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ABSTRACT

The comprehension of the Minimum Distance Principle was examined in three experiments, using the "tell/promise" sentence construction. Experiment one compared the listening and reading comprehension of singly presented sentences, e.g. "John tells Bill to bake the cake" and "John promises Bill to bake the cake." The comprehension question asked for the subject of the infinitive complement clause, e.g. "Who bakes the cake?" Subjects were 96 third, fourth, and fifth graders. A significant positive relationship was found between reading skill level and performance on this task. Reading skill level was a better predictor of "Promise" performance than were age or IQ. Experiment two investigated the effect of the composition of the experimental presentation list on performance by comparing comprehension when the list contained only "promise" or only "tell" sentences with that obtained when the list contained both types of sentences. For half the subjects, performance differed as a function of the list composition. In experiment three, the sentences were embedded in a paragraph context. Comprehension of "promise" sentences was better in context than in isolation. Implications of these studies for the assessment of the development of language competence are discussed. (Author)

READING SKILL AND THE MINIMUM DISTANCE PRINCIPLE: A COMPARISON OF SENTENCE COMPREHENSION IN CONTEXT AND IN ISOLATION

By

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Most children have mastered the basic rules of their native language by approximately age 5. However, a number of researchers have shown that the complete understanding of complex, compound, conditional and biconditional sentences, as well as of certain types of anaphoric reference does not occur until early adolescence (cf. Palermo and Molfese, 1972). It is also during this school age period that the aural language input is augmented by a second source of language input, the printed word. There are certain constraints in a spoken message on the complexity of the sentence structure, or syntax, that are lacking in the written message. As the child develops facility in reading, his exposure to longer and sometimes more complex sentence forms increases, placing demands on his language comprehension system to understand and use these forms in his own spoken and written messages. There have been some attempts to assess the aural, or listening, comprehension of these more complex forms as well as their usage in spoken and written communications (O'Donnell, Griffin & Norris, 1967; Strickland, 1962; Davis, 1937) but the comprehension of such sentence forms when read by the child has been relatively unexplored. Also largely unexplored is the relationship between the assessment of level of reading skill and the occurrence and understanding of the more complex sentence structures which occur in the texts and paragraphs of the measurement instruments.

The present research addresses two questions: (1) How do the listening and reading comprehension of singly presented complex sentences

compare? and (2) Is the comprehension of such a sentence, occurring in isolation from a meaningful context, improved when it occurs in a meaningful context and is the comprehension affected by the pragmatic quality of that context?

The Minimum Distance Principle

There are many examples in English of sentences which contain more than one subject-verb or subject-verb-object relationship. In some cases the surface structure, or performance, form of the sentence is a "shortened" form of the underlying meaning or deep structure form of the sentence. For example, the surface structure form

1. John told Bill to leave.

may be represented as

2. John told Bill 'X'

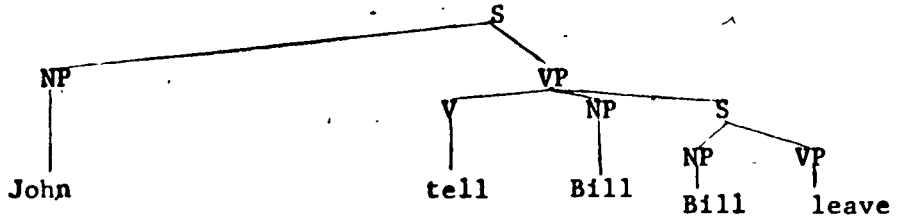
where X is equivalent to

3. Bill should leave. or Bill leaves.

The embedded sentence 'X' appears in a truncated form in (1). This particular truncation is called an infinitive complement clause, and deletion of the subject of (2), Bill, is necessary for the surface structure form to be judged grammatical, i.e.,

4. John told Bill Bill should leave.

is an ungrammatical English sentence. Note that in this example, Bill has two constituent functions: it is the object noun of the main sentence (2) and the subject noun of the embedded sentence (3). The deep structure form of (1) may be represented as



Tell is a member of a class of English verbs for which the presence of the object noun in the surface form is mandatory. The Principle of Minimum Distance (Rosenbaum, 1967) was proposed as a linguistic processing strategy for determining the correct subject noun of the infinitive complement clause: the implicit subject of the complement clause is that noun phrase most closely preceding the clause. As can be seen from the representation, this is the noun phrase Bill. In contrast to tell, which follows the Minimum Distance Principle, the verb promise does not follow this principle. The implicit subject of the complement clause in

5. John promised Bill to leave.

is the noun phrase John, the noun phrase "further away" from the clause. It has been pointed out that the verb promise stands, basically, in a class by itself and that its exceptionality is stored directly with its meaning (Stockwell, Schachter and Partee, 1973).

