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**FACTORS UNDERLYING SENTENCE INTERPRETATION IN YOUNG
CHILDREN: WORD ORDER, REAL WORLD KNOWLEDGE AND LINGUISTIC
STRUCTURE**

City University of New York

PH.D. 1986

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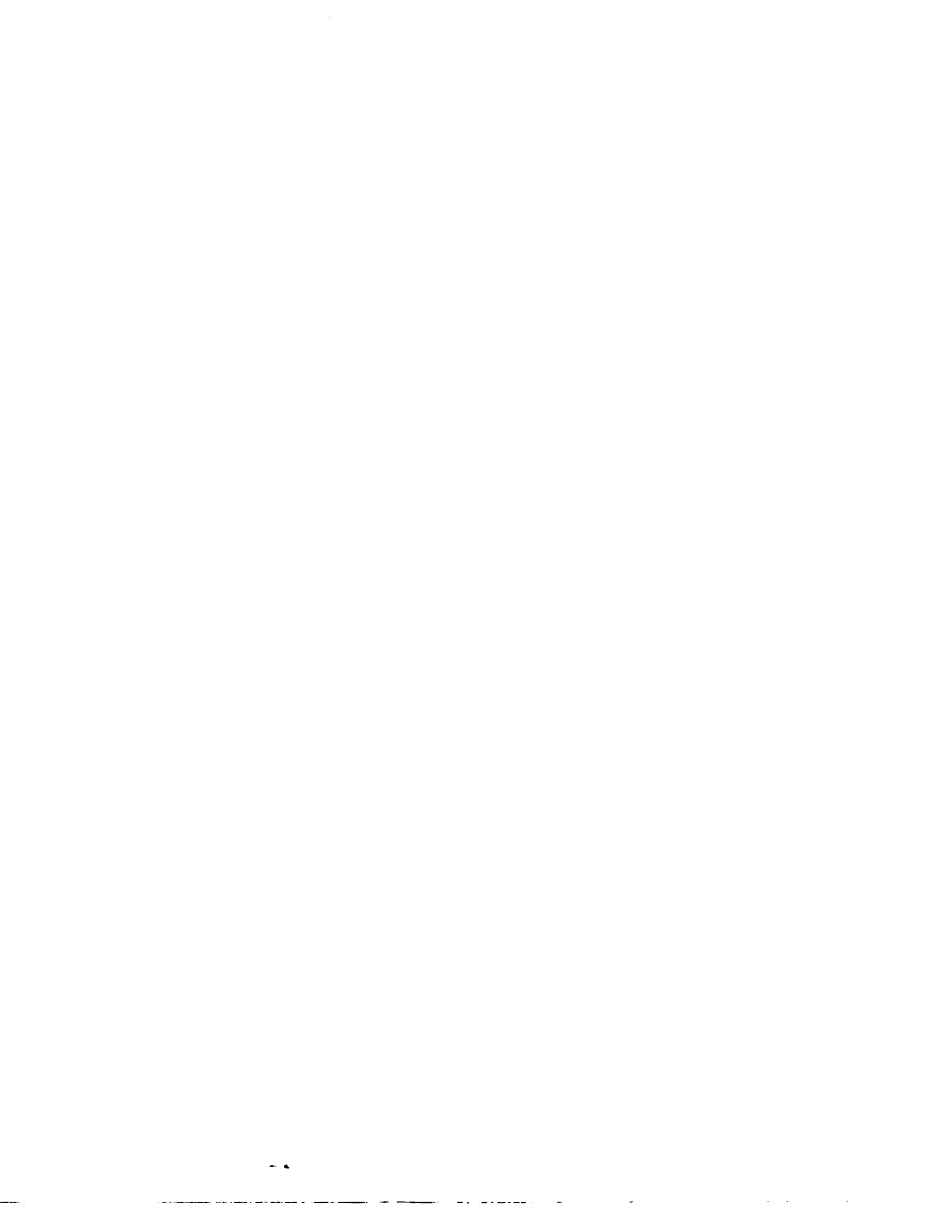


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FACTORS UNDERLYING SENTENCE INTERPRETATION
IN YOUNG CHILDREN: WORD ORDER, REAL WORLD
KNOWLEDGE AND LINGUISTIC STRUCTURE

by

ANN MARY STANTON

A dissertation submitted to the Graduate Faculty in
Speech and Hearing Sciences in partial fulfillment
of the requirements for the degree of Doctor of
Philosophy, the City University of New York.

1986

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This manuscript has been read and accepted for the Graduate Faculty in Speech and Hearing Sciences in satisfaction of the dissertation requirement for the Degree of Doctor of Philosophy

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Chair of Examining Committee

Sept. 16, 1986
Date

Joseph Harkley
Executive Officer

Louis J. Gertsman

Margaret M. Lahey

Supervisory Committee

The City University of New York

Abstract

FACTORS UNDERLYING SENTENCE INTERPRETATION
IN YOUNG CHILDREN: WORD ORDER, REAL WORLD
KNOWLEDGE AND LINGUISTIC STRUCTURE

by

Ann Mary Stanton

Adviser: Dean Helen Smith Cairns

This study evaluated the process of early acquisition of comprehension of syntactic structure and the interaction of factors of probability, real world knowledge and linguistic structure. Competing theories of strategy use were evaluated, with particular reference to prior age-based group data, and established patterns of development. Results from previous studies implied that individual children perform according to age-group norms. This study investigated whether strategy use is reflective of consistent individual patterns or mixed responses by making both individual and group analyses. A population of fifty-six children aged 3 to 6 years was assessed on an acting-out comprehension task and a related metalinguistic judgement task. The study was replicated after a six-month interval to evaluate development in comprehension over time. The factor of Animacy was controlled for while manipulating factors of

probability and linguistic complexity. The stimuli used were Simple Active Declarative, Passive and Inverted Cleft Sentences that were either Probable, Improbable or Neutral with respect to probability, allowing a measure of structural knowledge with and without interaction with Probability. It was hypothesized that Probability would exercise a greater effect in younger children with use of the Probable Event Strategy predominating in their responses. Older children were expected to show high levels of usage of the Word Order Strategy before developing adult comprehension based on linguistic rules. Results indicated differential effects of Probability continuing throughout the age range tested, and much lower usage of the Word Order Strategy than anticipated. Age-based analysis did not succinctly characterize the results. Grouping based on individual response using developmental parameters for each sentence type provided concise analysis and enabled profiles to be established and measured across time. Strategy use was not found to be transferred across sentence types. The Word Order Strategy was used at three distinct levels of development. The acquisition of adult responses on Passive and Inverted Cleft was found to be a fixed state, indicating the absolute nature of linguistic rules versus cognitive strategies. Metalinguistic judgements based on

probability were strongly related to Comprehension levels of the same structure indicating the similarity of processing in both areas.

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I N T R O D U C T I O N

Normal language acquisition entails development of a highly complex, arbitrary, abstract, rule-governed linguistic system. Adult competence allows both comprehension and production of novel grammatical utterances in multiple contexts, often with no explicating context at all. By the age of five the child's linguistic production demonstrates elaborate syntax, an almost complete system of morphophonological contrasts, semantic categorizations closely aligned to those of adults and a diversity of pragmatic abilities. While there is further elaboration of complex morphosyntactic structures and semantic and pragmatic aspects throughout childhood, the explosion of linguistic skill between the ages of three to five reflects the transition from a pre-syntactic lexical system to a system motivated primarily by syntactic structure. In analyzing the process of this transition, we seek to inform ourselves of the relation between cognitive and linguistic processing, and the validity of possible grammatical models.

The problem for the early language learner seems to be twofold. The first problem is to discover the mechanisms for cracking the linguistic code, in particular the syntactic code operating in the environmental

language. Languages differ along various dimensions in the ways in which grammatical structure represents semantic and pragmatic information. They differ in the degree of reliance placed on surface grammatical cues for interpretation and encoding. Establishing the relevant parameters of the target environmental language forms the essential base of the syntactic component of the grammar.

The second problem the early learner faces is that of decontextualization. The enormous literature on 'motherese' or 'child-directed speech' indicates that language addressed to young children is not only simplified but also redundant in grammatical marking because of its contextual support for decoding. Yet, ultimately the child has to generate good enough syntactic hypotheses about the target language to enable him to go beyond context-bound, simple utterances in both comprehension and production.

There is no evidence of significant causal relations between tailored input and linguistic production, within the ranges examined. (Bates et al. 1982). While the double mapping may aid the child in hypothesis formation, once he is alerted to a specific parameter, child-directed speech actually serves the function of maintaining communication with a pre-syntactic child. Conversely, it is precisely those inputs that cannot be decoded by

contextual or lexical reference that become the focus of the child's more stringent syntactic hypotheses. The child's task is to discover the parameter values of the language to be acquired as it is the fixed parameters along which languages may vary that characterize classes of languages.

Transformational generative theorists attempt to describe by cross-linguistic comparisons aspects of grammar common to all languages. These universal features are considered to reflect biological preparedness. If the child is predisposed to attend to certain dimensions to evaluate specific aspects of the language, then no more than some minimal experience is needed to set the parameters for the language being learned.

Berwick and Weinberg (1984) discuss the issue of parameter setting in the context of the acquisition of base phrase structure rules. They hypothesize a parser divided into two parts: a grammar rule interpreter and a set of grammar rules that are the operating rules of the parser. The initial stage has a "bare" interpreter with no grammatical rules. The parser gradually learns these rules using the rudimentary knowledge of categorizing words as objects, actions, or 'unknown'. The prior knowledge attributed to the initial state includes morphological and segmentation structure of words,

syntactic categorizations of lexical items such as noun and verb based on semantic correspondences, and something of the data structure of the parser and the format of its rules. Berwick and Weinberg claim:

"The proposed model for acquisition is quite simple. Knowledge of syntax (a grammar) is defined as a parser; development of that knowledge as a sequence of parsers. The acquisition process itself is driven by the current parser's attempt to interpret positive example sentences, prompting change to its data base of parsing rules." (Berwick and Weinberg, 1984, p. 204).

In this framework, on-line parsing continues to the extent that a grammar rule is eligible for triggering (i.e. is active) and only if it is associated with the part of the phrase structure that is the current locus of the parser's attentions. Berwick and Weinberg explicitly state that a change of rule is only possible on an individual basis (p. 206). An input will be rendered inactive if that rule change also recursively requires still other new rules. Thus, we would anticipate that an interpreter with only minimal phrase structure rules available may reject a syntactic parse of a form that requires more than one rule adjustment, even when the form

may have within it a recognizable phrase structure. An example of this might be the failure of a young child to transfer the syntactic parse of a Simple Active Declarative based on word order to a Passive form, which reverses the expected order. The child may resort instead to semantic and pragmatic strategies. During the evolution of the syntactic parser we would expect a continual relation between syntactic parsing and interpretation based on other factors.

Setting the parameters of the target language with regard to surface form presumably allows the child to use these parameters as triggers in the establishment of these base rules. A capacity to reflect on specific surface cues such as morphological case markers, word order, or stressing would enable the child to make tightly constrained hypotheses that would require only well-defined evidence to confirm or refute. For example, in a strongly word-oriented language such as English, any hypothesis concerning word order would be rapidly confirmed and an early parsing rule based on word order would be expected. Any hypothesis concerning case markers would not be confirmed whereas they would be in a free word order language such as Turkish, which uses case markings.

Canonical Sentence Forms

Slobin and Bever (1982) discuss the notion that sensitivity to those sentence types in the language which they consider diagnostic of underlying structure allows the child to characterize and identify canonical forms. They define such forms as those in which the speaker makes minimal assumptions about the background information of the listener. They are neutral sentence types that transmit new information. Bates and MacWhinney (1982) talk of canonical sentence forms as prototypes and of category membership as a function of degree of resemblance to the prototype.

Slobin and Bever (1982) evaluated sensitivity to canonical sentence form in a comprehension study, with children aged 2 to 4 years, in four different languages. The four languages -- English, Italian, Serbo-Croatian, and Turkish -- vary along the two dimensions of word order and case inflections. English (word ordered) and Turkish (inflectional minimally ordered) are both extremes, whereas Serbo-Croatian and Italian are medial in these dimensions, with both languages employing weak order and inflections. The canonical sentence form embodies the typical features of complete clauses in the input language. To the extent that one dimension is used to express a broad range of semantic-syntactic functions we

would predict that the parameters of that dimension would be readily established by the child. Conversely, where a language has different surface cues to express the corresponding functions, we would predict slower acquisition of these parameters and a trade-off relation between them. This is exactly the relation found in the four languages studied by Bever and Slobin.

The children were presented with sentences containing two animate nouns and a reversible verb in all three versions of ordering: NVN, NNV, VNN. These were rendered ambiguous in the inflectional languages by using neuter marking of nominative and accusative forms contrasting with the marked forms. Ambiguity for English and Italian was provided by unusual word orders. The children acted out the sentences heard, receiving equal numbers of clear and ambiguous items for their language. Turkish children at the age of 2 years were extremely competent in using the inflectional cues for interpretation. English and Italian children were competent in using word order cues but had fewer correct items at an early age than the Turkish. The children slowest to use the cues of their adult language were those learning Serbo-Croatian, for which they had to set parameters for both inflection and word order. Generally, inflections mark the subject and object but occasionally a neuter marked sentence can be

presented requiring a word order strategy to disambiguate it. A possible artefact in the test was the fact that Serbo-Croatian, by including inflections, had some sentences where the Object preceded the Subject, whereas the English and Italian had varying order, but the Subject consistently preceded the Object. Overall, however, the expected trade-off relation was observed. Similar findings are reported in Japanese where both word order cues and inflections are used together by young children, and in Polish and Hungarian. In the latter language, case markers were used in Comprehension at 2:6 years but the word order cue of SOV was not consistently responded to until 4 years (Bates et al. 1984).

In English the canonical sentence form has the Order Subject Verb Object (SVO), as in the Simple Active Declarative, and the earliest Syntactic device used is the word order cue. To map the transition from pre-syntactic to grammatical processing in children learning English, entails responses to word order cues and the relative reliance placed on syntactic strategies of word order versus other semantic-pragmatic strategies. Word order appears to be one of the earliest parameters to be fixed by English-speaking children.

Word Order as a Linguistic Universal

Word order has been described as a linguistic universal, because so many languages use compulsory or preferred word orders to explicate meanings. Even in languages that have a so-called free word order, adults will employ preferred word orders in cases of ambiguity (Greenberg, 1963; Slobin and Bever, 1982).

In their previously reported Comprehension study, Slobin and Bever (1982) hypothesized that, given ambiguous items, all children would employ strategies corresponding to the order regularities of their target language. From an analysis of word order in both adult and child language, these authors found that certain word orders predominate in each of the languages examined, even the inflectional ones. Thus in Italian, which allows word order variation, the most frequent order as in English is Subject Verb Object (SVO). Furthermore, ignoring verb position, the majority of sentences place the Subject before the Object.

In Serbo-Croatian NVN (Noun Verb Noun) predominates. (73% of children's utterances and 57% of adult utterances followed this order.) The first Noun is almost always the Subject. Children placed the Subject in the initial position overall 95% of the time to the adults' 87% of the time. In Turkish the most frequent order is NNV,

averaging 55% for children and adults, with a high usage of NVN at 37%. Again 73% of children and 78% of adults placed the Subject in initial Noun position in their utterances. This regularity of established order, particularly the placement of Subject before Object, supports the notion of word order as a linguistic universal. English-speaking children are found to be consistent in their use of word order from their earliest utterances, so that an underlying SVO structure has been inferred for a majority of their utterances at a 2-3 word utterance level (Bloom, 1970, Chapman and Miller, 1975; De Villiers and De Villiers, 1973). Similarly, maternal speech to children in English follows the trend of using simple canonical SVO sentence frames. Abrams et al. (1978) found that 60% of complete utterances with a verb, addressed to children aged 3 to 5 years, followed canonical word order. In their sample, only eight Cleft sentences and no Passives were used. Maternal frequency of canonical declarative and interrogative sentences, using a non-copular verb, were found to correlate highly with the child's age, and showed a decreasing use of the copula with increasing age. The child's comprehension of non-canonical forms was also correlated with the proportion of such forms in maternal utterances.

In English, the surface Subject precedes the Verb and agrees in number and person with it. Generally, the grammatical Subject coalesces with semantic Agency and pragmatic Topic. Bates and MacWhinney (1982) claim that this is prototypical of English. When there is conflict between the expression of the Topic and the Agency, as when a Patient is topicalized, English speakers may use an alternative word order such as the Passive. Any deviations from canonical word order, however, are syntactically marked. Bates and MacWhinney point out that languages differ in the way in which this type of competition is resolved. The coincidence of Agent, Topic, and Subject in English is not typical of all languages. Italian has no case marking for Agency but uses Animacy as a cue much more than word order, so that an Italian speaker faced with competition between Agency and Topic probably will choose the first Noun as Topic and give verb agreement with the Agent, producing a reversed Simple Active Declarative (SAD).

Therefore, while word order may be a universal feature, there are differences in the way languages express the complex of semantic and pragmatic aspects by word order.

Comprehension Testing

Evidence of early syntactic knowledge has been inferred from both production and comprehension studies. Production studies take the form of measuring spontaneous or elicited language samples, presuming that errors reflect an immature system. The problem in production studies has been that of inferring from the production of sentences with the same surface structure as those of an adult, an underlying grammatical competence of similar complexity. Linear mappings of verbal productions from actual events are possible, such that an action passing from an Agent to a Patient may be mapped in the Agent-Verb-Patient form, before rules for real phrasal categories are available in the grammar. Also, in an elicited production task, several different responses may be appropriate for a given context, and the child may never attempt the structure an examiner is hoping to sample.

Comprehension studies have the advantage of allowing precise structural analyses since a discrete input can be fixed. Usually, if co-operation is obtained in an enactment task, it is assumed that the response reflects the child's interpretation of the input. Logically, comprehension is prior to production. It may be argued that a child first will learn to decode a linguistic structure before he will make any productive attempt.

Therefore a process analysis must focus on the input side, rather than the output. In any case, the underlying linguistic competence serves both comprehension and production.

In view of the primacy of comprehension over production, and the relative ease of testing Comprehension, the study presented here will focus only on Comprehension. The following literature review examines studies that have analyzed performance in this area. More specifically, this review is concerned with studies that investigate the earliest stages of syntactic development and the transition from a lexical semantic system to a syntactic one.

At the earliest level the child uses the external real-world context plus knowledge of lexical items to guess the meaning of words in sentences, whereas at a later, syntactic stage the child uses surface cues and structure to interpret relations among words. Increasingly the extralinguistic context, while still present and a needed ratification of the message, becomes redundant with respect to the linguistic context and shifts from primary to secondary importance in decoding. This increasing 'decontextualization' is a part of the Comprehension process.

R E V I E W O F T H E L I T E R A T U R E

Early Use of Probable Event and Word Order Strategies

The use of lexical and contextual cues to interpretation has been termed a Probable Event Strategy (PES). This strategy has been inferred from children's response patterns both before and at the same stage of development as the Word Order Strategy (WOS). There appears to be a relation between these strategies such that a child may only make a structural analysis of sentences that cannot be decoded by probability. For a period of time the PES strategy appears to override the WOS.

Bever (1970) was the first to describe the WOS in responses to an enactment Comprehension task in children aged 2 to 3 years. He found that these children could not only act out plausible sentences of the form "The boy kicked the ball' but were 95% accurate on reversible SAD's such as "The boy kicked the girl.' Bever attributed this ability to a strategy of segmentation of the Surface Structure to isolate the first NVN heard and interpret this as a main clause corresponding to the Actor/Action/Object. Thus, although the early use of WOS was described for the SAD, it was conceived as a heuristic also applicable to multiclausal utterances.

The discovery of high levels of comprehension of the SAD had already been reported in 1967 by Lovell and Dixon. They used a picture pointing task with children aged 30 months. Given the complexity of the task, compared to enactment in a more lifelike context, the level of 60% accuracy they found agrees with Bever. Additionally, Bever's scoring was later criticized by De Villiers and De Villiers (1973), who pointed out that responses other than correct or reversed had been omitted in the count of 95% accuracy. Accordingly, if all responses were taken into account, Bever's results were 70% accurate. Bever, however, was the first person to talk of strategy use in comprehension and to employ an innovative procedure for testing.

In the same study, Bever claimed that a child under 3 years lacked the experience to use contextual information and employ probability judgement. Over the age of 3 years he found the PES would take precedence over the WOS in cases where it could be applied to decode a SAD. He also found an interference effect of probability after the age of 4 years for improbable SADs.

Strohner and Nelson (1974), replicated Bever's study, using Active and Passive sentences as he did. They found children of 2 years identical to those of 3 years with minimal use of WOS and much use of PES. There was a

striking response to probability with 100% correct performance on probable Actives and Passives, and 90% incorrect improbable Actives and 100% incorrect improbable Passives. Only reversible sentences showed use of the WOS.

The same relation between probability and word order was found in a study by Golinkoff and Markessini (1980), who looked at comprehension of the possessive form. Children of 20 months who were still at a predominantly single word utterance level were shown to have a clear notion of who could serve as possessors, and which objects could be possessed. Given anomalous forms such as 'flower's boy' they used a PES or else failed to respond. By the age of 5 years, however, when Mean Length of Utterance (MLU) exceeded 4 morphemes, a WOS was evidenced. The results for the younger group reinforce Berwick and Weinberg's notion of pre-syntactic lexical knowledge, because the children seemed to exhibit sub-categorization features of the lexicon.

A similar study is that of Sachs and Truswell (1978), who presented 12 children at an MLU level of 1.4 to 2 morphemes with unusual instructions such as 'tickle the book.' All the children responded to at least one unusual form, indicating some awareness of word combinations before they had begun to apply the WOS.

In the normal setting, verbal comprehension is supported by many different cues of lexical and extralinguistic probability and of suprasegmental aspects. Therefore, since structural analysis is not the only cue to response, conflicts occur when there is discrepancy between these redundant features. Chapman (1978), distinguishes systematic linguistic response strategies or "comprehension strategies" such as the WOS from other non-linguistic response strategies such as PES. The non-linguistic strategies are evidenced developmentally before the linguistic, and remain as potential strategies for dealing with different sentences in different contexts. Even adults, when given multiply center-embedded sentences, will reject a syntactic analysis and revert to a plausibility strategy in decoding.

This notion of the primacy of plausibility is supported by adult results on denial structures (Wason, 1965), and in a study of 2 to 4-year-olds demonstrating faster reaction time to plausible rather than implausible negatives (G. De Villiers and Tager Flusberg, 1975).

It is known that children cope differently with the same sentence in different contexts, and that a sentence is more easily comprehended if consonant with the

non-verbal context (Huttenlocher, Eisenburg, & Strauss, 1968). As a principle, Bransford and Nitch (1978) state that one must consider the linguistic input to be decoded with its context, as a minimal unit.

Strohner and Nelson (1974) demonstrated the contextual influence by biasing the response of 4-year-old children in the Active and Passive testing by showing a picture preceding the sentence in which either the Agent or the Patient was highlighted. Passive responses improved and showed less use of WOS when there was a match between the Picture and the sentence. A similar study by Hargrove and Panagos (1982) showed that prior linguistic context of short stories could bias responses if the highlighted toy was the Agent. Similar effects were noted in a study by Bridges (1980) who looked at comprehension of reversible Actives and Passives, where the relative proximity, mobility, and position of referents influenced the response. It is clear then that probability cues are available to very young children; syntactic strategies predominate with increasing age, starting with the operation of the WOS at 3 years for SAD interpretation; both PES and WOS remain operative even in adults, and exercise competitive effects during syntactic development.

Self as Agent

Another pre-syntactic strategy was first reported in a study by De Villiers and De Villiers (1973). They gave children aged 19 to 37 months an enactment task with reversible Actives and Passives. The youngest children, under 2 years with MLU levels of under 1.5, demonstrated a predominant response of Self as Agent (SAA), which made up a third of the responses. Many Actives and Passives were correct but in each category this was a lower percentage than SAA, defined as the child acting on the object himself with the stated verb.

Bridges (1980) found a similar response pattern to Active and Passive interpretation, especially at 2:6 years. Only 10% of the responses of children aged 2:6 to 5 were attributable to the WOS. One rule interpretation was noted at 2:6 to 3:6, followed by a period of mixed responses until 3:9 to 4:3, when adult-like responses were obtained.

Later Use of the Word Order Strategy

Since word order is used as a device for comprehension of the SAD, we would expect that children would transfer the use of the WOS into other contexts such as multiclausal utterances and sentences with reversals of canonical word orders. Bever, however, found that younger

children who were using the WOS on Actives, performed randomly on Passives (which reverse canonical order, so that the Patient is topicalized in initial position). Not until the age of 3:6 to 4:3 did he find the WOS applied to Passives to incorrectly reverse them. The same latency effect was noticed in contrasting Cleft and Inverted Cleft sentences, which mirror the order relations of SAD and Passive respectively, (e.g. It's Mummy that washes the baby; It's the baby the Mummy washes). Random performance before age 4 gave way to WOS usage for interpretation of Inverted Cleft at 4 years.

Strohner and Nelson (1974) also replicated these findings with Active/Passive contrasts. At 4 years both the PES and WOS were equally used, the latter particularly in interpreting Active sentences. Not until 5 years did syntactic considerations over-ride probability.

De Villiers and De Villiers (1973) found a similar period of non-application of WOS to the Passive even when it was operative for the SAD. At an MLU of 1.5 to 2.5 (i.e., 2-3 word utterance level) the child used the WOS to interpret a reversible SAD, but not until MLU of 3.0 to 3.5 did the child apply this to the Passive.

The early studies assumed that the WOS operative for both Active and Passive forms was the same. However, it

is possible that a linear mapping underlies the early occurrence of WOS, whereas by the time the child applies the strategy to non-canonical forms it may represent a very different level of structural awareness. In the Passive, the auxiliary represents a disruption in the surface search for an NVN. Normal experience of such a form in on-line processing would lead the child to anticipate an adjective such as 'The boy ishungry' or a present progressive form such as 'The boy is ... sleeping' rather than a passive such as 'The boy is bitten by the dog.' Even this assumes a child alert to the auxiliary form. By the time a child applies the WOS to the passive he is already able to parse separately, and then recombine parts of the sentence.

Lempert and Kinsbourne (1980), considered this when they analyzed different aspects of the WOS and demonstrated that it was only a particular example of making the Noun before the Verb an Agent. They presented children aged 2:6 to 6:3 with reversible Passives and Inverted Clefts. Between 3 to 4 years two strategies were operating, both leading to Passive reversal but one leading to a correct response on the Inverted Cleft. For example, applying a strategy of Noun pre Verb as Agent (N pre V), Sentence A (below) would be reversed and Sentence B correct:

A. The boy was kicked by the girl. (Passive)

B. It's the boy the girl kicked. (Inverted Cleft)

Applying a strategy of Order of Mention (OOM) -- making the first Noun the Agent -- both sentences would be reversed.

The first strategy (N pre V) that Lempert and Kinsbourne described was derived from Sinclair and Bronckart (1972), who had characterized the SVO response as a combination of Action plus Object or VO interpretation and Agent plus Action or SV interpretation.

In another study of children, aged four to six, Lempert and Kinsbourne (1978) compared the developing comprehension of reversible Passives and Inverted Clefts. Some children aged 4 performed well on Clefts (which the authors attributed to the (N pre V) Strategy) but at 5 and 6 years performance on Passives was better than Clefts. The authors suggested a WOS might be applied to Clefts at a later age, but the prepositional cue 'by' could alert the child to correct performance on Passives. The results indicate that different strategies may be applied to different sentence forms. Also individual children may apply strategies idiosyncratically.

