules, nor do they have any kind of word class of verbs that would support generalizations across verbs. Processes of symbolic integration that serve to create sentences from words operate on a verb-specific basis as well. What children have at this stage are a knowledge of specific kinds of events, and words to indicate them (verbs), and a knowledge of the roles played by various entities in these specific events, along with syntactic devices to indicate these.

### 2.2.2. Early syntactic development

The Verb Island hypothesis is my way of stating that learning to use verbs in meaningful ways provides the major stepping-stone for the child's transition from single word to grammatical speech. The hypothesis has the further virtue of explicitly denying the existence of abstract categories and rules in early child grammars. Children do come to have more abstract syntagmatic and paradigmatic categories as they develop, however.

Syntagmatic categories, in my interpretation (relying heavily on Nelson, 1982, 1985), are categories often referred to by such terms as *agent, patient, instrument,* and so forth. These are inherently relational categories that indicate how an object (or something treated as an object) is related to an action or process (or in some cases to another object). In the Verb Island hypothesis, these begin on a verb-specific basis, with such things as hitter, thing hit, thing hit with, and so forth. And though restricted to this one action, these *are* categories: Many different objects can be a thing hit. Children learn these with their general capacities for cultural learning — when adults order words in this way this is meant, in that way that is meant. But at some point they notice regularities across verbs. These regularities are based on the fact that the same syntactic device is used to mark various verb-specific categories across different verbs in adult speech. Thus, in a case-marking language the child might notice that in adult speech such things as hitter, fixer, and runner are all marked with the same morphological marker. In addition, the child's developing notions of causality allow her to recognize that a hitter and a fixer and a runner have something in common that may justify adults' treating them similarly: They all initiate an action (they are agents or actors). The process of forming syntagmatic categories is thus the same categorization process that we see in other domains, including lexical development. In this case, a second-order symbolic device such as morphological marker provides the form that invites the child to construct a category. What results should thus show prototype effects and all of the other major characteristics of lexical and other cognitive cat-

egories – which they do (see Taylor, 1989, and the papers in Corrigan et al., 1989).

(It is important to emphasize that in a very important sense verb-specific syntagmatic categories are still a part of adult language; on the cognitive level individual verbs involve individual syntagmatic relations [Bolinger, 1977]. The sentence "John mibbed the chair" does not tell us whether, as a result of John's behavior, there was a change of state in the chair ["He destroyed it"], no change of state in the chair ["He admired it"], or even whether it was in existence or not before the mibbing ["He made it"]. Even with our adult knowledge and categories the fact that *John* is an actor and *chair* is a object, as indicated by their positions relative to the verb, only gives us a vague causal arrow pointing from one to the other [cf. Clark & Carpenter, 1989, on "source" as the common spatial basis for both agents and causes]. Only knowledge of the specific conceptual situation represented by *mib* supplies the specific syntagmatic relations intended.)

Word order as a syntactic device presents some problems for the formation of syntagmatic categories. The problem is what constitutes the symbolic device that is similar between "Daddy hit" and "Daddy fix" that would lead to a generalization such as agent or actor. It could be that in both cases *Daddy* is the first word of the utterance, but this would lead to many problems in cases in which something other than the agent is in the utterance-initial position. It seems that some structural–functional analysis must be involved so that the child may identify the syntactic device as something such as "before the verb." This requires something like a word class of verb (or perhaps something more limited) so that the child may equate the ordering patterns across different utterance types. This leads us to paradigmatic classes.

If syntagmatic categories in the case of verb-argument structure are concerned with relational "slots" that verbs carry with them (e.g., the agent slot, the patient slot), paradigmatic classes are concerned with what types of things may fill these slots – what types of lexical items (e.g., nouns, adjectives) and what types of larger phrasal structures (e.g., noun phrase). *Verb* itself is also a paradigmatic word class. The problem with paradigmatic word classes is that they are not functionally operative in the linguistic system in the same way that syntagmatic categories are; they do not participate as significant symbolic devices in verb-argument structure. This means that a paradigmatic class is *not* associated with a single, functionally operative symbol (syntactic device) that consistently marks the class, as syntagmatic categories are. There are morphological attachments that are often associated with particular paradigmatic classes (e.g., tense markers with verbs, articles with nouns), but these serve their own functions (e.g., to indicate past tense, to indicate definite or indef-

inite reference); they do not mark the basic grammatical function of the word to which they are attached as do case markers and basic word-order devices.

There are two classic views of how paradigmatic classes are formed, one relying on semantic factors and one relying on distributional factors. Bates and MacWhinney (1982) propose that children form paradigmatic categories such as noun and verb on the basis of semantic similarities. Thus, prototypical nouns are words for objects and verbs are words for processes. Maratsos (e.g., 1982, 1988), on the other hand, has argued persuasively that any sufficient account of the development of paradigmatic word classes must rely to some extent on distributional analysis. He proposes that the child notices and registers similarities in the way words are combined with other words or morphemes across time, and words that behave similarly combinatorially are members of the same class (e.g., *dog* and *tree* are both preceded by articles, take a plural marker, etc.). Although in some cases semantic considerations may play a role – for example, the child may come to see that many nouns are objects and that may be an aspect of her concept of nouns – Maratsos argues that semantic considerations are not sufficient because linguistic categories do not map onto them in a straightforward manner (many nouns are not objects, e.g.). Of special importance also are cases where semantics cannot possibly be a clue (e.g., masculine and feminine noun classes), for which something like distributional analysis would seem to be a necessity. On the other hand, however, it is also true (as Maratsos, 1990, recognizes) that purely distributional analyses are also not sufficient by themselves because there are systems of case inflection in some languages in which the same form serves several basic functions (e.g., Serbo-Croatian; Slobin, 1982), thus making purely distributional criteria ambiguous. Bates and MacWhinney (1989) have recently suggested, quite reasonably, that both sets of factors are probably at work.