Carol Chomsky investigated the acquisition of the Minimum Distance Principle as a comprehension strategy for tell sentences, e.g. (1), as well as the acquisition of the awareness that promise sentences, e.g. (5), violate that principle in a group of 5 to 10 year old children. In Chomsky's (1969) study, children heard tell and promise sentences, e.g. Bozo tells Donald to jump up and down or Bozo promises Donald to jump up and down. Comprehension was measured by whether the child chose the correct doll, Bozo the Clown or Donald Duck, in response to the command Make him do it, i.e. the child's task was to assign the correct implicit subject to the infinitive complement clause. In the sample of 40 children a variety of response patterns were found. Chomsky (1969) argued for a developmental progression in response patterns as shown in

Table 1. In Stage I the child always picks the "near" noun as subject

Insert Table 1 about here

of the complement and is thus always correct on tell but never correct on promise sentences. In Stage II the child sometimes picks the "near" and sometimes picks the "far" noun for both verbs and is therefore sometimes correct on both verbs. In Stage III the child is always correct on tell, as in Stage I, but is still only sometimes correct on promise, as in Stage II. In Stage IV, the child picks the "near" noun for tell but the "far" noun for promise and is always correct on each verb. Chomsky (1969) described the ordering of stages with respect to a rule learning process. She suggested the following analysis: In Stage I, the child has acquired the rule of Minimum Distance and overgeneralizes this rule to all instances of this surface sentence structure. In Stage II, the child is in the process of realizing that there are exceptions to the rule but is not sure what these exceptions are. In Stage III, the child knows that tell sentences follow the rule but is still not sure whether promise is an exception or not. Finally, in Stage IV, the child has learned that tell but not promise sentences follow the rule of Minimum Distance.

However, the reliability of these response patterns is questionable. Using the same procedure with a sample of 35 children between age 5 and 10, Kelleher (1973) found response patterns I, III and IV but not II. That is, her subjects showed three types of responding to promise (never, sometimes and always correct) but only one type of responding to tell (always correct). Moreover, in a later study, Chomsky (1972) used the

same comprehension task but presented only promise sentences and found no "sometimes" correct performance. That is children were either "always" or "never" correct on a test of five promise sentences.

These discrepancies in the data raise a question about the reproducibility of these response patterns in different samples of subjects and across experimental methods. Whether Stage II is observed or not is a critical test of the developmental progression and lack of independence between tell and promise sentences which Chomsky proposed (1969). If, for example, Stage II is not reliably found, there is no particular explanatory advantage in Chomsky's formulation. The verb promise may merely be added to the child's vocabulary at some point in time after and independently of the word tell. Further, if the performance in an experimental situation where both tell and promise sentences are presented is qualitively different, i.e. three types of responding, from a situation where only promise sentences are presented, i.e. two types of responding, drawing inferences about underlying competence or linguistic awareness on the basis of data collected in only one type of experimental situation is a questionable practice.

Chomsky (1969) also made the claim that chronological age was a good predictor of Stage. This claim seems unwarranted upon careful examination of the data. In the sample, the age range of the children within each stage varied over the five year span of the sample. Nor did the mean age within each stage reflect a progression from Stage I to IV which was ordered by age. Cromer (1970) found that mental age or IQ was a better predictor of performance on an ambiguity recognition task than was chronological age. Chomsky (1972) has also presented some "mini-correlations" which suggest that a child's level of linguistic

awareness or sophistication as derived from performance on five tasks (including promise sentences) ordered in difficulty was positively related to his reading level, as derived from all types of exposure to the printed word including things such as being read to, number of trips to the library, etc. These "mini-correlations" however were based on only three subjects, one at each of three reading levels, who were matched on chronological age and on IQ. Thus, it may be the case that reading comprehension skill is also correlated with performance on tell and promise sentences and may be a better predictor of performance than age or IQ. Chomsky, however, has not extended this correlational analysis.

Syntactic Analysis and Comprehension Skill

That the ability to analyze syntactic structures is important to language comprehension seems intuitively obvious. In order to extract meaning from sentences, the reader must understand the semantic relations among the concepts denoted by the words in the sentence. Knowledge and use of the syntactic and semantic constraints of language is necessary for the accurate extraction of the relational information contained in clauses within sentences and sentences within the larger discourse.