Cues to Response in Passive Comprehension

The Passive sentence may be interpreted by both the structure (Noun Phrase + Auxiliary be + Verb with -ed past participle ending) and by the cue of the preposition by. Watt (1970) claimed the structure was the cue, but a study of anomalous passives such as 'The cat is licked of the dog' found the preposition to be the cue in children aged 3 to 4 years (Maratsos and Abramovitch, 1975). Shorr and Dale (1981) further evaluated prepositional use in the passive frame. Working with children aged 33 to 46 months, they found from a stronger elicitor of a passive interpretation than the normal by, whereas the preposition to resulted in an active interpretation. They attributed this to a case-grammar notion of Source-Goal structures being applied to Agent-Patient relationships; this entails semantic interpretation of the preposition as the major cue to response, rather than word order or structure.

Harris (1976) found that children aged 3 to 7 years comprehended truncated Passive forms more readily than full Passives. This was, however, contradicted in Maratsos and Abramovitch's study in which the forms were equally difficult.

Exact measures of comprehension of Passives were made by Baldie (1976), who looked at Imitation, Comprehension and Production in children aged 3 to 8 years. Auxiliary

errors were found in Imitation but not in Production. Comprehension was almost perfect at the age of 6:6 to 7:6, and production improved greatly from the age of 6:9, closely mirroring comprehension.

Comprehension of Grammatically Distorted Sentences

Arguing that the use of lexical and contextual cues precedes the use of word order cues to comprehension, a set of studies has attempted to give young children scrambled word order, truncated utterances, and utterances that omit functors. These studies have the intention of mapping the acquisition of the WOS.

Wetstone and Friedlander (1973) presented holophrastic level children with normal sentences, telegraphic utterances, and scrambled sentences. All of these were interpreted equally well by the children, yet older, more 'fluent' children experienced difficulties with scrambled word order.

A similar study by Kramer (1973) presented well-formed, anomalous, and ungrammatical sentences to children productively in Brown's stages I - III (MLU = 1.01-2.99). At stage I responses were dependent on intonation contour and semantic knowledge of the Noun. Well-formed sentences were always easier than the other forms, at all stages.

Shipley, Smith and Gleitman (1969) presented young children aged 18 to 33 months with utterances that mirrored their own levels of production. They found differential responses as a function of production skill. Telegraphic speakers responded best to full adult forms, whereas more primitive holophrastic speakers responded best to telegraphic forms. The addition of a nonsense word disrupted the response, particularly if inserted at the beginning of a command, and had a worse effect than simple item omission. These findings were later disputed in replication studies demonstrating that telegraphic speakers aged 1:6 to 2:6 preferred adult forms to child forms although there is increasing responsiveness with age to adult forms (Petretic and Tweney, 1976; Ruder, Smith, and Murai, 1980). Overall, these studies indicated that even the youngest children tested responded best to adult forms. Even older children, aged 5 to 7 years, showed an increasing ability to discriminate grammatical from scrambled sentence forms from 22% to 78%. They also showed better imitation and comprehension of grammatical than scrambled forms (Bohannon, 1976).

Table 1 presents a summary of findings with respect to word order.

Other Cues to Response Apart from Word Order

Suprasegmental Features and Timing

To test the assumption that intonation contour may cue the meaning of an entire phrase, prosodic aspects have been studied in relation to comprehension. Presenting various types of relative clauses in four variant conditions of omitted/retained, prosodic markers/syntactic markers, to children aged 4 to 5 yrs, Lahey (1974) found word order the major cue to response. Elimination of either prosodic markers or syntactic markers had little effect. The only interaction was found in center-embedded sentences with retained syntactic markers without prosody, which were hard to decode. Prosodic features, syntactic markers, and word order were all functional productively. It is possible that older children having greater comprehension of the relative clause would be more affected by these markers. Nevertheless this still implies that sentence structure cannot be learned through prosodic features alone.

Emphatic stress has been shown to force a change of pronominal reference in the interpretation of pronominal co-reference at 5 years (Maratsos, 1973). This indicates that prosody can be used to shift markers once they have been learned.

Timing changes have been shown to enhance comprehension, but only of specific sentence types. Nickola Nelson (1976) found that slowed rate enhanced comprehension of her less difficult sentences in children of 5:6 but did not affect more complex sentences, perhaps because these were already beyond the processing level and only increased memory load. Pause placement between clauses was found to aid comprehension in children aged 44 months (LaBelle, 1973). Presumably, timing changes help preliminary clausal segmentation, thereby allowing the allocation of units to internal structure mapping more easily. Highlighting the phrasal unit for decoding may act as a signal device to the system before strategies are applied.

The Nature of the Verb

Two studies by Maratsos et al. (1979) indicated verb effects on comprehension and the difference between action/non-action verbs such as shake vs. know (Maratsos, Kuczaj, Fox, and Chalkley, 1979; Becker and Maratsos, 1979). These findings fit a model of parameter setting based on prototypical form. Strongly actional verbs map Agent/Patient relations very clearly. Different effects of individual verbs were also noted by Broen and Santema (1983) in a comprehension test of verb tenses in children

aged 3:6 to 5:6 and in a test of comprehension and production of word order in Stage I children (Roberts, 1983).

Animacy

An additional factor, not considered in early studies, yet affecting both linguistic sub-categorization frames and extralinguistic probability, is Animacy. Chapman and Miller (1975) found a hierarchy of difficulty associated with Animacy in Subjects and Objects such that the easiest comprehension of actives in children aged 1:8 to 2:8 was Animate Subject with Inanimate Object. The reverse was the harder, and intermediate in difficulty were sentences with Subject and Object either both animate or both inanimate. All the sentences tested were reversible Actives.

Older children aged 2:0 to 3:6 were tested in a follow-up study by Chapman and Kohn (1978), looking at six possible response strategies. The stimuli varied in animacy and probability. The WOS was not consistently applied until 3:6 and before this there was an inter-relation between Animacy and Probability, such that a preference for Animate nouns varied across sentences; there was a sentence specific PES, and mixed strategies were used by some children.

The same kind of ordering noted by Chapman and Miller is evident in the interpretation of the Passive with variants of animacy. In a population aged 3 to 5 years, who correctly interpreted all Active Sentences, the Passive was found to be easiest to interpret with inanimate Agent in a mixed animacy sentence such as 'The boy is hit by the ball'. A sentence with Animate agent such as 'The ball is hit by the boy' was found less easy to interpret. (Lempert, 1978).

Lempert noted that her results correlated with the production data of Horgan (1978) on Passives, where it was suggested that children used an "instrumental passive" to express 'non-agent' causation. Lempert proposed this as a viable explanation of the observed Comprehension performance. Her findings are reinforced by Dewart's study (1979) in which children aged 3:3 to 5:0 were first tested for Passive Comprehension and then given a task of choosing a suitable referent for a nonsense word in a sentence. The non-comprehenders preferred the first Noun to be animate in both the Active and Passive voice (i.e., treating both as Active), whereas the comprehenders only selected the first noun as Animate in the Active voice.

The ordering of animacy in processing direct and indirect object sentences in children aged 5 to 10 years has also been described (Cook, 1976). Easiest is

animate indirect object and inanimate direct object as in 'The man gives the woman the book.' The reversal of this is harder, and the hardest of all is when both are inanimate. Inclusion of the preposition to enhances comprehension, reflecting the same Source-Goal influence as the Passive data.

Recent papers, however, have suggested a trade-off relation between sentence voice and Animacy factors in the establishment of case. They have shown that young children are not influenced by Animacy and have sensitivity to Agent/Patient Categories despite animacy.

Angiolillo and Goldin-Meadow, (1982) showed children aged 2:4 to 2:11 action sequences with both Animate and Inanimate Agents and Patients, and measured four different aspects of production. They found Agents treated differently from patients on all four measures, regardless of Animacy.

In another study of 2-year-olds, Corrigan and Ody Weis (1985) trained children on Actives and Passives in a token placement task for distinguishing Agents and Patients. Subgroups received different animacy training parameters: either Animate Agent/Inanimate Patient (AI), or IA or II. When the children were divided into high and low scorers on a generalization test across all variants of animacy, the high scorers did equally well on trained

and non-trained variants. The low scorers, however, showed differences that depended on their animacy training. The prototypical AI sentence was reversed by training in IA, so that children trained on inanimate agents with animate patients could not generalize to the prototype, whereas II trained children could perform as well as the AI group on the prototype. The authors found that animacy had less effect than anticipated, but the study clearly showed prototypical features for English.

In a more extensive study, comparing children aged 3 to 7 years, and those of 9 years, with adults, Dolgin and Behrend (1984) found that young children were not biased by animacy factors. The task was to answer questions about exemplars of categories of animate beings and inanimate objects. The age at which most animacy bias was found was actually 5 years. The authors rejected the notion that children of this age are attributing animism to objects.

Some of the earlier studies on comprehension, such as Strohner and Nelson (1974), presented all variants of Animacy, but did not control for this in relation to other factors such as Probability. Thus, their results may have been biased by this lack of control. Overall, it is apparent that Animacy does exercise an effect and must be controlled for in comprehension studies. The studies

show, however, that animacy interacts with Agency and sentence type.

The Word Order Strategy and Animacy Factors in Relation to the Comprehension of the Relative Clause

Many different interpretations have been given for the results of relative clause studies. Some studies have considered all four variants of the relative clause, namely:

- SS The cat (that bit the dog) chased the rat.
Relative clause subject relativized and head of relative clause is matrix clause subject.
(Subject - Subject)
- SO The cat (that the dog bit) chased the rat.
Relative clause object relativized and head of relative clause is matrix clause subject.
(Subject - Object)
- OO The cat bit the dog (that the rat chased).
Relative clause object relativized and head of relative clause is matrix clause object.
(Object - Object)
- OS The cat bit the dog (that chased the rat)
Relative clause subject relativized and head of relative clause is matrix clause object.
(Object - Subject)

Smith (1974) described the WOS as a possible heuristic, along with the Minimum Distance Principle (MDP), which would make the Noun preceding the embedded clause its subject. Smith predicted the order of difficulty to be:

- OS Both strategies lead to correct interpretation
- SS NVN works for main clause but gets interrupted.
MDP fine.
- OO MDP fails. NVN works for main clause but then
linear breakdown disrupted.
- SO Both strategies fail.

This ordering was found in an elicited imitation task with children aged 29 to 35 months.

While it is quite clear what effect the MDP would have on the response, the actual effect of the WOS is more complicated to define in multi-clausal analyses with embedding. In both SS and SO, where the main clause is interrupted, the child has either to recognize the interpolation of that marking a separate clause or else risk isolating the wrong NVN sequence. In OS and OO, however, the strategy would help in the interpretation of the main clause. This is comparable to Slobin's "Interruption Hypothesis", by which center-embedded sentences that interrupt the main clause are expected to be harder to repeat (Slobin, 1971).

De Villiers, Flusberg, Hakuta, and Cohen (1979) re-evaluated this task using children aged 3 to 6 years and found age a factor. Other significant factors were embeddedness and focus, or the role of the head noun in the relative clause, with object relativization easier than subject relativization, and right-branching easier than center-embedded. This leads to better results for OO and OS than SS and SO.

Earlier, Sheldon (1974) had claimed that a parallel function hypothesis could explain her results with children aged 2 to 3 and 4:6 to 5:6. She claimed that relatives with identical functions for identical Noun Phrases were easiest -- that is, SS and OO. Foss, Bias and Starkey (1978) re-analysed Sheldon's data clause by clause, to evaluate competing theories of strategy application. The percentage correct for clauses was as follows:

- SS The dog that jumps over the pig (92%) bumps into the lion (54%)
- SO The dog that the pig jumps over (57%) bumps into the lion (39%)
- OO The dog jumps over the pig (91%) that the lion bumps into (50%)
- OS The dog jumps over the pig (85%) that bumps into the lion (34%)

According to WOS and the Interruption Hypothesis, performance on the main clause should not be as high in SS as in the OO and the OS, but roughly the same as in SO, which is what is found. However, the authors concluded that the parallel function hypothesis is correct because of the high result of the SS relative clause despite interruption. They then did a target word monitoring task for the word 'that' in various kinds of sentences, on a population aged 5 years. The relative pronoun does add to response time. It was claimed that occurrence of this word cues the child to enter a sub-routine in parsing.

None of these studies attributed performance on relative clauses to real linguistic or structural hypotheses. Yet it would be expected that by the time children begin to comprehend the relative clause, they have established a syntactic base and should be applying linguistic comprehension strategies. This was the claim made by Tavakolian (1979), when she found 63% of OS sentences interpreted as SS. Sheldon's explanation for this had been that the relative clause was extraposed from its original position as a subject modifier. Tavakolian showed that extraposition should also occur on OO relatives, making them extraposed versions of SO. This is disproved by the lack of better results on SO than OO. Instead, Tavakolian claimed a structural misrepresentation

hypothesis in which children interpret a relative clause as two conjoined sentences.

Solan and Roeper (1979), also supported the structural misrepresentation hypothesis, but claimed that the child attaches the relative clause to the topmost S node in the tree, in a right-branching recursive fashion, with a phrase structure rule of $S \rightarrow NP + VP + (S)$. This explains misinterpretation of OS sentences as SS. The child interprets a multiclausal sentence on the basis of the syntactic structure he assigns. Solan and Roeper explained the outcome of this structural misrepresentation as a broader base for the application of the C command Constraint, where the missing NP of the relative clause can be coreferential with the subject NP because the attachment was not through the Verb Phrase, but to the topmost S node. They also explained errors due to a failure to attach the relative clause at all, because of no tangle constraints with other compulsory constituents such as prepositional phrases attached to the VP.

The structural misrepresentation hypothesis was disputed by Goodluck and Tavakolian (1982), in a discussion concerning animacy factors as overloading the system. They argued that children aged 4 to 5 years could correctly analyze relatives as constituents within the Noun Phrase but that errors occurred when the processor

was overloaded. Goodluck (1981) had shown that reducing the animacy of the three Noun Phrases led to correct interpretation of the head Noun Phrase in an OS relative 75% of the time at 4 to 5 years. The object of the relative clause was made inanimate as in 'The cat bites the dog that jumps over the fence' and precluded Subject co-reference. The same children could cope with infinitival complements with 85% accuracy, with no effect of animacy, demonstrating that animacy may only affect structures children are in the process of learning.

In a second experiment Goodluck and Tavakolian demonstrated that the child is capable of analyzing relatives as constituents of the NP, by comparing Active and Passive main clauses in OS relatives and temporal participial complements such as 'The boy hits the girl after jumping over the fence'. Better performance on the relative clauses than on the participial complements (which are better in the Passive case) is attributed to a structural misanalysis of the participial complement. It is suggested that the complement is attached to the VP node, not the S node, so that co-reference with the matrix clause Object is possible in the Active case but prevented by the PP node attachment in the Passive. The fact that responses on these two types of sentences are different is due to recursion in the NP by the age of 4 years. Thus it

is claimed that the child has the adult competence, but is subject to processing difficulties.

One study of sub-rules in acquisition is by Hamburger and Crain (1982). They noted different aspects of relative clauses in production from 2 years and up, and demonstrated differential responses on OS relatives in comprehension studies, by failing to provide appropriate felicity conditions in testing. Since relative clauses function to discriminate two subjects or two objects they stressed the need to present two exemplars of each named animal or person in testing. Specifically they discussed the relation between presupposition and assertion and how this gets acted out with age.

In summary, there has been no clear consensus on the processes of comprehension of the relative clause. The results obtained have been attributed both to linguistic causes such as structural misrepresentation or process overload, and to non-linguistic issues such as parallel function, with lexical issues such as animacy as complicating features. In many studies only the OS relative has been a focus of attention, making comparisons between studies difficult.

Acceptability Judgements

Some of these pragmatic issues also bear directly on the whole issue of comprehension testing. A child who comprehends a sentence may still act it out incorrectly due to pragmatic factors. The only way to evaluate this possibility may be acceptability judgement tasks, yet this is a noted area of great metalinguistic difficulty for young children. We cannot be certain that the conscious cognitive processes needed for judgement are the same as the linguistic processing required for comprehension, even if the underlying initial decoding stage is the same. Moreover, most judgement tasks are given without an extralinguistic context, such as an enactment task provides, so that constraints on decoding are already different for the two types of task.

Judgement tasks traditionally have looked at issues of semantic anomaly versus syntactic anomaly. The former is usually provided by a synonym whose reading is explicated by the on-line linguistic context, or by contravening sub-categorization frames for specific lexical items. The latter is usually provided by scrambled word order.

Children aged 26 to 30 months were found to be significantly more accepting of normal than scrambled word orders by Gleitman et al. (1972). They still accepted 50%

of the imperatives with deviant word order, however, and when asked to correct those they called 'silly' made corrections on a semantic basis, if corrections could be given at all.

De Villiers and De Villiers (1973) modified this procedure and gave a series of semantically and syntactically anomalous sentences to children aged 28 to 45 months by asking them to teach a puppet how to say things the right way. They found an interesting progression from detection of semantic anomaly, such as 'drink the chair' to detection of both semantic and syntactic anomaly as in 'teeth your brush', at which stage children are also able to correct semantic anomaly. In a final stage children could detect and correct all types of anomaly. Children who were above a chance level at detecting incorrect word order imperatives and at accepting correct orders were found to have a correlation of 0.76 between judgements and corrections, and of 0.77 between word order corrections and the ability to enact correctly reversible passives. Thus there was a strong relation between comprehension of non-canonical word order and the detection and correction of anomalous word order. Children showing this ability were all over the age of 4 years and had an MLU over 4.0, being at Brown's Stage V.

Judgement tasks have not been used in the context of more advanced syntactic structures, where the syntactic anomaly provided by a misinterpreted Probable Passive would be similar to that in the De Villiers study. A judgement task could provide corroborating evidence in a comprehension study.

Summary

The studies reported here have been concerned with word order as the major cue to syntactic structure in English, and have evaluated the use of linguistic and pragmatic strategies in the acquisition process in Comprehension. The hypotheses that result from these studies may be summarized as follows:-

1. There are age-based stages of development in the comprehension of syntactic structure before adult competence is attained. The individual child passes through each stage.
2. Syntactic Strategies, such as word order, and pragmatic strategies, such as real-world probability, may be used interchangeably. At earlier ages probability decisions override syntactic ones, and this pattern reverses later.
3. Many factors influence comprehension. They include biasing context, animacy, prosodic

markers, changes or reductions in length or complexity and disruptions and alterations of word order. These operate as competing factors in on-line processing and are weighted according to the overall context.

4. In the acquisition of ever more complex structures the same strategies continue to operate and are subject to the same constraints and processes as they were in the acquisition of earlier structures. Children make hypotheses in Comprehension, based on the syntactic structures already acquired, and attempt to decode more advanced structures as if they were simpler forms.

Need for the present study

All the data reported above were concerned with group response patterns. This implies that, in interpreting the results, the mean response bias of a specific age is being described as normative. Chapman and Kohn (1978) did attempt to make an individual analysis of the use of six strategies and found mixed responses indicating that the use of a strategy may not be an absolute feature of a specific age or stage of development, but simply a response heuristic available to solve an individual

problem, namely that of decoding a given sentence. Chapman (1978) stated, "One can call these preferences 'comprehension strategies' if individual children show them consistently (for example, at least 80% of the time) in a sentence interpretation task." Pooling group responses to define a group strategy may mask the effects of individual variation in strategy use, especially at times of shift in strategy.

Also, if strategies are an aspect of the cognitive process, they surely reflect individual cognitive biases of a specific stage of development and should be manifested in highly consistent behaviour. Yet in some of the early studies individual children did not receive sufficient numbers of each item to fulfil the 80% criterion stated above. For example, in his two studies, Bever's subjects received one, then two items of each type; only sufficient to make statements on a group basis. There is need for a study that compares age-based group data with individual data, and ensures that sufficient items are included to evaluate strategy use for each sentence type. The finding of many different response biases before the use of WOS suggests the need to isolate more individual patterns of response to see if other general patterns exist.

While there is a clear progression of stages of development it is not known whether the individual child does, in fact, progress steadily through each stage. There have been no longitudinal studies. There is thus no indication of how an individual child develops both in terms of age, stages of development or process, nor even of group changes across time.

The historical spread of the studies reported and the different age ranges involved has made comparison of results difficult, especially as later studies have manipulated and shown the effect of factors that were not controlled for in earlier studies. As the following chart demonstrates, no one study has manipulated all the major factors.

Studies in Order of Publication

| <u>Author</u> | <u>SAD</u> | <u>PASS</u> | <u>(I)CLEFT</u> | <u>Probability</u> | <u>Mixed Animacy</u> | <u>Con- trolled Animacy</u> |
|---------------|------------|-------------|-----------------|--------------------|----------------------|---------------------------------|
| 1 | * | * | * | * | - | - |
| 2 | * | * | - | * | - | - |
| 3 | * | - | - | - | * | * |
| 4 | * | - | - | * | * | * |
| 5 | * | * | - | - | * | * |
| 6 | - | * | * | - | - | - |

* denotes included

- denotes not included

Authors

1 - Bever

2 - Strohnner & Nelson

3 - Chapman & Miller

4 - Chapman & Kohn

5 - Lempert

6 - Lempert & Kinsbourne

There is thus a need for a study that does manipulate or control for these variables.

Additionally, the exact relation between real-world knowledge and developing linguistic knowledge as reflected in the relative weighting of pragmatic or linguistic strategies, has not been tabulated across the age range from 3 to 6 years in any one study.

The assumption that the strategies for the interpretation of a simple sentence form are transferred unchanged to a more complex form has also not been carefully evaluated.

All these factors, therefore, provided the rationale for the present study.

Aims of the Study

This study was undertaken to answer the following questions concerning the development of comprehension.

1. What is the relation between a child's knowledge of real-world event probability and his developing structural knowledge during the period of early syntactic comprehension from 3 to 6:6 years? In what age groups are specific strategies demonstrated and particular structures learned?

2. How do children develop in their ability to make metalinguistic judgements of sentence plausibility based on both structural and real-world knowledge? What is the relation between Comprehension development and Judgement skill?
3. What use is made of strategies during the Comprehension process, particularly the Probable Event Strategy (PES) and the Word Order Strategy (WOS)? To what extent is the use of these same strategies replicated in the interpretation of more complex forms?
4. How does Comprehension develop over time in the same children?

Expected Patterns of Response

Relationship between event probability and structural awareness in comprehension

In this study it was predicted that early responses would be based on Probability of the event encoded in the sentence together with the child's knowledge of the lexical items used. Highly probable events facilitate interpretation based on real world knowledge, so that a child may be able to make sense of a sentence before he is able to perform a structural analysis. Sentences that are

Neutral with respect to probability and decodeable only by structural analysis are also the most decontextualized. Thus it would be expected that probable stimuli in which both factors of Probability and structure combine to promote the correct response would be easiest, followed by Neutral stimuli. The most difficult would be Improbable stimuli, in which Probability and structure conflict with each other in promoting an interpretation. Additionally it was anticipated that this sequence would be repeated for each sentence type in turn according to its complexity.

The sequence of development of SAD, then Passive, then Inverted Cleft Comprehension was anticipated, as described in the literature. The effect of probability was anticipated in the following sequence:

Stage 1 - The Neutral SAD is comprehended. Probability biases response in Improbable SAD and all other sentence types. Random interpretations are given to Neutral PASS and CLEFT sentences.

Stage 2 - The Improbable SAD is comprehended. There is use of a structural strategy such as WOS in Interpretation of Neutral PASS. The Improbable PASS and CLEFT are still biased by Probability and there is random performance on Neutral CLEFT.

Stage 3 - The Neutral PASS is comprehended. The WOS may be used for Neutral CLEFT. Probability

still biases responses in Improbable PASS and CLEFT forms.

Stage 4 - The Improbable PASS is comprehended. WOS may be used for interpretation of the Neutral CLEFT and Probability for the Improbable CLEFT.

Stage 5 - The Neutral CLEFT is comprehended. Probability still exercises an effect in Improbable CLEFT interpretation.

Stage 6 - The Improbable CLEFT is comprehended.

Judgement Task

No predictions were made concerning the Judgement task because of the young age of the population and the anticipated difficulty in performance. On the basis of the pilot study results, valid Judgements were anticipated at 4 years and upwards, with increasing numbers correct with age.

It was anticipated that the same ordering of sentence type would occur as in the comprehension test, such that SAD Judgements would be superior to PASS and PASS Superior to CLEFT.

Since Judgements of Plausibility are based on prior structural interpretation, it was expected that a child lacking a structural analysis of a sentence type may on a lexical base call the sentence 'good' simply by virtue of his lexical knowledge. Thus a careful analysis of

Judgement results is required to analyze responses on the basis of child comprehension as well as adult interpretation.

Comprehension of the Relative Clause

It was anticipated that the younger children would not be able to interpret relative clauses, but may apply a simple SAD interpretation to the first clause in the object relatives, and act out only one clause. The subjects tested on the relative clause task were a subset of the total, namely, those who used the WOS for either PASS or Inverted CLEFT sentence interpretation. Thus the main effect anticipated in interpreting the relative clause was that the WOS would be applied. Few correct responses were anticipated, but older children would be expected to act out both clauses and clearly demonstrate the strategy they preferred.

Strategy Use in All Sentence Forms

The expected effect of use of the PES was described in the earlier section on the pattern of responses in Comprehension tests. The Relative Clause test was devised to be Neutral with respect to Probability and to provide a check on structural interpretation only.

Use of the WOS in each sentence form has specific effects which should be evidenced in the Neutral forms. Included in descriptions of the strategy are three variants:

- (a) The first NVN = Actor/Action/Object
- (b) First Noun = Agent
- (c) Noun preceding Verb = Agent

In the SAD sentence all three variants lead to correct interpretation. In PASS sentence interpretation, all three lead to reversal.

It is only in the case of the Inverted CLEFT that different forms of the WOS provoke different interpretations. In this sentence type the verb phrase is inverted and split in two by an intruding Noun phrase, thus breaking the integrity of the verb/object structure. The form described in (a) above cannot be employed with the structure NNV; (b) leads to reversal; and (c) leads to a correct interpretation, provided the object is retained in memory. All of these variants would be anticipated.

In the case of the relative clauses, the use of WOS would be expected to be reflected in different response types as follows, depending on the form of the strategy if all three are viable. (Here 1223 means N1 acts on N2 and N2 then acts on N3.)

WOS use in relative clause types

| | <u>NVN</u> | <u>N₁ = Agent</u> | <u>N pre Vb = Agent</u> |
|----|------------|------------------------------|-------------------------|
| SS | 1223 | 1213 | 1223 |
| SO | (NVVN) Nil | 1213 | (NVVN) Nil |
| OO | 12 (NV?) | 12(NV?) | 123? |
| OS | 1223 | 1213 | 1223 |

Here WOS would aid SS and OS sentences but not OO, and only the N1 = Agent provides a viable strategy for the SO forms. If WOS is applied, then, the variant response patterns should indicate what form of the strategy is applied. An expected order of difficulty in acting out might be SS - OS - SO - OO, which runs counter to the literature.

In the case of the Relative Clause other strategies have been described, which suggest different orders and different interpretations, as described earlier in this chapter. A variety of response patterns is expected.