I would like to propose that the formation of paradigmatic word classes requires two steps (the Maratsos and the Bates and MacWhinney proposals concern only the second). This is necessitated by the fact that paradigmatic classes are classes of words, not things. Whereas an agent is a thing in the world (designated by a linguistic symbol), a noun only exists in language. Thus, the first step is that the child must first have some words that are subject to conceptualization and manipulation, that is, words that the child has treated as mental objects (Karmiloff-Smith, 1986). This means operating *on* them with other linguistic structures, especially predicates on arguments. As long as words are only operated *with* – they are predicates doing the operating – there can be no question of word-class formation. This has particular relevance for verbs because even when the child is speaking in short sentences, the verb is still the

main relational structure of the sentence and thus is still something the child is only operating with, not on. Following this reasoning, Ninio (1988) has proposed that children learning English should begin forming a word class of nouns quite early, because they are used as arguments of predicates quite early. Forming a word class of verbs should occur only later because verbs are not typically in the argument slots of other verbs until later. Children should not have a word class of verbs until they are treated as arguments by other predicates in, for example, sentences of the "I want to play" variety.[3]

In my opinion, two modifications of Ninio's hypothesis, one of which was hinted at by Ninio herself (1988), are required for this first step. First, it is not just verbs that may serve as predicates that treat other predicates as mental objects. As Ninio hints in some of her examples, of special importance are modal operators such as those in "Not bite it anymore," "I can't open it," "I won't swallow it." This point is important because some agglutinative languages such as Turkish and Tamil have elaborate verb morphologies that are used productively (indicating a word class of verb) quite early, before children would have used extensively sentences with two verbs. And many of the morphological markers in these two languages are indeed predicative in this sense that they are modal operators (and not just, e.g., tense markers). It is also possible that *wh*-question words may serve the same function in some cases (e.g., "What you making?").

A second modification of Ninio's hypothesis is an attention to comprehension. Undoubtedly, if the child produces predicates embedded as arguments in larger relational structures, she is acting on them as mental objects. But something similar must be going on when the child comprehends such a structure. Comprehending what the adult means by saying "I can't find it" or "I want to go" requires that the child determine the relationship between the two predicates – that is, in these two sentences, that *can't* and *want* are operating on *find* and *go* respectively. Note that comprehension does *not* mean simply that the child is exposed to such sentences or has them addressed to her. It means that she has performed the mental act of comprehending them in something like the adult manner, which means that the child has control of the key elements of the utterance and their interrelations.

Once the child has a group of words that have been treated as mental objects, the stage is set for the second step in the process of paradigmatic

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[3] This is actually a slightly slanted reading of Ninio's claim. Her claim is specifically about "hierarchical" predicate-argument structures, which she believes can be realized in sentences with a verb and two arguments, such as *X hit Y*. Her interpretation is that this implies a structure of the form *X [hit Y]*. My claim is that the verb itself must be placed in an argument slot before a truly hierarchical structure can be inferred.

word-class formation. Following Bates and MacWhinney (1989), it is likely that both form and function are important cues used in the categorization process. I would like to hypothesize the developmental priority of function; however, that function does not just mean the referent of terms, as it does in most accounts – that verbs refer to actions, for instance. It means more importantly *how the words function in the child's linguistic system,* what they do in the process of constructing complex symbolic structures. This means especially the role they play in verb-argument structure – for example, nouns are words that serve to fill all types of argument slots and verbs provide the main relational structures of sentences. Once basic categories have begun forming in this way, they may then be identified on the basis of simple surface-level distributional form cues (e.g., hearing "mib*bing*" means that *mib* is a verb). The analogy with Nelson's theory of concept formation is not accidental. Just as the child forms categories of objects and actions on the basis of how they function in larger event structures on the conceptual level (Nelson, 1985), on the linguistic level the child forms paradigmatic classes of words on the basis of how they function in sentences – a kind of functionally based distributional analysis.

My overall hypothesis, then, is that the child has no syntagmatic categories at all when she is just showing a word-order preference or a morphological marker that is not contrastive. The first syntagmatic categories are verb-specific and based on the child's abstraction that in "Boy hit" and "Girl hit" the word before *hit* is the hitter (the Verb Island hypothesis). More general syntagmatic categories await either the child's active use of a morphological marker across verbs, or the formation of the paradigmatic category of verb (or perhaps something more limited) to help identify the invariant in word-order patterns across verbs. This latter outcome can only occur when different verbs have been produced or understood as items operated upon, that is, only after they have been the objects of another predicate of some sort, including both other verbs and some currently unspecified set of modal operators. The main predictions that this account generates in the case of English are: that the child should form a word class of nouns earlier than that of verbs (if we assume that nouns are objects in argument slots earlier than verbs developmentally); that the formation of a word class of verbs will await their placement in argument slots of one form or another; and that verb-general word-order syntactic devices await the formation of the word-class verb.