The ability to utilize these within sentence syntactic and semantic cues has been shown to be a sensitive predictor of reading skill differences. In a study of oral reading behavior, Clay and Imlach (1971) identified a group of readers who read word-by-word and a group of readers whose intonation patterns reflected sensitivity to the sentence boundaries and meaning in the text. Weber (1970) examined the relationship between errors in oral reading and their appropriateness to the grammatical context for a sample of first grade children. Ninety percent of

errors made by both good and poor readers were consistent with the grammatical context. The only significant difference between these groups was that the high skill group corrected 85% of meaning-destroying errors while the low skill group corrected only 42% of such errors. However, for errors that did not destroy the meaning of the sentence, the correction rates did not differ: high skill readers corrected 27% and low skill readers 32% of such errors. Weber interprets these results in terms of high skill readers being more sensitive to the goodness of fit of incoming information with that previously acquired. The work of Guthrie (1973) and of Denner (1970) also suggests that the synthesis of new and old information may be part of the comprehension problem for low skill readers.

Guthrie (1973) tested three groups of readers: Normal young (mean age: 7.5) and Normal old (mean age: 10) were each reading at grade level. The Disabled group was matched with the Normal young readers on reading level but with the Normal old readers on chronological age, i.e. Disabled reading level was approximately 3.5 years below grade level. All groups were matched on IQ scores. Guthrie's (1973) task was basically a multiple-choice version of the cloze technique in which the subject had to choose one of three lexical alternatives rather than filling in the blank. The mean number of words intervening between choices was five. Each subject got one passage at each of seven difficulty levels (primer through sixth grade). The finding of most relevance here was that on the easiest level (primer) and the hardest levels (four, fifth and sixth grade) of text, performance was about equal for the Normal young and Disabled groups. However, at the first, second and third grade levels, the Normal young group performed significantly better than did

the Disabled group. That is, at the highest difficulty levels the vocabulary of the texts is equally unfamiliar to the Normal young and Disabled groups while at the intermediate levels the vocabulary is equally familiar to both groups. Guthrie (1973) suggests that the superiority of the Normal young readers at this level occurs because the Disabled group does not properly integrate the individual words in the sentences.

A study by Denner (1970) has also been interpreted as support for the synthesizing deficit hypothesis. Denner found that while good and poor readers did not differ in their ability to learn single word-logograph correspondences, i.e., abstract line drawing representations for individual words, the poor readers performance on a logographic synthesis task, i.e., constructing and comprehending sentence-like strings of individual logographs, was inferior to that of the good readers.

In work with college level readers, Wiener and Cromer (1967) have drawn a similar distinction between two groups of low skill comprehenders: Readers who demonstrated normal level vocabulary skills but low reading comprehension scores were called "difference" readers while readers with poor vocabulary word knowledge scores as well as low reading comprehension scores were called "deficit" readers. Ward Cromer (1970) compared word-by-word with meaningful phrase unit presentation of text for these two groups of poor readers. The assumption in this study was that the low comprehension for the difference group is the result of a failure to organize the incoming information in a "meaningful way" while low comprehension in the deficit group is the result of "deficient vocabulary skills" (Cromer, 1970, p. 472). Both groups were matched on IQ and reading comprehension scores but the deficit group

had lower vocabulary scores. Cromer (1970) found that comprehension for the difference group was facilitated when meaningful phrases were used while the deficit group performed best in the single word condition.

These studies seem to converge on the notion that knowledge and or use of the syntactic and semantic constraints within a text for the purpose of extracting the relational information is differentially available and useful for different groups or types of readers.

Role of Expectation in Comprehension

Other research suggests that the comprehender's expectations about the nature of the incoming information affects both reading behavior and comprehension.

Steiner, Wiener and Cromer (1971) examined the effect on the oral reading errors of good and poor readers of presenting an oral summary of the to-be-read passage prior to reading it. The interesting point here was that, contrary to the investigators' expectation, the good readers made significantly more errors when they had heard the summary before reading the passage than when they had not heard it. Steiner, et al., note that these errors were anticipation errors, i.e. the good readers made errors on single words but these errors reflected their expectations, based on the summary, of the content of the story. The summary had no effect on the poor readers' oral reading behavior which in both conditions reflected treatment of the words as unrelated items in a series (cf. Clay and Imlach, 1971). By way of explanation of the performance of the good readers in the summary condition, Steiner, et al., suggest that since they already knew what the story was about, the paragraph information was less critical and thus the good readers

scanned the text more rapidly under this condition than under the no summary condition.