The strategy of Self as Agent would be anticipated in only the youngest children, and on the SAD and PASS forms only, as by the age of 4:6, when CLEFT sentences were introduced, this strategy should be inoperative.

Comprehension Development over Time

It was expected that groups would attain higher scores on all sentence types after a six month period and

that the same relations of sentence type and probability would be discerned as at the first testing.

Comprehension Versus Interpretation

In reporting the results a distinction will be maintained between 'comprehension' and 'interpretation'. Comprehension is taken to be a correct interpretation of a sentence mirroring an adult response. Interpretation is considered to be the apparent understanding of the sentence by the child, based on the incorrect application of strategies.

M E T H O D S

Testing Verbal Comprehension

The major task of the experiment was to devise a comprehension test for young children that evaluated the planned variables of Word Order and Probability. In keeping with the Comprehension studies cited in the literature review, it was thought that an acting-out task was the best measure of verbal comprehension in young children.

Verb Choice

The choice of verbs was made on the basis of the following criteria. The verbs had to be:

- a) known to young children;
- b) readily acted out;
- c) clear in acting out from the perspective of scoring of Agent and Patient relations;
- d) unlikely to promote general excitement and distract from the task.

The following verbs were selected as candidates: bite, spank, feed, ride, wash, kick, knock down, jump over. These verbs then were tested in a pilot study.

Word Order

Canonical and non-canonical orders were included because of the known sequence of development of sentences varying in word order. Three sentence types were included: Simple Active Declarative (SAD), Passive (PASS), and Inverted Cleft (CLEFT). The exact acquisition process of the Inverted Cleft is unknown but occurs after Passive Acquisition. To measure the transition into syntactic structure, the age of the target population was chosen as 3 to 6 years.

Probability

Because the comprehension of reversible sentences with no inherent semantic probability is dependent upon comprehension of word order, the comprehension test had to include both reversible and irreversible sentences. In terms of adult notions of probability, an irreversible sentence would clearly be 'Probable', the reversal of it, 'Improbable', and a reversible sentence 'Neutral' with respect to Probability. Therefore, use of these three sentence types provided the three variants of Probability required. While it was assumed that in young children ideas of Probability would mirror those of adults, as long as the events were within their cognitive domain and

experience, it was considered necessary to verify this in a Pilot study.

Animacy

Animacy was controlled by employing only one form. Four forms are possible: Animate Agent (AA) with Animate Patient (AP), AA with Inanimate Patient (IP), Inanimate Agent (IA) with AP, and IA with IP. Choice among the four was relatively easy, as most Agents are Animate and, in their belief systems, children tend to attribute animacy to inanimate objects quite readily. Thus it was felt that the form with both Animate Agent and Animate Patient would be the easiest in devising Comprehension test items and the easiest for the children to decode. It is also the form found medial in difficulty by Chapman and Miller (1975).

Judgement Task

In considering possible responses on the Comprehension task, it was clear that a child could interpret an item correctly and yet still act out the opposite because of the inherent improbability of the sentence. In such a case a Judgement of the sentence indicating whether it was considered a "good" or "silly" sentence would be strong supportive evidence. It was

decided to include a Judgement task for this reason. The feasibility of a Judgement task with a young population was in doubt, however, and this also seemed an area that should be clarified in pilot testing.

Pilot Study

The specific questions to be asked in the pilot study were the following:

- a) Do the chosen verbs fulfil the stated criteria for a young population?
- b) Are children's ideas of real-world probability comparable to those of adults? What are the limitations of lack of experience?
- c) Is a judgement task a viable option for the intended population of young normal children?

Sample

A sample was drawn from the 4-year-old group of a university daycare in Montreal. Two boys and three girls aged 4 years 1 month to 4 years 6 months were selected by the teachers. All the children were living in monolingual

Anglophone homes.¹ A 4-year-old sample was considered an appropriate age to give reliable responses and to answer the above questions validly. The children were seen once only for 15 to 20 minutes, alone in a quiet room.

Materials

The examiner presented the children with two different sets of materials. One set consisted of a Fisher Price doll house with a set of figures: Mummy, Daddy, boy baby, dog, chicken, horse, cow, and pig. The other set consisted of a stuffed Snoopy doll.

Pilot Test Procedure

Judgement Task

The Snoopy figure was introduced to the child by telling him that Snoopy was having trouble saying his words right and needed his help to tell him if things he said were 'good' or 'silly'.

The following Simple Active Declaratives then were presented, in a random presentation.

1. In Montreal, all educational settings are bilingual to some degree and thus all children in this study are exposed to French in the environment. Subjects from bilingual homes were excluded. The population discussed is English-speaking in the home.

The Daddy bites the dog.

The dog bites the boy.

The dog bites the Mummy.

The horse bites the baby.

The Mummy spansks the baby.

The Mummy feeds the baby.

The baby feeds the Mummy.

The cow rides the chicken.

The boy rides the horse.

The baby washes the Mummy.

The girl kicks the dog.

The chicken kicks the horse.

The horse knocks down the chicken.

The horse jumps over the pig.

The child made a Judgement and if he considered a sentence 'silly' was then questioned as to the reason for his answer.

Comprehension Task

The child was presented with the house and doll figures and allowed to identify them and briefly play with them. The examiner then showed the child an action and suggested that the child could perform some actions when told what to do. Given the same sentences as in the above Judgement task, the child was asked to act them out.

Results

Judgement Task

The children readily responded to the Snoopy figure, telling him whether his sentences were 'good' or 'silly', frequently added comments such as 'Chop your legs off, Snoopy' or 'Bite your nose off, Snoopy' with corresponding attacks, and were quite definite in their responses with a good deal of uniformity.

(i) Verbs.

In relation to the verbs, the following evidence emerged:

bite: Dogs bite and people do not. Three objected to dogs biting as 'bad'. Horses biting are uniformly 'silly', on grounds of this not being 'nice'.

spank: Three children objected to babies being spanked when they were naughty, but accepted children being spanked. The other two felt the spanking sentence was fine.

feed: Uniformly babies do not feed people but get fed.

ride: Uniformly 'silly' if a cow rides a chicken and fine for a boy to ride a horse. Corrected the former by reversing it and one remarked, 'Sounds bad for the chicken but good for the cow!'

wash: Uniformly silly if the baby washes the Mummy.
Corrected it by reversing.

kick: A girl kicking a dog is 'not nice'; a chicken kicking a horse uniformly 'silly', as a chicken can't kick, he can only scratch; the horse kicks the chicken.

knock down: For a horse to knock down a chicken was considered uniformly silly.

jump over: One child said a horse can't jump over anything and one child thought he would 'jump over a pig'. The rest thought it was silly.

On the basis of the judgements, there was consensus on the probability of dogs biting, children getting spanked, parents feeding and washing babies, and people riding horses. These five verbs were therefore selected for use in the Comprehension test.

(ii) Validity of test

As a test, it was evident that a Judgement task was feasible for young children and provided reliable results at the age of 4 years. As an adjunct to the Comprehension test it was judged that a replication of the probable and improbable items of the Comprehension test in a Judgement task would add corroborating evidence for any analyses.

(iii) Probability

Real-world probability for this group of children was demonstrated to be totally dependent on familiar and personal experience and seemed to have little basis in information from books, stories, related events, etc. Within these limits, adult and child schemas seemed to correspond.

Comprehension Test

The children experienced no difficulties in acting out any of the given sentences even those that they had proclaimed as 'silly'. As expected, this style of comprehension test appeared viable and 15 items were found an appropriate number to administer in one session.

Difficulty was experienced in manipulating Fisher-Price figures that lack arms and legs. The verb 'feed' also seemed difficult to evaluate, as the children tended to put faces together for that item.

Summary

In summary, the pilot study confirmed the validity of a Judgement task in a young population, indicated notions of Probability for children of that age, and suggested a set of reliable verbs to use in sentences for a Comprehension or Judgement task.

Experimental Design

Sentences for Comprehension Test

After the pilot study, a Comprehension test was devised using the five chosen verbs to provide the five exemplars of each sentence type in each variant of Probability. The nine sentence types were Probable, Improbable, and Neutral versions of Simple Active Declarative, Passive, and Inverted Cleft Sentences. The list of sentences is provided in Appendix A.

Age Range

The lower end of the age range chosen was 3 years. Children of this age already comprehend irreversible Simple Active Declaratives (SAD) and show some comprehension of reversible forms. Thus, it was judged that the issue of Probability would be immediately evident in the SAD sentences at 3 years. This is also the lowest age to which one could extend the methodology used.

The age range for acquisition of the SAD and Passive was expected to be between 3 to 6 years, with the acquisition of the Inverted Cleft completed at a later stage. Thus the upper limit of 6 years was felt to be realistic in eliminating ceiling effects.

Below the age of 4:6 children were not expected to demonstrate knowledge of the Inverted Cleft. Therefore it

was decided to eliminate the Inverted Cleft Items from the testing of children under 4:6, leaving only SAD and PASS items.

Longitudinal Testing

The study was intended to evaluate development in verbal comprehension over time in the same population, and to make both group and individual analyses.

Testing was replicated after an interval of six months. To capitalize on this time span it was decided to sample children according to age exactly at the half-year, instead of sampling an age range. Thus children averaging 3:6 at Time 1 would average 4 years at Time 2 and be comparable to the 4-year-old group of Time 1, thereby allowing additional comparisons.

Judgement Task

The judgement task used the same sentences as the comprehension test but excluded the Neutral versions and included the Probable (Good) and Improbable (Silly) sentences only.

Materials

Comprehension Test

A less interesting Fisher-Price A-frame house was used than that employed in the pilot study, since the original house had been found to be too distracting. The house provided a family context for the introduction of the figures. The figures used were Playmobil figures with moveable arms and legs, and included a father, mother, boy, and girl. The baby was a smaller, non-Playmobil figure, also with moveable arms and legs. The animal figures used were Fisher-Price and consisted of a horse and a cow of equal size, and a pig and a dog equal in size. A plastic spoon was included to allow the verb 'feed' to be acted out more clearly. All the figures were placed inside the house initially.

Judgement Task

The only piece of equipment was the stuffed Snoopy doll.

Test Forms

The Comprehension test for the older group consisted of 45 items, and for the younger group, 30 items. The sentences were scrambled and distributed for balance in verb ordering, sentence type, and probability

differences. They were altered if any nouns were mentioned as Agents in two consecutive sentences. The sentences then were listed on the test forms in order of presentation, and divided into two sections in case a break was needed in the testing. The resultant test forms for Comprehension IA and IB for the younger group and Comprehension IIA and IIB for the older group are displayed in Appendices B-D.

The Judgement test consisted of 30 items for the older group and 20 items for the younger group. These also were scrambled and placed on test forms in the order of presentation as Judgement I (Younger) and Judgement II (Older), and are given in Appendices E-F.

In all four tests, the first item was a Probable Simple Active Declarative.

Testing Procedure

Subjects

The pre-school group was drawn from three Daycare Centers in Montreal, (one in a university setting, one in a hospital, one in the downtown business area), and from one nursery school.

The children in these specific daycare settings tend to come from high socio-economic or educated groups. Therefore the nursery school and the two primary schools

used as sources for the school-age population were selected from upper-class residential areas, in order to create homogeneity across the age range.

The staff in the institutions provided lists of normal Anglophone children within the age range. Any child with suspected developmental delays or a history of neurological dysfunction was excluded.

The parents of each child received an explanatory letter that detailed the format of the experiment and the task, and included a consent form (see Appendix G). Only those children whose parents gave consent were included in the list of potential candidates.

Sample

In each institution children were selected first on the basis of age at the time of testing, those being closest to the half-year being seen first, with a leeway of 2 months either way. Any child who refused to come with the examiner to the testing room or who was unwilling or unable to complete the Comprehension test in two sessions was excluded. Only one child of 3 years refused to accompany the examiner.

In all, 70 children were tested. Two children of 3 years and one of 3:6 years could not complete the test. From those who did complete one child, found to be from a

bilingual home, was rejected. The remaining 56 children were selected out for their closeness to the half year, their sex, and their order of sampling. There were thus eight children in each of the seven age groups from 3 years to 6 years.

Comprehension Test

Each child was seen alone in a quiet room in the institution, generally seated at a small table opposite the examiner. In the nursery school and at two of the primary schools space was limited, so that children were interviewed sitting on the hall floor, with the equipment between the child and the examiner.

The same words were used to establish the procedure in each case. The examiner presented the doll house and invited the child to open it and see what he/she could find in there. If the child did not spontaneously name all the objects the examiner asked, "What's this?" Any errors or omissions were corrected and the names of the objects checked once more after some playing, before testing began. The child was allowed to play briefly with the toys, once the house had been removed to prevent its incorporation into the play.

The examiner then stated, "Look, I can make them do different things; like this" and showed the Mummy riding

the cow. The child was asked if he/she could do the same thing and only when the motor imitation was established did the testing proceed. The examiner then said, "Now we'll play a special game. I'll say something and you see if you can show me what's happening. What if I say 'The Mummy feeds the baby. Can you show me that? The Mummy feeds the baby.'" This was the first item on the Comprehension test. Testing then continued with repeats given if requested until the child completed Comprehension A. No child consistently requested repeats so no analysis of this was done. The child then was asked if he/she would like to play some more. Testing continued if the child agreed or it was suggested that the examiner and the child would continue another day. The child was asked to replace all the toys in the house. The examiner removed the house from the table.

Judgement Task

Following the completion of Comprehension B the child received the Judgement task. This meant that some children required two sessions for testing and some only one. Since this was not only reflective of fatigue but choice, no analysis was made.

In the Judgement task, Snoopy was placed on the table between the examiner and the child. The examiner asked

the child to identify the character and then stated, "Snoopy has a problem saying his words. Sometimes he says things that sound good and sometimes they sound silly. Can you help him?" The child nodded agreement and the examiner continued: "When he says something you tell him if it sounds good or silly. OK? Like, if he says 'The girl rides the horse', is that good or silly?" The child replied and the examiner reacted and discussed it, then continued: "If he says 'the orange eats the girl', is that good or silly?" The child replied and the examiner reacted and discussed it. Only those children who correctly identified the good and silly pilot sentences were given the Judgement task. Only one child, aged 3:6 did not receive at least one Judgement item.

The test continued with the instructions, "That's right. Now you listen to Snoopy and tell him if his sentences sound good or silly. Ready?"

The sentences then were presented in the order given on the form, with Snoopy standing facing the child and the examiner behind Snoopy. If the children reacted with the same response continually, the examiner reiterated the instructions.

Frequently if the child gave a response of "silly" the examiner asked "Why?" and elicited a comment.

Scoring

The test sheets included space for shorthand recording of responses. On the Comprehension test, the examiner marked A for Agent or P for Patient under the Spaces marked Noun 1 and Noun 2. If the verb was correctly acted out the verb space was checked or the substituted verb that was used was written in. Under the section marked Comment the examiner added remarks such as 'N/R' for No Response, 'Appeared confused', or any related verbal remark made by the child. Additionally, any productive use of Passive or Inverted Cleft forms was noted down.

For the Judgement task the examiner checked the 'Good' or 'Silly' space and added explanatory or related comments that the child gave, or marked 'N/R'.

Second testing: At the time of the second testing the procedure was replicated exactly. All but five of the children were retested. The missing subjects had left the institution (4) or refused to be retested (1).

Relative Clause Comprehension Test

An additional Comprehension test was given at Time 2 to test the assumption that children having a strong word order strategy might give an extraposition interpretation to an OS Relative Clause: for example, by making the first

mentioned noun in a sentence such as 'The Mummy washed the pig that pushed the girl' into the Agent of both clauses. This could be explained by both a conjoined clause analysis, as in the Tavakolian (1977) study or by a WOS usage. Considered along with the WOS usage on other sentence forms, however, this could be an informative addition to the Comprehension test. Only those children demonstrating the WOS response on 5 or more Passives or Clefts were tested.

To test the assumptions of Relative Clause Comprehension, all four variants of Relative Clauses were given using the five verbs of the Comprehension test and five exemplars of each clause type. The four types of Relative clause; SS, SO, OO, and OS; thus produced 20 items for testing. The test form is presented in Appendix H.

The Relative Clause Comprehension test used the same material as the Comprehension test with the addition of a giraffe for novelty, and the same procedure as described in the Comprehension test was followed.

Scoring with the form given in Appendix H proved to be complicated if the same procedure was followed as for the basic Comprehension test. In practice it was found easier to transcribe the entire response for each relative clause given, ignoring the headings.

R E S U L T S

Age Based Evaluation of Comprehension Skills

At the initial assessment at Time 1, 56 subjects were sampled, 8 in each age group. All these subjects were administered complete Comprehension tests. At Time 2, only 51 of these subjects could be retested because 4 had left the institutions and 1 refused to cooperate. Therefore the data reported are based on 56 Comprehension tests at Time 1, and 51 at Time 2. Of the original 56 subjects, 26 were boys and 30 girls, distributed almost equally throughout the age range.

Figures 1 to 3 show the percent correct responses for all sentence types across the age range. These are based on collapsed data from Time 1 and Time 2, representing groups of 16 from age 3:6 to 6 years and groups of 8 at the extremes (at ages 3:6 and 4:6 reduced to 14 and at 5:6 to 15 subjects, so responses are averaged). It is clear the sentence structures are learnt in the expected order of Simple Active Declarative (SAD) then Passive (PASS) then Inverted Cleft (CLEFT). The PASS sentences discriminate the groups well at all ages whereas the SAD is consistently high-scoring and the CLEFT low-scoring. Only the SAD reaches 100% accuracy by the end of the age range.

A three way analysis of variance evaluating the variables of Age, Probability and Sentence Type (SAD and PASS only), based on the ages of 4, 5 and 6 years of groups of 16, showed the main effects of Age ($F(2,45) = 8.35$ $p < .001$), Sentence Type ($F(1,45) = 102.02$ $p < .001$) and Probability ($F(2,90) = 17.8$ $p < .001$) to be highly significant. (At these ages all groups numbered 16.) The main effect of age is demonstrated in the difference between 4 years and 5/6 years ($p < .05$) and between 4 and 6 years ($p < .01$) by Wilcoxon tests. The main effect of sentence type is predictably that of SAD being much easier than PASS. Probable Sentences are consistently easier than the Improbable and the Neutral ($p < .001$) whereas Neutral and Improbable do not differ. Interactions of Age with Sentence Type ($F(2,45) = 4.78$ $p < .01$), and Age with Sentence Type with Probability ($F(4,90) = 2.65$ $p < .05$) were also significant. The effects of Probability change more over the age range for SAD than PASS showing that Probability affects ages equally but affects Sentence Types unequally. Age and Probability interact to affect some sentence types and not others. Thus the interaction of Age with Probability was not significant although the interaction of Sentence Type with Probability ($F(2,90) = 5.82$ $p < .01$) was significant. Figures 1 and 2 demonstrate the differential patterns of effects of Probability across

age range for SAD and PASS respectively. Table 2 shows the Analysis of Variance table and Table 3 shows the mean number correct in comprehension of sentence type by age group.

In a separate three-way analysis of variance of the 5- and 6-year-old groups only, but including all three sentence types, the main effect of Age did not reach significance. The main effects of Sentence type ($F(2,60) = 66.472$ $p < .001$) and Probability ($F(2,60) = 22.79$ $p < .001$) were significant and also the Interaction of Sentence Type with Probability [$F(4,120) = 6.236$ $p < .001$] such that all three forms of Probability are equivalent on the SAD.

Table 4 shows the Analysis of Variance Table and Table 5 the mean number correct in comprehension on each sentence type. The means are collapsed over age as there was no main effect of Age or any significant interaction of Age with other factors.

Comprehension of the SAD

The SAD sentences are significantly easier than the PASS sentences at all ages ($p < .05$). SAD sentences produce high scores throughout, with a consistent differential between Probable, Neutral and Improbable until 6 years. However, there are no statistically significant

differences between the Probable and the other two forms as there are on Passive reflecting the interaction of Sentence Type with Probability. In contrast to the literature, the expected extreme differences between Probable and Improbable are not seen. In fact, the Improbable SAD exceeds a 60% accuracy level throughout and matches the Probable score at the age of 6 years as does the Neutral. There is no significant difference between the age groups on the SAD probably because the greatest progress in this form occurs before 4 years.

The interaction of Age, Sentence Type and Probability is demonstrated by the fact that at 4 years the Neutral SAD is significantly different from the Neutral PASS ($p < .05$) but at 5 years the difference is significant in the Improbable forms only ($p < .05$) and at 6 years there are no significant differences between the SAD and PASS of any type.

Tables 6 and 7 show the percent of Subject/Object reversals and 'Other Responses' respectively; both are percentages of total responses. On the SAD the largest number of incorrect responses on Neutral are of the 'Other Responses' category. These include nonsensical responses, failures to respond, incorrect selection of Agent, Patient or Verb, Self as Agent and mutual activity of Agent and Patient. At 3 years 'Other responses' account for 32.5%

of the Neutral and 22.5% of the Improbable responses and even 15% of Probable indicating that Probability cues are less salient for the youngest children than for those 3.6 years and older. With increasing age, 'Other Responses' decrease and more responses are attributable to the use of the WOS or the PES. In keeping with findings in the literature, correct responses on the Neutral SAD increase from 63% at 3 years to 86% at 3:6 years, indicating an increasing degree of structural awareness.

Comprehension of the Passive (PASS)

The Passive is learnt during the age range sampled. The average correct PASS score of 15% at 3 years rises to 91% at 6:6 years. The interaction of Age with Sentence Type is demonstrated by a consistent age effect on Passives such that 4 years is significantly different from 5 and 6 ($p < .05$) and 4 from 6 years ($p < .01$). By contrast age groups are not significantly different on the SAD. All three forms of the Passive are low initially and the PES is not used to discriminate the Probable PASS from the other forms until 4 years. This is surprising in light of the reports in the literature of 100% correct Probable PASS at 3 years. Similarly the Improbable PASS does not show the extreme low scores reported by Strohner and Nelson who found 0% at 3 years rising to 18% at 4 years

and 70% at 5 years. Here the Improbable PASS is only about 15%-20% lower than the Neutral throughout and matches it at 4 years, 6 years and 6:6 years. At 5 years the Improbable is 65% correct but the extreme jump reported is never seen. At 6:6 years all three forms are comparable as were those of the SAD at 6 years and none of them is 100% correct. However, the Probable PASS is significantly different from the Neutral and Improbable forms ($p < .01$) which do not differ significantly from each other.

In addition to the strangely low scores for Probable PASS under 5 years, Table 6 indicates that there is also far less usage of WOS (measured by reversals) than would have been anticipated on the Neutral. Reversals are highest for neutrals, around 30% at 3:6 to 4 years, in keeping with Bever's findings of age of WOS usage, but there is no corresponding drop in correct performance, which remains much the same from 3:6 to 4 years as do the numbers of alternate responses at 25%. Also the number of reversals on Neutral at 3 to 3:6 years are matched on the Probable PASS which is not an anticipated result. This seems an over-usage of a WOS despite variation in Probability. As expected there is more use of reversals in the Improbable case where both WOS and PES would lead to this response, but in the youngest age groups it

appears that the Probability variation only adds about 20% more reversals in the Improbable case, at a stage when Probability should have a more dramatic effect.

Table 7 indicates that the low usage of PES at 3 years is attributable to a high incidence of alternative responses, accounting for roughly 50% of PASS at each Probability level. For this sentence type 'Other Responses' were failures to respond (18%), nonsensical responses, (10%), and a larger number of verb failures than in the SAD (38%) as well as Agent/Patient selection errors. The percentage of 'Other Responses', even for the Probable PASS, remains high until 5 years.

The Neutral PASS improves steadily, reaching 60% at 4:6 years, in keeping with reported findings of passive comprehension from age 4:6 years (Strohner and Nelson '74, Bridges '80). The bias of probability, however, is not overcome until 6 years when Neutral and Probable are equivalent and 6:6 years when all forms are comparable. These results suggest the application of different strategies throughout the age range, with no strong age-based trends for specific strategy use.

Comprehension of the Inverted Cleft (CLEFT)

The interaction of Age with Sentence Type was not found statistically significant. Across the age range the

scores on the CLEFT are low in comparison with other sentences. The clefts show the highest difference between Probable and Neutral forms of any sentence type averaging 24% across the age range. At the earliest ages the effect of Probability is also seen in higher scores for Neutral than Improbable until 5:6 - 6 years. However, these differences are not significant and only Probable is significantly different from the other two forms ($p < .01$).

As Table 6 demonstrates, a higher usage of WOS (as N1 = Agent) occurs in the Neutral Cleft than in the Passive, rising to 50% at 6 years. Throughout the age range from 4:6 to 6 years there are almost equivalent numbers of correct and reversed responses. At 6:6 years numbers correct increase and reversals decline. This equivalence could be accounted for by the usage of two different forms of WOS, a) the Noun before the Verb = Agent or b) the First Noun = Agent, which result in Correct and Reversed responses respectively. Lempert and Kinsbourne (1980) found high levels of correct performance on Neutral Cleft after 4:6 years with an average of 76% correct, and a range of 69% to 83%, commensurate with the use of WOS a) above. Here the average is only 47% which could reflect either random performance or mixed strategy use. In keeping with Lempert and Kinsbourne, however, the Neutral PASS is better than the Neutral Cleft.

At 4:6 years, 25.4% of responses on Neutral are of other types. This proportion decreases with age until 6:6 years when all responses are correct or reversed (see Tables 6 and 7). 'Other Responses' on CLEFT were predominantly failures to respond, mutual activity of both Agent and Patient performing action on each other and incorrect selection of Agent or Patient.

Despite the difference between Probable and Neutral forms, approximately 25% of the Probable CLEFT sentences are reversed, by children adhering strongly to the WOS, as the children aged 3 to 3:6 years do on the PASS. This is further support for the notion that WOS is strongly used in CLEFT interpretation. However, the failure to take account of Probability is belied by the fact that the Improbable form shows the most reversals indicating the use of both WOS and PES. As in the other sentence forms this influence of Probability persists until 6 years. At the age of 6:6 years neither Improbable nor Neutral attain 75% accuracy.

These differences in CLEFT responses reflect mixed strategy use by groups or else random response before acquisition of a structure. The section on individual analysis will clarify this.

The source of interaction between Sentence Type and Probability is evidently the relatively small effect

of Probability level on SAD as compared with its effect on PASS and CLEFT.

Table 8 summarizes the group data by listing the ages at which the scores of the various sentence types attain 75% accuracy. For each type it appears that Probability cues combine with developing structural awareness, such that there is always a gap of 6 months after the acquisition of a Neutral structure before Probability is overridden for the Improbable case. Figures 1 to 3 indicate that by 6:6 years, probability does not influence interpretation of the SAD and PASS, which are now almost perfect, but still has a small effect in aiding Probable CLEFT interpretation. This effect would not be predicted by 7 years in the CLEFT forms, however.

Data from Time 1 and Time 2

Separate tables of results for Times 1 and 2 for groups of 8, can be found in Appendices I to J. There is more fluctuation across the age range in the smaller groups. This fluctuation occurs during the process of acquisition of each structure and not at the age of more or less full acquisition. As such, it reflects the same operation of mixed strategies reported above. For this reason statistical analyses of Times 1 and 2

separately are not reported. Because of the individual variation, these data will be presented in terms of individual analyses only, as will change across time, in a later section on individual analysis.

