LEARNING THE STRUCTURE OF CAUSATIVE VERBS: A STUDY IN THE RELATIONSHIP OF COGNITIVE, SEMANTIC AND SYNTACTIC DEVELOPMENT*

Melissa Bowerman
Bureau of Child Research and Department of Linguistics
University of Kansas

What do children mean by what they say and how do their initial meanings and ways of expressing these meanings change and develop over time? Studies of child language have recently begun to investigate these questions both in connection with the relational meanings expressed by words in combination (e.g., Bloom, 1970; Schlesinger, 1971; Brown, 1973; Bowerman, 1973) and with the meanings conveyed by individual lexical items (e.g., Clark, 1973).

Exploration into the way in which the meanings contributed by lexical items and by words in combination are related to each other and interact in the course the child's linguistic development has barely begun (e.g., Antinucci and Parisi, 1973, in press), but it promises to yield important insights into the problem of how a child makes the transition from having a nonlinguistic understanding of an experience to being able to express that understanding in words.

In this study, a body of spontaneous errors made by my daughter provides the starting point for an investigation of the kinds of processes involved in learning the meaning of individual lexical items. In particular, the study will deal with how the acquisition of lexical meaning is related to the cognitive structuring of events on the one hand and the ability to produce syntactic paraphrases of a word's meaning and other related constructions on the other.

1. Errors involving the use of noncausative words in a causative sense.

Since her second birthday, my almost-four-year-old daughter Christy has produced a great many sentences which from the adult point of view involve errors in verb usage. For example, as she held a piece of paper over her baby sister's head she said, "I'm just gonna fall this on her," then she dropped the paper. On another occasion she pulled the string on a broken musical toy shaped like a cow and announced, "I'm singing him." In still other examples, she said, "full it up!" as she watched her bottle being prepared, and "down your little knee" as she pushed on her sister's flexed leg. These and other examples of

* This research was supported in part by Grant No. NS10468 from NINDS.

In Papers and Reports on Child Language Development. Stanford University Committee on Linguistics, 1974, 142-178.

the same type of error are listed in Table 1. They are similar in that they all involve using a verb, adjective, or locative particle as a transitive verb meaning something like "cause the event normally referred to by this word to come about." A listing of all the words she has erroneously used in this way is given in Table 2; there are about 36 different words involved in over 100 sentences.

Table 1

Christy Bowerman: Examples of sentences involving the use of a non-causative predicate in a causative sense.

C = Christy E = Eva, Christy's baby sister
M = Mother F = Father

Child's utterances to right, Mother's utterances to left

Intransitive verbs

1) 2;8 (C is in a toy chair which spins; M has been spinning her but has just stopped. C looking hopefully across room towards F). > Daddy go me around. (= make me go around)

2) 3;2 (C hears water being turned on in bathtub by a female visitor). > How come she goes on the bathtub, Mommy? (= makes the bathtub (water) go on)

You mean how come she's turning on the water? Yeah.

3) 2;3 (C pulling a bowl closer to her as she sits on kitchen counter) > I come it closer so it won't fall. (= make it come closer; bring it closer)

4) 2;9 (M playfully holds E out toward C. C covering her face.) I don't want her to come.

(M withdraws E, C drops hands) (C pleased when M repeats game). > Come her! (= make her come)

5) 3;4 (C watching a dog take a bit of food into the adjacent room). > She came it over there. She brought it over there.

6) 2;6 (C trying to hold refrigerator door open, having difficulty) > Mommy, can you stay this open? (= make this stay open; keep this open)

7) 3;7 (C looking at herself in mirror; she has a ponytail held with rubber band) > I want to stay this rubber band on. (= let it stay on; leave it on.)

8) 3;1 (M holding a broken musical cow toy; music no longer plays). The cow would like to sing but he can't. (C pulling string which used to make the music play) > I'm singing him. (= making him sing.)

(Table 1 continued)

9) 2;3 (C's feet are swollen, M and F concerned. C upset about the prospect of medicine, protests that she doesn't need medicine, just a bottle.)
> Bottle feel my feets better. (= bottle will make my feet feel better)

10) 2;9 (C holding a piece of paper over E's head, subsequently drops it.)
> I', gonna just fall this on her. (= make this fall on her; drop this on her)

11) 3;1 (C struggling with her sweater, then leans over so M can help her take it off.)
> I wanta be it off.
I wanta put it off.

12) 2;1 (M and C playing on couch) Close your eyes.
> No! I want be my eyes open! (= make my eyes be open; keep my eyes open. C's later rendition of this type of sentence was: "I want to stay my eyes open." This early version suggests that "stay" has "be" as a subcomponent, perhaps in "continue to be")

13) 3;5 (M is taking pictures with polaroid camera; C climbs onto couch and poses with her cousin)
> Be a picture of Emily and me. (= cause to be/exist; make. "take" would be appropriate, but is idiomatic. Cf. Anderson, 1969 for a discussion of "make" in superficially simple sentences as having an underlying structure such as "cause to exist")

Syntactically transitive, semantically intransitive predicates

14) 2;9 (C having trouble trying to turn somersault) Before I count to 5 she's going to turn a somersault. (M to F) (C comes over to M)
> You turn me a somersault! (= make (help) me turn a somersault)

15) 3;5 (C telling some about a wheelchair ride she got in a hospital)
A nice nurse lady took me a ride.

Transitive verbs

16) 3;3 (C eating lunch; pretending to feed a doll by poking a spoon at its closed mouth) Just pretend, honey.
See, she can't eat.
> But I can't eat her! (=make her eat; feed her).

17) 3;8 (M about to put E in highchair for lunch; E needs a diaper change)
> No, mommy, don't eat her yet, she's smelly!

(Table 1 continued)

18) 3;1 (Yesterday M squeezed an orange half directly into C's mouth. C handing M an orange half in similar circumstances, waiting expectantly) > Drink me. Uh . . . put it in (=make (help, let) me drink)

19) 3;4 (M and C have been drawing puzzles for each other. After C does one:) Do you think Daddy can guess that one? (C then turns to ask F to guess the right answer.) > I'm gonna guess it to him.

Adjectives

20) 2;3 (C peering with dissatisfaction into her bottle which M has only partially filled) > Full it up! (= make it full; fill it up)

21) 2;11 (C trying to smooth down paper on her magic slate) Make it nice and flat. (C brings it to M) > How would you flat it? (= make it flat; flatten it)

22) 3;6 (C sticking a pencil into a pencil sharpener. M has called it a "pencil sharpener" but has not mentioned "sharp" or "sharpen.") > I'm gonna sharp this pencil.

23) 3;6 (C hands M a baby bottle with clogged nipple) > Unstuck it. (= make it not stuck)

Locative particles

24) 3;0 (C watching M use egg beater; stretching out her hand towards handle). > I wanta . . . wanta . . . wanta round it. (= make it go around; turn it)

25) 3;1 (C pushing E's legs up as E lies on stomach) > Up your legs! (= make your legs go up; put your legs up)

26) 3;3 (C pushing down on E's flexed knee) What? (C continues to push) > Down your little knee. Down her little knee. (= make your/her little knee go down; put . . . down).

Table 2

Listing of the predicates which Christy has inappropriately used in a transitive, causative sense.

Intransitive Verbs

come

{come / came} NP {off / over there (3)[1] / closer} (make come = bring)[2]

go (3)

be gone (passive: be made gone=be taken)

go NP {around (2); / in; on; at (=to); / back; / (up) to NP (2); / open and shut} (make go; "take" would paraphrase some of these)

stay

stay NP {on (7); on there; / in there; out; / out in front; / up (3); here (3); / there; open (3); / closed (2); / like this; awake; / all night long; / a NP} (make stay = keep; let stay = leave)

be (cause to be/exist = make);

be NP {off / open} (make NP be off = put NP off);

feel NP better (5);

fall NP {down / on NP} (make fall down=knock down); (make fall = drop);

peek NP out; ride NP in; slip NP down;[3]

lie NP down (2) (make lie = lay);

sit NP up here (make sit = set);

soak NP in (2); jump (4);[3] jump NP over NP;[3]

climb NP up; sing; whistle; disappear; itch;[3]

bleed[3]

Transitive Verbs

drink; eat (2) (make, let eat = feed)

guess

Locative Particles

'round (2); up;[3] down;[3]

Syntactically transitive, semantically intransitive VP

{take / took} {NP a ride / a walk / little bites} (4) (make take = give)

turn NP a {(forwards) / (back-wards)} somersault (4)

get NP a kiss (many times) (cause to get = give)

Adjectives

full (make full = fill)

full NP up (2)

flat (make flat = flatten)

squeaky

sharp (make sharp=sharpen)

stuck (make stuck = stick)

unstuck (2)

dirty[3]

stable

---

[1] Numbers in parentheses indicate number of different sentences a verb appeared in, if more than one.

[2] Suppletive or morphologically related lexical items which paraphrase C's meaning and would be used in such utterances by adults are given where they exist.

[3] These words are usable as causative verbs in English, but they are restricted to rather specialized uses and/or are extremely infrequent in colloquial speech: it is unlikely that Christy had heard them used causatively.

I have seen a few isolated examples of this phenomenon mentioned in the child language literature, and I have collected some examples from children other than Christy,[1] so it is evidently not an unusual process. But one cannot tell on the basis of one or two examples whether a particular child has really established a system for producing sentences of this type. The data I've collected from Christy, in contrast, are comprehensive enough to allow some conclusions to be drawn and some speculations to be entertained about the implications of such errors for a theory of language development.