One implication of Steiner, Wiener and Cromer's (1971) findings is that poor readers do not normally scan text in the way good readers do. Data from a study by Willows (1974) provides support for this notion. Willows (1974) had good and poor readers read a passage aloud. Typed in a contrasting color, between the lines of the passage, were words and phrases that were semantically related to the content of the story but which were irrelevant to the story line. After reading the passage, a multiple choice comprehension test was given. Contrary to Willow's expectation, she found that good readers were more affected than poor readers by the information between the lines, as measured by the number of intrusion errors on the comprehension test. An error was scored as an intrusion if the incorrect answer according to the passage was the correct answer according to the information between the lines. Willows (1974) suggests that the good reader scans the text and detects words that are consistent with the expectations built up by the meaning of the preceeding context. The words between the lines being semantically related to the story and not completely unexpected thus influenced the good readers more than the poor readers.

It has also been shown that expectations about the real world influence correct comprehension of active and passive sentences (Gowie and Powers, 1972) and of tell and promise sentences (Gowie, Note 1). Using kindergarten, first and second graders, Gowie found that when the implied subject of the infinitive complement clause in a tell sentence is consistent with the child's choice of the likely subject of the complement clause, performance on tell sentences is facilitated. That is,

in the sentence Mother tells Father to paint the fence, an independent sample of children rated Father as the likely subject of the complement clause, the person more likely to paint the fence. When this sentence was read to kindergarten and first graders, followed by the question Who will paint the fence?, more correct responses were made than when the children had heard the sentence Father tells Mother to paint the fence. Second graders' performance on tell sentences was unaffected by the expectation variable: they chose the grammatically correct subject of the complement clause regardless of the "likely subject" ratings. Gowie (Note 1) further notes that expectations had no effect on performance with promise sentences in this sample: "promise was equally problematic for all children (p. 10)."

To reiterate the research reviewed here: there are discrepancies in the data with regard to the Minimum Distance Principle. Specifically there are three questions which Experiment I was designed to address.

1. Is there reliable evidence for Stage II response patterns, i.e. does the appearance of the correct comprehension of promise sentences negatively affect comprehension of tell sentences? Absence of Stage II responding suggests that promise is acquired independently of tell and that Chomsky's (1969) analysis is less than parsimonious. It was hypothesized that there would be no evidence for Stage II responding.

2. How do the response patterns obtained on a listening comprehension task compare with those obtained on a reading comprehension task when tell and promise sentences are presented in isolation, i.e. in the absence of a meaningful context. It was hypothesized that a reading comprehension task would produce better performance than a listening comprehension task because the graphic stimulus would increase

attention to the task.

3. Is reading skill a better predictor of level of syntactic skill as measured by comprehension of tell and promise sentences than is age or IQ? It was hypothesized that, consistent with the "mini-correlation" data (Chomsky, 1972), reading skill would be the best predictor.

A methodological issue with respect to the type of experimental materials used to measure performance is raised by the discrepancy in the types of responding on promise sentences Chomsky found in her first and second studies (Chomsky, 1969; Chomsky, 1972). When both tell and promise sentences were presented (a mixed list) "always", "sometimes", and "never" correct responding was found for the promise sentences but when only promise sentences were presented (a blocked list), "sometimes" correct responding was not found. Experiment II compared an individual's performance on a blocked presentation list with his performance on a mixed list. It was hypothesized that "sometimes" correct responding would occur only in the mixed-presentation list condition.

A second set of questions raised by the existing research concerns the role of context and expectation in reading comprehension. Experiment III addressed two questions.

1. How does the child use his expectations about the world in attempting to comprehend language? It was hypothesized that, given less than "always" correct responding to promise sentences presented with no context, when the expectancy developed by a context and the correct grammatical analysis were in agreement, there would be more accurate responding than when the context developed an expectancy which disagreed with the grammatically correct answer.

2. Does the context in which a particular sentence structure occurs differentially affect the reading comprehension of high and low skill readers? Given less than "always" correct responding on promise isolated sentences, it was hypothesized that performance would improve more for high than for low skill readers when the sentences concluded a meaningful discourse.