Analysis of Verbs Used

By choosing the initial verbs with the criteria stated in the Methods chapter and subjecting them to a pilot test with regard to Probability notions of young children, it was not anticipated that any one verb would show results inconsistent with the others, but in reality the verb ride demonstrated an effect throughout the test, by reducing all group means except for the Probable and Neutral CLEFT which were raised. This is evident in Table 9 which shows the percent correct and reversed for each sentence across ages, at Time 1.

The results from the Probable SAD indicate an understanding of the semantics of the verb 'ride' and an ability to perform the appropriate action. However, even on the Neutral SAD sentences there is difficulty with this verb and more reversals occur, as is the case again in the Improbable SAD when performance is below chance, with a large percentage of reversals.

On the Passive the 'ride' sentences have the lowest scores and in the Neutral case the verb provokes more

reversals than other verbs. Although the Probable is much better than the Neutral and Improbable, it is the lowest scoring of all Probable sentences and appears to present much more of a problem in this sentence form than the others.

The results on the Inverted Cleft are even more striking. It appears as if the structural analysis attempted for other verbs is not even applied but there is much more reliance on the PES for the Probable and Improbable and reliance on some WOS for the Neutral. This results in a high score for Probable and low for Improbable and the Neutral is the highest scoring sentence of the CLEFT and the one with the greatest number of reversals.

Table 10 shows an analysis of age-based confusions with specific verbs, indicating that 'ride' exercised its effect on all ages.

Verbal Comments Given During Comprehension Testing

Some of the children tested were vocal in elaborating their response, disclaiming it, making remarks about sentence meaning, protesting, or opposing the stated sentence. Some of these responses clarify the comprehension responses and enable insight into the

interpretations made in decoding. Comments can be found in Appendix K.

Metalinguistic Judgements

In each Judgement task the children evaluated as 'Good' or 'Silly' Probable and Improbable versions of the sentences that they had acted out on the Comprehension task. There was, therefore, a younger group, under 4:6 years, receiving no CLEFT sentences for judgement and an older group, over 4:6 years, who did receive CLEFTs for judgement. The younger group received 20 items and the older group 30 items.

As expected, younger children were not able to make metalinguistic judgements. If they completed the task at all, many simply displayed a bias towards 'good' or 'silly' giving the same response to everything; usually this was 'good' presumably because of conformity to adult expectations and simple lexical understanding. Some children were able to make a few judgements and then lapsed. In the subsequent analyses, since an unchanging response resulted in a score of 50% correct, only those children completing the task and giving a ratio of 25% to 75% Good to Silly responses were included. These were characterized as 'valid' judgers. This criterion of inclusion allowed non-responses to some items, but not on

a continuous basis, which constituted non-completion. The children excluded were mostly those who gave an identical response throughout, or changed only when the instructions were repeated. Table 11 shows the number of children completing the Test at both times and the level of validity. The Table indicates developmental growth in the ability to make metalinguistic judgements, particularly from 4 years upwards. Roughly 75% valid judgements are noted by 5:6 years.

The purpose of the Judgement task was to determine to what extent the children's Judgement comported with their Comprehension and to use the Judgement data as corroborating evidence for the Comprehension findings.

Judgement Based on Child Responses on Comprehension Test

Lack of comprehension of a particular item on the Comprehension test resulting in a reversal of the expected Agent/Patient relation in acting out the sentence may dictate a reversal of the expected relation in correct Judgement. In other words, what is correct on the Judgement task should not be the 'goodness' or 'silliness' of a sentence as it is perceived by an adult, but the 'goodness' or 'silliness' of the sentence as it is interpreted by the individual child. Therefore, reference

must be made to the response of the child to the Comprehension item, in order to assess what would be a correct Judgement in the light of that performance.

Table 12 represents the change over time in Judgement scores related to the Comprehension results, by Sentence Type. Only those items which were acted out correctly or with an error-free reversal were analyzed with reference to expected responses. For example, at age 4 years on the PASS there was an average score of 6.8 correct out of 10 for Comprehension and 1.9 reversed and incorrect. The Judgement score was calculated stimulus by stimulus according to Probability and the expected result based on the child's own comprehension. Thus a reversed Probable Passive should be labelled 'silly' and would be counted as correct if it was. The results in Table 12 are collapsed over Probability as the probabilities for the Judgement task shift in line with Comprehension responses. Thus the average 4.9 correct in Judgement of the PASS at 4 years is calculated as a percentage of the 6.8 correct and 1.9 incorrect Comprehension, being 8.7.

It is apparent from Table 12 that those children who provide valid Judgements, even at 3 and 3.6 years have scores that are higher than the 50% that would be expected by chance alone. However, Judgement does not comport highly with Comprehension at a specific age but reflects

the linguistic complexity of the sentence types in the same way that the Comprehension data does. Thus the relative accuracy in Judgement is a reflection of both sentence type and age and seems to support the notion that a certain level of linguistic knowledge of a specific form is necessary before a child can make metalinguistic judgements of that form. If a 75% level of accuracy is taken, as for Comprehension in Table 8, it is clear that Judgement of the SAD reaches criterion at 5 years, that of the PASS at 5:6 years and that of CLEFT at 6:6 years. Even at 4 years, the age where judgements seem valid, the level of accuracy on the SAD is high as would be expected from children who have managed to overcome the bias of Probability in Comprehension. By the time Judgement improves on the Passive the Neutral Passive is comprehended with 75% accuracy. In the case of the CLEFT Comprehension at 6.6 years, it has already been noted that Probability has little effect and here there is 80% comporment between Comprehension and Judgement scores even while children are still experiencing difficulties in Comprehension.

In other words, before the Neutral Cleft is comprehended with a 75% accuracy level and at a stage when responses seem to reflect mixed strategy use and unclear group trends, individual children are evidently highly

consistent in their interpretive procedures across tasks. These results indicate the need to evaluate Judgement concurrently with Comprehension as these two processes are much more related than previously supposed. Since they also reflect individual item consistency, this will be further examined in the next section on individual analysis.

Individual Analysis

Because of the noted variation within the groups and the uncertainty as to whether group patterns reflect consistent strategy use by some children, but not by others, or mixed strategy use by all, individual analyses were undertaken. As stated before, this is the only systematic way of looking at strategy use, particularly in relation to the transfer of one response pattern to a different sentence type. It is also the only viable way of evaluating how comprehension develops.

Types of Responders

Using the predicted patterns of response, described in the Review of the Literature chapter, as indices of development, we can group children according to their responses on both the SAD and the PASS sentences. The distribution of such groups would be expected to be

weighted towards the adult end for the SAD, and more evenly distributed for the PASS. CLEFT groupings are not possible with this age range. Figure 4 shows clearly the impracticality of age-based groupings to define performance on the PASS, the medial sentence type, yet also shows the development with age through stages of response.

Grouping by Response on SAD

The criteria of grouping based on SAD sentences is as follows:

Group 1: These subjects rely more heavily on probability than on other interpretive principles. To be classified in this category children must have at least 4 items correct on Probable SAD. Probable scores must exceed Neutral and Neutral must exceed Improbable.

Group 2: These subjects are primarily users of the WOS. To be classified in this category children must have equal numbers of Probable and Neutral correct (at least 4), but may reverse Improbables.

Group 3: These subjects rely on a structural analysis of SAD, using the WOS to promote a correct response and overriding the PES so that Probable = Neutral = Improbable with at least 4 Neutral correct.

Group 4: These subjects have a completely correct adult response on all SAD forms.

One score exceeds another only if they differ by two or more. Scores differing by only one are said to equal one another.

Table 13 displays the groupings obtained by using these criteria to evaluate SAD responses. It is immediately apparent that Groups 3 and 4 extend across the age range, while Groups 1 and 2 extend from 3 to 5:6 years.

Over time, of the 51 children retested at Time 2, 23 had progressed (including 3 T1 uncoders now coded), 17 remained the same (14 of these in Group 4), 7 had regressed and 4 became unclassifiable. All regressions were back one group from Groups 2, 3 and 4. This is a total of 72% who remain at ceiling or progress over time, suggesting that the developmental basis for the groupings is justified (see Table 24). With these groupings as a basis, we can compare performance on Passive, CLEFT and Judgement tasks.

Grouping by Response on Passive

The criteria of grouping on the Passive is as follows:-

Pre-code: These subjects put named objects together, or give Self as Agent response or fail to respond, demonstrating immaturity.

Group 1: These subjects use the PES. To be classified in this category subjects must have at least 4 Probable correct with Probable exceeding Neutral and Neutral equal to or exceeding the Improbable. The Improbable is likely to be reversed.

Group 2: These subjects are users of WOS. To be classified in this category children must have at least 3 or 4 Neutral reversed and the Neutral equal to the Improbable. They may get Probable correct.

Group 3: These subjects demonstrate an emerging notion of the Passive. To be classified in this category children must have at least 3/4 Probable and Neutral correct; the Improbable may be reversed.

Group 4: These subjects have adult level responses with at least 4 or 5 of each type correct.

These criteria for the Passive result in the groupings shown in Table 14. These groups represent children at all ages, except for Group 4 where only children 4 years and older are found. All pre-code children are aged 3 years. Of the 51 children tested at Time 2, 25 had progressed (including 6 T1 uncoders and 3 pre-coders now coded), 23 remained the same (15 of these

already at ceiling) 1 had regressed and 2 had become uncodeable. Again, this represents 78% who have progressed or remained at ceiling, reinforcing the correct criteria for the groupings on a development basis (See Table 24).

Grouping by Response on the CLEFT

On the CLEFT sentences the use of the primitive strategy, N pre-verb = Agent, means all forms can be correct before a real structural analysis is performed, and give the impression of skill at an early age. This will occur less on the Improbable, making that a test condition for knowledge. The use of both the PES and the WOS (NVN or First N = Agent) make the Probable correct and the Improbable reversed on the CLEFT condition and except for the Neutral make it impossible to say which strategy is being employed. Strong use of the WOS on the Neutral would imply use of that primarily in the other forms also and without this the implication is of PES use.

Grouping by response on the CLEFT is therefore complicated by the possible use of both types of WOS in Group 2, and by the lack of data for cross-reference under the age of 4:6. However, using these criteria for grouping, the following groups emerge.

Group 1: These subjects are users of PES. To be classified in this category children must have at least 4 Probable correct, with Probable > Neutral > Improbable.

Group 2: These subjects are users of WOS. To be classified in this category children must have at least 3 or 4 Neutral reversed. The PES may be used to reverse 3 or more Improbables, or responses may be random on Improbables.

Group 3: These subjects using adult structural interpretation may still be overridden by Plausibility on Improbables. To be classified in this category children must have at least 3/4 Probable and Neutral correct.

Group 4: These subjects are adult level and overcome the PES check.

Using this criteria, Table 15 shows the groups that emerge.

In the CLEFT groupings all age groups are distributed throughout as would be expected in a sentence form that is only being acquired at the end of the age range. Despite this, from Time 1 to Time 2, 62.5% have stayed at ceiling or improved, with one becoming unclassified and one missing at Time 2. Forty percent remain the same, a very high number. The groupings are again justified by these figures (See Table 24).

General Predictions

Cross tabulations of the groupings found allows analysis of profiles to evaluate specific predictions. Sentence coding in each sentence type marks a progression from simple PES use through WOS usage to adult interpretation. In general, it would not be expected that a child would be coded in a higher group on one sentence form than he would be in a lower sentence form. Thus the following specific predictions can be made, and related to the stages of development described on page 47. Group 1 SAD precedes Stage 1 of the developmental sequence. As such it would be predicted that this group would also be Group 1 on PASS and CLEFT or else immature pre-coders. Additionally it would be predicted that more Group 1 PASS and CLEFT coding would be found in SAD Group 1 than in SAD Groups 2, 3 and 4.

Group 2 SAD corresponds to Stage 1 in the earlier predicted sequence of development (see page 47). As users of the WOS on SAD, this group may apply the strategy to more complex forms such as the PASS and be categorized as PASS 2. However they may fail to transfer to the next higher form and still be PASS 1. It would not be predicted that any of this group would be in PASS Groups 3 or 4 or in CLEFT Groups 2, 3 or 4.

Group 3 SAD are users of adult structural interpretation but still subject to error on a probability check. These subjects correspond to Stage 2. It would be predicted that these would be classified as Groups 2 and 3 PASS and Groups 1 CLEFT. Additionally more PASS 2 coders should be found in SAD Groups 2 and 3 than in other groups.

Group 4 SAD is completely correct and corresponds to Stage 3. It would be predicted that this group would be classified mainly as PASS Groups 3 and 4 and would be categorized as CLEFT 2. However, since this is the SAD ceiling CLEFT Groups 3 and 4 are also possible.

Having reached the ceiling of the SAD, further stages would reflect in developing relation between PASS and CLEFT, bearing in mind that the Noun before the Verb = Agent strategy can artificially improve Cleft scores before a structural interpretation is correct. PASS Group 2 would be expected to transfer the use of the WOS to the CLEFT and be categorized as CLEFT 2. PASS Group 3 would also be expected to show use of WOS on CLEFT and be classified as CLEFT 2, but with some CLEFT 3. PASS Group 4 corresponds to Stage 4 and would be expected to be classified as CLEFT 2 and 3. Since this represents the ceiling for PASS acquisition this group would also include CLEFT 4 representing Stages 5 and 6. No CLEFT

Groups 3 or 4 would be expected in PASS Groups 1, or 2, but should only occur in SAD Group 4 and PASS Groups 3 or 4.

Comparison Across Sentence Types

Using the groupings as cross-measures of ability, Tables 16-18 show the relationships between SAD and PASS, CLEFT and PASS, and SAD and CLEFT.

Bearing in mind that Passive pre-coders are 3 years old, Table 16 shows that these tend to be Probability users on the SAD, although 2 of them seem to be acquiring the SAD without having any strategies for Passive interpretation. PES users on the SAD are not therefore all using PES on Passives as predicted, although one is already at a WOS stage. WOS users on the SAD are divided between WOS use and unclassifiable response on the Passive at T1 supporting both predictions, but use WOS at T2 tending towards correct passives. Only in SAD Groups 3 and 4 do adult responders on the PASS emerge although at T1, SAD Group 3 is distributed in all Passive groups. The prediction of use of WOS in this group is not supported. Group 3 is tending to adult responses as Time 2 shows most clearly. Adult responders on SAD still have some WOS usage but are mainly adult on Passive as predicted. The predictions made imply discrete stages but the results

show that stages merge. Some children appear to work fully on one sentence type before attempting the next, but most have shifting systems that relate idiosyncratically. Children of 4 years and up are found in the adult Passive group.

Using the Passive as a baseline measure for the next sentence type, it was predicted that PES users on PASS would show this strategy on the CLEFT, and WOS users on PASS would use the same strategy in CLEFT interpretation. Only adult responders on the Passive would be adult on CLEFT. Table 17 shows the relation between CLEFT and Passive.

It is immediately apparent that the predictions concerning strategy transfer are incorrect. Those children who are unclassifiable or using the PES and WOS on the CLEFT are the most mature on the Passive. WOS usage occurs surprisingly in three children who use the PES on the Passive. The only correct prediction is of CLEFT comprehension occurring only in the adult Passive group. All these children are over 4:6 years.

The same relationship between strategy use across sentences is apparent in Table 18 comparing SAD with CLEFT. Specific strategy uses are not transferred across sentences. Adult comprehension on CLEFT only occurs in

children who have comprehension in both SAD and PASS, again aged 4:6 and up.

Figure 4 displays the age distribution across Passive groups collapsed for Time 1 and 2 which demonstrates the spread of ages in each developmental phase and clarifies the age relationship to Tables 16-18.

The fact that strategy use is not transferred across sentences is particularly interesting given that most responses are patterned and are accounted for by categories other than 'unclassifiable'. Individual children are using different strategies for different sentence types. The PES remains an option for the interpretation of more complex forms even when structural hypotheses are being used for less complex. A few children do have such strong structural hypotheses that they are led to reverse even probable Passives and CLEFTs. Table 19 lists these strong word order strategy users that reverse Probables on PASS or CLEFT and shows their coding on all sentence types. All of the strong WOS users on Passive were too young to receive the CLEFT. Two are not categorized as WOS users on the Passive but are on the SAD.

The over-users of WOS on the CLEFTs are a completely different group. All are mature or almost adult on SAD and PASS. These children would not be expected to show

responses that defy Probability. Strangely almost half fail to show the WOS on the Neutral required to be coded as WOS users. One child on the Passive and four on the CLEFTs show the same phenomenon both times, but the rest shift from Time 1 to Time 2.

These results indicate that the use of a specific strategy is not an age-based or developmental stage-based phenomenon but is an idiosyncratically applied sentence specific phenomenon.

Comprehension of the Relative Clause

A further sentence type was tested in Comprehension at Time 2 to evaluate the transfer of the WOS to a more complex form, that of the Relative Clause. Children who showed five or more reversals (i.e. one third) of either Passive or CLEFT sentences were given the relative clause test. Five children, who did not receive CLEFT, got this on the basis of Passive responses, with an average of 7 reversals. Twenty children got this on the basis of CLEFT responses alone, with an average of 9 reversals, and 7 children had 5 or more reversals of both, averaging 6 on Passives and 7 on CLEFTS. Thirty-two children out of 51, were, therefore, tested, and their responses scored on the four relative clause types.

Response patterns were determined by numbering the nouns in the order of the stated sentence and then by giving for the main and relative clause the relation pertaining between the nouns, the first number of the pair acting upon the second.

Examples

SS The cow [1] that bit the pig [2] pushed the dog [3] - correct response 1213, where N1 acts on N2 then N3.

SO The Daddy [1] that the cow [2] spanked rode the pig [3] - correct response 2113 where N2 acts on N1 then N1 acts on N3.

OO the dog [1] rode the cow [2] that the Daddy [3] washed - correct response 1232 where N1 acts on N2 and N3 on N2 also.

OS The pig [1] rode the giraffe [2] that kicked the Mummy [3] - correct response 1223 when N1 acts on N2 and N2 on N3.

Only those clauses where the verbs were correctly acted out were analyzed. Verbs were incorrect in 49 of the 456 sentences attempted and affected more of the younger subjects in both single clause and double clause responses on all Relative Clause types.

Table 20 shows the responses of each of the 32 children, grouped according to Passive groups. Tabulated

is CLEFT coding if old enough, number of correct responses, incorrect response patterns and whether or not both clauses were acted out.

Although there are some children in Passive Groups 2 and 3 who complete 19 or 20 items on the Relative Clause Test, (5 out of 14), it is clear that the bulk of the children who do so are in Passive Group 4 (11 out of 15). Also Passive Group 4 shows increasing numbers of correct relative clauses. This shows that children who give a mature response in one form often attempt more structural analysis in a more complex form.

The 6 children in PASS Group 2 are WOS users on the Passive. Only one, subject 23 is also coded as a WOS user on the CLEFT. If responses are considered in the light of possible WOS responses on the relative clause, one would expect high numbers of correct responses on the SS for N1 = Agent, but high responses on OS and some OO if NVN = Agent Verb Patient. (See predicted patterns of response in Review of Literature chapter. N pre Verb = Agent is not considered as this would have resulted in correct CLEFT performance, not Group 2 coding.)

In fact, there is no patterned response to support any version of the WOS being used in the relative clause interpretation by this group. There are no relative clauses correct until the age of 5 years and then very

minimal SS responses, and one OO response from a 6-year-old.

The rest of the children tested are in Passive Groups 1, 3 and 4, but are WOS users on the CLEFT, although 8 of these are not categorized as CLEFT Group 2. It would be predicted that this group reflects use of the WOS at a different stage of development from those using WOS on Passive. This may be demonstrated in more WOS usage on the Relative Clause.

Taking three responses of any type as patterned, Table 20 shows 4 of the 8 children in Group 3 to be patterned and 13 of the 15 children in Group 4 to be patterned. Subjects 18, 21 and 35 are unpatterned.

Nine children (Subjects 36, 37, 42, 44, 45, 46, 51, 54 and 56) show use of the NVN Strategy for correct interpretation of OS relatives, and extend it to the interpretation of SS (5 children), SO (1 child), or both SS and SO (3 children). Another 3 children interpret OS correctly but do not extend the WOS to other relative clauses. Only 1 child (subject 34) interprets SS correctly and incorrectly extends the N1 = Agent to the OS form. Two other children show correct interpretation of SS and do not extend any strategy use. One child with no SS correct uses the 1213 interpretation of OS.

These results strongly suggest that the WOS is extended to the Relative Clause by the CLEFT 2 Group and is used here in the form of the NVN Strategy which reflects a linear mapping allowing for a conjoined clause type of analysis. Additionally the linear aspect of the 'act-out' favours this strategy. This is also reflected in total scores obtained in each relative clause type, as Table 21 displays. Fifty percent of OS relatives are correct compared to 25% of the SS relatives. Additionally, the OO relative clause scores are high, as would be expected if the WOS also aids in their interpretation. In the OO the main clause is a complete NVN followed by a further NV requiring a decision as to which of the preceding nouns could be the patient of this clause. One child (Subject 36) consistently chose the First Noun as Patient. Four of the nine children who extended WOS from OS into the SS and SO forms were also correct on OO relatives but so was the N1 = Agent Strategy user. Three other children showed correct OO relatives either alone or with other correct forms. The 12% correct SO relatives do not reflect correct patterns from any child but accumulated sporadic responses correct on a group basis. The only patterned response for SO relatives was the incorrect 1223.

It would not be anticipated that children using a specific strategy would show responses consistent with an alternative strategy simultaneously. This is what is reflected in the patterned responses. Children may demonstrate maturity in having a variety of correct responses, or may show individually varied responses but strategy users employ one form consistently.

However, only half of the WOS users on the CLEFT use WOS on the relative clause.

Since it appears that relative clauses are difficult sentence types for this group to comprehend, it may be that single clause analysis will demonstrate the use of WOS more clearly than analysis of complete structures. In this analysis clauses that are part of a correct response are excluded, but all other single- and two-clause responses are included, even those making up the patterns reported above.

Table 22 shows the numbers of correct single clauses calculated for those sentences incorrect overall, for each relative clause type. Here it is clear that the SS relative that had fewer correct responses overall than OS and OO does show a strong effect of the WOS in making the relative clause portion, the first NVN, correct in 69% of sentences. Similarly, the operation of the WOS on the first NVN of OO and OS relatives leads to correct main

clause responses in 68% of OO sentences and 64% of OS sentences. In contrast, the relative clause portion of the SO sentences which has reversal of Agent and Patient as in the Inverted Cleft, shows only 24% accuracy.

Many children with incorrect responses show one clause correct for all 5 exemplars. Analysis of those clauses present and those missing indicates the processing difficulties experienced at stages before comprehension.

On the SS relatives, 9 subjects have all 5 of the relative clause part of the SS relatives correct. Of these, all except 1 are in PASS Group 4 and all but two demonstrate at least one SS correct. Seven of these, including the two with no SS correct, show the 1223 response pattern on OS and SS. No children show all 5 relative clause portions correct on the SO relatives with Inversion in the relative clause.

As might be expected, the OO and OS relatives which start with an (NVN) structured main clause, have very few exemplars of correct relative clause portions and many correct main clause portions. On the OO, 7 subjects show all 5 of their main clauses correctly acted out. Once again they are all in Group 4 except for the uncodeable subject 18 and all except for 18 have some correct OO responses. Once again, response patterns are mixed but 4 show 1223.

On the OS, 11 subjects show main clause correct throughout, and all but 2 are in Group 4. Again all but 2 have correct responses on OS, and 8 show the pattern of 1223.

Among the children who have 5 of one clause correct in the absence of 5 totally correct responses on a relative clause type, it can be seen that 4 of them have the SS relative portion and the OS and OO main clause portions correct and also have several complete relative clauses correct. Others have a co-occurrence of two clause portions only, but again are children who have many relative clauses correct. Thus it is apparent that an ability to process consistently a single clause of a relative clause sentence is only found at a level where some real ability to process both clauses is apparent. There is no evidence that children simply disregard one clause and process the resultant simple sentence according to their linguistic ability. Instead the younger, linguistically less mature children become disgruntled, fail to respond, give up readily and show confused responses.

Comments concerning the Relative Clause can be found in the Appendix.

Gender Differences in Comprehension

In looking at individual profiles of performance, it is pertinent to ask whether any gender differences exist in sentence type grouping, since Bever found that boys were six months later than girls in their application of the WOS to Passive interpretation. Table 23 shows the distribution of sentence groups by sex and indicates that there are no major differences.

Growth from Time 1 to Time 2 in Relation to Task Performance

Grouping According to Responses on Passive Forms

There are various ways of analyzing the growth from Time 1 to Time 2. If children are grouped according to their performance on all sentences cross-tabulations reveal developmental trends both in direction and rate of learning.

Tables 24 to 27 show the relationships within and across sentence types over time. Looking first at Table 24 which shows the relations within each sentence, strong predictions can be made. In all sentences unclassifiable children of T1 are spread throughout the groups at T2. The SAD is the only sentence in which attainment of adult response is not a fixed state and 4 children regress from this. In general, however, SAD Groups 3 and 4 at T1

are good predictors of SAD Group 4 at T2. Group 1 seems to shift to 2 and 2 to 3 which supports the developmental progression. All sentence types have increased numbers of adult responses at T2.

On the Passive all coded groups can attain adult response by T2, but as in SAD it is predominantly Groups 3 and 4 that attain this. There are 8 children in the middle groups who remain unchanged. This is seen again quite markedly in the CLEFT sentences where almost all the Group 2 and Group 3 children stay the same. There is a strong trend for the random responders of T1 and the younger children to use WOS at T2 on the CLEFT. On the Passive and the CLEFT, attainment of Group 4 at T1 is a fixed state. No children regress from 4.

Much more interesting relations emerge between sentence types. Table 25 shows the relation between the SAD and PASS forms. Groups 3 and 4 on SAD at T1 have high incidences of correct Passives at T2 (55% and 88% respectively). This is important as it refutes the notion that there is a stepwise progression from one structure to the next with strategy use as an intermediate step, and is surprising as a prediction from a simple to a more complex structure. The Passive at T1 predictably characterizes the SAD at T2, such that pre-coders tend to WOS, and

Groups 2, 3 and 4 are tending towards adult responses but, strangely, they are not totally correct.

Looking at the relation between the Passive and the next higher form, the CLEFT, there are, once again, some surprises. High scores on the Passive at T1 do tend to predict high scores on the CLEFT at T2 in Group 4. However, the disconnection between the use of WOS for the Passive and the CLEFT is made manifest again in the fact that a large number of WOS users come from Passive Groups 3 and 4 and only 2 from Group 2. As predicted, coding on the CLEFT Groups at T1 is likely to result in correct PASS performance at T2 and all the WOS users of CLEFT T1 are correct on Passive.

Because of the spread in age of acquisition between the SAD and the CLEFT it would not be anticipated that there would be strong relations between these two sentence types. The interesting point here is that SAD Groups 3 and 4 have 50% using the WOS on the CLEFT at T2, although correct performance also occurs in these groups. Any grouping of CLEFTs at T1 results in correct response on SAD at T2 and only those unclassifiable or very young are scattered through the groups.

Table 28 displays individual profiles over time. The subjects coded by SAD groups are too young to receive the CLEFT. The relation of age to comprehension skill is

demonstrated by the fact that only 2 of this group are in SAD and PASS Groups 4 at T2 compared to 21 of 32 of those old enough to receive the CLEFT. There is also a much higher incidence of early coding on PASS. In the group coded by CLEFT, it is also clear that those children who are unclassifiable on CLEFT are highly structured Groups 3 and 4 on SAD and PASS, not primitive responders at all. Six months later two of them have regressed from a 44 coding on SAD/PASS and most are WOS users on the CLEFT. Any child completely correct at T1 is also completely correct at T2, reinforcing the fixed state aspect of adult-type competency.