1.1 Accounting for causative verb errors

What kinds of rule-formation processes could account for a child's making errors of this type? One simple possibility is that a child may have difficulty in classifying verbs according to transitivity. In English, some verbs are obligatorily transitive, others are obligatorily intransitive, and still others can be used either transitively or intransitively. The child may notice that some verbs occur both with and without direct objects, but be uncertain about which ones belong in this category and which do not. This hypothesis can be quickly ruled out, however. First, errors in verb use of the type in question appear to reflect a relatively advanced problem in language acquisition. In Christy's case, they did not begin to occur until the verbs (and adjectives) in her vocabulary had already been used in a consistently appropriate way for some time: transitive, intransitive, or both, and have continued to occur for almost two years. The seven other children whose errors I have culled from the literature or overheard were all at least 26 months old and producing sentences as long as 5 or more words; most were close to three years or beyond. Thus, they were well beyond the early stage of language acquisition. Second, a simple misclassification-according-to-transitivity hypothesis would be unable to account for errors involving the transitive use of verbs which normally are in fact in fact transitive: for example, #17, "no, mommy, don't eat her yet, she's smelly" (= don't make her eat yet)' #19, "I'm going to guess it to him" (= I'm going to make (have) him guess it).

A more sophisticated version of the misclassification hypothesis would attempt to take into account the consistent semantic relationship which holds between the normal use of a verb or adjective and the erroneous use. In English there are many verbs and some adjectives

---

[1] Published examples: Baron, 1972, p.73, girl, 27 mo., "fall;" Braine, 1971b, p.159, Stevie, 26 mo., "fall;" p. 173, girl, 32-34 mo., "cough," "reach," "ride;" Ingram, 1971, girl, 9 yrs., "die;" my data on children other than Christy: Kendall, 27 mo., "fall;" Marc, 4;2, "jump;" Andrea, 3;9 "ride;" Hilary, 4+, "die," "take NP a bath," "take NP a ride."

which can be used either intransitively, to express a state or process, or transitively, to express an action which brings that state or process about. For example, "the stick broke," "John broke the stick;" "the door opened (was open)," "John opened the door;" "the milk become warm," "Mary warmed the milk." Many linguists have treated these as a single lexical item with two different functions, determined by the context they appear in (e.g., Jespersen, 1927). A current account of this type is proposed by Fillmore (1968), who suggests that such verbs be given a single entry in the lexicon, along with the case frames (context) they can occur in. For example, "open," "break," "warm," etc., occur obligatorily with an object (patient) noun phrase, optionally with an agent and/or instrument nounphrase as well. When there is only an object it becomes the surface structure subject. If there is an agent, it becomes the subject and the object becomes the direct object. In a similar way, "kill" and "die," "show" and "see," "teach" and "learn," and other verb pairs are treated as contextually determined variants of single lexical entries. If the sentences in which they occur contain agents, the first member of the pair is selected; if not, the second member occurs.

A child might become aware of syntactically and semantically consistent variations in the use of verbs and adjectives like "open" and "break," and, assuming that many or all verbs and adjectives have the same flexibility, produce sentences like those in Table 1. This hypothesis has more to recommend it than the last, but it too is inadequate as it stands. First, it cannot account for the directionality of the errors in Christy's usage. If the errors stemmed from the realization that some verbs can express either a state (process) or an action which brings this state (process) about, one would predict that a child would not only use state (process) words in a transitive causative sense, as Christy did, but also that he would use obligatorily transitive verbs intransitively in a stative or process sense. Thus, one should hear not only sentences like "I'm just gonna fall this on her" (#10), but also "The paper cuts," "the fly killed" (=died), "the key lost" (= become lost). While errors of this type have occurred occasionally in Christy's speech, they have been extremely rare compared to the reverse error.

A second problem with this more sophisticated misclassification hypothesis, which regards the meaning (causative or not) of a verb as determined by the context it occurs in, is that it cannot account for a child's causative use of verbs which in normal noncausative use already have agentive subjects. In Fillmore's model, it is the addition of an agent which makes verbs like "break," "open," and "warm" causative and allows them to take a direct object. Some linguists (e.g. Kastovsky, 1973: 259; Anderson, 1969: 101) have noted that relying solely on the presence of an agent to provide the causative interpretation

for such verbs constitutes a general weakness of the case grammar approach for adult English because it means that there is no way to distinguish semantically between sentences involving causative verbs ("open," "break," etc.) and those involving "basically" or "inherently" transitive verbs which are not readily analyzable as causatives ("beat," "read," "listen," "look at," etc.) (cf. Lyons, 1968: 384). Sentences of both types would have agentive subjects and objective direct objects. This weakness becomes particularly salient when we try to account for Christy's errors by suggesting that she had noticed that the meaning of verbs like "open" etc. varies according to linguistic context such that the presence of an agent confers a causative sense. Many of her errors have involved verbs which in her normal usage have agents already, e.g., "come," "go," "sing," "eat," "drink," "guess." In some of her sentences there is nothing in the linguistic context alone to differentiate between the causative and the noncausative interpretation of a verb; the semantic functions (cases) which would be assigned to the nouns ocurring with the verb would be identical under either interpretation: e.g. #16, "but I can't eat her," #18, "drink me."

A more satisfying interpretation of Christy's errors can be found within a theoretical framework which assumes either that transitive "open," "break," "warm," etc. are derived from their intransitive or adjectival counterparts (e.g., Lyons, 1968; McCawley, 1968, 1970, 197-; Lakoff, 1965; Binnick, 1971) or at least that the meanings of the latter are included in the meanings of the former (e.g., Bierwisch, 1970). These linguists agree that the lexical items of a language are not the basic units of meaning. Rather, they are made up of syntactically structured combinations of smaller semantic units variously termed components, markers, semantic predicates, features, etc. These components are not unique to particular lexical items but rather occur in a number of different words. (Cf. Clark, 1973, for a theory of the acquisition of word meaning based on semantic features.)

A semantic component or predicate which is said to play an important role in the English lexicon is CAUSE. This is present in the underlying semantic structure of verbs like "kill," "show," and transitive "open," "break," and "warm," and shows explicitly the way in which these verbs are related to "die," "see," and intransitive or adjectival "open," "break" and "warm." "Kill," "show," and "open," for example, have deep structures suggested by the paraphrases "cause to die," "cause to see" and "cause to open." The caused predicate can often be decomposed still further into an inchoative semantic notion such as BECOME, and a state. Thus, "cause to die" has a deeper level corresponding to "cause to become dead," and "cause to open" has one such as "cause to become open."

Children's errors involving the use of noncausative verbs in a causative sense provide strong support for a model of lexical structure which regards the relationship between causative verbs and their noncausative counterparts as derivational or inclusive. It is difficult to imagine how Christy could make errors like using "come" to mean "cause to come" unless she does it by analogy with verbs such as "open" and "break" which she has heard used both causatively and noncausatively. To be able to make such analogies, she must have realized that verbs like transitive "open," "break" and "warm" are related to their intransitive or adjectival forms "open," "break," and "warm" in that they express actions which bring about the state referred to. In other words, she must have recognized the causative member of a pair as implicitly containing the meaning of the noncausative member of a pair plus an additional component suggested by the term CAUSE. From this understanding she apparently inferred the existence of a general rule such as "any noncausative verb or adjective can be used without modification as a verb meaning 'cause the state or event normally referred to by this word to come about.' "[2]

1.2 Acquiring knowledge about "possible lexical items"

A child's inference of a rule of this sort provides evidence for a process involved in language acquisition which to my knowledge has not received explicit attention. This is the acquisition of knowledge regarding the way in which units of semantic material can be combined to form possible lexical items.

The notion of "possible lexical item" was introduced by McCawley (1968, 1970, 1971). According to him and other linguists (e.g., Postal, 1966; Bierwisch 1970), the semantic units of which words are composed constitute a set of semantic primitives which are not specific to any particular language but rather are universal, underlying all languages. Languages differ, however, in the ways they combine these units into individual lexical items. A subset of the components which corresponds to a particular lexical item in one language may have no lexical realization in another and would have to be expressed periphrastically through syntactic means. McCawley (1971) has suggested that the way in which units of semantic material are combined into words in a language is not arbitrary. Rather, it is systematic, following both certain universal

---

[2] In addition to adjectives and noncausative verbs, Christy has occasionally used locative particles ("up," "down," "round") as causative verbs. These have shared many of the functions of verbs and adjectives in her developing grammar and so can probably be considered instances of these for purposes of the rule for deriving causative verbs. E.g., (2;0) "watch me round" (= watch me go around); (3;4), "find one of the down ones" (= find one of the ones on the bottom shelf).

constraints on how material can combine and also less general patterns which are characteristic of the particular language. Thus, the lexicon of a language, like its phonology and syntax, is rule governed. Permissable patterns of combination can be represented as rules of word formation, which specify in effect what types of lexical items are possible. Only a finite number of the combinations of semantic material which the rules of word formation allow correspond to actual lexical items of a language, however. Those which lack lexical realizations are 'accidental gaps' in the lexicon -- accidental in the sense that factors other than structural well-formedness are responsible for the lack. This is analogous to the observation that the lack of a word BLICK in English is accidental, since by the phonological rules of English such a word would be well-formed in a way in which PFAD is not (McCawley, 1970).[3]

English, unlike some languages, allows complex semantic notions involving the concept of CAUSE to be bundled together into single lexical items. For example, English has words such as "open" (cause to become open) "kill" (cause to die/become dead), and "warm" (cause to become warm). The actual lexical items which express such causative notions in English are related to their noncausative counterparts in various ways (cf. Baron, 1972: 67-77; Kastovsky, 1973: 266-270; Lyons, 1968: 360). Some are related through morphological processes of varying degrees of productivity, e.g., lie-lay, sit-set, fall-fell, rich-enrich, noble-enoble, legal-legalize. For other noncausative-causative pairs, the two forms are morphologically identical (a "zero-modification" relationship: Lyons, 1968: 360): open-open, warm-warm, etc. Still others have a suppletive or "lexicalized" relationship to their noncausative counterparts, e.g., kill-die/become dead, bring-come, keep/leave-stay, drop/knock down-fall (down), show-see, give-have/get.