Much of the subsequent grammatical development of children may be seen as the acquisition of more and more adultlike ways for marking argument slots (syntagmatics) and for filling these slots with ever more complex linguistic material such as noun phrases, complement clauses,

house were transferred to the main diary in the evening of the day they were recorded.

In recognition of the fact that recording everything a child utters is an impossible task, we focused from the outset on nonnominal expressions and all word combinations. Thus, T's use of holophrastic object labels was not systematically recorded at any time during the study (we did compile one early list that will be presented later). Upon the emergence of the first nonnominal expression (at around 14 months of age), the following procedure was observed. For each nonnominal expression, the first spontaneous (nonimitative) use was recorded along with its situational context. For the early words, an attempt was made at this point to determine the adult–child interaction (i.e., the adult linguistic model and context of use) that gave rise to the learning of the word; this later became problematic, and was discontinued. All subsequent uses of the expression were recorded except that the "same" expression in the "same" context was not recorded after its first occurrence (e.g., telling Daddy "Bye-bye" as the car left each morning). If there was any question about the novelty of use, the utterance was recorded. All word combinations, including those containing only object labels (e.g. "Book table"), were recorded, again excepting repeated instances of routinized usage (e.g., "Bye-bye Daddy" as the car left each morning).

From 17 to 20 months, at the beginning of each month, T was video- and audio-taped playing with her mother or with me. The hour-long video recordings were conducted at the Department of Psychology at the University of Georgia, and T usually interacted dyadically for one-half hour with her mother (while I filmed) and for one half-hour with me (while her mother filmed). The hour-long audio recordings were conducted at home and represented in most cases dyadic interaction between T and me. Both types of recording were transcribed immediately by me (I was present at all recordings), on the same day that they were made.[1] In addition, at these same monthly intervals, T's mother and I perused the previous month's diary and made a list of each nonnominal expression and our intuitions about its use during that time; we often made notes on parental usage of particular words at that time as well.

At T's 20th month, a decision was made to focus more on the "emergent structure" (Braunwald, 1979) of T's word combinations with verbs,

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[1] The video transcriptions I made at the time focused on T's language, with adult language transcribed only where it was necessary for understanding what T was doing or saying; that is how I was able to do them in the same day. The videotapes have since been retranscribed by a team of research assistants, with more careful attention to the adult's language. The original transcriptions by me were of immense help, however, in deciphering T's language as I was there at the time and thus counted as unintelligible almost nothing.

that is, on those combinations that seemed to represent her most so-
phisticated linguistic skills. Thus, from the 20th month, we began ig-
noring sentences that showed a well-established verb combination
pattern, even if it may have contained a new object label. For example,
after 20 months an utterance such as "Hit truck" would not have been
recorded if T had previously shown many patterns with *hit* + *X*, and if
she was simultaneously using more complex sentences with the verb *hit*
(i.e., two-word combinations were not on the cutting edge of her com-
petence with *hit*). For T's more complex sentences at any given time, all
new instances were included. Thus, "Danny hit me tennis-racket" (on
the same day as "Hit truck," e.g.) would have been recorded even if she
had previously produced *X hit me Y* patterns because this was a sentence
on the cutting edge of her competence. Obviously, these criteria could
not be applied in ongoing interactions as systematically as one might
wish, but in practice we recorded during this final 4 months all of the
instances of T's newest and most interesting sentences – which, given
our almost total knowledge of her past language, really did stand out
fairly clearly. When there was any doubt, the utterance was recorded.
Near the end of this period (at 23 months) a final video recording was
made and transcribed in the usual way (except that it took me several
days). Monthly summaries were made throughout this period, but be-
cause T's language was at this point too complex and diverse for us to
know all parts of it intimately, they were not nearly as complete or
accurate as the earlier summaries (we were so uncertain of our knowl-
edge of parental models at this time that they were discontinued). To
summarize the boundaries of the diary:

1. No object naming was included.
2. No repeated utterances of routinized words or phrases were included.
3. After the 20th month, utterances that were instances of well-established
   patterns of "immature" uses for particular verbs were not included.

For purposes of the current study, all diary entries of verbs and word
combinations (which included the utterance along with its date and con-
text of use) were typed into a computer file by a research assistant, and
checked for accuracy by a second assistant (and myself if there were any
questions). The KWAL (Key Word And Line) program from the
CHILDES system (MacWhinney & Snow, 1990) was used to extract and
collate all of the utterances containing previously identified verbs and
predicates (identified from the monthly summaries). After this was done,
the remaining entries were examined for other utterances containing
verbs or predicates; these were collated in the same way. A final residue
were sentences containing no verbs and they were collated in various
ways (to be reported in chapter 6). The appendix contains all of the

diary entries organized, for the most part, around the main verb or predicate of the sentence. Notes about single-word usage or parental usage, mostly from the monthly summaries, are included where they are available and useful for current purposes.