D I S C U S S I O N

The first question posed in this study concerned age of comprehension of specific structures. It is clear that age-based grouping does not adequately describe the acquisition process. As predicted, there is increased accuracy with age, sentences are comprehended in the predicted order and there are clear systematic principles operating. However, it is impossible to define any absolute principles for the responses of a specific age group. Instead, not simply chronological age, but age in association with linguistic sophistication becomes the defining factor of relative maturity. This finding is in direct contrast to the literature in which more uniform age group responses have been recorded (Bever, 1970, Strohner & Nelson 1974, Lempert & Kinsbourne 1980).

One possible reason for this difference could be the test structure. Bever's subjects, receiving mixed SAD and PASS sentences, heard only one reversible PASS, thereby reinforcing correct SAD responses and WOS use. Children who failed to respond could choose one of two acted-out versions performed by the experimenter, reducing the 'other responses' category. Strohner and Nelson tested 2 items of each type in a mixed test, but gave the two designated puppets for each sentence presented,

eliminating multiple choices for Agent and Patient. Lempert and Kinsbourne gave 8 examples of each sentence type tested in a mixed task, but used only reversible sentence forms, thus forcing reliance on structural hypotheses. All of these factors conspire to make previous tests easier, promoting greater accuracy at earlier ages. However, they cannot completely account for the extreme individual variation noted here as task performance was accomplished by all with few failures to respond.

In part, the lack of age-based specifics is attributable to the unexpected effects of Probability throughout the age range and the absence of strong trends in strategy use. The hypothesis that Probability would have the greatest effect in the youngest children, who lack a structural hypothesis for interpretation, is refuted by these results. Probable scores are lower and Improbable scores higher than anticipated, in the younger age groups, in all sentence types. In addition, Probability continues to exercise its effect until the age of 6 years and has a changing relation with sentence type and age. Probable is different from Neutral and Improbable at all ages but this difference is attributable to responses on the PASS and CLEFT only, not the SAD. By 4 years the differences between SAD and PASS are

significant in the Neutral forms indicating acquisition of the SAD, but at 5 years this difference is in the Improbable forms, indicating the resistance to the bias of Improbability in the SAD and not the PASS case. This reflects the age of 75% accuracy in terms of sequence of development but does not show exactly comparable ages. PASS and CLEFT sentences show significant differences between Probable and Improbable/Neutral at all ages these sentences were tested.

Probable Event Strategy

If we predict strong use of PES regardless of structural interpretation, as reported in the literature, an assumption is made that the child recognizes the limitations of his current syntactic knowledge and does not even attempt a structural hypothesis, but relies solely on lexical and pragmatic support. However, the results obtained suggest strongly that after an initial phase of simple PES use without structural analysis, in all later stages a structural interpretation is made, and then subjected to a Probability check. As a result Probable scores are generally higher than Neutral, Improbable lower than Neutral and the same pattern appears for all Sentence Types. Given that the population sampled was bright and well-endowed, it may be that such

3-year-olds are often already too advanced for much use of a pure PES. Nonetheless, three of the eight children aged 3 years were PES users on SAD, and were also pre-code on PASS, showing that at least some children had a pure PES. A second level of PES use occurs on a continuing basis as a check on structural interpretation. This PES usage operates in a symbiotic relation with the WOS which comes to override it. This is reinforced by Strohner & Nelson's figures of SAD Improbable scoring 10% correct at 3 years but rising to 70% at 4 years.

Word Order Strategy

A major key to structural interpretation in English is word order. A high level of WOS usage was predicted with a stepwise progression such that adult comprehension of the SAD would precede WOS extension to the PASS and adult comprehension on the PASS would precede WOS extension to the CLEFT. This hypothesis was also refuted. The amount of WOS usage on the Passive was highest at the expected age of 3:6 to 4 years declining thereafter, but was at a level of only 30% at both ages and did not correspond with a drop in correct responses. WOS use on the PASS occurred in SAD groups 2 (WOS usage on SAD), 3, and 4 with some outliers in more primitive groupings. Usage of the WOS for PASS did not, therefore,

follow neatly after adult SAD comprehension. Similarly WOS use in CLEFT interpretation occurred in PASS Groups 1 through 4, although 55% of those classified were in PASS Group 4. This implies some children use WOS on CLEFT before its use in PASS interpretation. Those children who used WOS in CLEFT interpretation also showed use of the strategy in interpreting the relative clauses, and 50% of patterned responses showed the influence of the WOS. This is expected as the CLEFT is really a reduced relative clause and thus any interpretive procedures ought to be identical for both sentence types.

In summary, the WOS is not used at a specific age; nor is it as dominant in interpretive procedures as expected. The stepwise progression is only partially seen in that children can be at any stage of development of the prior sentence type when they use a WOS, although most children apply it after adult comprehension of the prior form.

As in the case of the PES, there is evidence to suggest that the use of the WOS undergoes change. The earlier use of the strategy in interpreting the SAD sentences may reflect a linear mapping schema in which the ordering of events is mapped directly in temporal sequence. The first mentioned Noun is both the grammatical subject and the semantic or logical subject

and there is no conflict of roles. All that is needed for Comprehension is lexical knowledge and the recognition of the role played by the first Noun. In using the WOS for PASS interpretation the child demonstrates his difficulty in reversing the Agent/Patient roles, which would necessitate a recognition of the division between grammatical and semantic subjects. Comprehension of the PASS implies acquisition of reversibility and also the establishment of a hierarchical linguistic structure specifying the constituents of both the Noun phrase and the Verb phrase. Application of a WOS, after this stage to a different sentence type would suggest a strategy with more complex structural implications. This is supported by the fact that WOS users on the CLEFT are predominantly from SAD and PASS Groups 3 and 4 as are those children unsystematic on the CLEFT at T1 who tended to become WOS users at T2. Also WOS use on CLEFT is transferred to the relative clause by half the children categorized as CLEFT Group 2, whereas no PASS/WOS users make this transfer. Seventeen out of 25 of these CLEFT WOS users have two or more correct OS relatives which demonstrates use of a double WOS, allowing for a duplication of the middle Noun as both an object and a subject (NV(N)VN).

In structural terms this finding implies elaboration of the Verb Phrase and the ability to attach the embedded

relative clause to the object of the Verb Phrase rather than to the sentential subject. Three children show two different responses to OS relatives, giving the correct 1223 response as well as the overextended SS response of 1213. This is an example of misuse of the WOS leading to error. The 1213 response indicates the primacy of the first Noun as Agent and may be considered a more primitive conjoined-clause type of analysis of relative clauses. The PASS WOS users have no OS relatives correct, but show some minimal ability on SS relatives; this would support the notion that the 1213 response is more primitive. The CLEFT WOS users that show both response types may be transitional responders as compared to those more established 1223 responders. Thus there is some evidence that early WOS is a First N=Agent strategy that later gives way to a more syntactic strategy of NVN = Subject Verb Object.

A further justification for a more structurally complex notion of word order at the same time as CLEFT WOS use derives from the fact that adult acquisition of the PASS is a fixed state from which no regression occurs over time. Since most of the CLEFT Group 2 occur in PASS Groups 3 and 4 (showing adult structural interpretation of the PASS) these are children who have reversibility, that is, who have developed grammatical categories of Subject,

Verb and Object and hierarchical phrase structure categories. Also, simple explanations such as a 'main clause first' analysis (Amidon & Carey, 1972), cannot explain the Relative Clause results.

The sequence of development in relation to strategy use appears to be a progression from a purely lexically based PES to a primitive WOS usage with a probability check. This gives way to a WOS usage that overrides a probability check. Later there is an evolution into a more complex WOS usage which may at first be applied with a probability check and subsequently overrides it. In such a sequence one would expect 'casualties' in the sense of overuse of a strategy flying in the face of probability occurring before adult interpretation. This does occur as Table 19 demonstrates. The continuing Probability check occurring after an adult interpretation is also shown by the failure of the Improbable forms to match the Neutral. The fact that this occurs less in the CLEFT sentences suggests that the effect of Probability declines after 6 years.

Response Categorization

Clearly, the failure to find age-based stages of development did not prevent the categorization of responses on a patterned developmental basis. The

categorization of stages of development of the SAD, PASS and CLEFT sentences was reinforced by the fact that only 7% SAD, 14% PASS and 28% CLEFT responses were unclassifiable at Time 1 and 8% SAD, 6% PASS and 8% CLEFT responses at Time 2, leaving an average of 88% classifiable responses. Also, only 2 children were unclassifiable on all sentence types tested at any one time. This suggests that an unclassifiable state in one sentence type is not indicative of disorganized response, but rather of mixed stages.

The sequence of development of SAD, then PASS, then CLEFT is reinforced by individual profiles. Making comparisons between sentence types on Table 28, there are only 15 instances of coding on one sentence type being higher for a more complex structure than a simpler, out of 120 comparisons (ignoring 'unclassifiable' coding). There remains a question concerning the process for the individual child. It is impossible to say whether each child has to pass through each stage or whether these are viable options that can be bypassed. The failure to find high usage of distinct strategies suggests idiosyncratic application dependent on specific sentence features and context.

Semantic Issues

Overall, the verb 'ride' was found to exercise an effect of lowering scores in comparison with other verbs, independently of the form of the verb. That this was not due to difficulty with the past participle ending in the Passive (ridden) is evident from a comparison with the verb 'bite', which shares the form (bitten) and did not show the same effect. Comments concerning the verb indicated difficulty with both the form of the past participle ending and with the semantics of the verb. The probability of the horse riding the Daddy does appear to be at the extreme end of a plausibility continuum of the given sentences. However, it is hard to explain why this particular verb affected all sentence types and all probabilities. It seems that the sub-categorization features of the verb 'ride' must have an influence beyond the sentential structure. The child is alerted to processing this verb in an independent and idiosyncratic manner, while using the same interpretive heuristics as employed in other sentences.

Metalinguistic Judgements

The results of the metalinguistic judgement task show great consistency across tasks and good agreement with the performance task. This suggests that the processes

underlying the interpretation of sentences for an acting out performance and the processes underlying a judgement of semantic plausibility are identical. In each case a structural representation of the sentence is subjected to a PES check, leading to a decision as to plausibility. Also, as in the comprehension test, judgement accuracy improves over time, and we find the same interaction with Sentence Type so that judgement of the SAD precedes the PASS and both precede the CLEFT. It would seem the tasks differ only in their final response.

Valid judgement is normal at 4 years and high judgement scores from 4-6 years. This supports the findings of De Villiers and De Villiers, 1974, who found children able to correct syntactic anomaly at 4 years. The task in this study involved more complex structures than prior studies and tested older children. In each sentence type there is a delay of 6 months to 1 year following the acquisition of the Neutral form before high levels of accuracy are seen in Judgement. However by 6 years the noted reduction in effect of the PES results in high judgement scores for the CLEFT before the Neutral form is well comprehended. It is clear that judgement cannot be considered in isolation from comprehension and that the results strongly corroborate each other. Excluding non-valid judgers, even the youngest children

showed a comporment of 55-60% with their Comprehension results despite these being extremely low in accuracy. High-scoring judgers (75% accuracy level) are, however, chronologically over 4:6 years and have high comprehension scores as well.

Development of Comprehension Skills

A major question asked by this study concerned the evolution of comprehension skills. This is an area not previously studied, and was analyzed here in terms of individual profiles over time and direction of change.

Only 15 instances of regressive coding across sentence types were observed, and 72% SAD, 78% PASS and 62.5% CLEFT groupings remained at ceiling or advanced over time. This supports the developmental basis for the groups as defined. It was predicted, however, that children would only show change towards more adult performance, but the noted regression did not support this for all children. One explanation for failure to progress in one sentence type could be that progress is being made in another sentence type. Looking at change in the total profile (see Table 28), only 5 children of the 51 retested showed no progress in any form; subjects 36, 46, 31 (unchanged), 34, 13 and 18 (regressed). The first three were already at ceiling on the SAD and PASS. Furthermore

21 children made progress on all tested structures except those already at ceiling. Clearly children do tend to move to a higher grouping over time in any sentence type.

It was also found that adult response groups in one sentence type predict adult responses on that sentence form and on the next higher form six months later. There is not a clear pattern of shift from one group to the next, but rather a scatter until adult performance is attained. On both the CLEFT and the PASS adult competence is a fixed State. Any stage before this is subject to fluctuation over time. This indicates very clearly that adult-type comprehension is based upon structural rules and that linguistic rules are different in an absolute sense from cognitively based strategies. Once acquired, rules are not lost. This reinforces the notion of autonomy in syntactic processing and may explain why a probability check becomes less likely to sway the structural hypothesis after the age of 6 years when fixed rules operate. This may also reflect differences in underlying neural substrate for language and general cognition.

Summary and Conclusions

Previous studies on the development of comprehension reported findings and analyzed data on an age group basis. The implication was that individual children perform according to their age-group norms. However, it was not clear whether individual children would show consistent strategy use or mixed responses since individual variation had not been analyzed in any depth. Strategies, which are used as interpretive heuristics when a child cannot make a structural interpretation, are reflective of individual cognitive bias and should be evaluated on an individual basis.

Progress over time was a major area to be studied since no longitudinal study had been done. This study therefore sought time-based information to evaluate the development of comprehension in the same children.

Historically, several studies considered issues of probability and the relation between real-world knowledge and linguistic structural knowledge. More recent studies highlighted the factor of Animacy of Agents and Patients as being very significant in influencing responses. No study had systemically varied or controlled for the factors of both Animacy and Probability as was the case in the present study. In addition, the exact relation between the pragmatic extralinguistic factors of

probability and the developing linguistic structure had not been measured across the age range of 3 to 6 years.

This study was therefore undertaken to investigate these issues. Fifty-six children in seven age groups between 3 and 6 years were tested in an acting-out task for Comprehension of the Simple Active Declarative (SAD), Passive (PASS) and Inverted Cleft (CLEFT) sentences. The children were distributed equally between the age groups, in sex and number. The groups' ages were by the half year, thus 3, 3:6, 4, 4:6, 5, 5:6 and 6. Each sentence type was given in a Probable, Neutral probability and Improbable form using five different verbs. The Neutral form required structural interpretation to decode having no inherent Probability. Animacy was controlled for by presenting Animate Agents and Patients. A metalinguistic judgement task requiring evaluation of the goodness or silliness of the same set of Probable and Improbable sentences was included to further elucidate findings on Comprehension. Children under the age of 4:6 did not receive any items testing the CLEFT.

Six months later the population was retested with the same test procedure to evaluate progress. At the time of the second testing a further comprehension test of the relative clause was given to a subset of children who were users of the Word Order Strategy (WOS) on PASS or CLEFT.

Results

As expected, SAD was easier than PASS and PASS easier than CLEFT for all ages in both Comprehension and Judgement. Four-year-olds were significantly different from 5 and 6-year-olds and 4 years from 6 years on a three-way Analysis of Variance of groups of 16 on SAD and PASS. There was also a main effect of Sentence Type with SAD easier than PASS and of Probability with Probable easier than Neutral and Improbable which were equally difficult. A significant interaction of Age with Sentence Type was reflected in the greater progress in PASS than in SAD (which had ceiling effects) and that of Sentence Type with Probability in the greater effect of Probability on the PASS than on the SAD. At 4 years SAD and PASS differed significantly on Neutral and at 5 years on Improbable whereas at 6 years the differences were insignificant. This reflects the significant interaction of Age, Sentence Type and Probability.

A further Analysis of Variance including CLEFT sentences considered only ages 5 and 6. No effect of age was found. SAD sentences were significantly easier than PASS and PASS than CLEFT. The Probable Sentences were significantly easier than the Neutral and Improbable, which did not differ. The only interaction found was that

of Sentence Type with Probability. All forms of Probability are equally easy in the SAD sentences.

The youngest children were expected to show a strong influence of Probability which would later be overridden by the WOS. Only 3 of the youngest children showed evidence of this pure PES, however, and there was no extreme difference between Probable and Improbable responses as expected. The children aged 3 to 3:6 showed one-third other types of responses on the SAD indicating less reliance on Probability than expected at this early age. Probability did, however, exercise an effect up to 6 years but this was in interaction with other strategies.

A stepwise progression was anticipated such that children would use the WOS and override the PES on the SAD before usage of the WOS on the PASS. Similarly, that WOS usage on the CLEFT would only follow a stage of overriding the PES on the PASS. This did not occur. Children still made errors related to Probability on one form when they were already using the WOS on the next higher form.

It was expected that children using the WOS on the PASS or CLEFT would transfer the use of this to the interpretation of the Relative Clause. Only CLEFT WOS users transfer the strategy to the Relative Clause. In fact children are at different stages of development when they use the WOS on the PASS and on the CLEFT and do not

transfer strategy use. There was far less usage of WOS on the PASS than anticipated. Greatest use occurred at the expected age of 3:6 to 4 years on Neutral PASS (30%) but was not accompanied by a decrease in correct performance and was matched by the same amount of usage on the Probable PASS. Children using the WOS on the CLEFT are generally mature on the PASS and only these children transfer the WOS to the Relative Clause which is structurally similar to the CLEFT. WOS usage is highest on the CLEFT reaching 50% at 6 years. Throughout the age range, however, two strategies are operative for the CLEFT resulting in equal numbers of correct and reversed, both of which are types of WOS. Use of the First Noun = Agent WOS results in 25% of Probables reversed through the Age range. It appears that there are different WOS uses in each stage.

A strong verb effect was noted for the verb 'ride' in which all group means were depressed in all sentence types except Probable and Neutral CLEFT which had raised means. In the latter case it appeared that the normal structural analysis for the CLEFT was dropped. This effect was related to semantics since the verb 'bite' did not show the same result.

Age-based analysis of Comprehension revealed much variation within groups. The only pattern that emerged

related to age of acquisition of 75% accuracy. However, individual analysis revealed clear developmental stages. A comparison of stages across sentence types showed that most children demonstrated lower levels of coding on the next higher sentence type. Any child showing adult response on CLEFT was also adult on PASS.

Metalinguistic Judgement was found to be valid in children 4 years and older. As in Comprehension, aged-based analysis revealed great variation within groups. The same order of difficulty of Sentence Type and Probability was noted as was found in Comprehension. Judgement was evaluated with reference to the child's comprehension of each individual sentence, resulting in fluctuating Probability dependent on the child's response in Comprehension testing. This was shown to be a necessary adjunct to evaluate Judgement. High judgement scores were only found with increasing age and high levels of comprehension of the same form. Age based levels of 75% correct were also obtained for Judgement.

Individual analysis of Comprehension over time revealed much fluctuation in the process of acquisition. Acquisition of adult responses on PASS or CLEFT was a uniformly fixed state from which no regression occurred, indicating the difference between linguistic rules and cognitive processes. In intermediate stages some children

regressed. At Time 2 some children previously codeable on a specific Sentence Type had become uncodeable, indicating that an unclassifiable state is not simply precursory to patterned behaviour but can reflect a medial stage. Overall, most children advanced in all three Sentence Types if not already at a ceiling and all but 3 of the 51 children retested had advanced in at least one sentence form.

Limitations of this Study

The group of children tested were sampled from a materially and intellectually well-endowed population. It is therefore, questionable to what extent the results can be generalized to a wider population. Because of high scores, the SAD sentences did not significantly discriminate the groups thereby creating ceiling effects on the scores for the SAD sentences.

In administering the relative clause test it was assumed that the children grouped according to WOS usage on the PASS and the CLEFT would show uniformity in response on the relative clauses. In reality, while trends emerged, these groups were not cohesive in their response patterns. Because only a limited subset of the total population received the relative clauses no groupings of response on this sentence form were

possible. Only subsequent to the testing was it realized that an array of relative clause responses was found in the WOS group and that analysis of the other response patterns on PASS and CLEFT in relation to the relative clause would be informative.

An alternative way of categorizing the children would be according to some measure of expressive language, to make a comparison between the skills of comprehension and expression. In this study there was not sufficient time to take expressive language measures which limits the extent of application of the findings. For similar reasons of length of testing, animacy was controlled for and only animate agents and patients used but this leaves unanswered the question of the relation between the variables studied and all variants of animacy.

Implications of the Study

The results of the study seriously bring into question comprehension tests based on normative age levels. It is possible to say at what age 75% of the population or 100% achieved adult competency and to make predictions based solely on adult responses, since this reflects a fixed state. Prior to this, strategy use shows fluctuation through the age range with all ages being represented in all developmental groupings and some

children even regress in their performance over time in this fluctuating state. Further research on a larger population might clarify this more for age-based testing but, in general, individual profile analysis using several different tasks may be the optimum method of testing.

Any research must consider sentence types in concert with each other in profile analysis remembering that those children who appear unsystematic in one form are really patterned responders, not simply random responders, since they are invariably systematic in another form.

Judgement tasks are feasible in a population aged 4 years and upwards and provide corroborating evidence for comprehension test findings. Without analysis of Comprehension responses on an individual item basis, no real conclusions can be drawn from a metalinguistic judgement task that assumes the child's probability decisions to be based on adult processing.

Suggestions for Further Research

This study only assessed the early stages of development of the Inverted Cleft. It would be interesting to replicate the study extending the age range to 8 years to cover the period of CLEFT acquisition and to see whether hypotheses concerning age and influence of Probability are accurate.

Animacy was a controlled variable in this study which did not attempt to analyze all four variants of Animate/Inanimate Agents and Patients. Further research is needed to clarify the relation existing between real world knowledge and structural knowledge given animacy variations. It may be that Probability exercises a different effect in mixed animacy sentences. Until this is clarified there is still a possibility that Strohner and Nelson's extreme findings with respect to Probability are reflective of animacy issues.

The test of Comprehension of the Relative Clause was included here simply to answer the question of strategy transfer. However, if all the children had received this test comparison of profiles in relation to more complex structures might have been possible. It would be expected that adult responders on CLEFT might be more mature in comprehension of the relative clause. Enlarging the age range of testing of the PASS and CLEFT sentences and giving all children the relative clause test would allow a comparison of mature CLEFT responders with other groups and might also lead to the definition of more response patterns on the relative clause.

In attempting to answer the question of individual evolution through strategy use it would be helpful to sample a child's response patterns for a longer period

than 6 months and on a more frequent time span such as every 2 months, using a much smaller population. In this way the question of individual fluctuation prior to adult response would be clarified and the question of the individual progress through stages elucidated.

The results of this study clearly show different stages of use of the WOS. Children using the WOS in CLEFT interpretation are mature responders on SAD and PASS with relatively sophisticated syntactic parsers. It is therefore, questionable whether the responses obtained reflect a cognitive strategy applied after a failure to parse a given sentence, or are reflective of an immature parsing system, with structural misrepresentation. The finding of a fixed state when adult comprehension is achieved would suggest that developing linguistic rules, even if structurally incorrect would be applied in 100% of all given sentences. However, there must always be a margin for error which results in a lowered criterion that is identical to that defining strategy use. Thus the results of this study cannot answer this issue which needs to be addressed in further research.

Table 1
Summary of Experimental Findings on Word Order

| Age in Yrs. | 1:6 | 2:0 | 2:6 | 3:0 | 3:6 | 4:0 | 4:6 | 5:0 | 5:6 | 7 | |
|--|--|--------|--|-------------------------|---|------------------|--------------------------|--------------------------|-----|---|--|
| Task | 95% accurate - use WOS (A) | | | | | | | | | | |
| Reversible SAD | SAA(D) | 60%(B) | | Use of WOS til 5 yrs(C) | | | | | | | |
| Reversible PASS | SAA to 3:6, 1 rule interpretation(E) | | Mixed responses(E) | | Adult at 4:3(E) | | | | | | |
| | Random til 3:6(A) | | WOS til 4:3(A) til 5(C) | | Adult at 6:6 to 7:6(F) | | | | | | |
| | SAA to 3:6, 1 rule interpretation(E) | | Mixed responses(E) | | Adult at 4:3(E) | | | | | | |
| | Choose inanimate agent in mixed animacy sentences(G) | | Mixed N1 = A and OOM til 5(H) | | | | | | | | |
| Reversible I.CLEFT | Random til 4(A) | | | WOS(A) | | WOS(N pre Vb)(H) | | Deteriorated on CLEFT(H) | | | |
| Probable SAD | Similar to 3(C) | | 100% accurate - PES til 5(C) | | | | | | | | |
| | | | Use PES from 3(A) | | | | | | | | |
| Improbable SAD | Similar to 3(C) | | 90% incorrect - PES til 5(C) | | | | Syntax over-rides PES(C) | | | | |
| | | | Use PES from 3, interferes at 4 plus(A) | | | | | | | | |
| Probable PASS | Similar to 3(C) | | 100% accurate - PES til 5(C) | | | | | | | | |
| | | | Use PES from 3(A) | | | | | | | | |
| Improbable PASS | Similar to 3(C) | | 100% incorrect - PES til 5(C) | | | | | | | | |
| | | | Use PES from 3(A) | | | | | | | | |
| Scrambled and anomalous imperatives | Treated as normal(I) | | Confusion(I) | | Discrimination goes from 22% to 78% by 7(J) | | | | | | |
| | Detect semantic(D) | | Correct semantic | | Correct scrambled | | | | | | |
| | 50% accepted semantic correction(K) | | Detect scrambled(D) | | MLU 4 plus(D) | | | | | | |
| Telegraphic Unusual 2-word utterances | Holophrastic prefer it(L) | | Telegraphic prefer adult forms (L),(M),(N) | | | | | | | | |
| | Holophrastic can respond?(WOS)(O) | | | | | | | | | | |

Note: Authors

(A) Bever 1970
 (B) Lovell & Dixon 1967
 (C) Strohner & Nelson 1974
 (D) De Villiers & De Villiers 1973
 (E) Bridges 1980
 (F) Baldie 1976
 (G) Lempert 1978
 (H) Lempert & Kinsbourne 1980

(I) Wetstone & Friedlander 1973
 (J) Bohannon 1976
 (K) Gleitman et al. 1972
 (L) Shipley, Smith & Gleitman 1969
 (M) Petretic & Tweney 1976
 (N) Ruder, Smith & Mursi 1980
 (O) Sachs & Truswell 1978

Abbreviations

WOS - Word Order Strategy
 MLU - Mean Length of Utterance
 SAA - Self as Agent
 OOM - Order of Mention
 N pre Vb - Noun pre Verb is Agent
 N1 = A - First Noun is Agent
 PES - Probable Event Strategy

Table 2
 Analysis of Variance Table for all Groups
 SAD and PASS

| Source | d.f. | Mean Square | F-test |
|------------------------|------|-------------|------------|
| Age | 2 | 27.128 | 8.353*** |
| Unit | 45 | 3.248 | - |
| Sentype | 1 | 101.531 | 102.028*** |
| Age x Sentype | 2 | 4.760 | 4.784** |
| Sentype x Unit | 45 | 0.995 | - |
| Probability | 2 | 13.608 | 17.798*** |
| Age x Prob. | 4 | 0.743 | 0.972 |
| Prob. x Unit | 90 | 0.765 | - |
| Sentype x Prob. | 2 | 3.823 | 5.825** |
| Age x Sentype x Prob. | 4 | 1.740 | 2.651* |
| Sentype x Prob. x Unit | 90 | 0.656 | - |
| Total | 287 | 1.843 | |