The actual order in which the three experiments were conducted differs from the order in which they are reported here. The actual order was Experiment I, Experiment III, and then Experiment II. Initially, the data for the reading comprehension task, performance on isolated sentences, was to be compared with the reading comprehension performance on the sentences in meaningful context. However, a five week time period intervened between the two experiments. It was therefore decided to "retest" each subject on the isolated sentences in a reading comprehension task just prior to the discourse condition. Experiment II was conducted six months after Experiments I and III.

Experiment I

Method

Design. Experiment I is a three factor repeated measures design with Reading Comprehension Skill a between-subjects factor. Within-subject factors were Verb - tell or promise and Comprehension Task - listening or reading. Each subject was observed on four sentences in each cell. (See Appendix A for design.) The dependent measure was accuracy in reporting the implicit subject of the infinitive complement clause.

Subjects. With the exception of 24 students who had served in a

pilot version of Experiments I and III, the entire third, fourth and fifth grades of a Pittsburgh parochial school served as subjects in Experiment I. Of the 116 students, 96 were selected to participate in Experiment III also. The data for Experiment I are based on these subjects who participated in both Experiment I and III. The 20 subjects were eliminated for a variety of reasons: low IQ scores (less than 80), failure to demonstrate that they understood the meaning of the word promise (see Method section, Exp. I), failure on the sensitivity to sharing pretest (see Method section, Exp. III), absence of age, reading comprehension or IQ scores, or illness during the time period in which Experiments I and III were conducted.

Reading Comprehension Skill was assessed by performance on the Metropolitan Reading Test, Elementary form for all subjects. The Raw Score frequency distribution of these 96 subjects was divided into thirds such that there were 32 subjects in each of three groups, low skill, medium skill and high skill readers. Table 2 shows the group

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Insert Table 2 about here

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means for the reading skill measure as well as for age and IQ, based on the Otis-Lennon IQ test which was administered one month before Experiment I was run. The difference between the low and high group on age and on IQ was significant, however correlational data reported below suggests that these differences may not be as relevant to the task under consideration as is reading skill.

Materials. The basic form of the test sentence frames for the three experiments was

_____ + tells/promises + _____ + infinitive complement clause.

Name 1 Name 2

Sixteen infinitive complement clauses were generated for Experiment I. The printed frequency of the words in a particular Experiment I complement clause was equal to that of the words in a particular complement clause in the test sentences of Experiment III. This procedure was used to control for effects of word frequency on comprehension of the two sets of experimental sentences. Words with a printed frequency above 25/million according to third-grade norms (Carroll, Davies, and Richman, 1971) were used.

Each complement clause was randomly assigned a pair of common names which were equated on printed frequency and sex. Sex of the people within each sentence was matched so that role stereotyping would not bias the choice of implicit subject. Each of these sentence frames was then randomly assigned to one of two lists. The verb tell or promise was randomly assigned to these sentence frames with the constraint that each list contained four tell and four promise verbs. Then two alternate lists were generated from these basic lists by substituting the "other" verb, i.e. tell for promise or promise for tell, in the sentence frame. Thus, if the basic list contained the sentence Peter tells Fred to find the children, then the alternate list contained the sentence Peter promises Fred to find the children. The comprehension question was the same for both lists and asked the child for the subject of the infinitive complement clause, e.g. Who finds the children?

In order to control for responding based on the surface structure order of the two names, eight reversible sentences of the form

_____ + verb + _____.
Name 1 Name 2

were constructed. Of these eight, four appeared in the active form and four in the passive surface structure form for each subject. It was assumed that the sample tested could accurately identify the actor in these sentences, e.g. Who "verbs"? It was hoped that responding based on a strategy of always answering with Name 1 or with Name 2 would thus be discouraged. Four active sentence frames were randomly assigned to the basic and four to the alternate list. Within a basic list two appeared in the passive surface structure and two in the active. Again, the "other" form appeared in the alternate list. Thus, if the basic list sentence was Eric helps Neil (active surface structure), then the alternate list sentence was Neil is helped by Eric (passive surface structure). The comprehension question for both surface structure forms was Who helps?

In summary, each presentation list contained 12 sentences: four tell and four promise plus two active and two passive sentences without complement clauses. The sentences within each list were ordered randomly with the aid of a random number table. Each subject was presented with two unique lists, so that each subject performed on each of the 24 sentence frames, 12 in a listening comprehension task and 12 in a reading comprehension task. Task was counterbalanced across lists and order of the two tasks was counterbalanced across subjects. (See Appendix B for the full set of materials used in Experiment I.)