Despite this general pattern in English whereby a single verb can encode a complex causative concept, there is not a lexical realization for every possible combination of CAUSE plus a verbal or adjectival

---

[3] Halle (1973) has made a similar proposal about potential vs. actual words of a language on the level of rules for combining morphemes (as opposed to sublexical semantic components). E.g., "derival" and "arrivation" are well-formed but only accidentally not words. Halle notes that it is possible that "a large part of the dictionary is stored in the speaker's permanent memory and ... he needs to invoke the word formation component only when he hears an unfamiliar word or uses a word freely invented." Thus, knowledge of rules of word formation is "more passive" than that of rules of syntax or phonology. The same remarks are undoubtedly applicable to the kinds of rules for word formation discussed in this paper.

predicate. Some of these gaps can be systematically accounted for by specifying that the caused predicate must be a state (e.g., stay, remain) or a change of state, broadly defined so as to include motion verbs which express a change of locative state, e.g., become open, become dead, move, turn, fly, become on/off, etc. (Kastovsky, 1973; Binnick, 1971). These restrictions account for the absence of verbs meaning "cause to sing" or "cause to read," since "sing" and "read" are neither states nor changes of state. But even within the realm of state or change of state predicates there are still unexplained gaps -- for example, there are no verbs meaning "cause to climb" or "cause to disappear."

When the lexical items of a language are conceived of as following systematic rules governing well-formedness, the question immediately arises as to whether children acquire such rules, just as they acquire rules governing phonological and syntactic well-formedness. In other words, do they do more than simply memorize lexical items and learn through experience how to use them in an increasingly appropriate way? Do they in fact analyze the form and interrelationships of words in such a way as to derive from them some rather abstract information about what types of lexical items are possible in their language, whether or not they have yet learned the conventional forms for these items or even if the items exist?

A child's systematic production of errors like those listed in Table 1 suggests the answer to this question may be yes. In learning the lexicon of English, Christy appears to have gone beyond the actual words she learned through hearing them spoken to extract a rule about possible lexical items. Her hypothesis is evidently that whenever the semantic concepts of a state or a change of state plus an action or circumstances which maintains this or brings this about come together in an intended utterance, these can be expressed by a single lexical item. In creating her idiosyncratic verbs she simply uses the noncausative word without modification as a transitive verb with a causative sense, as in the second method outlined above. Her rule is more general than English apparently allows, since although most of the predicates which she has used as causative verbs are either states ("stay") or changes of state, including motion, some are nonstative, e.g., "sing," "whistle," "guess," "drink."[4]

---

[4] The exact meaning of CAUSE in Christy's rule and the nature of the "causer" which can function as sentence-subject cannot be dealt with in detail here (cf. Baron, 1972:105-122, for a discussion of the range of possibilities for adult English). However, neither the "causer" nor its causative relationship to the effect was constant across all sentences with novel causative verbs. The causer was most often an animate being who performed an act. For some sentences with "stay," it was an agent who did nothing or refrained from performing an act (e.g., #8, Table 1). Other sentences with "stay" required active intervention on

Some of her idiosyncratic causative verbs have no single word counterparts in adult English. For example, there are no verbs meaning "cause to drink" or "cause to sing," which is the sense of the verbs in Christy's "drink me" (#18) and "I'm singing him (#8). For her other causative verbs, adult English offers a legitimate causative form which has either a morphological or a suppletive relationship to its noncausative counterpart. For instance, in #22 she said "sharp;" adult English provides "sharpen." In #6 and #7, she said simply "stay," while adult English offers "keep" in the sense of "make stay" and "leave" in the sense of "let stay." In #3-5, she lexicalized the notion "cause to come" simply as "come," while an adult would say "bring." On a few occasions, she has in fact paraphrased her own causative verb with its correct suppletive form, thus showing their psychological equivalence: e.g., #5 "she come it over there ... she brought it over there;" also (3;9) "You feed me. Take me little bites (= cause me to take)...give me little bites."

2. When does a child become aware of the structure of causative verbs?

At what point in linguistic development does a child become aware that causative verbs have the kind of structure described above? Is this understanding present from the time that children first begin to use such verbs appropriately in a transitive context? Or does it develop later, such that sentences like "mommy open," "open box," "break stick" and "daddy bring letter" are initially produced and comprehended by children

(footnote 4 continued)
the part of the agent (e.g., #7). Still other sentences had inanimate NP or sentential "causers" (e.g., #9; also, for example, (2;9) "I need them snapped to stay them on" (pajamas); (3;0) "maybe they had a cold and the cold stayed them awake;" (3;6) "These socks itch my feet;" (3;7) "But I still have to clap to soak it in" (lotion on hands)).

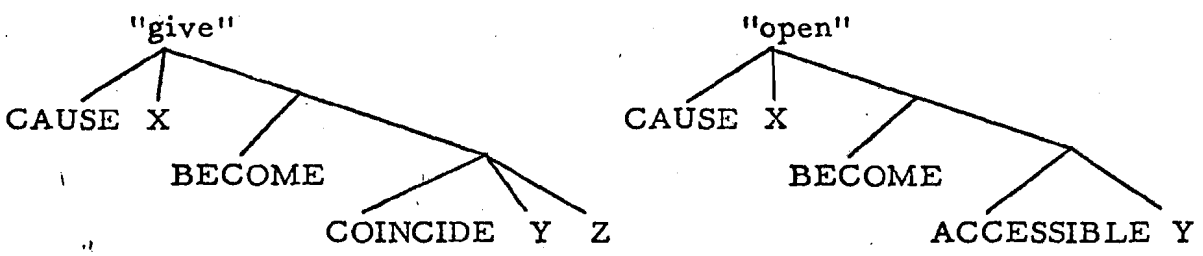
Independent of the nature of the "causer," its relationship to the effect varied from completely sufficient to bring it about or maintain it (e.g., #1-7, 10-15, 20-26) to necessary or helpful but not in itself sufficient (e.g., #9, 16-19; also, for example, (3;2) "Is this to climb her up? So she can climb up?" (C pointing to a ramp leading up to a van in a picture. A hippo stands at the bottom looking up). In this latter case, the sentence would sometimes be paraphrasable with "help," "enable," or "have," or "let," with the subtle semantic differences that these terms suggest. The range of causal and semi-causal relationships which Christy evidently felt could be combined with an effect into a single lexical item was somewhat broader than adult English typically allows, cf. "Is this to climb her up?" above; also #19. Thus, her rule for deriving causative verbs was overgeneral in this regard as well as with regard to the type of effect which could be subjected to this treatment.

in a more limited and superficial way than they are at some later stage of development?

I will argue that the latter is true -- that when a child first begins to use causative verbs in 2- and 3-word sentences, the verbs are essentially "unanalyzed" forms in that although they are used referentially in a roughly appropriate way, the child is not yet in any sense aware of their internal structure in the way that he must become before he could begin to create novel causative verbs by analogy with his pre-existing ones. This interpretation bears directly upon the currently much-discussed problems of how cognitive and linguistic development are related and how this relationship should be handled in formally representing the structure of children's utterances. Therefore, the arguments will be developed in some detail. In section 2.1 below, some theoretical problems are dealt with regarding the conceptual nature of semantic components like CAUSE and their relationship to a speaker's cognitive structuring of a referent situation. In section 2.2 following, evidence is presented to support the claim that causative verbs initially have unanalyzed status for children.

2.1 Semantic components vs. nonlinguistic structuring of experience

Antinucci and Parisi (1973; in press), working within a generative semantics framework, have recently postulated that complex semantic deep structures underlie children's early 1, 2, and 3 word utterances. For an Italian child Claudia at 15 to 17 months, they propose the following semantic structures for utterances involving da or tazie, glossed as "give," and those with api, glossed as "open":



To paraphrase, the meaning of "give" is said to be "X causes Y to come to (=become) coincide with Z" while that of "open" is "X causes Y to become accessible." X, Y, and Z are deep structure arguments of the predicates with which they are linked (CAUSE, COINCIDE, ACCESSIBLE). They are realized in surface structures as noun phrases functioning as agent, patient, and (for "give" only) recipient or indirect object.

Antinucci and Parisi postulate that these structures were present from a very early stage of development, but that at first the child had a limited sentence programming span such that she could only lexicalize the verb and one of its noun arguments, or two arguments with the verb

only implicit in the context. For a time, development consisted of increasing the lexicalization span so that the verb plus all its noun arguments could be produced at once.

The primary justification for assigning semantic structures which are so different from surface structures to Claudia's sentences was as follows:

> "A first and most important proof is the meaning that must be assigned to a sentence by observing the situation and Claudia's actions and intentions when pronouncing the sentence. When she says da, it is difficult to suppose that she does not know who must give, what must be given, and who must receive, as in that case we should be supposing that she does not execute the mental operations -- which we call semantic components -- corresponding to all these elements. A second proof is that da or tazie occur with all three NPs of the semantic structure, even if only one NP is present in each particular sentence."
>
> (Antinucci & Parisi, 1973:611)

The essence of Antinucci and Parisi's justification, then, appears to be that there is evidence that the child had a cognitive awareness of the proposed underlying structures at the time she produced utterances with these verbs. Part of the evidence for this assumption was her nonlinguistic behavior and part was the fact that across a sampling of utterances, the verb occurred with noun phrases performing semantic functions corresponding to all the arguments of the underlying structures.

The claim that Claudia knew who was giving what to whom and who was opening what when she uttered sentences like "mommy give," "give ball," and "open box" is not at issue. However, it is a long step from this assumption to the structures postulated to underlie such sentences. Some of the questions which arise in traversing this distance have been debated by Schlesinger (in press) and Parisi (1974). Schlesinger rightly points out that not all the cognitive distinctions a child may be aware of while she produces an utterance are linguistically relevant, and those that are not should not appear in the linguistic representation of the utterance. Parisi counters, also rightly, that his and Antinucci's model is not guilty of confounding relevant and totally irrelevant aspects of cognition. The underlying structures they posit are formulated on the basis of what the child actually expresses linguistically at one time or another; the fact that Claudia may be aware that her mother is smiling or wearing a green dress when she gives Claudia something does not enter into the description of utterances with 'give" because "give" never occurs in combination with elements expressing this awareness, while it does systematically co-occur with elements representing the agent, the patient, and the recipient of the act of giving.