* = $p < .05$
 ** = $p < .01$
 *** = $p < .001$

Table 3
 Mean Number Correct in Comprehension
 on each Sentence Type by Age Group

| Sentence Type | Ages | Probability | | | Row means |
|---------------|-------------|-------------|-------|-------|-----------|
| | | Prob. | Neut. | Imp. | |
| SAD | 4 | 4.750 | 4.313 | 3.750 | 4.271 |
| | 5 | 4.813 | 4.563 | 4.688 | 4.688 |
| | 6 | 4.875 | 4.875 | 4.875 | 4.875 |
| | Submean | 4.813 | 4.583 | 4.438 | 4.611 |
| PASS | 4 | 3.313 | 2.000 | 2.438 | 2.583 |
| | 5 | 4.313 | 3.625 | 3.000 | 3.646 |
| | 6 | 4.625 | 3.750 | 3.750 | 4.042 |
| | Submean | 4.083 | 3.125 | 3.063 | 3.423 |
| | Column mean | 4.448 | 3.854 | 3.750 | 4.017 |

Maximum possible = 5

Table 4

Analysis of Variance Table, ages Five
and Six on SAD, PASS and CLEFT

| Source | d.f. | Mean Square | F-test |
|------------------------|------|-------------|-----------|
| Age | 1 | 6.125 | 1.829 |
| Unit | 30 | 3.349 | - |
| Sentype | 2 | 126.219 | 66.472*** |
| Age x Sentype | 2 | 0.260 | 0.137 |
| Sentype x Unit | 60 | 1.899 | - |
| Probability | 2 | 21.260 | 22.790*** |
| Age x Prob. | 2 | 2.198 | 2.356 |
| Prob. x Unit | 60 | 0.933 | - |
| Sentype x Prob. | 4 | 4.839 | 6.236*** |
| Age x Sentype x Prob. | 4 | 1.161 | 1.497 |
| Sentype x Prob. x Unit | 120 | 0.776 | - |
| Total | 287 | 2.416 | |

*** = $p < .001$

Table 5

Mean number Correct in Comprehension on each Sentence Type for ages Five and Six combined

| Sentence Type | Probability | | | Row mean |
|---------------|-------------|-------|-------|----------|
| | Prob. | Neut. | Imp. | |
| SAD | 4.844 | 4.719 | 4.781 | 4.781 |
| PASS | 4.469 | 3.688 | 3.375 | 3.844 |
| CLEFT | 3.406 | 2.219 | 1.875 | 2.500 |
| Column mean | 4.240 | 3.542 | 3.344 | 3.708 |

Note: Maximum possible = 5

Table 6

Percentage of Subject/Object Reversals in Comprehension Test
(Groups of 16 except at 3 and 6:6)

| Sentence Type | Ages | | | | | | | |
|---------------|------|------|------|------|------|------|------|------|
| | 3:0 | 3:6 | 4:0 | 4:6 | 5:0 | 5:6 | 6:0 | 6:6 |
| SAD Prob. | 0 | 1.7 | 1.3 | 0 | 0 | 0 | 0 | 0 |
| SAD Neut. | 5.0 | 4.2 | 7.5 | 1.7 | 2.5 | 4.1 | 1.3 | 0 |
| SAD Impr. | 15.0 | 25.0 | 15.0 | 10.4 | 2.5 | 16.3 | 2.5 | 0 |
| PASS Prob. | 25.0 | 31.7 | 15.0 | 11.3 | 7.5 | 9.5 | 5.0 | 10.0 |
| PASS Neut. | 25.0 | 31.7 | 30.0 | 20.0 | 21.3 | 17.3 | 22.5 | 7.5 |
| PASS Impr. | 45.0 | 55.0 | 32.5 | 31.7 | 25.0 | 23.2 | 17.5 | 5.0 |
| I.CLEFT Prob. | | | | 27.1 | 28.8 | 25.6 | 27.5 | 22.5 |
| I.CLEFT Neut. | | | | 37.5 | 32.5 | 43.8 | 50.0 | 32.5 |
| I.CLEFT Impr. | | | | 54.6 | 61.3 | 64.5 | 51.3 | 35.0 |

Table 7

Percentage of Other Responses in Comprehension Test
(Groups of 16 except 3 and 6:6)

| Sentence Type | Ages | | | | | | | |
|---------------|------|------|------|------|------|------|------|-----|
| | 3:0 | 3:6 | 4:0 | 4:6 | 5:0 | 5:6 | 6:0 | 6:6 |
| SAD Prob. | 15.0 | 3.8 | 3.8 | 5.0 | 3.8 | 1.3 | 2.5 | 0 |
| SAD Neut. | 32.5 | 10.0 | 5.0 | 7.9 | 7.5 | 2.9 | 1.3 | 0 |
| SAD Impr. | 22.5 | 8.3 | 8.8 | 7.9 | 3.8 | 2.9 | 0 | 0 |
| PASS Prob. | 55.0 | 25.4 | 18.8 | 21.5 | 6.3 | 5.0 | 2.5 | 0 |
| PASS Neut. | 52.5 | 25.4 | 23.8 | 20.0 | 6.3 | 4.1 | 2.5 | 0 |
| PASS Impr. | 50.0 | 17.5 | 18.8 | 19.6 | 12.5 | 6.5 | 3.8 | 2.5 |
| I.CLEPT Prob. | | | | 10.4 | 3.8 | 1.3 | 0 | 0 |
| I.CLEPT Neut. | | | | 25.4 | 20.0 | 15.4 | 10.0 | 0 |
| I.CLEPT Impr. | | | | 20.0 | 8.8 | 1.3 | 2.5 | 0 |

Table 8
Ages at which Structures are 75% Correct

| Probability | Sentence Type | | |
|-------------|---------------|------|-------|
| | SAD | PASS | CLEFT |
| Probable | 3:0 | 5:0 | 6:6 |
| Neutral | 3:6 | 5:6 | - |
| Improbable | 4:0 | 6:0 | - |

Table 9

Percentage Correct and Reversed in Comprehension
of Individual Sentences

| <u>Sentence type</u> | <u>Sentence</u> | <u>% correct</u> | <u>% reversed</u> |
|----------------------|----------------------|------------------|-------------------|
| Prob. SAD | Mum feeds baby | 94.6 | |
| | Dad rides horse | 98.2 | 1.8 (1 response) |
| | dog bites Dad | 92.9 | |
| | Dad spans girl | 85.7 | |
| | Mum washes baby | 92.9 | |
| Neut. SAD | Dog feeds pig | 89.3 | 3.6 |
| | dog rides pig | 73.2 | 10.7 |
| | cow bites horse | 96.4 | |
| | boy spans girl | 89.3 | 1.8 |
| | horse washes cow | 82.1 | 3.6 |
| Imp. SAD | baby feeds Mum | 85.7 | 7.1 |
| | horse rides Dad | 48.2 | 37.5 |
| | Dad bites dog | 92.9 | 1.8 |
| | girl spans Dad | 89.3 | 1.8 |
| | baby washes Mum | 82.1 | 7.1 |
| Prob. PASS. | baby fed by Mum | 66.1 | 12.5 |
| | horse ridden by Dad | 42.9 | 10.7 |
| | Dad bitten by dog | 69.6 | 7.1 |
| | girl spanked by Dad | 71.4 | 12.5 |
| | baby washed by Mum | 76.8 | 10.7 |
| Neut. PASS. | pig fed by dog | 50.0 | 23.2 |
| | pig ridden by dog | 21.4 | 35.7 |
| | horse bitten by cow | 57.1 | 21.4 |
| | girl spanked by boy | 69.6 | 17.9 |
| | cow washed by horse | 60.7 | 19.6 |
| Imp. PASS. | Mum fed by baby | 53.6 | 28.6 |
| | Dad ridden by horse | 21.4 | 37.5 |
| | dog bitten by Dad | 41.1 | 37.5 |
| | Dad spanked by girl | 32.1 | 37.5 |
| | Mum washed by baby | 48.2 | 26.8 |
| Prob. Cleft | baby the Mum feeds | 78.1 | 15.6 |
| | horse the Dad rides | 90.6 | 3.1 |
| | Dad the dog bites | 53.1 | 37.5 |
| | girl the Dad spans | 53.1 | 31.2 |
| | baby the Mum washes | 68.7 | 25.0 |
| Neut. Cleft | pig the dog feeds | 37.5 | 25.0 |
| | pig the dog rides | 50.0 | 28.1 |
| | horse the cow bites | 25.0 | 25.0 |
| | girl the boy spans | 31.2 | 21.8 |
| | cow the horse washes | 31.2 | 12.5 |
| Imp. Cleft | Mum the baby feeds | 15.6 | 68.7 |
| | Dad the horse rides | 18.7 | 75.0 |
| | dog the Dad bites | 50.0 | 31.2 |
| | Dad the girl spans | 40.6 | 34.4 |
| | Mum the baby washes | 31.2 | 56.2 |

Table 10

Age of acquisition of correct Comprehension
by Verb and Sentence Type
75% of age group correct on sentence (N = 8)

| Verb | SAD | | | PASS | | | CLEFT | | |
|-------|-------|-------|------|-------|-------|------|-------|-------|------|
| | Prob. | Neut. | Imp. | Prob. | Neut. | Imp. | Prob. | Neut. | Imp. |
| feed | 3 | 3:6 | 3:6 | 4:6 | 4:6 | 4:6 | 5 | no | no |
| ride | 3 | 4:6 | 5 | 5 | no | no | 4:6 | no | no |
| bite | 3 | 3 | 3 | 4:6 | 5:6 | 5:6 | no | no | no |
| spank | 3 | 3 | 3 | 4 | 4:6 | 6 | 6 | 1:0 | no |
| wash | 3 | 3:6 | 3:6 | 4 | 4:6 | 5:6 | 6 | no | no |

No - never reached level

Table 11

Numbers of Children Completing Judgement Test
and making Valid Judgements

N = 107 (56 T1 + 51 T2)

| Judgement | Ages | | | | | | | |
|---------------|------|------|------|------|------|------|------|------|
| | 3:0 | 3:6 | 4:0 | 4:6 | 5:0 | 5:6 | 6:0 | 6:6 |
| No. completed | 6 | 11 | 12 | 13 | 12 | 14 | 15 | 8 |
| No. valid | 1 | 2 | 10 | 9 | 10 | 11 | 14 | 7 |
| Percent valid | 12.5 | 14.3 | 62.5 | 64.3 | 62.5 | 73.3 | 87.5 | 87.5 |
| N = | 8 | 14 | 16 | 14 | 16 | 15 | 16 | 8 |

Table 12

Mean Number Correct and Reversed in Comprehension and Mean Number of Judgements Correct Relative to Child's Comprehension

| Sentence Type | Ages | | | | | | | | |
|---------------|-----------------|---------|---------|---------|---------|---------|---------|---------|-----------|
| | 3:0 | 3:6 | 4:0 | 4:6 | 5:0 | 5:6 | 6:0 | 6:6 | |
| SAD | Correct Comp. | 9.0(90) | 8.5(85) | 9.3(93) | 9.1(91) | 9.7(97) | 9.4(94) | 9.7(97) | 10.0(100) |
| | Reversed Comp. | 1.0 | 0.5 | 0.5 | 0.3 | 0 | 0.5 | 0.1 | 0 |
| | *Correct Judge. | 6.0(60) | 5.0(55) | 7.2(72) | 6.6(70) | 7.5(78) | 8.2(83) | 9.1(91) | 9.8(98) |
| PASS | Correct Comp. | 0(0) | 2.5(25) | 6.8(68) | 5.6(56) | 8.2(82) | 7.9(79) | 8.7(87) | 9.1(91) |
| | Reversed Comp. | 5.0 | 4.0 | 1.9 | 2.3 | 1.2 | 1.4 | 1.0 | 0.7 |
| | *Correct Judge. | 3.0(60) | 4.0(51) | 4.9(56) | 6.0(73) | 6.6(70) | 7.1(76) | 7.6(76) | 8.5(87) |
| I.CLEFT | Correct Comp. | | | | 4.4(44) | 4.6(46) | 5.3(53) | 6.1(61) | 7.4(74) |
| | Reversed Comp. | | | | 4.2 | 4.9 | 4.5 | 3.8 | 2.5 |
| | *Correct Judge. | | | | 4.9(56) | 6.3(66) | 5.9(59) | 6.8(68) | 8.1(81) |

Note: () percentage correct

Maximum Correct Comprehension = 10

* A Judgement is considered correct if it matches a child's interpretation on the Comprehension test.

Table 13
Subjects Grouped by SAD Coding

| Groups | Time 1 | | | Time 2 | | |
|--------------|--|-------------------------|-------|---|-------------------------|---------|
| | Subject Numbers (Age) | Mean Age (Yrs:mths.) | Range | Subject numbers (Age) | Mean Age (Yrs:mths.) | Range |
| 1 (PES) | 1, 6, 7 (3) 12 (3:6), 18 (4) | 3:4 | 3:4 | 27 (5) 35 (5:6) | 5:3 | 5-5:6 |
| 2 (WOS) | 2 (3), 10, 11 (3:6), 17, 21 (4), 27 (4:6), 43 (5:6) | 4:0 | 3-5:6 | 1, 5 (3:6) 12, 15 (4) 23, 26 (4:6) | 4:0 | 3:6-4:6 |
| 3 | 4, 5 (3) 9, 14, 15, 16 (3:6), 19, 22, 23 (4), 28, 30, 32 (4:6), 33, 37, 38, 39 (5), 44, 45, 47, 48 (5:6), 53 (6) | 4:5 | 3-6 | 2, 3 (3:6) 9, 11 (4) 17, 19, 21 (4:6) 34 (5:6) 42, 48 (6) | 4:7 | 3:6-6 |
| 4 (Adult) | 8 (3), 13 (3:6), 24 (4), 25, 26, 29, 31 (4:6), 34, 36, 40 (5), 41, 42, 46 (5:6), 49, 50, 51, 54, 55, 56 (6) | 5:0 | 3-6 | 10, 13, 14, 16 (4) 22 (4:6) 25, 28, 29, 30, 31, 32 (5) 36, 37, 38, 40 (5:6) 41, 43, 44, 45, 46, 47 (6) 49, 50, 51, 52, 53, 54, 55, 56 (6:6) | 5:6 | 4-6:6 |
| Uncl. | 3 (3), 20 (4), 35 (5), 52 (6) | 4:6 | 3-6 | 18 (4:6), 4 (3:6), 8 (3:6), 33 (5:6) | 4:3 | 4:6-5:6 |
| Missing | | | | 6 (3:6), 7 (3:6), 20, 24 (4:6), 39 (5:6) | | 3:6-5:6 |

Table 14
Subjects Grouped by PASS Coding

| Groups | Time 1 | | | Time 2 | | |
|-----------------|---|-----------------------|---------|---|-----------------------|-------|
| | Subject Numbers (Age) | Mean Age (Yrs:mo.) | Range | Subject numbers (Age) | Mean Age (Yrs:mo.) | Range |
| 1 (PES) | 23, 18 (4) 32 (4:6) 37, 39 (5) | 4:7 | 4-5 | 35 (5:6) | 5:6 | 5:6 |
| 2 (MOB) | 3, 8 (3) 9*, 12*, 13 (3:6) 17, 21* (4) 38* (5) 43* (5:6) 51* (6) | 4:1 | 3-6 | 1*, 3, 4* (3:6) 12*, 15* (4) 23* (4:6) 27 (5) 43 (6) | 4:2 | 3:6-6 |
| 3 | 10, 14 (3:6) 19, (4) 25, 28 (4:6) 33, 35, 40 (5) 42, 48 (5:6) 52, 54, 56 (6) | 4:10 | 3:6-6 | 2, 5, 8 (3:6) 10, 13, 16 (4) 17 (4:6) 28 (5) 33, 38 (5:6) 42, 48 (6) | 4:7 | 3:6-6 |
| 4 (Adult) | 26, 29, 30, 31 (4:6) 34, 36 (5) 41, 44, 45, 46, 47 (5:6) 49, 50, 53, 55 (6) (3 of these totally correct) | 5:3 | 4:6-6 | 9, 11, 14, (4) 19, 22 (4:6) 25, 26, 29, 30, 31, 32 (5) 34, 36, 37, 40 (5:6) 41, 44, 45, 46, 47 (6) 49, 50, 51, 52, 53, 54, 55, 56 (6:6) (8 of these totally correct) | 5:6 | 4:6-6 |
| Pre-code | 1, 5, 6, 4, 7 (3) | 3:0 | 3 | | | |
| Missing | | | | 6, 7, 20, 24, 39 | | |
| Uncode- able | 2 (3), 11 (3:6) 15, 16 (3:6), 20, 22, 24 (4), 27 (4:6) | 3:8 | 3:6-4:6 | 18, 21 (4:6) | 4:4 | 4:6 |

* Children scoring only 3 of Neutral, i.e. 'trend'

Table 15
Subjects Grouped by CLEFT Coding

| Groups | Time 1 | | | Time 2 | | |
|--------------|--|-------------------------|---------|--|-------------------------|---------|
| | Subject Numbers (Age) | Mean Age (Yrs:mths.) | Range | Subject numbers (Age) | Mean Age (Yrs:mths.) | Range |
| 1 (PES) | 28, 32 (4:6), 35 (5) 44 (5:6), 50, 53 (6) | 5:2 | 4:6-6 | | | |
| 2 (WOS) | 36, 37, 39, 40 (5) 45, 46 (5:6), 51, 52, 54*, 55, (6) | 5:5 | 5-6 | 17, 19*, 21, 22, 23 (4:6) 25, 26*, 28*, 30, 35, 36, 40 (5:6), 42, 44*, 45, 46, 48 (6), 54, 56 (6:6) | 5:5 | 4:6-6:6 |
| 3 | 27, 31, 4:6), 38, (5) 43 (5:6) | 5:4 | 4:6-5:6 | 27, 31, 32 (5) 33, 37, 38 (5:6), 43 (6) 50 (6:6) | 5:5 | 5-6:6 |
| 4 (Adult) | 29 (4:6) 41 (5:6), 49 (6) | 5:3 | 4:6-6 | 29 (5), 41, 47 (6) 49, 52, 53, 55 (6:6) | 6:1 | 5-6:6 |
| Uncl. | 25, 26, 30 (4:6) 33, 34 (5) 42, 47, 48 (5:6) 56 (6) | 5:1 | 4:6-6 | 18 (4:6), 34 (5:6), 51 (6:6) | 5:5 | 4:6-6:6 |
| Missing | 1-24 | | | 1-16, 20, 24, 39 | | |

* Children scoring only 3 of Neutral, i.e. "trend".

Table 16

Number of Children Within each SAD Group
Classified According to PASS Groups

Time 1

| SAD Groups | PASS Groups | | | | | | Totals |
|---------------|-------------|----------|-----------|-----------|-----------|----------|-----------|
| | Precode | 1(PES) | 2(WOS) | 3 | 4(Adult) | Uncl. | |
| 1(PES) | 3 | 1 | 1 | 0 | 0 | 0 | 5 |
| 2(WOS) | 0 | 0 | 3 | 1 | 0 | 3 | 7 |
| 3 | 2 | 4 | 2 | 5 | 5 | 3 | 21 |
| 4(Adult) | 0 | 0 | 3 | 5 | 10 | 1 | 19 |
| Uncl. | 0 | 0 | 1 | 2 | 0 | 1 | 4 |
| Totals | 5 | 5 | 10 | 13 | 15 | 8 | 56 |

Time 2

| SAD Groups | PASS Groups | | | | | | Totals |
|---------------|-------------|----------|----------|-----------|-----------|----------|-----------|
| | Precode | 1(PES) | 2(WOS) | 3 | 4(Adult) | Uncl. | |
| 1(PES) | 0 | 1 | 1 | 0 | 0 | 0 | 2 |
| 2(WOS) | 0 | 0 | 4 | 1 | 1 | 0 | 6 |
| 3 | 0 | 0 | 1 | 4 | 4 | 1 | 10 |
| 4(Adult) | 0 | 0 | 1 | 5 | 23 | 0 | 29 |
| Uncl. | 0 | 0 | 1 | 2 | 0 | 1 | 4 |
| Totals | 0 | 1 | 8 | 12 | 28 | 2 | 51 |

Table 17

Number of Children Within each PASS Group
Classified According to CLEFT Groups

Time 1

| PASS Groups | CLEFT Groups | | | | | Totals |
|----------------|--------------|-----------|----------|----------|----------|-----------|
| | 1(PES) | 2(WOS) | 3 | 4(Adult) | Uncl. | |
| 1(PES) | 1 | 2 | 0 | 0 | 0 | 3 |
| 2(WOS) | 0 | 1 | 2 | 0 | 0 | 3 |
| 3 | 2 | 3 | 0 | 0 | 5 | 10 |
| 4(Adult) | 3 | 4 | 1 | 3 | 4 | 15 |
| Uncl. | 0 | 0 | 1 | 0 | 0 | 1 |
| Totals | 6 | 10 | 4 | 3 | 9 | 32 |

Time 2
(3 missing)

| PASS Groups | CLEFT Groups | | | | | Totals |
|----------------|--------------|-----------|----------|----------|----------|-----------|
| | 1(PES) | 2(WOS) | 3 | 4(Adult) | Uncl. | |
| 1(PES) | 0 | 1 | 0 | 0 | 0 | 1 |
| 2(WOS) | 0 | 1 | 2 | 0 | 0 | 3 |
| 3 | 0 | 4 | 2 | 0 | 0 | 6 |
| 4(Adult) | 0 | 12 | 4 | 7 | 2 | 25 |
| Uncl. | 0 | 1 | 0 | 0 | 1 | 2 |
| Totals | 0 | 19 | 8 | 7 | 3 | 37 |

Table 18

Number of Children Within each SAD Group
Classified According to CLEFT Groups

Time 1

| SAD Groups | CLEFT Groups | | | | | Totals |
|---------------|--------------|-----------|----------|----------|----------|-----------|
| | 1(PES) | 2(WOS) | 3 | 4(Adult) | Uncl. | |
| 1(PES) | 0 | 0 | 0 | 0 | 0 | 0 |
| 2(WOS) | 0 | 0 | 2 | 0 | 0 | 2 |
| 3 | 4 | 3 | 1 | 0 | 4 | 12 |
| 4(Adult) | 1 | 6 | 1 | 3 | 5 | 16 |
| Uncl. | 1 | 1 | 0 | 0 | 0 | 2 |
| Totals | 6 | 10 | 4 | 3 | 9 | 32 |

Time 2
(3 missing)

| SAD Groups | CLEFT Groups | | | | | Totals |
|---------------|--------------|-----------|----------|----------|----------|-----------|
| | 1(PES) | 2(WOS) | 3 | 4(Adult) | Uncl. | |
| 1(PES) | 0 | 1 | 1 | 0 | 0 | 2 |
| 2(WOS) | 0 | 2 | 0 | 0 | 0 | 2 |
| 3 | 0 | 5 | 0 | 0 | 1 | 6 |
| 4(Adult) | 0 | 11 | 6 | 7 | 1 | 25 |
| Uncl. | 0 | 0 | 1 | 0 | 1 | 2 |
| Totals | 0 | 19 | 8 | 7 | 3 | 37 |

Table 19

Subjects who Demonstrate Word Order Strategies
in the Probable Form of Passives and Inverted Clefts

| PASS T1 | | | PASS T2 | | |
|-------------------|--------------|----------|-------------------|--------------|------|
| Subject Number | Group Coding | | Subject Number | Group Coding | |
| | SAD | PASS | | SAD | PASS |
| 2** | 2 | unclass. | 1** | 2 | 2 |
| 8* | 4 | 2 | 3** | 2 | 2 |
| 9** | 3 | 2 | 12** | 2 | 2 |
| 11* | 2 | unclass. | | | |
| 12** | 1 | 2 | | | |
| 13** | 4 | 2 | | | |

| CLEFT T1 | | | | CLEFT T2 | | | |
|-------------------|--------------|------|----------|-------------------|--------------|----------|----------|
| Subject Number | Group Coding | | | Subject Number | Group Coding | | |
| | SAD | PASS | CLEFT | | SAD | PASS | CLEFT |
| 25** | 4 | 3 | unclass. | 21* | 3 | unclass. | 2 |
| 34* | 4 | 4 | unclass. | 25** | 4 | 4 | 2 |
| 42* | 4 | 3 | unclass. | 28* | 4 | 3 | 2 |
| 48* | 3 | 3 | unclass. | 34** | 3 | 4 | unclass. |
| 54* | 4 | 3 | 2 | 36** | 4 | 4 | 2 |
| 56* | 4 | 3 | unclass. | 45* | 4 | 4 | 2 |
| | | | | 46* | 4 | 4 | 2 |
| | | | | 48* | 3 | 3 | 2 |
| | | | | 51* | 4 | 4 | unclass. |
| | | | | 56* | 4 | 4 | 2 |

* 60% Reversal of Subject and Object

** 80% Reversal of Subject and Object

Table 20

Responses on Relative Clause Test
According to Groupings on Passive Test

| | <u>Subj. No.</u> | <u>CLEFT Group</u> | <u>Age</u> | <u>Number Attemp- ted</u> | <u>Correct</u> | <u>Incorrect - 4 of each unless stated</u> | <u>All responses 2 Clause</u> |
|----------------|----------------------|------------------------|------------|-----------------------------------|------------------------------|--|---------------------------------------|
| <u>Group 1</u> | 35 | 2 | 5½ | 4 | 1 SS | SO-2123 (1) | No |
| <u>Group 2</u> | 1 | Ø | 3½ | 12 | 0 | | No |
| | 4 | Ø | 3½ | 19 | 0 | No 2 clauses | No |
| | 15 | Ø | 4 | 4 | 0 | | No |
| | 27 | 3 | 5 | 20 | 1 SS | | No |
| | 43 | 3 | 6 | 6 | 1 SS 1 OO | | No |
| | 23 | 2 | 4½ | 8 | 1 SS | | No |
| <u>Group 3</u> | 8 | Ø | 3½ | 7 | 1 SS 2 OO | | No |
| | 16 | 0 | 4 | 4 | 1 OS | | Yes |
| | 17 | 2 | 4½ | 13 | 1 SS 2 OS | | No |
| | 28 | 2 | 5 | 7 | 2 OO 1 OS | | Yes |
| | 33 | 3 | 5½ | 19 | 1 SS 1 OO | OS-1213 | No |
| | 38 | 3 | 5½ | 20 | 1 SS 3 OO 2 OS | | No |
| | 42 | 2 | 6 | 12 | 1 SO 3 OO 3 OS | SS-1223 | Yes |
| | 48 | 2 | 6 | 20 | 2 SS 2 OO 3 OS | SO-2123 | No |
| <u>Group 4</u> | 19 | 2 | 4½ | 9 | 0 | | No |
| | 22 | 2 | 4½ | 17 | 3 SS 1 SO 3 OO 2 OS | OO-1231(2) OS-1213(2) | Yes |
| | 25 | 2 | 5 | 20 | 2 SS 1 OO 3 OS | OS-1213(2) | No |
| | 26 | 2 | 5 | 20 | 3 SS 1 SO 4 OO 3 OS | | No |
| | 30 | 2 | 5 | 10 | 2 OO 2 OS | SS-1223 | Yes |
| | 34 | Uncl. | 5½ | 20 | 5 SS 1 SO 3 OO 2 OS | OS-1213(3) | Yes |
| | 36 | 2 | 5½ | 20 | 1 SS 2 SO 3 OS | SO-1223(3) OO-1231(3) | No |
| | 37 | 3 | 5½ | 20 | 1 SS 2 SO 2 OO 4 OS | SS-1223 | Yes |
| | 40 | 2 | 5½ | 5 | 1 OO | | No |