Procedure. Each subject was tested individually. Before presenting the test sentences, the experimenter ascertained that each subject understood the word "promise." This was done by asking the child what it meant if he promised that he would do something, such as go to a friend's house. If the child responded with "I'd do it" or a response that

conveyed the notion of obligation, it was assumed that the child understood the word "promise." (For these subjects, the word "promise" was most often equated with the concept of "Giving your word on something.")

In the listening comprehension task the sentences were tape recorded and played to the subjects. The sentence was repeated by the experimenter if the subject requested it. All subjects were told that if they forgot the sentence or weren't sure that they had heard it accurately, it would be repeated. Each sentence was preceeded by the word "Ready" and immediately followed by the comprehension question.

In the reading comprehension task, subjects read aloud the test sentence from a 4x6 index card. The experimenter corrected any word recognition errors. The comprehension question was read by the subject immediately after one correct reading of the test sentence. Both the question and the sentence cards remained in front of the subject until a response had been given.

Subjects were informed before the task that the experimenter would be writing down what they said but would not tell them whether their answers were right or wrong.

Results

An analysis of variance on the number of correct responses by each skill group for each verb in each comprehension task was performed. The main effect of Reading Skill was significant, $F(2,91) = 12.53$, $p < .01$. Scheffé contrasts on the cell means revealed that the low skill group's performance was significantly below that of the high and medium groups' but that the high and medium groups did not differ from each other. Performance on tell sentences was significantly better than on promise sentences, $F(1, 93) = 128.23$, $p < .01$. The Reading Skill x Verb, the

Verb x Task and the Reading Skill x Verb x Task interactions were also significant, $F(2, 93) = 3.05$, $p = .052$, $F(1,93) = 23.12$, $p < .01$, and $F(2, 93) = 3.68$, $p = .03$, respectively. Figure 1 shows the nature

Insert Figure 1 about here.

of these interactions.

The magnitude of the difference between performance on tell and on promise sentences varies among the three skill groups, although the direction of the difference is the same: reading comprehension of tell sentences was better than listening comprehension while the reverse was true for promise sentences. Further, for the high skill group performance on promise sentences was equal across both comprehension tasks and 95% of the variance due to the Reading Skill x Verb interaction was accounted for by the low skill group's significantly greater divergence between tell and promise responding than the divergence of the other two groups.

In summary, there was more correct responding to tell sentences than to promise sentences, the reading task produced better performance on tell sentences but worse performance on promise sentences as compared with the listening task and the low skill group performed worse on promise sentences than did the other two groups.

Response patterns for tell and promise sentences were examined and Chomsky's (1969) stage analysis applied to these patterns. The following classification criteria were established for the present data and the correspondence to Chomsky's can be seen in Table 1. Out of a maximum of four correct on each verb, a score of 0 or 1 was classified as "Never" correct; of 2 or 3 as "Sometimes" correct; and of 4 as "Always" correct. Each subject was placed in one stage

for each of the comprehension tasks. The category of Unclassified represents those response patterns that did not "fit" into one of the four stages. Table 3 shows the frequency distribution for

Insert Table 3 about here.

each reading skill group in each comprehension task which resulted from this classification procedure. Chi square tests performed on these distributions showed that for the reading comprehension task there was a significant $\chi^2 = 25.98$, df = 8, $p < .01$, while for the listening comprehension task distribution there was not, $\chi^2 = 8.57$, df = 8, $p = .38$. Thus, the frequency distribution of response patterns found in the reading task was not independent of reading skill while there was no evidence for such a relationship in the listening task. The difference between the two frequency distributions was, however, only marginally significant, $F(8,8) = 3.03$, $p = .07$. Note also, that on the reading comprehension task only two of 32 low skill readers were "Always" correct on both tell and promise sentences, i.e. in Stage IV, while 11 of the 32 high skill readers were in this stage. There is an apparent correlation between performance on the reading comprehension task and reading skill.