Parisi goes on to clarify his conception of the semantic structure underlying an utterance as "a cognitive structure which is constructed with the intention to communicate it. Therefore semantic structures are a sub-class of cognitive structures" (p. 10 of MS.). Some of the elements of a structure may be present only at a pre-conceptual (sensory-motor) level, while others are present conceptually (given mental representation) as well. When all the elements are present at a conceptual level, they nevertheless may not all be expressed verbally due to "limitations of the mapping mechanism," i.e., a limited sentence-programming span.

When the relationship which holds between structures underlying sentences and more general cognitive structures is delimited in this way, some (but not all) of Schlesinger's criticisms are met. However, a further major problem remains. When cognitive understanding, even in this circumscribed "intention to communicate" sense, is equated with semantic deep structure, an important level of linguistic structuring is bypassed and certain steps which a child must take between his early attempts to communicate verbally and his final adult understanding of language are lost, not being representable within this system. This is the level at which the nonsystematic and redundant aspects of the cognitive apprehension of events are filtered out and those which are systematic and play special semantic and syntactic roles within a language are recognized, retained, sharpened, and organized in relation to each other.

Semanticists have traditionally agreed that there are at least two aspects to word meaning. One has to do with reference, or the way in which words are related to extralinguistic objects and events, and the other has to do with the way in which words are related to each other and to phrases in the language -- in other words, with the way in which the lexicon, or, more generally, the meaning system of a language, is internally structured (Lyons, 1970: 166; Miller, 1972: 336). While children must clearly learn about both aspects of word meaning, it is the latter which is primarily under analysis in current theories of lexical meaning, as in the generative semantics model upon which Antinucci and Parisi draw. In postulating a complex underlying structure for a lexical item or for sentences containing it, the goal is not to represent all those cognitive distinctions relevant to a situation (for example, an act of giving) by which a speaker identifies the situation and selects a word to describe it. Rather, it is to select just those distinctions which are linguistically relevant (cf. Clark, 1973: 74). Sublexical components such as CAUSE and BECOME have not been postulated arbitrarily in the linguistic literature. Rather, their existence has been justified by demonstrating, for example, that a speaker's awareness of ambiguity in some sentences can be accounted for if adverbs sometimes modify underlying elements rather than any constituent which is present in

surface structure (McCawley, 1970, 1971). Another type of evidence comes from studies showing that the way in which given groups of lexical items are structured can best be explained by reference to semantic components which are independent of the meaning of any particular words but can combine with other units of meaning in a patterned way to produce a variety of related lexical items (e.g., Bendix, 1966). There is also psycholinguistic justification for positing abstract sublexical components in that speakers perceive similarities and differences among lexical items in ways which such elements would predict (e.g., Miller, 1972). Similarly, the systematic creation of novel causative verbs by children, as described in the present study, points to the psychological reality of an abstract semantic element CAUSE.

Thus, semantic components like CAUSE and BECOME are not intended to directly represent the way in which speakers perceive the situation to which they refer. Rather they are abstractions which represent a kind of distillation of those aspects of cognition which are relevant to the meaning-structure of a language taken as a whole, not one word at a time. In sum, they are not purely cognitive elements, although of course they fundamentally depend on the ability to apprehend on a cognitive level various features or relationships of the nonlinguistic world. Rather, they exist by virtue of the relationships which hold among the lexical items and syntactic constructions of the language.

When a child utters sentences like "mommy give" and "open box," we know very little about her cognitive structuring of the referent situation, much less what components of that structuring she regards as linguistically relevant. Notice that it is not at all necessary to postulate semantic structures containing elements like CAUSE, BECOME, ACCESSIBLE, and COINCIDE to account for the fact that a child uses "open" and "give" in a referentially appropriate way with nouns representing entities which play different roles in the situation. Rather, one might simply say that "give," for example, is associated with a situation in which there is "one who gives" (e.g., extends his hand with an object in it), "that which is given," and "one who receives" (e.g., takes the object from the hand of the other). We as yet do not know which of the cognitive distinctions associated with this general paradigm the child at first regards as critical to the meaning of "give" and which are incidental. (The extension of the hand? The use of a hand rather than a foot or a pair of tongs? The changed status of the giver? (He no longer is in contact with the object.) The changed status of the recipient? (He now is in contact with it.) The connection between the action of the giver and the status of the recipient?) Yet when a meaning such as "cause to come to coincide" is postulated for the early utterances with "give," the first three possible criteria are omitted as irrelevant .

and the last two are retained as criterial, in the form of BECOME, COINCIDE, and CAUSE. While this might provide an accurate characterization of the child's understanding of "give," there is as yet no evidence for this.

Even if a child realized that critical aspects of the meanings of "give" and "open" revolve around relationships which an adult might term "causal," it is not at all clear that he would see the two relationships as similar in any sense. That is, the causal connection between giving and receiving (or "coinciding") and between opening and becoming open (or accessible) may well be seen as unrelated. Yet when semantic structures such as CAUSE X (BECOME (COINCIDE Y, Z)) and CAUSE X (BECOME (ACCESSIBLE Y)) are posited for sentences with these words, the implication is strong that the child has at some level an awareness of an abstract concept of causation which is independent of any particular causal situation.

One might argue that this implication is not intended, that the components are used only as a convenient way of symbolizing the cognitive structuring of events we assume the child has when she talks of giving and opening. But such an implication should be intended when such a semantic structure is assigned, because how else are we to represent the fact that speakers of a language do at some point acquire knowledge of at least some abstract semantic components of this sort, as noted above?

Despite these objections to Antinucci and Parisi's model, I fully agree with Parisi (1974) that an adequate approach to child language development must "distinguish between what a child means and what he manages to express." Finding out what aspects of a situation a child has in mind as an integral part of his communicative act and comparing this with how successfully he expresses these in his actual utterance at successive stages of development is clearly an important part of any comprehensive theory of language acquisition. And as Slobin (1973) demonstrates, the cross-linguistic application of such an approach can help to reveal the relative difficulty for the child of the various linguistic mechanisms by which meaning is expressed. My point, therefore, is not that this endeavor is irrelevant but rather that cognitive knowledge or intention in this general sense must not be confused with knowledge which can more properly be called "knowledge of linguistic structure," or, more specifically, "knowledge of semantic structure" (regardless of whether or not what the child knows of this structure at any given stage corresponds to the knowledge of the adult speaker). When the semantic structures which are proposed to underlie a child's early utterances are defined in terms of the former kind of knowledge, there is no place left in the model for representing the way

in which the latter kind of knowledge grows and changes over time, and in fact we are in a sense discouraged from even recognizing that this kind of learning may go on during language acquisition. Perhaps some sort of a two-level model of underlying structure is called for which would allow one to clearly differentiate between hypotheses about a child's nonlinguistic (sensory-motor or representational) understanding of an event and those about his knowledge of which aspects of that understanding have special linguistic relevance within the semantic system of his language.

2.2. Evidence that causative verbs are initially unanalyzed forms

2.2.1. What is an unanalyzed form?

When a child uses a linguistic form without yet being aware of its internal structure -- that is, of the components of which it is comprised -- the form is said to be "unanalyzed." This phenomenon of child speech is well recognized on the level of compound or inflected words and whole phrases, in which the components making up the construction are segmental morphemes readily seen as having independent combinatorial possibilities. For example, small children often use compound nouns such as "mailman" and "blackboard" in a generally appropriate way, but even when they are as old as 7 they are often unaware that such words are made up of two separate morphemes which are meaningfully related to the sense of the word as a whole (Berko, 1958). They perceive the words as simple names with no internal linguistic structure, although they may be aware on a cognitive level of the components of their referents, e.g., that the mailman is a man and he brings something called mail. In contrast, adults are not only aware of the internal structure of such words but in many instances can create novel but related compounds in a rule-governed fashion. Thus, when an adult is asked "what would you call a dog who brings the mail?" he responds "a mail dog," whereas children will often answer "a dog mailman" (Gleitman and Gleitman, 1970: 87). Other types of unanalyzed forms are fixed routines like "what's that?" and words or phrases like "it's" and "that's a," which often initially have monomorphemic status for the child -- i.e., the presence of multiple morphemes each with its own referential and syntactic function is not recognized (Brown, 1973: 391-395).

Lexical items like "kill" and transitive "open" differ from forms like "mailman" and "it's" in that they are composed of a single morpheme and the components in question do not appear on the surface. Nevertheless, they too could be unanalyzed forms for the young child: he may use them as unitary labels for various types of events without yet recognizing the underlying presence of combinatorily independent semantic components which contribute to both the meaning and the syntactic properties of the word. Miller (1972) makes essentially this claim, suggesting that children at first learn the referential aspect of word meaning and "only

later acquire the multiple differentiations that an adult recognizes in the sense of those words." He notes further that there appears to be no necessary correlation between the semantic complexity of a word and the cognitive complexity of its referent. Thus, a child could learn to use "throw" (for which Miller suggests a complex underlying semantic structure such as "apply force by hand to make X begin traveling through the air) in a generally appropriate way before he learned exactly which aspects of the referential act of throwing are the semantically critical ones which both relate the word to and contrast it with other words.

2.2.2. What constitutes evidence that an unanalyzed form has been analyzed?

In acquiring an adult-like understanding of forms which he initially uses in an unanalyzed way, a child must come to recognize the components which constitute it, and, where relevant, the structural pattern according to which these components are arranged. For example, an adult-like understanding of "mailman" requires (1) recognizing the presence of both "mail" and "man" and knowing their independent meanings, and (2) realizing that the two words cannot be combined in random order but rather follow a general ordering pattern which characterizes other compounds. Similarly, the structure "what's that" is not understood completely until the child gains independent control of the three component morphemes and understands the patterning behind the order they appear in.