## 3.2. Determining meaning

The data for the current analysis are, quite obviously, the utterances T produced and the contexts in which she produced them. But because my emphasis is on the meaning of utterances and words – as I determine them through an analysis of T's apparent motives in particular situational contexts – issues of "rich interpretation" arise as well. Although there is no perfect solution to the problem of "radical translation," I believe there are several things that help.

The first, as argued previously, is some form of cognitive–developmental theory to help us reconstruct the child's point of view from our point of view as we examine the contexts in which she used a particular word. For example, at around her second birthday, T learned from a cartoon detective show on television the word *clue*. She used it on several occasions when she found something like a feather on the sidewalk, a comb under the dresser, and so forth. It is obvious that we cannot assign to her anything like the adult meaning of the word *clue* in these instances because she shows no other indication of understanding a mystery and how a clue fits into that context. To cite just one other example (this time from the data to be analyzed), when T wanted to enter the study when I was working, her mother would tell her that she could not because "Daddy is working." T learned to say that she or others were "working" when they were at a desk, or using paper and pencil. In both of these cases, most adults would attribute to the child some "reduced" form of the adult meaning focusing on sensory–motor aspects of the physical objects involved and so forth. As discussed in the previous chapter in connection with semantic analyses in general, the only way to perform such reductions in a principled way is to have a theory of the child's cognitive development. I will outline the fairly simple theory I am using in the section that follows.

A second consideration is contexts of use. This means paying close attention to how the child uses an expression – in what contexts and for what purposes. In addition, however, is a consideration explicated most clearly by an example from Edwards (1978). Edwards's daughter used the word *pull* on several occasions as she was pulling at items that were stuck: a closed door, a purse with a difficult snap, and so forth. If these uses happened in a taping session, and were our only source of information, we would likely attribute to this child something close to the

adult meaning of *pull*. However, further observations revealed that this child never used the word *pull* when she was pulling on things that did not thwart her, that is, when she was opening doors, pulling toys, and so forth. She thus apparently meant by this term something closer to our word *stuck*. Edwards (1978, p. 67) observes that in many analyses

the nature of the situational context of any single utterance is assumed to be uncontroversial and determinant, so that the problem of deciding what particular aspects of the context, as perceived by the child, are crucial to the child's intended meaning, is ignored. What can easily happen in the analysis of child language is that the child's words are interpreted in terms of the observer's own semantic system, and this is then checked against the immediate situational context for confirmation.

The point for current purposes is that if we want something resembling the child's meaning as she represents it to herself, we must use our cognitive–developmental theory of the child's world in conjunction with a sensitive analysis of all of the contexts in which she uses the term along with, in some cases at least, those contexts in which the child does not use the term.

Another consideration is related to this point. I believe that a close examination of the child's alternative means of expression (another way of determining where a given expression does not apply) is often very important (cf. MacWhinney, 1989, on competition between lexical forms). For example, if a child often requests of adults that they *give* things to her – always in a context where the child wants but cannot independently obtain an object – there are many different ways that we might represent what aspects of this situation are salient for the child: Is it crucial that the adult "causes" the transfer (as in the adult *give*) or just that the child obtains the object in some way? We may be aided considerably in this determination if we know what other possibilities are at the child's disposal. Thus, at one point T distinguished cases where she just wanted to "Have it" from those cases where she wanted an adult to "Give it," thus indicating, presumably, the precise causal difference in question.

One final issue must be considered. When we choose to attempt a formal representation of a language form from a child's grammar, we almost always mean to represent something relatively stable. This is determined by examining contexts of use over time, for example, determining that the child uses *more* with food by examining each individual context and discovering that each of these instances involves food. But this procedure can never, in my view, be systematized into a set of clear and consistent procedural rules because there are times that the child changes her use of particular forms abruptly, and we do not want to sum across this change. For example, if the child one day uses *more* for

a nonfood object, we are presented with a dilemma. On the one hand, we might assume that the child had the wider meaning throughout the previous weeks but we did not observe its use for objects other than food because she simply was not motivated or did not have the opportunity to use it in nonfood situations. On the other hand, of course, we can assume that the meaning has changed. We cannot reasonably ask for precision in these matters, but must rely on gross indications of meaning change, namely, fairly dramatic changes in contexts of use on several occasions during the same time period. Until there are such changes, our meaning representations must take as data all previous uses of the term since the last meaning change.

To summarize, then, attributing meaning to child utterances and words begins with a rich interpretation of the child's meaning in context. This should be guided by a relatively explicit theory of what aspects of the situations are conceivable and salient for the child. In general, it is advisable to assume the least-specific intended meaning on the part of the child given the alternative means at her disposal. For example, we should not assume that *give* includes as part of its meaning an agent if it is the only term she has for such situations; when she acquires linguistic means for a differentiating situation then we may attribute more specific semantic structures. When attempting to specify the meaning of a symbolic form over time, a full analysis of both that word's use over time (a horizontal specification across a time line) and the alternative means of expression at each of those times (a vertical specification at a single time) is required. Only by taking into account all of these considerations may we begin to determine the meaning of particular pieces of language from something resembling the child's point of view.