Table 4 reports the simple correlations of reading skill, of age

Insert Table 4 about here.

and of IQ with six criterion measures: with accuracy on tell and on promise sentences in the listening and reading comprehension tasks and with the response patterns or stages obtained in each of these task situations. The obtained correlation coefficients indicate that reading skill accounted for a higher percentage of the variance than did IQ or age on each criterion measure. That reading skill was the best

predictor of performance was confirmed in a multiple regression analysis of those criterion measures with which IQ and age also yielded significant simple correlations. The obtained beta weights and multiple correlation coefficients appear in the lower half of Table 4. A comparison of the beta weights for promise performance on both comprehension tasks shows that reading skill is a better predictor than IQ. On the listening and reading tasks, the addition of reading skill produced a significant increase in the percentage of variance accounted for over that explained by IQ alone, $F(1, 93) = 4.12$, $p = .05$ and $F(1, 93) = 11.72$, $p < .01$, respectively. However, the addition of IQ did not account for a greater percentage of the variance than that accounted for by reading skill alone, $F(1, 93) < 1$ and $F(1, 93) = 1.16$, $p = .28$, for the listening and reading tasks respectively. On the listening task stage, the addition of reading skill produced a significant increase in the percentage of variance accounted for over that explained by IQ alone, $F(1, 93) = 32.75$, $p < .01$ and the addition of IQ produced a significant increase in the percentage of variance accounted for over that explained by reading skill alone, $F(1, 93) = 21.30$, $p < .01$. For the reading task stage, where the simple correlation with each of the population variables was significant, the addition of reading skill significantly increased the percentage of variance accounted for over that explained by IQ and age, $F(1, 92) = 18.92$, $p < .01$. But neither the addition of IQ nor age produced significant increases in the percentage of variance accounted for over that explained by reading skill alone, F's $(1, 92) \approx 0$. It should also be pointed out that the three population variables were each significantly correlated with each of the others. These correlations appear in the lower right hand portion of Table 4.

With respect to the simple correlations of reading skill with tell sentence performance, the difference between the correlations for the listening and reading comprehension tasks was not significant, $t = -.89$, $df = 94$. For promise however, reading skill was more highly correlated with reading than with listening task performance, although the difference was only marginally significant, $t = 1.84$, $df = 94$, $p = .07$.

Discussion

There is support in the data of the low skill readers for the assumption that comprehension of tell sentences precedes promise sentences. The significant interactions of Skill, Task and Verb can be interpreted as reflecting a ceiling effect in which comprehension task differences may result from attentional failures. Individually, this is reflected in the fact that of those 15 subjects who scored less than "always" correct on tell in the listening task, 10 scored "always" correct on the reading task.

The situation is more complex in the case of promise sentences. Performance on promise interacted with both reading skill and comprehension task. It may be that for less skilled readers the act of decoding in reading "detracts" from the act of comprehending: for the high skill group task did not affect promise performance while the low skill group did significantly less well when they had to both read and comprehend as compared to when they only had to listen and comprehend. The pattern of correlations suggests further that reading skill is the best predictor of performance on promise in both listening and reading comprehension situations. That the low skill group did significantly worse than the high skill group on the listening task supports the notion that low skill readers, in addition to problems arising from the graphic

input per se, also have less well developed general language comprehension skills. Perfetti and Goldman (1975) and Berger (Note 2) have also reported superior performance for high skill over low skill readers on listening comprehension tasks.

However, the significant drop in performance for the low skill group from listening to reading comprehension implicates an additional source of difficulty for this group when faced with graphic input. Assuming a limited capacity processing system, if single word decoding occupies a large chunk of that capacity, comprehension may well suffer. Perfetti and Hogaboam (1975) have shown that low skill readers take longer to decode unfamiliar singly presented words than do high skill readers. However, the claim that differences in single word decoding time are responsible for the promise performance differences cannot be made too strongly since reading task tell performance was not different for high and low skill groups. It may be that because comprehension of tell sentences is "easy" it is not interfered with by decoding inefficiency. When comprehension takes more work, as in the case of promise, decoding inefficiency takes its toll. To summarize, while decoding may contribute to differences in comprehension for high and low skill groups, there are indications of significantly better syntactic analysis skills in the high skill group as well.

There are methodological implications to be drawn from the findings that age and IQ did not significantly increase the amount of variance in performance accounted for by reading skill in this experiment. These data suggest that reading skill is a more effective predictor than age or IQ. While the direction of the relationship between comprehen-

sion of complex sentence structures and reading comprehension is not clear from these data, there does appear to be a relationship. Evidence that reading skill is the best predictor of performance on a broad range of complex syntactic structures is needed to confirm and explore the nature of this relationship.