Acquiring knowledge of this sort requires experience with linguistic forms which are related to the unanalyzed form in that some of the same or similar components occur in them but are put together in different ways with different semantic or syntactic effects. For example, the complete analysis of "mailman" may wait not only on the independent control of "mail" and "man" but also on the acquisition of terms like "garbage man," "milkman," and "paper boy," and perhaps also ability with paraphrases which explicitly show the relationship between the two morphemes, such as "man who brings the mail."

How do we know when a child has analyzed a previously unanalyzed form? The most incontrovertible evidence is his creation of novel forms which are made up of some of the same or similar components, combined according to the same rules. For example, a child who carries blocks in a pail and says he is the "block man" does this by analogy with forms like "mailman." When children acquire a regular rule for combining linguistic elements (words, inflections, sublexical semantic components), they regularize forms which do not fit the pattern. Thus, for example, there is a stage at which children say "breaked," "goed," and "foots," errors which clearly show that they have come to recognize the components of any regular past tense and plural forms they may know and how

these are combined. In many instances, they have used irregular forms such as "broke," "went," and "feet" in a referentially appropriate way earlier, but these drop out because the child has not understood them as containing the needed components, "break" + past, "go" + past, and "foot" + plural. When the child figures out that "broke," "went" and "feet" are simply the way "break" + past, "go" + past, and "foot" + plural are pronounced, the forms re-emerge and this time the child knows something about their internal structure which he did not know when he used them initially.

For causative verbs, just as for other linguistic forms, the creation of novel forms by analogy with existing ones provides clear evidence that the existing ones have been analyzed into at least some of their components. And, just as "went" drops out in favor of "goed" when the child gains control of the independent notions of a temporally neutral verb stem and a past tense marker, so irregular causative verbs in the child's lexicon may be supplanted by regularized forms when the child recognizes in his causative verbs the underlying notions of CAUSE plus a state or change of state. The irregular causative forms are those which are suppletive. They cannot be predicted from their noncausative counterparts by any general rules just as "went" cannot be predicted from "go[illegible]." In Christy's case, "bring," "keep," and "leave" had all occurred prior to the production of novel causative verbs; these disappeared for some time, being replaced with causative "come" and "stay." Certain other verbs which linguists regard as suppletive causatives did not vanish entirely but were occasionally replaced in contexts which called for them by causative verbs derived from their implicit underlying noncausative forms: e.g., "give" (replaced by "take," "get" (never "have")), "put" ("be," #11, Table 1, also footnote 10), "make" ("be," see #13), "take" ("go"). "Show" was never replaced by a causative use of "see." When suppletive causatives like "bring," "keep," and "leave" reappeared months later, they were and continue to be in apparently free variation with their regularized counterparts, as two forms with the same meaning.

The mere fact of a child's beginning to produce novel causative verbs relatively suddenly, after several months of using legitimate causative verbs, coupled with the replacement of existing suppletive causatives with regularized forms, constitutes one source of evidence that children do not initially understand the internal structure of the causative verbs they use but acquire this knowledge only later in development. There is additional evidence to support this conclusion, but this can be best presented in connection with the following discussion of the way in which an understanding of the structure of causative verbs may be acquired.

3. Cognitive and syntactic prerequisites to an understanding of the structure of causative verbs.

Christy did not begin to produce errors involving the causative use of noncausative verbs until she was 24 months old, about 5 months after the first transitive uses of particular causative verbs such as "open." Between 24 and 26 1/2 months only 3 such errors occurred; from then on there were many. Were there any specific cognitive or linguistic developments which may have triggered her analysis of causative verbs into their underlying components at this time?

The most striking candidate for this role was the emergence of the ability to produce periphrastic causative constructions with "make" and "get." The first such construction, "I made back wet" occurred one week before her first causative verb error: "awant full Andrea bucket" (= I want to make Andrea's bucket full). Examples of others which occurred in the period preceding the real onset of the causative errors are "I made it full," "make cow fix," "make it clean," "it could make me sneeze," "I can't get door open," "no, you have get it cook," (=cooked), "this get me sick." Constructions like these are surface structure versions of the structures which have been postulated to underlie causative verbs, in that they explicitly spell out the relationship between a causative element ("make," "get") and a noncausative predicate ("full," "wet," "fixed," "clean," "sneeze," etc.). If a child became aware that "make the door open" and "open the door," "make the trike dry" and "dry the trike," etc., are different ways of expressing the same meanings, she could easily go from there to the hypothesis that alternative ways of saying "make the bucket full," "make the door stay open," and "make it come closer" would be "full the bucket," "stay the door open," and "come it closer" respectively.[5] Put differently, she would assume that just as transitive "open," "dry," etc., encode the notions "make (or get) open" and "make dry," so there could be transitive "full," "come," "stay," etc. which would encode the notions "make full," "make come" and "make stay."

Somewhat parenthetically, it was also at this time that Christy began to produce sentences containing surface structure versions of the inchoative semantic component BECOME: "get," "be," "come." For example, "I get wet," "I can't get comfy," "I won't get burn" (= burned), "I want be change" (= changed), "her dress came undress" (= undone). While there is no compelling evidence that Christy's analysis of causative verbs at

[5] By 24 months, she had used about 8 words in both noncausative and transitive causative contexts: "open," "close," "wet," "hurt," "break," "spill," "pop," and "dry." Knowledge of these might have facilitated her performing such comparisons.

this time included recognition of an abstract inchoative concept, the emergence of sentences like these slightly before the onset of the causative verb errors and at the same time as periphrastic causatives suggests this possibility.

I do not know whether the other children from whom I have examples of adjectives and noncausative verbs used causatively began to produce these only after learning how to produce syntactic causatives with "make" and inchoatives with "get." However, their relatively advanced ages (see section 1) make this seem likely. If, in fact, the production of novel causative verbs comes only after or at least contemporaneously with the ability to produce periphrastic causatives and perhaps inchoative constructions, it may well be that it is the acquisition of these syntactic abilities which allows a child to analyze sentences like "John opened the door" into the components suggested by a paraphrase like "John caused the door to become open," and to go from there to create new causative verbs on the same pattern.

However, a child's ability to produce periphrastic causatives does not suddenly emerge from nowhere. In Christy's case, there was a chain of developments leading up to it which clearly set the stage for this achievement at about 24 to 26 months. In a broad sense, then, it is these developments rather than the acquisition of the ability to produce periphrastic causatives per se which may have constituted the prerequisites to the analysis of causative verbs into their components. Understanding why these developments are significant requires taking a closer look at the conceptual nature of the underlying structure of causative constructions.

3.1 The underlying structure of causative sentences.

According to current linguistic analyses, (e.g., McCawley, 1970, 1971; Fillmore, 1971; Kastovsky, 1973), a great many sentences can be regarded as basically causative in that they encode a relationship between an act, process, or state of affairs and a resulting effect of some kind. In order to account for such sentences adequately, complex deep structures must be postulated--complex in that they contain more than one underlying proposition. In McCawley's early conception (1968), the effect clause was seen as embedded directly into the causing clause, as when "John killed Harry" was said to derive from a structure like "John CAUSE Harry BECOME NOT ALIVE." In more recent formulations, the causing clause receives a fuller representation such that CAUSE becomes the link between two propositions: "John DO CAUSE Harry BECOME NOT ALIVE" (McCawley, 1970); "John by doing something caused Harry to die" (Fillmore, 1971).

In many sentences, including those discussed in sections 1 and 2, the underlying presence of two conceptually distinct propositions is well

hidden; superficially, the sentences are simple: e.g., "Mommy opens a box" (Mommy does something which causes the box to become open). In others, the deep structure relationship between a causing event and an effect is more explicitly spelled out in surface structure; although in traditional analyses these sentences would also be considered simple, sometimes involving a separable verb. In contrast to sentences with verbs like "open" and "kill," the nature of the causing act is presented in the form of a transitive verb. The effect of this action on the patient is represented by a locative or stative word or phase: "John pushed the baby down" (John pushed against the baby, which caused the baby to fall/move/go down,") "John shot Harry dead" (John shot Harry, which caused Harry to become dead); "Daddy ate his cereal allgone" (Daddy ate his cereal, which caused his cereal to become allgone); similarly, "George rubbed the rock smooth," "Harry threw the ball up/into the wastebasket," "Mary ripped the paper to pieces" (cf. Fillmore, 1971; McCawley, 1971; Kastovsky, 1973, on sentences of this type).

There is a related type of construction which, like the latter group above, makes explicit mention of an agent, an act, a patient, and an effect; it differs, however, in that the act is represented not by an independent transitive verb but rather is selected on the basis of the nature of the effect clause: e.g., "Mommy put her hat on," "Daddy took his coat off," "Daddy turned the light off," "Mommy picked the baby up." These cannot be paraphrased by sentences like "Mommy put her hat, which caused her hat to be on." "Put" has been analyzed as the causative of "be" when "be" takes a locative complement (Binnick, 1971; Fillmore, 1970). "Take" (when in opposition to "put"), "turn," "pick," and certain other such verbs also appear to be similarly causatively related to "be" (or "become" or "go/come") plus locative or stative complements.

In sum, causative sentences of many different types can be regarded as fundamentally alike in that they all have deep structures in which a causal relationship between two propositions is shown. They differ superficially with regard to which and how many deep structure elements appear on the surface. Understanding the structure of causative sentences involves recognizing the underlying presence of this relationship between a cause and an effect even if the relationship is obscured in surface structure, as it is in sentences involving verbs like "kill" and "open."