### 3.3. Semantic analysis of verbs

Given these considerations about how to determine child meanings, I proceeded in my semantic analysis of T's verbs as follows. The first task was to identify the verbs. As mentioned previously, I used a very liberal criterion: any word whose conceptualization was a process and whose use was as a predicate. This led to the inclusion of many so-called relational words such as *more* and *bye-bye*. Although this may seem odd to some, I must report that upon deep reflection I was unable to say how, for T, the request for *more* or *off* was any different than the request to *go* or *move*. There is thus a sense in which what I am reporting on is all nonnominals that were not clearly nonprocessual property words such as *pretty* or *hot*.

I began with the output of the KWAL program for each verb – that is, all of its uses and the date and context of use for each. I grouped

citizens and their government (itself a complex concept) hold and a succeeding state in which another set of complex relations holds among those same entities. However, we may hypothesize that human cognition works in such a way that *democratize* is simply represented as a moment with "no democracy" followed by one with "democracy," with all of the complexities being in the internal structure of this abstract concept, which may be accessed as needed (see Bates, 1976). Another complication is highly abstract or mental state verbs such as *know, believe,* and *deserve,* which would seem to require a very different set of abstract conceptual elements. But the assumption is that these may be analyzed into simpler elements as well, in many cases in terms of more concrete sensory–motor concepts (Lakoff, 1987; Lakoff & Johnson, 1980).

It is important to note at the outset that the representations I will propose do not for the most part incorporate the pragmatics of how these semantic structures are used. Thus, for example, I represent *bye-bye* in terms of an object disappearing, but the salutory function of that utterance is *not* represented. What is represented is the conceptual situation underlying use of the word. In general, I would argue that pragmatic intentions must be represented in some other way than the conceptual situations I am attempting to depict. Nevertheless, I will employ a very simple method for representing one and only one pragmatic distinction, and that is because in the child's early language many words are used for this one pragmatic function, namely to request. Requests involve a different conceptualization than commenting on a state or naming an object because they request a state or object that is not currently realized to become realized in the child's perceptual field. In any case, I will introduce this and a few other minor variations on the method as they are needed in the analyses.

In chapter 4 I provide formal analyses of the meanings of all of T's change of state words in terms of the temporal sequencing of states involved, as briefly described here. In chapter 5 I provide English descriptions of the meanings of all of T's activity words.

### 3.4. Syntactic analysis of sentences

For each verb, using the same computer printouts described previously, I classified each word combination and sentence for a given verb according to the argument structures involved. Word combinations and sentences involving the same argument types designated in the same way with syntactic devices were classified as the same sentence type – *on a verb by verb basis.* Thus, "Put hat on these feet" and "Put that in the box" were considered the same sentence type because they both contained a specification of the thing being put and the place where it was

put, the former being designated by its positioning immediately after the verb and the latter being indicated (in the postverbal position) with a locative preposition. The fact that the articles used in the two sentences were different and that one used a pronoun to designate the thing being put were not parts of this classification (the use of articles and pronouns were subjects of other analyses; see chapter 6).

The outcome of this analysis was a developmental chart for each verb noting the age at which each sentence type emerged and the number of that type during the period of study (with representative examples being given for the different developmental periods). These are presented in table form for each of T's verbs, with verbs in the same semantic group being presented together in the same table. Also noted in each case is the complexity of the material that may go into a particular argument slot (e.g., for the "_____ stuck" sentence frame, "Big rock" is the most complex linguistic material to fill that slot).

Two problems with this methodology must be noted. The first is how to designate the arguments. On the Verb Island hypothesis, the child does not have any abstract argument categories such as agent and instrument, but must construct these. Before the child has constructed verb-general argument categories, therefore, each verb has its own argument types. However, I can find no alternative that is not exceedingly awkward to using verb-general terms of some sort in the tables – terminology such as *the one who sweeps* and *the thing swept with* becomes very tiresome and difficult to work with. The compromise I have chosen is to use the terms *actor* and *object* in as wide a sense as possible. Thus *actor* includes what have been called agents and experiencers, and perhaps a few that do not fit either of these so well; and *object* includes patients, results, and also themes. I also use the terms *instrumental, locative,* and *recipient* throughout the study. In the text I try to use more verb-specific terminology such as *giver, given, thing given with,* and so forth, where it is accurate and appropriate.

The second problem is deciding when an argument is marked at all. In principle, as stated previously, a syntactic device is only considered operative in the current study when the child uses it contrastively, that is, its presence or absence affects the meaning of the utterance for the child. But word order, the most important device in English, presents difficulties. Early in development there are certain positional preferences. The child may use, for example, *hit* + *X* constructions when describing an act of hitting; the agent is not expressed. If this is her only construction, then it is not a contrastive use of word order. On the other hand sentences such as *Pete hit Daddy* would seem to indicate that the child knows how to mark the hitter and the hittee with English word-order conventions, especially if both *Pete* and *Daddy* may occur in either

position depending on the circumstance. This is sometimes complicated by the fact that many verbs used by children early in development have animate actors and inanimate objects, for example, *eat* or *read,* and so most object labels occur only in one position, with virtually no chance of being in the other. In the current study, I consider that a given verb has contrastive word-order conventions associated with it when it is used in sentences in which both argument slots are filled appropriately.