(table continues)

| | <u>Subj. No.</u> | <u>CLSEPT Group</u> | <u>Age</u> | <u>Number Attemp- ted</u> | <u>Correct</u> | <u>Incorrect - 4 of each unless stated</u> | <u>All responses 2 Clause</u> |
|------------------------------|----------------------|-------------------------|------------|-----------------------------------|------------------------------|--|---------------------------------------|
| <u>Group 4 (Cont'd.)</u> | 44 | 2 | 6 | 20 | 1 SS 2 OO 4 OS | SS=1223(3) SO=1223(3) | Yes |
| | 45 | 2 | 6 | 20 | 2 SS 3 OO 4 OS | SS=1223(3) SO=1223 OO=1223(2) | Yes |
| | 46 | 2 | 6 | 20 | 1 SO 1 OO 4 OS | SS=1223 | No |
| | 51 | Uncl. | 6½ | 20 | 1 SS 2 SO 5 OO 3 OS | SS=1223 | Yes |
| | 54 | 2 | 6½ | 20 | 1 SS 2 SO 2 OO 3 OS | SS=1223, SO=1223(3) OO=1223(2) | Yes |
| | 56 | 2 | 6½ | 20 | 4 OO 5 OS 1 SO | SS=1223 | Yes |
| <u>Uncode- able</u> | 18 | Uncl. | 4½ | 20 | 0 | inconsistent except OO=12 | No |
| | 21 | 2 | 4½ | 6 | 0 | incomplete | Yes |

Note: () = number of instances

Table 21
 Number Correct on Relative Clause Sentences
 by Passive Groups

| PASS Groups | Relative Clause Sentence Types | | | |
|----------------|--------------------------------|----------------|----------------|----------------|
| | SS [122] | SO [111] | OO [117] | OS [106] |
| 1 | 1 | 0 | 0 | 0 |
| 2 | 3 | 0 | 1 | 0 |
| 3 | 6 | 1 | 13 | 11 |
| 4 | 20 | 12 | 33 | 42 |
| Total | 30(25%) | 13(12%) | 47(40%) | 53(50%) |

Note: [] number attempted

Table 22
 Numbers of Correct Single Clauses
 for each Clause Type

| Sentence Type | Clause Type | |
|------------------|-------------|--------|
| | Relative | Main |
| SS | 64(69) | 4(4) |
| SO | 24(24) | 16(16) |
| OO | 7(10) | 48(68) |
| OS | 5(9) | 34(64) |

Note: () percentage of total incorrect sentences

Table 23
 Percentage of Boys and Girls
 in each SAD and PASS Group

| Sentence Type | | Boys | Girls |
|---------------|-------|------|-------|
| SAD | 1 | 10 | 3 |
| | 2 | 8 | 15 |
| | 3 | 23 | 34 |
| | 4 | 48 | 42 |
| | Uncl. | 10 | 5 |
| Total | | 99 | 99 |
| PASS | Pre. | 6 | 3 |
| | 1 | 6 | 3 |
| | 2 | 23 | 11 |
| | 3 | 21 | 24 |
| | 4 | 37 | 46 |
| | Uncl. | 6 | 11 |
| Total | | 99 | 98 |

Note: 26 Boys and 30 Girls distributed
 through age range

Table 24

Performance at Time 1 and Time 2
on the same Sentence Type

| SAD Groups T1 | SAD Groups T2 | | | | | | Totals |
|------------------|---------------|----------|-----------|-----------|----------|----------|-----------|
| | 1 | 2 | 3 | 4 | Uncl. | Missing | |
| 1 | 0 | 2 | 0 | 0 | 1 | 2 | 5 |
| 2 | 1 | 0 | 4 | 2 | 0 | 0 | 7 |
| 3 | 0 | 3 | 3 | 12 | 1 | 2 | 21 |
| 4 | 0 | 1 | 2 | 14 | 1 | 1 | 19 |
| Uncl. | 1 | 0 | 1 | 1 | 0 | 1 | 4 |
| Totals | 2 | 6 | 10 | 29 | 3 | 6 | 56 |

| PASS Groups T1 | PASS Groups T2 | | | | | | | Totals |
|-------------------|----------------|----------|----------|-----------|-----------|----------|----------|-----------|
| | Precode | 1 | 2 | 3 | 4 | Uncl. | Missing | |
| Precode | 0 | 0 | 2 | 1 | 0 | 0 | 2 | 5 |
| 1 | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 5 |
| 2 | 0 | 0 | 3 | 3 | 2 | 2 | 0 | 10 |
| 3 | 0 | 1 | 0 | 5 | 7 | 0 | 0 | 13 |
| 4 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 15 |
| Uncl. | 0 | 0 | 2 | 2 | 2 | 0 | 2 | 8 |
| Total | 0 | 1 | 8 | 11 | 28 | 3 | 5 | 56 |

| CLEFT Groups T1 | CLEFT Groups T2 | | | | | | | Totals |
|--------------------|-----------------|-----------|----------|----------|----------|--------------|----------|-----------|
| | 1 | 2 | 3 | 4 | Uncl. | Too Young | Missing | |
| 1 | 0 | 3 | 2 | 1 | 0 | 0 | 0 | 6 |
| 2 | 0 | 5 | 1 | 2 | 1 | 0 | 1 | 10 |
| 3 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 4 |
| 4 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 |
| Uncl. | 0 | 6 | 1 | 1 | 1 | 0 | 0 | 9 |
| Too young | 0 | 5 | 0 | 0 | 1 | 16 | 2 | 24 |
| Totals | 0 | 19 | 8 | 7 | 3 | 16 | 3 | 56 |

Table 25

Performance on SAD Sentences in Relation to
PASS Sentences over time

| SAD Groups T1 | PASS Groups T2 | | | | | | | Totals |
|------------------|----------------|----------|----------|-----------|-----------|----------|----------|-----------|
| | Precode | 1 | 2 | 3 | 4 | Uncl. | Missing | |
| 1 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 5 |
| 2 | 0 | 0 | 2 | 3 | 1 | 1 | 0 | 7 |
| 3 | 0 | 0 | 3 | 6 | 11 | 0 | 1 | 21 |
| 4 | 0 | 0 | 0 | 2 | 15 | 1 | 1 | 19 |
| Uncl. | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 4 |
| Totals | 0 | 1 | 8 | 11 | 28 | 3 | 5 | 56 |

| PASS Groups T1 | SAD Groups T2 | | | | | | Totals |
|-------------------|---------------|----------|-----------|-----------|----------|----------|-----------|
| | 1 | 2 | 3 | 4 | Uncl. | Missing | |
| Precode | 0 | 2 | 0 | 0 | 1 | 2 | 5 |
| 1 | 0 | 1 | 0 | 2 | 1 | 1 | 5 |
| 2 | 0 | 1 | 4 | 4 | 1 | 0 | 10 |
| 3 | 1 | 0 | 3 | 8 | 1 | 0 | 13 |
| 4 | 0 | 1 | 1 | 13 | 0 | 0 | 15 |
| Uncl. | 1 | 1 | 2 | 2 | 0 | 2 | 8 |
| Totals | 2 | 6 | 10 | 29 | 4 | 5 | 56 |

Table 26
 Performance on PASS Sentences in Relation
 to CLEFT Sentences over time

| PASS Groups T1 | CLEFT Groups T2 | | | | | | | Totals |
|-------------------|-----------------|----|---|---|-------|--------------|---------|--------|
| | 1 | 2 | 3 | 4 | Uncl. | Too Young | Missing | |
| Precode | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 5 |
| 1 | 0 | 1 | 2 | 0 | 1 | 0 | 1 | 5 |
| 2 | 0 | 2 | 2 | 0 | 1 | 5 | 0 | 10 |
| 3 | 0 | 9 | 1 | 1 | 0 | 2 | 0 | 13 |
| 4 | 0 | 6 | 2 | 6 | 1 | 0 | 0 | 15 |
| Uncl. | 0 | 1 | 1 | 0 | 0 | 4 | 2 | 8 |
| Totals | 0 | 19 | 8 | 7 | 3 | 14 | 5 | 56 |

| CLEFT Groups T1 | PASS Groups T2 | | | | | | | Totals |
|--------------------|----------------|---|---|----|----|-------|---------|--------|
| | Precode | 1 | 2 | 3 | 4 | Uncl. | Missing | |
| 1 | 0 | 1 | 0 | 1 | 4 | 0 | 0 | 6 |
| 2 | 0 | 0 | 0 | 0 | 9 | 0 | 1 | 10 |
| 3 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 4 |
| 4 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 |
| Uncl. | 0 | 0 | 0 | 3 | 6 | 0 | 0 | 9 |
| Too young | 0 | 0 | 6 | 7 | 5 | 2 | 4 | 24 |
| Totals | 0 | 1 | 8 | 12 | 28 | 2 | 5 | 56 |

Table 27

SAD Groups in Relation to CLEFT Groups
over time

| SAD Groups T1 | CLEFT Groups T2 | | | | | | | Totals |
|------------------|-----------------|----|---|---|-------|--------------|---------|--------|
| | 1 | 2 | 3 | 4 | Uncl. | Too Young | Missing | |
| 1 | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 5 |
| 2 | 0 | 2 | 2 | 0 | 0 | 3 | 0 | 7 |
| 3 | 0 | 8 | 4 | 2 | 0 | 6 | 1 | 21 |
| 4 | 0 | 8 | 2 | 4 | 2 | 2 | 1 | 19 |
| Uncl. | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 4 |
| Totals | 0 | 19 | 8 | 7 | 3 | 16 | 3 | 56 |

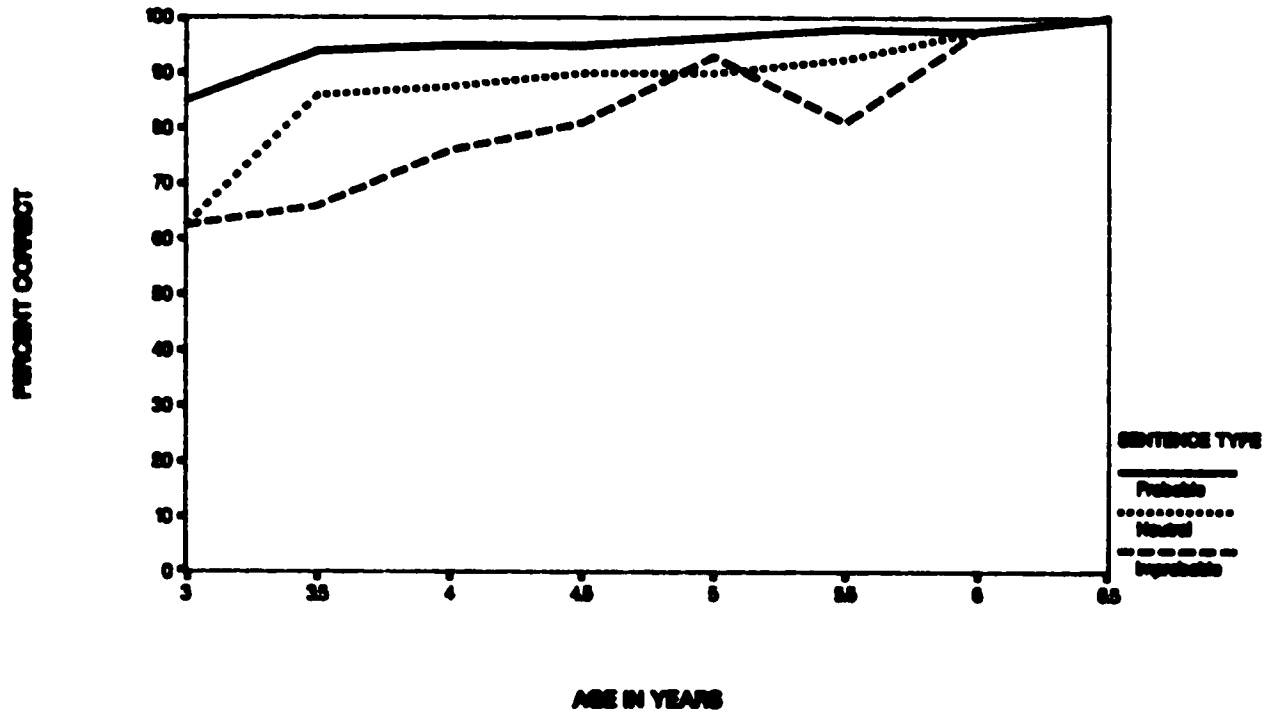
| CLEFT Groups T1 | SAD Groups T2 | | | | | | Totals |
|--------------------|---------------|---|----|----|-------|---------|--------|
| | 1 | 2 | 3 | 4 | Uncl. | Missing | |
| 1 | 1 | 0 | 0 | 5 | 0 | 0 | 6 |
| 2 | 0 | 0 | 0 | 9 | 0 | 1 | 10 |
| 3 | 1 | 0 | 0 | 3 | 0 | 0 | 4 |
| 4 | 0 | 0 | 0 | 3 | 0 | 0 | 3 |
| Uncl. | 0 | 1 | 3 | 4 | 1 | 0 | 9 |
| Too young | 0 | 5 | 7 | 5 | 3 | 4 | 24 |
| Totals | 2 | 6 | 10 | 29 | 4 | 5 | 56 |

Table 28
Individual Coding on all Sentence Types T1 to T2

| Subjects grouped by SAD coding | | | | | | Subjects grouped by CLEFT coding | | | | | | | |
|--------------------------------|-----|------|-------|-----|------|----------------------------------|----------------|-----|------|-------|-----|------|-------|
| Subject Number | T1 | | | T2 | | | Subject Number | T1 | | | T2 | | |
| | SAD | PASS | CLEFT | SAD | PASS | CLEFT | | SAD | PASS | CLEFT | SAD | PASS | CLEFT |
| 1 | 1 | pre | Ø | 2 | 2 | Ø | 28 | 3 | 3 | 1 | 4 | 3 | 2 |
| 6 | 1 | pre | Ø | - | - | - | 32 | 3 | 1 | 1 | 4 | 4 | 3 |
| 7 | 1 | pre | Ø | - | - | - | 35 | un | 3 | 1 | 1 | 1 | 2 |
| 12 | 1 | 2 | Ø | 2 | 2 | Ø | 44 | 3 | 4 | 1 | 4 | 4 | 2 |
| 18 | 1 | 1 | Ø | un | un | un | 50 | 4 | 4 | 1 | 4 | 4 | 3 |
| | | | | | | | 53 | 3 | 4 | 1 | 4 | 4 | 4 |
| 2 | 2 | un | Ø | 3 | 3 | Ø | | | | | | | |
| 10 | 2 | 3 | Ø | 4 | 3 | Ø | 36 | 4 | 4 | 2 | 4 | 4 | 2 |
| 11 | 2 | un | Ø | 3 | 4 | Ø | 37 | 3 | 1 | 2 | 4 | 4 | 3 |
| 17 | 2 | 2 | Ø | 3 | 3 | 2 | 39 | 3 | 1 | 2 | - | - | - |
| 21 | 2 | 2 | Ø | 3 | un | 2 | 40 | 4 | 3 | 2 | 4 | 4 | 2 |
| | | | | | | | 45 | 3 | 4 | 2 | 4 | 4 | 2 |
| 4 | 3 | pre | Ø | un | 2 | Ø | 46 | 4 | 4 | 2 | 4 | 4 | 2 |
| 5 | 3 | pre | Ø | 2 | 3 | Ø | 51 | 4 | 2 | 2 | 4 | 4 | un |
| 9 | 3 | 2 | Ø | 3 | 4 | Ø | 52 | un | 3 | 2 | 4 | 4 | 4 |
| 14 | 3 | 3 | Ø | 4 | 4 | Ø | 54 | 4 | 3 | 2 | 4 | 4 | 2 |
| 15 | 3 | un | Ø | 2 | 2 | Ø | 55 | 4 | 4 | 2 | 4 | 4 | 4 |
| 16 | 3 | un | Ø | 4 | 3 | Ø | | | | | | | |
| 19 | 3 | 3 | Ø | 3 | 4 | 2 | 27 | 2 | un | 3 | 1 | 2 | 3 |
| 22 | 3 | un | Ø | 4 | 4 | 2 | 31 | 4 | 4 | 3 | 4 | 4 | 3 |
| 23 | 3 | 1 | Ø | 2 | 2 | 2 | 38 | 3 | 2 | 3 | 4 | 3 | 3 |
| | | | | | | | 43 | 2 | 2 | 3 | 4 | 2 | 3 |
| 8 | 4 | 2 | Ø | un | 3 | Ø | | | | | | | |
| 13 | 4 | 2 | Ø | 4 | un | Ø | 29 | 4 | 4 | 4 | 4 | 4 | 4 |
| 24 | 4 | un | Ø | - | - | - | 41 | 4 | 4 | 4 | 4 | 4 | 4 |
| | | | | | | | 49 | 4 | 4 | 4 | 4 | 4 | 4 |
| 3 | un | 2 | Ø | 3 | 2 | Ø | | | | | | | |
| 20 | un | un | Ø | - | - | - | 25 | 4 | 3 | un | 4 | 4 | 2 |
| | | | | | | | 26 | 4 | 4 | un | 2 | 4 | 2 |
| | | | | | | | 30 | 3 | 4 | un | 4 | 4 | 2 |
| | | | | | | | 33 | 3 | 3 | un | un | 3 | 3 |
| | | | | | | | 34 | 4 | 4 | un | 3 | 4 | un |
| | | | | | | | 42 | 4 | 3 | un | 3 | 3 | 2 |
| | | | | | | | 47 | 3 | 4 | un | 4 | 4 | 4 |
| | | | | | | | 48 | 3 | 3 | un | 3 | 3 | 2 |
| | | | | | | | 56 | 4 | 3 | un | 4 | 4 | 2 |

Figure 1

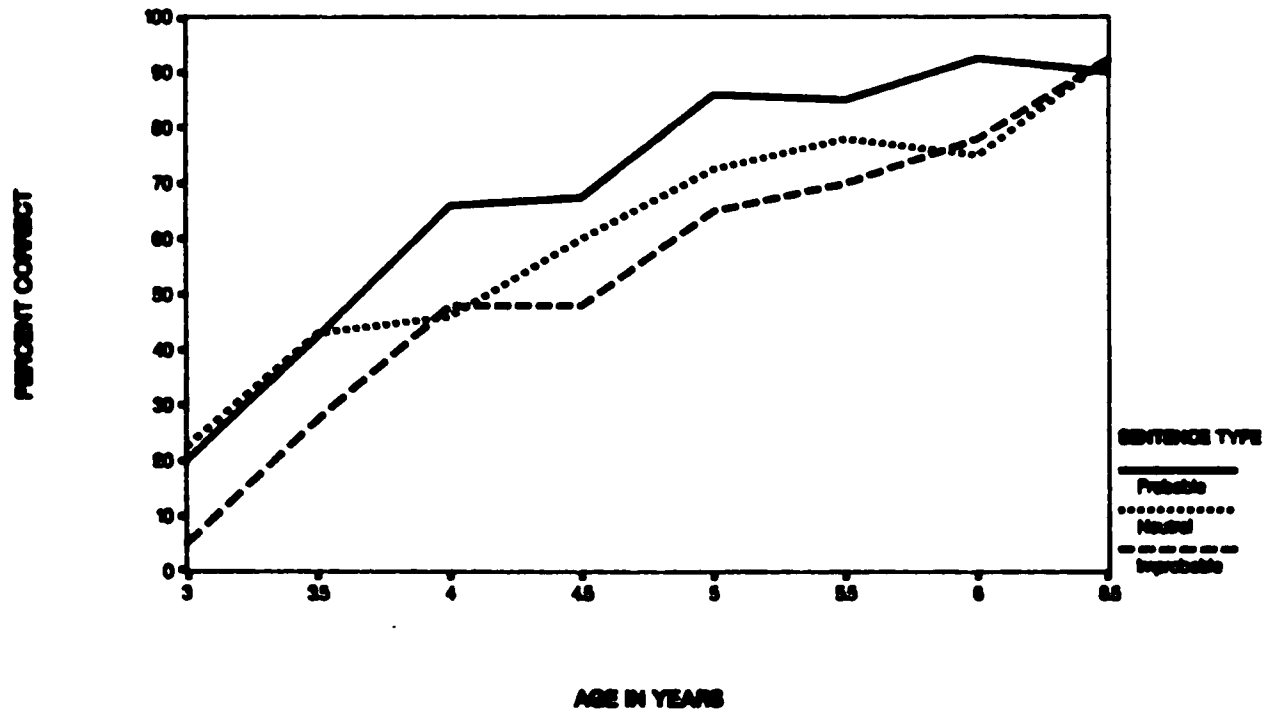
SAD Responses, groups of 16



Note: Groups of 8 at ages 3 and 6.5

Figure 2

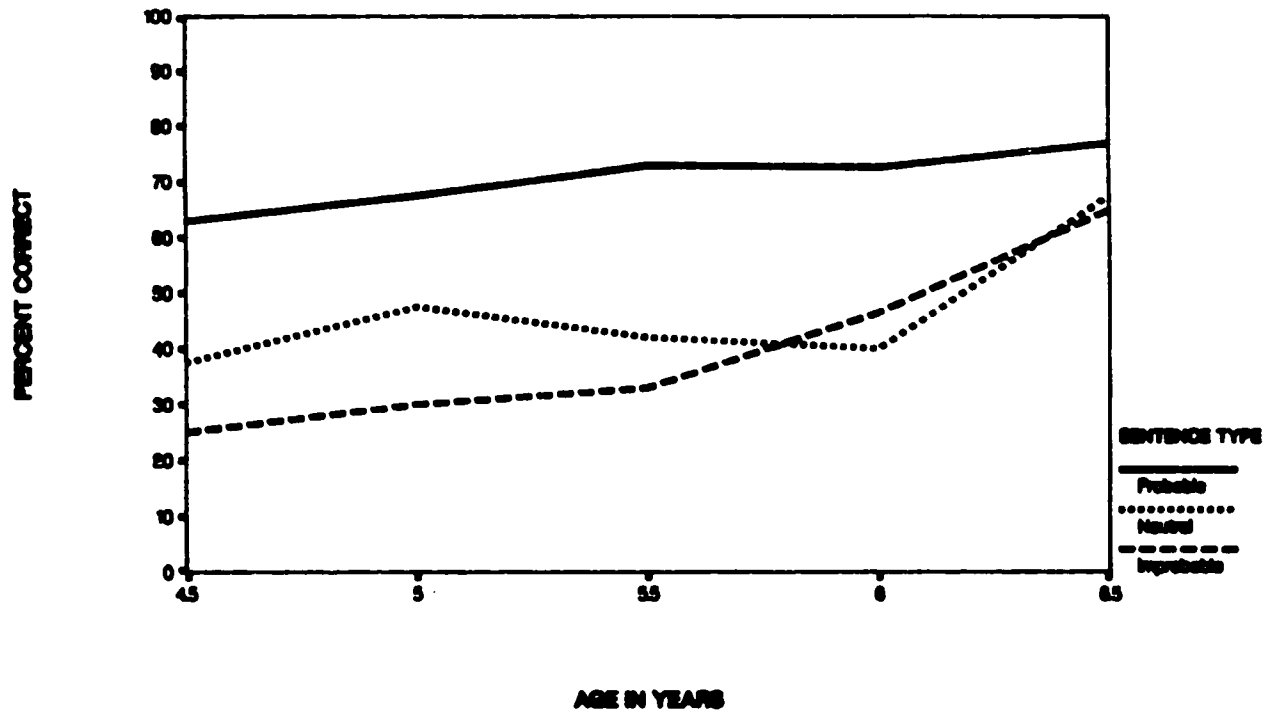
PASSIVE Responses, groups of 16



Note: Groups of 6 at ages 5 and 65

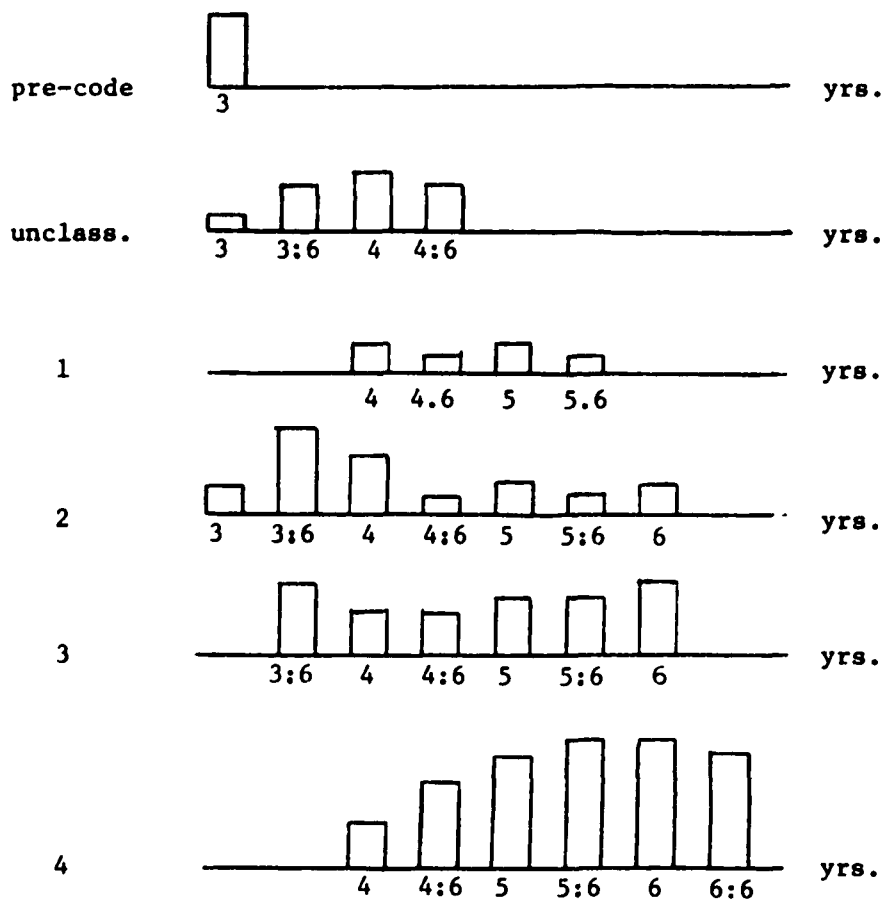
Figure 3

CLEFT Responses, Groups of 16



Note: Groups of 8 at age 6.5

Figure 4
Ages of children in Passive Groups
N = 107



Appendix A

| SAD | | |
|---|---|---|
| Probable | Neutral | Improbable |
| The Mummy feeds the baby The Mummy washes the baby The dog bites the Daddy The Daddy rides the horse The Daddy spanks the girl | The dog feeds the pig The horse washes the cow The cow bites the horse The dog rides the pig The boy spanks the girl | The baby feeds the Mummy The baby washes the Mummy The Daddy bites the dog The horse rides the Daddy The girl spanks the Mummy |
| PASS | | |
| Probable | Neutral | Improbable |
| The baby is fed by the Mummy The baby is washed by the Mummy The Daddy is bitten by the dog The horse is ridden by the Daddy The girl is spanked by the Daddy | The pig is fed by the dog The cow is washed by the horse The horse is bitten by the cow The pig is ridden by the dog The girl is spanked by the boy | The Mummy is fed by the baby The Mummy is washed by the baby The dog is bitten by the Daddy The Daddy is ridden by the horse The Mummy is spanked by the girl |
| CLEFT | | |
| Probable | Neutral | Improbable |
| It's the baby the Mummy feeds Its the baby the Mummy washes It's the Daddy the dog bites It's the horse the Daddy rides It's the girl the Daddy spanks | It's the pig the dog feeds It's the cow the horse washes It's the horse the cow bites It's the pig the dog rides It's the girl the boy spanks | It's the Mummy the baby feeds Its the Mummy the baby washes It's the dog the Daddy bites It's the Daddy the horse rides It's the Mummy the girl spanks |