3.2 The acquisition of complex sentences.

Several investigators of children's productive linguistic abilities have observed that in the early period of word combination, children work on simple sentence patterns (e.g., Brown, Camden, Bellugi, 1968; Brown, 1973; Bowerman, 1973). Transformational mechanisms for creating complex sentences by embedding and conjoining underlying simple sentences

appear to be lacking until at least beyond Stage 1, which extends from the start of word combination until mean length of utterance (MLU) reaches 2 morphemes; by this time sentences up to 4 or 5 morphemes long can be programmed. (The studies from which these conclusions were drawn did not regard sentences like "Mommy open box" or "Mommy put hat on" as complex, so the occurrence of sentences like these would not have been considered counterexamples.)

Christy's development was basically consistent with these findings.[6] Leaving aside for the moment causative sentences involving verbs like "break" and "open," complex sentences emerged as follows: First word combinations occurred at about 18 1/2 months. For approximately 2 1/2 months, her constructions were either single propositions or fragments of such propositions.[7]

Starting at about 21 months and gradually gaining momentum, however, were signs of her beginning to try to relate two propositions. The first sentences which could be described as combining elements from two propositions were those which expressed an agent plus a change of location he or she brought about in a patient; e.g. "Mommy coat on," "Christy shoe on," "Christy plate in," "Daddy off shirt," "Mommy gum away," where verbs such as "put," "take," and "throw" would be appropriate.[8]

---

[6] Data comes from copious daily notes on Christy's development plus weekly tapes of 1/2 to 2 hours. Developments involving either new syntactic structures or new semantic uses for existing structures were monitored extremely closely, so the representativeness of the sample is not a serious problem.

[7] Apparent exceptions to this were numerous two-word and later three-word constructions beginning with [ãwã] "I want." This form had been learned from another child and was fixed, i.e., there was no "you want," "Christy want," etc., or any other use of "I" at this time. Seemingly precocious embeddings with "want" and occasionally "see" (cf. Braine, 1971a:33) are common and are probably best explained in other ways (e.g. cf. Limber, 1973: 177). Three-word sentences involving possessives and preposed adjectives are also common in Stage 1 speech; Brown (1973) and Bowerman (1973) have suggested that these be accounted for without recourse to embedding as well.

[8] Before 21 months, there was only a tiny handful of sentences which seem to have expressed elements from both the causing proposition and effect proposition of an underlying causative paradigm, far too few to constitute evidence for a productive rule. E.g., "Mommy see" (Mommy pick up Christy so that Christy can see, or Mommy cause Christy to see), "Daddy potty" (Daddy is helping Christy use the potty). Five utterances

A striking finding is that between 21 and 22 1/2 months, when sentences 3 and even 4 words long were frequent, there were no constructions which explicitly expressed a link between an action and an effect on a patient, such as "put shoe on," "take coat off," "eat cereal allgone," and "turn light off." With the exception noted above, (i.e., constructions like "Christy shoe on") Christy at this time produced only sentences corresponding to either a simple act upon an patient by an agent or to a change of state or location undergone by a patient, but did try to link them causally. Thus, there were sentences like "mommy push baby," and those like "baby fall," but none like "mommy push baby down," or even simply "push baby down." Similarly, there were sentences like "mommy eat," "eat yogurt" and "yogurt allgone," but none like "eat yogurt allgone."

At about 22 1/2 months, other types of proposition relating began, with the relationship shown either by simple temporal justaposition of two propositions, with a pause in between, or by running two propositions or elements of reduced propositions together. Some examples are given in Table 3, #1-6. The logical connections which at least to the listener would appear to relate the two propositions involved causation (X because Y, X so that/in order to Y); time (after X, then Y), and contrast (not X, but Y).

Between 23 and 24 1/2 months, conjoined sentences of this kind became more elaborate and sentence embedding (another way of relating two propositions) began. Two kinds of embedding appeared at close to the same time: those involving a sentential proposition as the direct object of a verb like "see," "look at," "find," "help," "watch," "need," or "hear," and those with relative clauses. Some examples from this later period are given in #7-20 of Table 3.

(footnote 8 continued)
of this sort involved a relationship between an agent and a locative change of state undergone by an unmentioned patient, e.g. "Mommy up" (Mommy pick it up), "Daddy off" (Daddy is taking Christy's pants off). However, almost all of the many Noun + Locative Particle sentences which were produced at this time expressed either a change of location initiated by an agent on itself (e.g., "Christy down" as she got off her kiddicar; "Mommy up" after Mommy got up) or an inanimate object plus a past, present, or anticipated change of location (e.g., "shoe on," as she tried to put her shoe on; "dolly in," just before she put the doll into a bag).

Table 3

Christy Bowerman: Examples of attempts to relate two propositions to each other either through juxtaposition, conjoining (causal, temporal, or contrastive relationship), or embedding (sentential direct objects, relative clauses).

A. Earliest Attempts: 22 - 22 1/2 months

1. Christy sweater, cold. ("Christy wants a sweater because she is cold.")
2. Out dress ("I want to ge dressed so I can go out.")
3. Want out see wow-wow. ("I want to go out to see the dog.")
4. Wow-wow. Not a wow-wow, cow. ("This is dog. Not a dog, a cow.")
5. After Andrea Christy turn. ("After Andrea has a turn, Christy will have a turn.")
6. Come hi. ("The girl(on a bicycle) is coming to say hi.")

B. Slightly later: 23 - 24 1/2 months

7. Mommy hold, too heavy. ("Mommy hold this, it's too heavy for me.")
8. Crying want mommy. ("The child is crying because she wants her mommy," or "The child is crying and she wants her mommy.")
9. Get him, time got up ("Let's get Daddy, it's time for him to get up.")
10. Christy fall down, hurt self ("Christy fell down and hurt herself.")
11. Stay home play Christy ("Stay home and play with Christy.")
12. After my daddy come back, I see Volvo.
13. Daddy alldone Christy room ... but my mommy here.
14. Find girl fall down. ("Let's find the picture where the girl falls down.")
15. Help me night night ("Help me go night-night.")
16. See Kendall crying.
17. Watch me swinging.
18. Want feel slide cool now. ("I want to feel if the slide is cool now.")
19. This Christy mommy hugging Christy. ("This is Christy's mommy who is hugging Christy.")
20. This Christy's house where Christy's toys is. ("This is Christy's house where Christy's toys are.")

During this period (around 23-24 months) Christy finally mastered a number of sentence patterns which, although superficially dissimilar, can be regarded as conceptually similar in that they all reflect on underlying causal relationship between an action by an agent and an effect upon a patient. Effects included both changes of location and changes of state. Changes of location were expressed by locative particles (occasionally phrases) or indirect objects, with verbs like "put," "take," "give" and "throw": e.g., "Marc mommy put Christy pant away?" (Did Marc's mommy put Christy's pants away?) "put nipple away," "I pick money up," "take Christy outside," "take bottle out," "give my a kiss," "I give wow-wow something eat," "I throw it Jerry," "I throw it you," "I throw it over wow-wow." Changes of state were expressed by adjectives, with the action represented by "make" or occasionally an independent transitive verb: "eat cereal allgone," "I made back wet," etc.[9]

---

[9]Binnick (1971) has discussed the parallel functions of "put" and "make." Both can be considered causative versions of "be;" which one is used depends on whether "be" takes a locative or a stative complement. E.g., "I put it on the shelf" "*I made it on the shelf," vs." I made it soft. *I put it soft." That Christy is aware of this functional parallel between "put" and "make" is demonstrated by errors she had made involving the substitution of one for the other: e.g. (3;9) "but never ever put the door locked"(= make the door locked; cause the door to be locked); (3;5) "They didn't have a pancake cookie cutter so I made my hand to it" (= put my hand onto it; C describing how she made a pancake out of baker's clay at school). (Cf. Baron, 1972: 126 ff. for a discussion of a hypothetical "periphrastic causative paradigm" in which all periphrastic causative verbs (e.g. make, have, get) could occur with any complement. She looks for evidence of this in child speech but finds relatively little (p. 288); however, she does not include "put" as a periphrastic causative verb in her analysis.)

"Put" and "give" are also closely connected. The selection between them depends largely on whether the "location" to which something is conveyed is animate or not (Lyons, 1967). Christy has on numerous occasions used "put" to cover the function of "give": e.g., (3;3) "you put me just bread and butter" (= give me just bread and butter); (3;4) "put Eva the yukky one first" (= give Eva the yukky medicine first). Sometimes "put" has been replaced by "give" in a subsequent sentence, as if the more specific lexical item required had finally become accessible: (3;4) "now put the good one to Eva; give the good one to Eva;" (3;0) "put me the pink cup; give me the pink cup."

Sentences in which the verb representing the causal act is semantically relatively "neutral" (i.e., does not explicitly specify the nature of the act; e.g. "put," "take," "make," "get") were mastered earlier than those in which the word for the act is an independent (i.e., not necessarily

During the period when this ability to relate two causally linked propositions in the same utterance was establishing itself, there were some odd transitional sentences which show rather clearly that for a child such superficially simple sentences as "push baby down" and "put hat on" are conceptually complex. For example, after I bumped into Christy and she fell down, her remark (age 1;11) was "mommy push me fall," where "mommy push me" and "me (or I) fall" are the conjoined propositions. Similarly, she tried to get me to put a toy "lady" into her crib by saying (age 1;11, 2) "mommy do it lady in." Here there is explicit mention of the fact that mommy is to do something in order to bring about the effect of the lady's going in. In the week immediately after this utterance she mastered the use of "put" as the mature way to express this sort of semantic relationship between an act by an agent and a change in location by a patient.[10]

(footnote 9 continued)
tied to the causative paradigm) transitive verb with its own semantic properties. Sentences of this latter type at first involved frequently modeled cause-effect relationships such as "push down," "eat allgone," "pour out," "brush off." Not until about age 3;6 did a real productivity with such sentences develop, such that Christy could select words for the action and the effect relatively independently of each other. This was evidenced by her beginning to produce ungrammatical but rule-governed sentences belonging to the agent-action-patient-effect paradigm: e.g., "I catched her up" (= I, by catching her, caused her to come up), "untie it off" (= by untying it, cause it come off), "I pulled it unstapled," "the monster would eat you in pieces" (= the monster, by eating you, would cause you to become in pieces).