Two further difficulties occur with this procedure. On some occasions it comes to pass that the child is using two-term sentences and produces some with the actor position filled and some with the object position filled – for example, *Daddy hit* and *Hit ball.* I assume that these do not have contrastive use of word order unless a single object label is used in both slots on some occasions within the same developmental period (e.g. "Daddy hit" and "Hit Daddy"). The other problem is that intransitive verbs have only one slot, for example, *Mommy sleep.* In these cases, I assume nothing about their structure and only assign them the appropriate conventions when it is demonstrated that general ordering rules apply across the board to other verbs. These same general principles apply, of course, to the other types of marking. Intonational variations will only be assigned status as syntactic conventions if they are used contrastively: For example, with emphasis on Mommy, *Mommy sock* is possessive, but without special emphasis, *Mommy sock* is not. Similarly, if a preposition or other lexical marker is used in only one of a few linguistic contexts, it is not considered productive: For example, T's *piece-of-ice* and, later, *piece-of* + X constructions are not evidence that the lexical item *of* is functioning as a syntactic marker of any sort.

The semantics and syntax of sentences with verbs are thus the focus of this study and indeed, I believe, of T's grammar. A number of linguistic phenomena in the diary, however, were not of this type. After chapters 4 and 5 consider verbs, therefore, I present some further grammatical analyses: sentences without verbs, noun and verb-related morphemes, and complex sentences such as negatives and questions. It will be seen that the description and explanation of these do not require any formal or other type of apparatus beyond general cognitive and social–cognitive abilities, in combination with the semantics of verbs and their associated syntagmatic and paradigmatic categories.

## 3.5. T's earliest language

T began talking at around her first birthday. She first used object labels, both as requests and as comments or attention getters. During a period of a few days around 17 months, we made a list of the object labels T knew at that time (note that these are taken from a parental self-

**Table 3.1.** *T's object labels at 17 months of age (from parent self-interview)*

*Names of persons and pets*

| | | | |
|---|---|---|---|
| Mama | Pete | Dave | Beta |
| Dada | Mino (Cinnamon) | Paul | Dapne |
| Ia (Maria) | Pokey | Ex (Lex) | Zoo-zoo |
| Danny | Dano | Bance (Valerie) | Pooh |

*Objects labels (animate)*

| | | | |
|---|---|---|---|
| Bird | Goat | Bug | Lion |
| Dog | Bear | Bee | Deer |
| Cat | Cow | Frog | Baby |
| Mouse | Owl | Monkey | Boy |
| Duck | Turtle | Bunny | Girl |
| Zat (horse) | Man | | |

*Object labels (inanimate)*

| | | | |
|---|---|---|---|
| Ball | Picture | Coat | Coat |
| Chair | Window | Shirt | Pen |
| TV | Money | Hat | Pin |
| Bed | Game | Towel | Tray (ashtray) |
| Light | Sand | Kite | Box |
| Clock | Cup | Ciga (cigarette) | Flower |
| Choo-choo | Plant | Purse | Car |
| Baby-doll | Door | Penny | Tree |
| Spoon | Gaba (garbage) | Shelf | Rock |
| Bowl | Chess | Kegs | Stick |
| Shoes | Boat | Swim-pool | House |
| Socks | Pocket | Soap | Berry |
| Glove | Mirror | Bush | Gaga (nightgown) |
| Shower | Cycle | Book | Silk (blanket) |
| Soup (bathing suit) | Plane | Phone | That (all purpose) |

*Body parts*

| | | | |
|---|---|---|---|
| Eye | Hair | Teeth | Leg |
| Ear | Tummy | Beard (chin) | Arm |
| Nose | Toes | Foot | Cheeks |
| Mouth | Butt | Finger | Bee-doo (bosom) |

*Food and drinks*

| | | | |
|---|---|---|---|
| Bottle | Corn | Bread | Sauce |
| Co-Coo (cookie) | Corn (ice cream) | Apple | Waffle |
| Ca-Coo (coffee) | Bacon | Pear | Bagle |
| Co-Co (coca-cola) | Eggs | Ba-bee-ca (strawberry) | Cheese |
| Ca-ca (jello) | Warley (water) | Toast | Milk |
| I (ice) | Salt | Chip | Juice |
| Patu (french fry) | Beer | Boney (baloney) | KK (ketchup) |
| Ceel (cereal) | Some (all purpose) | | |

interview, and some unsystematic diary notes, not systematic diary re-
cordings at the time of T's utterance). They are listed in Table 3.1. Object
labels not appearing in sentences were not systematically recorded in
any way after this time.