Appendix B

COMPREHENSION TEST I - PART A

Name:
Age:
Date:
Location:

| <u>Sentence</u> | <u>N₁</u> | <u>Verb</u> | <u>N₂</u> | <u>Other</u> |
|--------------------------------------|----------------------|-------------|----------------------|--------------|
| 1. The Mummy feeds the baby. | | | | |
| 2. The Daddy is spanked by the girl. | | | | |
| 3. The cow bites the horse. | | | | |
| 4. The horse is ridden by the Daddy. | | | | |
| 5. The baby washes the Mummy. | | | | |
| 6. The dog feeds the pig. | | | | |
| 7. The girl is spanked by the Daddy. | | | | |
| 8. The Daddy bites the dog. | | | | |
| 9. The pig is ridden by the dog. | | | | |
| 10. The Mummy washes the baby. | | | | |
| 11. The boy spanks the girl. | | | | |
| 12. The Mummy is fed by the baby. | | | | |
| 13. The Daddy is bitten by the dog. | | | | |
| 14. The horse rides the Daddy. | | | | |
| 15. The horse washes the cow. | | | | |

COMPREHENSION TEST I - PART B

Date:

| <u>Sentence</u> | <u>N₁</u> | <u>Verb</u> | <u>N₂</u> | <u>Other</u> |
|--------------------------------------|----------------------|-------------|----------------------|--------------|
| 1. The baby is fed by the Mummy. | | | | |
| 2. The girl spanks the Daddy. | | | | |
| 3. The horse is bitten by the cow. | | | | |
| 4. The Daddy rides the horse. | | | | |
| 5. The Mummy is washed by the baby.. | | | | |
| 6. The girl is spanked by the boy. | | | | |
| 7. The baby feeds the Mummy. | | | | |
| 8. The dog bites the Daddy. | | | | |
| 9. The Daddy is ridden by the horse. | | | | |
| 10. The cow is washed by the horse. | | | | |
| 11. The pig is fed by the dog. | | | | |
| 12. The Daddy spanks the girl. | | | | |
| 13. The dog is bitten by the Daddy. | | | | |
| 14. The dog rides the pig. | | | | |
| 15. The baby is washed by the Mummy. | | | | |

Appendix C

COMPREHENSION TEST II - PART A

Location:
Name:
Age:
Date:

| <u>Sentence</u> | <u>N₁</u> | <u>Verb</u> | <u>N₂</u> | <u>Other</u> |
|---------------------------------------|----------------------|-------------|----------------------|--------------|
| 1. The Mummy feeds the baby. | | | | |
| 2. The Daddy is spanked by the girl. | | | | |
| 3. It's the horse the cow bites. | | | | |
| 4. The Daddy rides the horse. | | | | |
| 5. The Mummy is washed by the baby. | | | | |
| 6. It's the girl the boy spans. | | | | |
| 7. The Mummy is fed by the baby | | | | |
| 8. The dog bites the Daddy. | | | | |
| 9. It's the cow the horse washes. | | | | |
| 10. The Daddy is ridden by the horse. | | | | |
| 11. The Daddy spans the girl. | | | | |
| 12. It's the pig the dog feeds. | | | | |
| 13. The dog is bitten by the Daddy. | | | | |
| 14. The Mummy washes the baby. | | | | |
| 15. It's the pig the dog rides. | | | | |
| 16. The baby is fed by the Mummy. | | | | |
| 17. It's the Daddy the girl spans. | | | | |
| 18. The cow bites the horse. | | | | |
| 19. The horse is ridden by the Daddy. | | | | |
| 20. It's the Mummy the baby washes. | | | | |
| 21. The Daddy is bitten by the dog. | | | | |
| 22. The boy spans the girl. | | | | |
| 23. It's the Mummy the baby feeds. | | | | |

Appendix D

Name:
 Age:
 Date:
 Location:

COMPREHENSION TEST II - PART B

| <u>Sentence</u> | <u>N₁</u> | <u>Verb</u> | <u>N₂</u> | <u>Other</u> |
|--------------------------------------|----------------------|-------------|----------------------|--------------|
| 1. It's the Daddy the horse rides. | | | | |
| 2. The dog feeds the pig. | | | | |
| 3. The horse washes the cow. | | | | |
| 4. The girl is spanked by the Daddy. | | | | |
| 5. It's the dog the Daddy bites. | | | | |
| 6. The dog rides the pig. | | | | |
| 7. The baby is washed by the Mummy. | | | | |
| 8. The girl spanks the Daddy. | | | | |
| 9. The horse is bitten by the cow. | | | | |
| 10. It's the baby the Mummy feeds. | | | | |
| 11. It's the horse the Daddy rides. | | | | |
| 12. The baby washes the Mummy. | | | | |
| 13. The girl is spanked by the boy. | | | | |
| 14. The baby feeds the Mummy. | | | | |
| 15. It's the Daddy the dog bites. | | | | |
| 16. The horse rides the Daddy. | | | | |
| 17. The cow is washed by the horse. | | | | |
| 18. The pig is fed by the dog. | | | | |
| 19. It's the girl the Daddy spanks. | | | | |
| 20. The Daddy bites the dog. | | | | |
| 21. It's the baby the Mummy washes. | | | | |
| 22. The pig is ridden by the dog. | | | | |

Appendix E

Name:
 Age:
 Date:
 Location:

JUDGEMENT TASK I

| <u>Sentence</u> | <u>Good</u> | <u>Silly</u> | <u>Other</u> |
|---------------------------------------|-------------|--------------|--------------|
| 1. The Mummy feeds the baby. | | | |
| 2. The Daddy is spanked by the girl. | | | |
| 3. The horse rides the Daddy. | | | |
| 4. The Daddy is bitten by the dog. | | | |
| 5. The baby is washed by the Mummy. | | | |
| 6. The girl is spanked by the Daddy. | | | |
| 7. The baby feeds the Mummy. | | | |
| 8. The Daddy bites the dog. | | | |
| 9. The Mummy is washed by the baby. | | | |
| 10. The horse is ridden by the Daddy. | | | |
| 11. The baby is fed by the Mummy. | | | |
| 12. The dog bites the Daddy. | | | |
| 13. The girl spans the Daddy. | | | |
| 14. The Daddy is ridden by the horse. | | | |
| 15. The Mummy washes the baby. | | | |
| 16. The dog is bitten by the Daddy. | | | |
| 17. The Mummy is fed by the baby. | | | |
| 18. The Daddy spans the girl. | | | |
| 19. The Daddy rides the horse. | | | |
| 20. The baby washes the Mummy. | | | |

Appendix F

Name:
Age:
Date:
Location:

JUDGEMENT TASK II -

| <u>Sentence</u> | <u>Good</u> | <u>Silly</u> | <u>Other</u> |
|---------------------------------------|-------------|--------------|--------------|
| 1. The Mummy feeds the baby. | | | |
| 2. The Daddy is spanked by the girl. | | | |
| 3. It's the Daddy the dog bites. | | | |
| 4. The baby is washed by the Mummy. | | | |
| 5. The horse rides the Daddy. | | | |
| 6. It's the Mummy the baby feeds. | | | |
| 7. The dog is bitten by the Daddy. | | | |
| 8. The Daddy spanks the girl. | | | |
| 9. It's the horse the Daddy rides. | | | |
| 10. The baby washes the Mummy. | | | |
| 11. It's the Daddy the girl spanks. | | | |
| 12. The baby is fed by the Mummy. | | | |
| 13. The dog bites the Daddy. | | | |
| 14. The Daddy is ridden by the horse. | | | |
| 15. It's the baby the Mummy washes. | | | |
| 16. The baby feeds the Mummy. | | | |
| 17. The girl is spanked by the Daddy. | | | |
| 18. The Daddy rides the horse. | | | |
| 19. It's the dog the Daddy bites. | | | |
| 20. The Mummy is washed by the baby. | | | |
| 21. The girl spanks the Daddy. | | | |
| 23. It's the baby the Mummy feeds. | | | |
| 23. The Daddy is bitten by the dog. | | | |
| 24. The Mummy washes the baby. | | | |
| 25. It's the Daddy the horse rides. | | | |
| 26. The Mummy is fed by the baby. | | | |
| 27. It's the girl the Daddy spanks. | | | |
| 28. The horse is ridden by the Daddy. | | | |
| 29. The Daddy bites the dog. | | | |
| 30. It's the Mummy the baby washes. | | | |

Appendix G

Ann Mary Stanton
3439c Aylmer
Montreal, Quebec

Dear Parents:

I am the Director of the Speech and Language Clinic at The Montreal Children's Hospital where I work as a Speech Pathologist. I am also completing my Doctoral Program in Speech and Hearing Sciences at the Graduate Center of the City University of New York.

I am currently engaged in planning my dissertation. It is concerned with the development of verbal comprehension in children. For this, like all other researchers, I need subjects and I have approached
to request some interviews with their children between the ages of

For the purpose of my study, I will need to work with several children. I will see each child twice every six months, on consecutive days, beginning in September 1983 and continuing until March 1984. My interviews with the children will last approximately twenty minutes each time. The children will be seen individually and will have some toys to play with which, after a warm up, they will use in order to act out sentences that I give them such as 'The Mummy feeds the baby.' I will also try to get a little bit of language from each child to see whether the structures I am analyzing in understanding ever occur in the child's own speech, and to see the average length of the child's own sentences. I will also have a 'game' of asking the child whether a set of sentences are 'good' or 'silly', probably using a puppet who needs help to learn to talk. The whole procedure should be fun for the child. If any of the children show fear or become upset, I will not use them. The children should have English as their first language and have no history of neurological disorder or developmental delays.

To date there have been no studies that have evaluated comprehension development over time in the same child and very little individual analysis of how children come to understand sentences. I hope this study will advance our understanding of language comprehension and enable us to deal more effectively with those children who have difficulties in this area.

I would very much appreciate being able to include your child in the study, and would feel most privileged to do so.

Yours sincerely,



Ann Mary Stanton, M.Sc., L.C.S.T.

I consent to my child being included in this study
I do not wish my child to be in this study

Name of child:

Date of birth:

Appendix H

RELATIVE TEST

Name:
Age:
Date:
Location:

- | | <u>Main</u> | | | <u>Relative</u> | | |
|-----|-------------|------------------|-------------|-----------------|--------------|----|
| | N1 | V | N2 | N1 | V | N2 |
| 1. | The cow | that bit | the pig | pushed | the dog. | |
| 2. | The boy | that the Mummy | pushed | kicked | the dog. | |
| 3. | The giraffe | bit | the horse | that the Mummy | spanked. | |
| 4. | The boy | that fed | the girl | washed | the dog. | |
| 5. | The pig | rode | the giraffe | that kicked | the Mummy. | |
| 6. | The dog | fed | the boy | that the baby | kicked. | |
| 7. | The Daddy | that the cow | spanked | rode | the pig. | |
| 8. | The girl | that bit | the baby | spanked | the cow. | |
| 9. | The Mummy | washed | the pig | that pushed | the girl. | |
| 10. | The dog | rode | the cow | that the Daddy | washed. | |
| 11. | The girl | that the Daddy | kicked | fed | the cow. | |
| 12. | The horse | bit | the pig | that fed | the dog. | |
| 13. | The Mummy | fed | the Daddy | that the baby | spanked. | |
| 14. | The boy | bit | the giraffe | that the pig | spanked. | |
| 15. | The horse | that pushed | the cow | rode | the giraffe. | |
| 16. | The Daddy | fed | the Mummy | that washed | the boy. | |
| 17. | The Mummy | that the giraffe | pushed | kicked | the baby. | |
| 18. | The dog | spanked | the girl | that bit | the Daddy. | |
| 19. | The baby | that the horse | fed | washed | the giraffe. | |
| 20. | The giraffe | that spanked | the pig | fed | the dog. | |

Appendix I

Percent of Structures Comprehended by Age

Time 1

| <u>Ages</u> | <u>3</u> | <u>3:6</u> | <u>4</u> | <u>4:6</u> | <u>5</u> | <u>5:6</u> | <u>6</u> |
|----------------------|----------|------------|----------|------------|----------|------------|----------|
| <u>Sentence type</u> | | | | | | | |
| SAD Prob. | 85 | 92.5 | 90 | 100 | 92.5 | 97.5 | 97.5 |
| Neut. | 62.5 | 85 | 77.5 | 97.5 | 90 | 97.5 | 95 |
| Imp. | 62.5 | 70 | 65 | 90 | 95 | 87.5 | 97.5 |
| PASS Prob. | 20 | 42.5 | 60 | 77.5 | 92.5 | 82.5 | 95 |
| Neut. | 22.5 | 40 | 27.5 | 67.5 | 65 | 80 | 72.5 |
| Imp. | 5 | 25 | 35 | 47.5 | 50 | 75 | 72.5 |
| I. Cleft Prob. | | | | 65 | 67.5 | 75 | 75 |
| Neut. | | | | 37.5 | 35. | 47.5 | 40 |
| Imp. | | | | 27.5 | 22.5 | 40 | 45 |

Time 2

| <u>Ages</u> | <u>3:6</u> | <u>4</u> | <u>4:6</u> | <u>5</u> | <u>5:6</u> | <u>6</u> | <u>6:6</u> |
|----------------------|------------|----------|------------|----------|------------|----------|------------|
| <u>Sentence type</u> | | | | | | | |
| SAD Prob. | 96 | 100 | 90 | 100 | 100 | 97.5 | 100 |
| Neut. | 87 | 97.5 | 83 | 90 | 88.6 | 100 | 100 |
| Imp. | 63 | 87.5 | 73 | 92.5 | 74.3 | 97.5 | 100 |
| PASS Prob. | 43 | 72.5 | 57 | 80 | 88.6 | 90 | 90 |
| Neut. | 46 | 65 | 53 | 80 | 77 | 77.5 | 92.5 |
| Imp. | 30 | 62.5 | 50 | 75 | 65.7 | 85 | 92.5 |
| I. Cleft Prob. | | | 60 | 67.5 | 71.4 | 70 | 77.5 |
| Neut. | | | 36.6 | 60 | 34.3 | 40 | 67.5 |
| Imp. | | | 23 | 37.5 | 28.6 | 47.5 | 65 |

Appendix J

Number of Responses
Indicating Subject/Object Reversal

Time 1

| Ages | 3 | 3:6 | 4 | 4:6 | 5 | 5:6 | 6 |
|----------------------|--------|--------|--------|------|--------|-------|----|
| <u>Sentence Type</u> | | | | | | | |
| SAD Prob. | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Neut. | 2 | 2(4) | 5 | 0 | 1 | 1 | 1 |
| Imp. | 6 | 8(10) | 8(9) | 3 | 1 | 5 | 1 |
| PASS. Prob. | 10(13) | 12(19) | 6(8) | 1(3) | 1 | 5 | 1 |
| Neut. | 10(14) | 12(16) | 15(16) | 4 | 11 | 7 | 9 |
| Imp. | 18(22) | 24(26) | 16(18) | 12 | 14 | 6 | 8 |
| I. Cleft Prob. | | | | 11 | 11(12) | 9(10) | 10 |
| Neut. | | | | 6 | 16(19) | 11 | 17 |
| Imp. | | | | 21 | 26(27) | 23 | 21 |

() Including those with errors

Time 2

| Ages | 3:6 N=6 | 4 N=8 | 4:6 N=6 | 5 N=8 | 5:6 N=7 | 6 N=8 | 6:5 N=8 |
|----------------------|---------|--------|---------|-------|---------|-------|---------|
| <u>Sentence Type</u> | | | | | | | |
| SAD Prob. | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Neut. | 1(2) | 1 | 1 | 1 | 2 | 0 | 0 |
| Imp. | 9(10) | 4 | 4(5) | 1 | 7 | 1 | 9 |
| PASS. Prob. | 10(12) | 6(10) | 6 | 5 | 4 | 2 | 4 |
| Neut. | 10(13) | 9(12) | 9(11) | 6(7) | 6 | 9 | 3 |
| Imp. | 15(17) | 10(12) | 10 | 6(8) | 6 | 6 | 2 |
| I. Cleft Prob. | | | 8(9) | 12 | 10 | 12 | 9 |
| Neut. | | | 18(19) | 13 | 21 | 23 | 13 |
| Imp. | | | 17(21) | 23 | 25(28) | 20 | 14 |

() Including those with errors

Appendix K

Comments Concerning the SAD

Most of the SAD comments concerned implausibility of the requested actions and were obtained from even the youngest children. In relation to "The baby feeds the Mummy" the following comments were made:

"She feeds herself" (3:6 yrs.) SAA response

"Babies can't feed; they don't have big hands"

(3:6 yrs.) reversal

"No, the Mummy feeds the baby" (3:6 yrs.) reversal

"No, change it cos the baby's too little. The girl has to feed the baby." (5 yrs.) N/R

Similar responses were obtained for the washing sentence, such as "That's funny, a baby washing a Mummy" (4 yrs.) and "Babies don't wash mammas; they wash by theirselves." (4:6 yrs.)

The sentence concerning the horse riding the Daddy provoked much protest.

"It's, of course, too big" (4 yrs.) correct

"I think he's gonna be a bit big, but anyway"

(5 yrs.) correct

"I never saw a person not riding a horse" (5:6 yrs.)
reversal

There were many instances of the child stating the opposite, as there were for all types, from all ages.

e.g. "No, the Daddy rides the horse."

Even the Neutral forms provoked comments. The action of the dog riding the pig was clearly not acceptable although acted out.

"Silly, no dog can ride pigs" (4 yrs.) correct

"He's too big for the piggie" (5 yrs.) N/R

"But he can't get on the pig" (3:6 yrs.) correct

"A dog and a piggie can't ride each other" (3 yrs.)

N/R

By contrast the feeding of the pig was variable in the comments it drew.

"No dogs don't feed; people" (3 yrs.) N/R

"OK, dog, you feed the piggie" (4 yrs.) correct. A few comments explicated the response as in mutual washing "Two of them washes" (3 yrs.). A few also gave explanations of how or why as in:

"Would have to do it with his tongue" (4 yrs.)

correct 'horse washes cow'

"I think because she spanked the Dad" (5 yrs.)

correct 'Dad spanking the girl'

Some comments dealt with preferences and with outcome.

"I don't want to hurt the girls" (5 yrs.) reversing

'boy spans girl'

"Then he gets punished" (4 yrs.) concerning 'boy
spans girl' correct

Only one was moralistic, concerning 'The girl spans
the Daddy', at 4 yrs.:-

"I'm not supposed to. I'm spanking you now (hitting
girl after) She's a bad girl now." correct

None of the SAD comments were direct statements of
the child's conscious difficulty in interpretation.

Comments Concerning the Passive

The Passive sentences on the Comprehension test
provoked many more comments than the SAD and were often
concerned with clarification, or attempts at confirmation
of meaning from the examiner, as well as covering the
same Plausibility issues as the SAD.

Of particular interest were comments that replicated
the structure of the Passive. Some of these indicated
Comprehension, as in these examples:

"Superman is bitten from the dog" (3 yrs.) correct

'Daddy bitten by dog'

"The Daddy got spanked" (3:6 yrs.) correct 'Dad
spanked by girl'

"The Daddy is got spanked" (4 yrs.) correct, as
above.

"How about the baby spanked by the Mum?" (4 yrs.)
after a correct Probable Passive 'spank' sentence.

"You forgot. The Daddy has been spanked from the girl" (4 yrs.) correct response to 'Girl spanked by Dad'.

"That's the easiest thing to do 'cos babies always get washed by their Mummies" (4 yrs.) correct 'baby washed by Mummy'

"And the cow is ridden by the Mum" (4 yrs.) after correct 'horse ridden by Dad'

"Why is the dog biting by the Daddy? (5 yrs.) correct 'dog bitten by Dad'

"And the Mum feeds to the baby too" (5 yrs.) correct 'Mum fed by baby'

"I think the baby should be washed by a mother" (5 yrs.) correct 'Mum washed by baby'

"The Daddy is bited from the dog" (6 yrs.) correct 'Dad bitten by dog'

Other Passive structures were used in the absence of comprehension, or failure to respond correctly.

"Why Mummy fed by the baby? (3 yrs.) N/R

"And the dog ridden by the pig" (3 yrs.) reversal of this having already reversed 'pig ridden by dog'

"She's sleeping. She doesn't want to be washed"

(3:6 yrs.) pointing to Mum before reversing

'baby washed by Mum'

"The girl got spanked by the Dad. She went like

this" (3:6 yrs.) reversed 'girl spanked by Dad'

"You mean the boy spanked by the girl" (4 yrs.)

doing correct version of 'girl spanked by boy'

"He feeds by the pig?" (4 yrs.) reversing 'pig fed
by dog'

"The dog is bitten from the Daddy" (3:6 yrs.)

reversing 'Dad bitten by dog'

These are most revealing in indicating a child's ability to use a form before he has complete grammatical competence. One child of 4:6 yrs., in this sort of state, confused 'Mum fed by the baby' and said "She can't walk. How does she get fed?" and for the sentence 'baby fed by the Mummy' made the mother tap the baby and stated "The Mummy is fed up with the baby."

Other comments about Passive concerned plausibility of the type described before for the SAD. Others concerned problems with the verb 'bitten' or 'ridden' as in "Where's the ridden?" (4 yrs.) nonsense response to 'The horse is ridden by Daddy' "The Daddy is ridden?" (4 yrs.), repeating statement of 'Daddy ridden by

horse'. "He rids like this" (4 yrs.) reversed response to 'Daddy ridden by horse'.

Comments Concerning the Cleft

The CLEFT comments usually related to a failure to comprehend which was recognized by the child.

The most usual response was of the type "The cow bites the horse or the horse bites the cow?" obtained from all ages tested, 4:6 yrs. and up. Many children used a simple sentence to describe their action and interpretation e.g. "The horse washes the cow."

Some children related a tale as in "The cow comes along and washes the horse" (5:6 yrs.) reversing 'It's the cow the horse washes'.

Other children inserted an extra 'filler' to help the processing.

"It's the horse what the Daddy rides" (4:6 yrs.)
correct

"It's the girl that the boy spans" (4:6 yrs.)
reversal

"It's the horse Daddy that rides. What does that mean?" (4:6 yrs.) correct

"It's the pig what the dog feeds so the pig feeds the dog" (6 yrs.) reversal

"It's the horse and cow bite" (5:6 yrs.) mutual
The first four clearly show knowledge of the relative
clause.

There were also a few of the usual protests and
Plausibility statements as in the SAD. Although there
were 41 comments about CLEFTS from 17 children at Time 1
and 31 comments from 13 children at Time 2, unlike the
other sentence types some children who commented,
verbalized for all their CLEFT sentences, indicating a
need to talk through the complex task. For example one
child of 4 yrs. given a series of clefts gave no responses
but said the following:

"That's a tough one. I can't do that one. You make
hard ones"

"This one is a funny one."

"That's a silly one."

"You make too tough ones."

General Remarks Concerning the Comprehension Task

There were many instances of children recognizing
the repetitive nature of the stimuli and needing to be
coaxed to continue as in "I think we already did this one
three times" (5 yrs.). "We're always doing the same
thing over and over eh?" (4:6 yrs.). There was an

assumption that all act-outs should be different. Some attempted character changes to lighten the load. "The Mummy will ride 'cos the Daddy doesn't have to go three times on the horse if he doesn't want to" (5 yrs.). At 4:6 yrs., one child refused a response "No, we're doing it 3 times", and for another item said "We didn't do it two times but I'll do it again". Another, at the same age, isolated the action with "Let's not do bites in this game" after a few.

Lack of comprehension was expressed in various ways.

"That doesn't hear good" (4 yrs.)

"I don't understand what you're saying. You're saying it backwards. You said it too quick for me" (5 yrs.) re: CLEFT sentence

General dis-satisfaction was noted in comments such as:

"It's not a game really" (3:6 yrs.)

"These are no good games. Now it's my games" (4 yrs.)

Overall, these comments revealed an amazing awareness of quality of task, in-built assumptions and on-going expectations and an analytic approach from very young children.

Comments Concerning the Relative Clause

The relative clause test did not provoke so many diverse comments as the other sections. Most remarks were requests for clarification, statements of the difficulty of the sentence, or imitations of the sentence. In some instances children repeated the input sentence but changed the verb or the placement of the article 'that'. In these cases, the act-out matched the child's production indicating comprehension of the form used.

Comments which employed relative clauses and were not exact imitations were the following:-

"The boy bit the giraffe what the girl smacked"

(5:6, giving response of 1231 to this input 'The boy bit the giraffe that the pig spanked'.)

"The pig rode the giraffe who hit the Mummy" (5:6, .

response of 1213 to input 'The pig rode the giraffe that kicked the Mummy')

"The cow he bit the pig which pushed the dog" (4:6,

response of 1223 to 'The cow that bit the pig pushed the dog').

"The boy bit the giraffe which the pig spanked"

(4:6, response of 1231 to same input barring that for which.)

"The Mum pushes the giraffe. Giraffe that kicked the baby." (4:6, response 1223 to 'The Mummy that the giraffe pushed kicked the baby')

"The Mummy said the Daddy that the baby pushed. OK, I'll fix it. Baby, that's very bad. Go up to your room and stay there." (4:6, nonsensical response to 'The Mummy fed the Daddy that the baby spanked.'

Some remarks converted the sentence into two sequential clauses almost like a conjoined clause analysis.

"So the dog fed the boy and then the boy kicked the baby" (6:0, acted out as said to 'The dog fed the boy that the baby kicked.'

"The giraffe bit the horse and then the Mummy spank" (5:6, correct response to 'The giraffe bit the horse that the Mummy spanked'.)

"The cow bit the pig then the pig pushed the dog" (5:6, response as said to 'The cow that bit the pig, pushed the dog').

A few children could not cope with both clauses:-

"The boy washed the doggie and what else?" (5:0, correct response on repetition to 'The boy that fed the girl washed the dog')

The same child said in recognition of the two clauses;

"Just say one word and I'll do it and then say the other word".

Only one child (4:6) reflected on her own performance, acting out the main clause in an SS and saying: "Least I did some of it, not all of it."

One child, aged 4:6 given 'The giraffe bit the horse that the Mummy spanked', made the giraffe bite the horse, stood the mother in front of the horse and a conversation ensued:-

"Hello horse"

"You know what the giraffe did? He bit me"

"Then I'll spank him"

The mother then spanked the giraffe.

Another child, aged 5:6, made up a relative clause of his own:

"The boy rided the giraffe that the giraffe slid the boy off",

making the boy ride the giraffe and slide off his neck. This was the only child who spontaneously used the correct article in the clause.

Those children who demonstrated comprehension of some relative clauses were the ones who made statements

going beyond the sentence into possible outcomes. The complaining statements were found in the children yielding incorrect and incomplete tests.

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