[10] Sentences from later in development continued to attest to the conceptual complexity of utterances of these types. E.g., #11, Table 1, "I wanta be it off ... I wanta put it off" demonstrates the relationship of "put it off" to "cause it to be off." Similarly, (3;4) "put a tape be over?" (C has asked M what "mending" means as M fixes something with tape; she now is confirming her understanding of M's reply). Here, "put" and "be" coexist rather than "put" supplanting "be" as its causative, as in the sequence above. This example suggests that "be" is implicit in normal sentences with "put." Other examples: (3;10) "go me to the bathroom before you go to bed" (= cause me to go). Later in the night this concept was expressed with "take": "you didn't take me to the potty before you went to bed." (3;9) "Mom, would you make it come on?" (C asking M to put her roller skate on. On innumerable other such occasions, "put ... on" has been used).

The almost simultaneous emergence of a number of different sentence patterns involving verbs like "put," "take," "give," and "make" plus changes of location or state does not appear to have been coincidental, but rather was a reflection of Christy's mastery of an underlying paradigm in which an agent performs an action which results in the patient's undergoing a change of state or location. And it was at just this time that Christy began to produce sentences involving the causative use of a normally noncausative verb or an adjective, which I have argued provides evidence that she had analyzed her existing causative verbs into a component corresponding to a causative act and a component corresponding to the event brought about. This timing of events strongly suggests that it was the acquisition of this general ability to relate two propositions causally which allowed the analysis to take place.

It is important to know whether the schedule followed by Christy in acquiring the ability to produce causative sentences is a general one. Preliminary evidence suggests that it is. For example, several investigators have noted that sentences involving indirect objects appear later than might be expected, often not emerging until the end of Stage 1 and even then being relatively rudimentary (e.g., Brown, 1973; Bloom, 1970). This is also true for children learning languages other than English (Bowerman, 1973). (Antinucci and Parisi's Claudia appears to be unusual in this respect.) The initial absence of such sentences can be accounted for in a principled way if we assume that in order to produce strings including both a a verb and an indirect object the child must have at least a rudimentary ability to handle two underlying propositions which show a relationship between a causing action and an effect.

Additional evidence for the generality of this sequence comes from an analysis I performed on longitudinal samples of spontaneous speech from another American child, Kendall, and two Finnish children, Seppo and Rina. For all three children, sentences involving mention of at least a causal action, a patient, and an effect (e.g., "put X on/in etc." "give/bring X to Y (or Y X)," "take X off/away/out, etc.," "eat X allgone," "turn X on/off") were delayed beyond the stage at which other 3-word sentences were common (cf. Bowerman, 1973, for speech samples and discussion of the early speech of these children).

For Seppo and Rina, such utterances did not come in until late Stage 1 or beyond, and, as in Christy's development, their emergence coincided with other evidence of the incipient ability to create a single sentence out of two conceptually and linguistically distinct propositions. In the Finnish children's case, this involved using sentential direct objects with verbs like "be-able," "know-how," "have-strength-to," and "be allowed."

For Kendall there is no sample between MLU 1.48 (age 2;1), when no such sentences occurred but many other 3-word utterances did, and MLU 2.19 (age 2;3), when there were many such sentences (e.g.,

"Kendall took her hat off," "put it on shelf," "get it out, Lissa," and "Kendall make food wiggle no, Daddy.") At this time there is also other evidence for proposition-relating as there was not earlier, in sentences like "doggie crying/infant seat hurt his feet," "Kendall fall bruise/Kendall bruise hurts/Kendall skiing/fall skiing ... bruise," and "on suitcase ... waiting me, mommy" (It's on the suitcase waiting for me). In this sample, moreover, there is the first recorded instances of Kendall's using a noncausative verb causatively: "Kendall fall that toy."

3.3 Learning that verbs like "open" and "break" make a statement about cause and effect.

The above detour into the acquisition of sentences containing both a causative verb and a word referring to the effect on the patient provides an additional source of evidence for the hypothesis that children initially use causative verbs like "break" and "open" in an unanalyzed way. When one assigns underlying structures such as "cause to become open/broken" to sentences with these verbs, one is in essence postulating that the child is aware of his utterance as making a statement about a relationship between a cause and an effect. In other words, one is saying that the child not only has a nonlinguistic understanding of a given causal relationship but also is capable of attending to both cause and effect simultaneously in order to formulate a sentence to express this relationship. If this interpretation is correct, it is difficult to explain why sentences like "put hat on," "take coat off," "push baby down," and "eat cereal allgone" should be absent for a prolonged period after sentences with "open," "break," etc. emerge. The two kinds of sentences have similar underlying structures, in which a causal relationship between an agent's act on a patient and a change of state or location undergone by the patient is spelled out. One would assume that if the child recognizes this sort of relationship to be implicitly present when he says "mommy open box" or "break stick," he should be able to produce other everyday sentences of the same pattern which differ only in that the presence of both the act and the effect are made explicit in surface structure as well as in deep structure.

One possible explanation for the discrepancy in time of emergence of sentences with "break," "open," etc. and those with "put on," etc. is that parents model the former more frequently than the latter and so provide more learning opportunities. Even a casual perusal of transcripts of mother-child interaction tends to rule out this explanation: taken as a group, sentences involving "put," "take," "give," "bring," "pick," "turn," and other transitive verbs plus locative particles or prepositional phrases are among the most frequently modeled of sentence patterns. Brown (1973) has demonstrated for other linguistic forms that relative frequency of modeling is not a determinant of order

of acquisition except in the limiting case of practically no exposure at all.

Antinucci and Parisi account for the absence in surface structure of all the elements they postulate to be in the deep structure of a child's sentence by assuming that the child initially has a limit on the length of sentence he can program. According to Parisi (1974: 8), "In our analyses, the various elements of the semantic structure were all constructed at the conceptual level, and the only explanation that could be offered for the brevity of child utterances was a limit at the moment of mapping the semantic structure into appropriate sounds." This explanation cannot account for the present situation. Of the four children investigated in this paper, all were able to produce many types of 3-word sentences at a time when those like "put hat on," etc., were still missing, and, in Seppo and Christy's case, would not emerge for 2 to 4 months respectively (the same may have been true of Kendall and Rina but their samples are not spaced so as to allow this judgment to be made).

The existence of situations in which a limited sentence programming span cannot be the explanation for the absence in surface structure of elements postulated to be present in deep structure forces a closer look at the relationship between the cognitive understanding we assume a child to have and his linguistic expression of this understanding. In some cases, delays in the acquisition of given linguistic structures when the relevant cognitive understanding is thought to be present appear to be due to the relative difficulty of the syntactic mechanisms a language offers to express the meanings in question (Slobin, 1973). This does not provide a very cogent explanation in this case. If, like Christy, Kendall, Seppo and Rina, a child can produce strings involving actions, objects, and locations, such as "Ben swim pool," "Kristin sit chair," "Kimmy change here" (= change Kimmy here) (Kendall), "elephant sits to-there," "spool goes to-there," "Rina draws here," "bunny drives car," (Seppo, Rina), why does he not say "put hat on," "take coat off," "throw ball there," etc.? Opportunities to produce such utterances were frequent, but generally resulted only in fragments of the underlying paradigm, especially N + particle constructions like "hat on." Some children (not these four) apparently occasionally also say things like "put hat" (e.g., Bloom, 1970, p. 108-246).

I conclude that the reason children do not say sentences like these at the time they can program other three-word sentences like "mommy open box" is that the former entail a special conceptual difficulty which the latter need not. Specifically, to have productive control of the former, the speaker must have in mind the two halves of the causative paradigm: an act upon a patient and the change of state or location which the patient undergoes.[11] In contrast, sentences of the latter type do not require this:

[11] Productive control must be stressed since it would be quite possible for a child to acquire a few phrases like "put hat on," "take coat off" and "give me X" early in development essentially as unanalyzed forms, i.e., without the ability to manipulate the parts separately according to the circumstances such that "put on" could contrast with "put in" or "put out," and "give me" with "give you," "give mommy."

the act and the change of state are bundled together into one word and therefore do not need to be explicitly recognized by the child as distinct components in order for the utterance to be produced. Therefore, "open," "break," etc. can be acquired as unanalyzed forms while "put/take/bring/throw/give (etc.) NP on/off/in/up/to mommy (etc.)" cannot. Through the early 2 and 3 word sentence period until about the end of Stage 1, children are still working on the expression of simple propositions of the sort which go into the agent-action-patient-effect paradigm: e.g. Agent-acts on-Patient, Entity-be (become/move to)-Location/State. They are not yet ready to try to join these together to express a causal relationship.

If "open box" does not mean "cause box to become open" for a child at the very start of his syntactic development, what does it mean? This is a difficult question. In order to use the word "open" in an approximately appropriate way, a child of course must be able to perceive a causal relationship between an action and an object and a certain effect and pick the word accordingly. However, a theory of language acquisition must draw a distinction between a child's knowledge of how to match a word to a referential situation and his knowledge of the internal structure of the word: recall that saying "mailman" when a mailman appears does not mean that a child is aware of how this word is structured.

I have argued that "open" does not initially mean "cause to become open" to a child in part simply because he is not yet able to entertain linguistic structures which involve a relationship between propositions. Can "open" be described in terms of a single proposition? It may be that early in a child's development, "causative" verbs like "open" and "break" are understood primarily in terms of the actual or anticipated act of an agent on a patient. Children's early uses of verbs like "open" and "break" appear to be far more tied to a perceptible act by an agent that they are for an adult or older child. An adult can use such verbs transitively with subjects which perform no tangible actions, e.g., "John broke my heart," "the experience opened up new vistas for me," "a breeze opened the door." Children do not use subjects like these for a long time; "opening" and "breaking" are acts which they can witness, done by the hands of an agent.