During the 14- to 17-month period, T also learned a number of words

Table 3.2. *T's presymbolic forms at 17 months of age*

| | |
|---|---|
| *Rockin* | First used while rocking in the rocking chair, then as a request to do so, and then as a name for the object, i.e., she would point to the chair and say "Rockin'" even when she did not want to rock |
| *Tickle* | First used to get an adult to repeat tickling her (usually pointing to where she wants to be tickled), and then to name the object that usually tickled her (i.e., to name, not request, her mother's pigtail or a feather) |
| *Phone* | First used in response to hearing the telephone ring, then as she "talked" on the phone, then to point at and name the phone, and then when she wanted someone to pick her up so she could talk on the wall-phone (pointing to it) |
| *Play-play* | First as an accompaniment to her "playing" the piano, then to name the piano |
| *Towel* | First as an accompaniment to her using a towel to clean up a spill, then to name the towel |
| *Ni-Ni* | First as an accompaniment to preparations for bed, then upon seeing others in bed (even pictures), then as she closed her eyes in a pretend game |
| *Dinner* | First used while Mommy was making dinner, then to name a plate of food, then as we were sitting down at the table, then as a pretend game in the sandbox (making dinner in a pot) |
| *Cake* | First used to name a pile of sand made into the shape of a cake, then while filling a bowl with sand in preparation of making a sand-cake, then when she wanted to play this game, then when she turned over a bowl indoors (no sand, no cakes), then as she carried a bowl to the sandbox |
| *Steps* | First used as an accompaniment to her climbing or descending stairs (never to name the object) |
| *Bath* | First used as an accompaniment to preparations for bath, then as she bathed her babydoll (never to name the object) |
| *Game* | First used for others and then for herself playing with a baseball and baseball glove (never to name objects) |
| *Mi* | First used to call Daddy into a room (Mommy sometimes called "Mike!"), then used to call Mommy as well |
| *Make* | First used in block play to request that a structure be built, usually so that she could knock it down (and make a "mess") |
| *Mess* | First used for the result of knocking down blocks, then when she wanted to knock them down |
| *Outside* | First used if she was inside the house and wanted to go outside, or if she was outside and wanted to go in |
| *Mma* | First used as accompaniment to kiss |

that seemed to refer to activities. Some of these had the disconcerting property that they could apparently be used to refer to either an object or the activity typically associated with that object. On some occasions, for example, she might point and name the "play-play" (piano); on other occasions, she would comment "play-play" as she was playing the piano.

entity (including objects, actions, and other experiential items), $P$ = people, and other letters as needed (e.g., $F$ = food).

3. The presence of a causal agent (actor) responsible for a particular object transformation (represented by means of a causal arrow $\rightarrow$).
4. The distinction between representational and perceptual states, for example, an expectation that an object will be present or a verbal reminder of an object is represented by shading the panel containing the object.

It is important to remember that the representations proposed are not meant to represent the entire "meaning" of the expression. The pragmatic intention behind most utterances is not represented. Thus, to repeat my earlier example, the disappearance of a person does not exhaust the meaning of the child's word *bye;* it may, however, be said to "underlie" it. The one use of pragmatics in the current analyses is for words that are used as requests only. This is because the conceptual situation underlying requests involves a representational rather than a perceptual end point, and it is important in many cases that this be depicted in our representations as it may be the only difference between two completely separate lexical items. The child might, for example, see an object and wish it absent. In this case the desired state is represented by a panel with a dark-lined border. If a word is used as both a request and a comment, the comment use is formally represented, as in all cases the request form merely requires depicting the final step in the sequence as a desired representation.

### 4.1.1. Where and find

Soon after her first birthday, T's parents began using expressions with the question word *where* in two distinct contexts. The first was the expression "Where's the bottle?" uttered as we searched around the house for the bottle T had dropped somewhere. (During this process, T was usually crying for and asking for it with "Bottle!") T's parents generalized this usage to other contexts in the succeeding months, for example, "Where's the silk?" (*silk* was her name for her blanket, which she also hated to lose) and "Where's the ball?" (when the dogs demanded it). The other context was a hiding/peekaboo game in which someone would deliberately hide themselves or some object as T watched. They would then ask her such things as "Where's Daddy?" or "Where's the bunny?" A variant on this theme in this context was "Where'd it go?" asked in an exaggerated questioning intonation. (T learned "Where-go?" in this context and generalized it to similar situations, but it was soon dropped from active use. I will thus not report on it further; see the appendix for examples.)

T's earliest uses of *where* (beginning at 15.28) were all in the expression *whereda-bottle* and all in the situation in which she and her

parents were searching for her bottle. I thus judge this to be a pre-lexical form. Like her parents, however, T soon generalized *where* to related situations in which she was reminded of an absent object and *whereda* became a true pivot word, combining with any and all of her object labels; for example, she asked "Whereda Pete" (16.13) when looking for the dog we were calling. Two important points about these early uses. First, an adult verbal response giving the object's location (e.g., "In your room," to which she had access) would not placate T's demand; to such a response she would repeat her request until the object itself was produced. Second, on some occasions T even asked "Whereda _____ " demandingly when the object was in sight but out of reach; clearly in this case it was not the location but the object that T desired.

By the video at 16.25, T's demanding use of expressions with *where* had lost much of its conative force. At around this time she began to ask the question in a less demanding way, she asked it only when the object was not perceptually present, and an adult answer that only supplied the name of a location was treated as a satisfactory response. In this new use, the instigation for the question was usually some verbal or nonverbal reminder of an absent object, and T's question often seemed addressed to T herself (absentmindedly, as she searched) as much as it was addressed to adults. On the videotape at 16.25 T asks "Where _____ " (the "da" has been dropped) on 23 occasions in 1 hour. She asks, for example: "Where spoon?" as she picks up the bowl and wants to stir in it; "Where bunny?" as she picks up a cup that she knows has a bunny painted on the bottom; and "Where dog?" as she looks through a familiar book for an expected picture. T's later uses at 18 and 19 months of age are very similar to these uses. On the video at 17.26, for example, she asks "Where baby?" as she has the spoon and bowl and wishes to feed the baby. A game she learned at this time demonstrates clearly that T now uses this not as a request for the object itself, but for the location of the object. The "names game" consisted of her asking a series of questions of the form "Where Grandmommy?" or "Where Aunt Toni?" and her parents would respond with "In Florida," "In Miami," and so forth.

I thus propose to represent T's early uses of *where* as follows. The earlier demanding uses consist of a first step in which T is reminded of an object. The second step shows that, upon checking, T finds that the object is not perceptually present. This is followed by the third step, a desire for the object's perceptual presence. T's later question uses have this same general structure with the difference that the desire is not for *O* itself but simply for *locO*, that is, *O*'s location. These two representations are thus:

Presumably one of the reasons why T's use of *where* became less of a demand during the 17-month period was because she learned two other expressions to request objects. One of these, *get-it* _____ , was used exclusively for objects in sight but out of reach (analyzed in section 4.3 on exchange–possession). The other was *find-it* _____ , which was used when T desired a perceptually absent object. This request for someone to find an object was often expressed at the end of a sequence in which she named the object demandingly ("Truck!") or asked where it was ("Where truck?"); when it became clear that her parents did not know where it was, T might say "Find-it" – presumably by analogy with parents responding to her *where* questions by telling her to "Find it." For example, on the videotape at 17.26, T asks her mother where a cracker is and is told; T searches but cannot find the cracker, and so she turns to mother and requests for her to "Find-it." Soon T began using this expression as an exhortation to herself as she searched for something, for example, "Find-it bird" (17.28) as she searches through a book; "Find-it Weezer" (18.08) as she looks around for a cat after she hears its mew; and "Find the stick" (19.03) as she pulls a popsicle off its stick.

I thus propose that upon its emergence around 17.26 (at which time *where* is becoming a full-fledged question) *find* takes over the early demanding use of *where* expressions in which the object is initially absent (*get-it* takes over those in which the object is perceptually present). This is justified because, as far as I can determine, she is using *find* in the same situations in which she previously used *where*. For example, in looking through a picture-book for specific pictures (on the videotape at 16.25) she says "Where dog?" and "Where fire?" demandingly. At around 18 months, her first three combinatorial uses of *find* all involve looking through books for specific pictures. Thus, because *find* is always a request of this type, its conceptual representation is simply the desire for a perceptually absent object that she has been somehow reminded of. (Perhaps a person who does the finding should be represented, but because T shows no evidence of this – she never names the finder and there are no other noncausal expressions from which it must be differentiated – I assume not.)
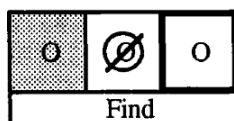
During the 20- to 24-month period, the use of both *where* and *find* declines in frequency and importance, although they were both still used. The syntactic form of each is generally constant with some small but important modifications involving articles, pronouns, and the like. (The development of T's grammatical morphology in general will be discussed in chapter 6.) In the case of *where* expressions, by 23 months T used the fully adultlike expression complete with the copula and the article when needed (i.e., the form was "Where's the _____ "). Her usage of other expressions with a similar form of the copula (e.g., "That's a _____ ," "It's a _____ ") and expressions with the article argue that this was indeed the emergence of the fully adult form of the question. Except for this variation (and the singular exception of "Where you are?" at 23 months), the syntactic form of *where* expressions was constant throughout the period under study: *where* always began the speech act, and the thing being located followed (expressed by the object name with no more than an article or possessive adjective as modification). In the case of *find,* some developments involving function words (*it, the*) took place as well. In all 12 of her sentences, *find* preceded the name of the thing being sought (with the exception of two examples of more sophisticated structures involving other verbs: "More find Lulu" and "Come find me"). In no case does T indicate the finder (with the one partial exception of "I found it" on the video at 23 months), and in no case does she indicate the thing being sought with more than an article and an object name. While early on *it* was used even when an object was named ("Find-it birds"), later there is substitution of one for the other (see chapter 6 for a discussion of this phenomenon also characteristic of some other words).

### 4.1.2. No, gone, and all-gone

T thus used *where* and *find* to request absent objects. When T wanted only to comment on the fact that an object was absent – with no desire to know its location or to have it produced – she had several other expressions. Her first at around 16 months was *no.* T had learned this expression from a game of "button-button" in which she was to guess which of two hands an object was in. If she was wrong, the parent would open their empty hand and pronounce "No" (with an exaggerated, rising intonation). T first used the expression in this context and then, at 15.27, to comment that she had not found a doll on her bed after her parents had told her it was there, and that a dog had refused a biscuit it was offered. At 16.02 she picks up her