But, an immediate objection might go, doesn't the very use of a verb like "open" or "break" indicate that the child is aware of the patient as undergoing the change of state suggested by the verb? How else could the choice of verb be interpreted? This does not seem to be a serious problem. Everytime a child produces a nonanomalous sentence with a verb and an actual or contextually-given direct object, he must attend to the characteristics of both the verb and the direct object to make sure they are suitable for each other. For example, when he says

"read book," "look at kitty," "want ball," "taste cereal," or "eat yoghurt," the direct object must refer to something which can be read, looked at, desired, or eaten. Similarly, when a child says "open X or "break X," must be something which can be opened or broken. Should we therefore conclude that all a child's transitive verbs should be given a causative interpretation (e.g., "cause NP to become read/looked at/wanted/tasted/eaten" or the like)? Rather than this, it would seem better to represent such selectional constraints in a more neutral manner for all a child's transitive verbs until there is some independent evidence that he has come to realize that some verbs make a statement about a cause-effect relationship in a way that others do not.

4. Conclusions

A number of different topics have been explored in this paper in the interest of presenting and supporting two major hypotheses:

1) At some point in development, speakers of English come to understand a certain class of verbs ("open," "break," "warm," etc.) as having underlying structures similar to those which have been assigned to them on purely linguistic grounds by generative semanticists and certain other linguists: CAUSE plus a state or change of state. The evidence for this claim comes from children's creation of novel causative verbs by analogy with their existing ones.

2) This knowledge is not present from the moment of the child's earliest transitive uses of causative verbs. Rather, the verbs initially have an "unanalyzed" status; only later does the child become aware of their internal structure. The evidence for this claim is a) the apparent time lag between the early transitive use of causative verbs in multiword constructions and the onset of errors involving the causative use of noncausative words (this time lag can be documented only for Christy, it can be inferred for the other children on the basis of their ages at the time of the errors; b) the absence of utterances which require the speaker to make explicit mention of an act, a patient, and a stative or locative effect, at a time when single-word causative verbs which have this structure only implicitly are already used and sentences of three or more words are common, and c) the emergence of many different kinds of (agent)-act-patient-effect sentences at about the same time and contemporaneously with other evidence of the child's emerging ability to combine two simple propositions to form complex sentences. In Christy's case, this sequence of development culminated in the ability to produce periphrastic causatives with "make" and "get" at exactly the time that the first errors involving the causative use of noncausative words began. This was taken as strong evidence that a child's analysis

of her existing causative verbs into their components has as its prerequisite considerable linguistic experience at relating two simple propositions in a causal manner.

In developing these arguments, a fundamental distinction was made between nonlinguistic or general cognitive knowledge and knowledge of linguistic structure. This distinction may be considered an instance of a more general distinction made by Piaget between different levels of understanding. Piaget argues that understanding which is achieved on one level, such as the sensory-motor or action level, does not become directly transferred to knowledge on a higher, representational level. Rather, "higher level knowledge involves a reconstruction of already acquired concepts and patterns" (Sinclair-de Zwart, 1973).

Piaget's observations of children's behavior establish that a basic nonlinguistic understanding of the relationship between cause and effect is acquired by the end of the sensory-motor period, which is about the time that word combination begins (cf. Baron, 1972: 53-58 for a review of Piaget's analysis). In this paper, however, I have argued that a child's presumed awareness of a causal relationship between someone's action and the opening of a box or the breaking of a stick should not be directly written into the deep structure representation of his early utterances with "open" and "break." If this is done, intricate developmental processes which may intervene between cognitive awareness and linguistic structure are missed. For example, a child acquiring language must gradually learn to distinguish those aspects of his experience which have linguistic relevance in a given utterance from those which do not, and discover how these are interrelated within the language system he is learning. For causative verbs, this involves learning that what is critical is the expression of a relationship between a cause and an effect. The ability to focus explicitly on both a causing act and a change undergone by a patient within the span of a single utterance is apparently acquired only gradually, perhaps as the outcome of considerable experience with trying to relate two simple propositions to each other in a variety of ways such as I have described for Christy. To credit sentences like "mommy open" and "open box" with complex causative deep structures from the very beginning of word combination, then, is to totally bypass the critical problem of how a child learns to give linguistic expression to what he may already know on a nonlinguistic level.

BIBLIOGRAPHY

Anderson, J. "The case for cause: A preliminary inquiry." Journal of Linguistics, 1969, 6, 99-104.

Antinucci, F. & D. Parisi. "Early language acquisition: A model and some data." In C.A. Ferguson & D.I. Slobin (eds.), Studies of child language development. New York: Holt, Rinehart & Winston, 1973.

Antinucci, F. & D. Parisi. "Early semantic development in child language. In E.H. Lenneberg & E. Lenneberg (eds.), Foundations of child language development. UNESCO, in press.

Baron, N.S. The evolution of English periphrastic causatives. Unpublished Ph.D. dissertation, Stanford University, 1972.

Bendix, E.H. Componential analysis of general vocabulary: The semantic structure of a set of verbs in English, Hindi, and Japanese. Bloomington: Indiana University Press, 1966.

Berko, J. "The child's learning of English morphology." Word, 1958, 14, 150-177.

Bierwisch, M. Semantics. In J. Lyons (ed.), New horizons in linguistics Middlesex, England: Penguin Books, 1970.

Binnick, R.I. "Studies in the derivation of predicative structures." Papers in Linguistics, 1971, 3, nos. 2 and 3.

Bloom, L. Language development: Form and function in emerging grammars. Cambridge: M.I.T. Press, 1970.

Bowerman, M. Early syntactic development: A cross-linguistic study with special reference to Finnish. London: Cambridge University Press, 1973.

Braine, M.D.S. "The acquisition of language in infant and child." In C. Reed (ed.), The learning of language. New York: Scribners, 1971. (a)

Braine, M.D.S. "On two types of models of the internalization of grammars." In D.I. Slobin (ed.), The ontogenesis of grammar. New York: Academic Press, 1971. (b)

Brown, R. A first language: The early stages. Cambridge: Harvard University Press, 1973.

Brown, R., C. Cazden, & U. Bellugi. "The child's grammar from I-III." In J.P. Hill (ed.), Minnesota symposia on child development, vol. 2. Minneapolis: University of Minnesota Press, 1968.

Clark, E.V. "What's in a word? On the child's acquisition of semantics in his first language." In T.E. Moore (ed.), Cognitive development and the acquisition of language. New York: Academic Press, 1973.

Fillmore, C.J. "The case for case." In E. Bach & R.T. Harms (eds.), Universals in linguistic theory. New York: Holt, Rinehart & Winston, 1968.

Fillmore, C.J. "Subjects, speakers, and roles." Synthese, 1970, 2, 251-274.

Fillmore, C.J. "Some problems for case grammar." In R.J. O'Brien (ed.), Monograph Series on Languages and Linguistics. 22nd Annual Round Table. Washington, D.C.: Georgetown University Press, 1971.

Gleitman, L.R. & H. Gleitman. Phrase and paraphrase: Some innovative uses of language. New York: W.W. Norton & Co., 1970.

Halle, M. "Prolegomena to a theory of word formation." Linguistic Inquiry, 1973, 4, 3-16.

[illegible]an, D. "Transitivity in child language." Language, 1971, 47, 888-909.

[illegible]persen, O. A modern English grammar on historical principles, vol. III, London, 1927.

Kastovsky, D. "Causatives." Foundations of Language, 1973, 10, 255-315.

Lakoff, G. Irregularity in syntax. New York: Holt, Rinehart & Winston, 1970.

Limber, J. "The genesis of complex sentences." In T.E. Moore (ed.), Cognitive development and the acquisition of language. New York: Academic Press, 1973.

Lyons, J. "A note on possessive, existential, and locative sentences." Foundations of Language, 1967, 3, 390-396.

Lyons, J. Introduction to theoretical linguistics. London: Cambridge University Press, 1968.

Lyons, J. Introduction to Bierwisch, "Semantics." In J. Lyons (ed.), New horizons in linguistics. Middlesex, England: Penguin Books, 1970.

McCawley, J.D. "Lexical insertion in a transformational grammar without deep structure. In Papers from the 4th Regional Meeting, Chicago Linguistic Society, 1968.

McCawley, J.D. "Syntactic and logical arguments for semantic structures. In Proceedings of the 5th International Seminar on Theoretical Linguistics. Tokyo: T.E.C. Corp, in press, 1970.

McCawley, J.D. "Prelexical syntax." In R.J. O'Brien (ed.P, Monograph Series on Languages and Linguistics. 22nd Annual Round Table. Washington, D.C.: Georgetown University Press, 1971.

Miller, G.A. "English verbs of motion: a case study in semantics and lexical memory." In A.W. Melton & E. Martin (eds.), Coding processes in human memory. New York: Wiley & Sons, 1972.

Parisi, D. "What is behind child utterances?" MS. to appear in Journal of Child Language, 1974.

Postal, P.M. Review article: André Martinet, "Elements of general linguistics." Foundations of Language, 1966, 2, 151-186.

Schlesinger, I.M. "Production of utterances and language acquisition." In Slobin, D.I. (ed.), The ontogenesis of grammar. New York: Academic Press, 1971.

Schlesinger, I.M. "Relational concepts underlying language." In Schiefelbusch, R.L. & L.L. Lloyd, (eds.), Language perspectives: Acquisition, retardation, and intervention, Baltimore: University Park Press, in press [1974].

Sinclair-de Zwart, H. "Language acquisition and cognitive development." In T.E. Moore (ed.), Cognitive development and the acquisition of language. New York: Academic Press, 1973.

Slobin, D.I. "Cognitive prerequisites for the development of grammar." In C.A. Ferguson & D.I. Slobin (eds.), Studies of child language development. New York: Holt, Rinehart & Winston, 1973.