On the listening comprehension task, the stages and frequencies-within-a-stage provide some support for the reliability and validity of Chomsky's (1969) analysis of the acquisition of the Minimum Distance Principle and the exceptionality of promise sentences with respect to it. However, on the reading comprehension task there was little support for regression on tell, i.e. for the reality of Stage II: almost all subjects were "Always" correct on tell regardless of their promise performance. Thus it appears, at least for spoken language, that the accurate comprehension of tell and promise sentences containing infinitive complement clauses is not completely independent, i.e. that tell sentence comprehension may be negatively affected by the initial appearance of the accurate comprehension of promise sentences. That this does not occur to the same degree for reading comprehension may reflect what Sticht (1972) has termed the hierarchical relationship between oral and written language comprehension: the correct listening comprehension of a particular form precedes the correct reading comprehension of that form. It may be that regression on tell occurs in the listening task more than in the reading task because the listening task performance reflects the process of acquisition while the reading task performance reflects a "transfer" of skills from oral to written language.

Consistent with the previous research which used mixed presentation lists of tell and promise sentences (Chomsky, 1969; Kelleher, 1973), "Sometimes" correct responding on promise was found in both comprehension tasks. The discrepancy between these results and Chomsky's (1972) failure to find "Sometimes" correct performance when only promise sentences are tested raises another methodological consideration. The experimental procedure of using mixed lists of tell and promise sentences may create a situation which increases the child's probability of realizing that there is a similarity between the two structures. The task situation itself may be the first time this similarity has been noted. This issue was explored in Experiment II.

Experiment II

Method

Design. Experiment II was a three factor design with Reading Skill the between-subjects factor and repeated measures on two within-subjects factors: Type of Presentation list- blocked or mixed, and Verb of the sentence - tell or promise. The dependent measure was accuracy in reporting the implicit subject of the infinitive complement clause.

Subjects. Sixteen third graders from a Pittsburgh Parochial school served as subjects. Of these, eight were high skill readers, having scored in the upper third of their grade on the Metropolitan Reading Test, Elementary Form, and eight were low skill readers, having scored in the bottom third of this distribution. The mean IQ for the high skill group was 119.5 and for the low skill group, 108.1. Mean age of the high skill group was 107.3 mos. and for the low skill

group, 109 mos.

In a replication, 16 second graders from the same school served as subjects. Again, eight high and eight low skill readers were chosen, reading skill being defined by teachers' ratings. Mean IQ for the high skill group was 126.8 and for the low 95.6. Mean age was 92.9 for the high and 96.9 for the low group.

Materials. There were three presentation lists: blocked promise, blocked tell and mixed tell and promise. Each of the blocked lists included five promise or five tell sentences. In addition, each blocked list contained five active sentences without infinitive complement clauses. For the blocked promise list, the correct response to the questions on the active sentences was the surface object while for the blocked tell list the surface subject was the correct response. This was done to equate for the fact that in the mixed list, correct responding on both tell and promise sentences requires switching between Name 1 and Name 2. By including the active sentences, the subject also had to switch between Name 1 and Name 2 on each of the blocked lists. That is, to score perfectly on the blocked promise, on the blocked tell and on the mixed tell and promise lists, Name 1 and Name 2 were the correct responses an equal number of times.

Sentences in the blocked and mixed lists were controlled for difficulty by choosing sentences from Experiments I and III which had been correctly answered an equal number of times. By assigning one member of each matched-for-difficulty pair to the mixed and the other to the blocked list, the two types of lists were equated for difficulty level of the sentences. (The full set of materials for Experiment II can be found in Appendix C.) Each of the lists was recorded and played

to the subject. Each sentence was preceeded by the word "Ready" and immediately followed by the comprehension question. For the tell and promise sentences this was the question asking for the implicit subject of the infinitive complement clause. For the active (no complement) sentences in the blocked promise list, this was the question for which the correct answer was the surface object. For the actives in the blocked tell list, this was the question for which the correct answer was the surface subject.

Procedure. Each subject was tested individually on three successive days. On Day 1 all subjects heard the blocked promise list, on Day 2 the blocked tell and on Day 3 the mixed tell and promise list. As in Experiment I, subjects were told before each session that the experimenter would write down their answers and that they would not be told whether their answers were right or wrong.

Results

For each grade, an analysis of variance was performed on the number of correct responses. The results can be seen in Table 5 which presents the mean number correct on each sentence type for each skill group within each grade. In grade 3, the only significant effect was that

Insert Table 5 about here.

of reading skill: high skill readers performed significantly better than did low skill readers, $F(1, 14) = 8.02$, $p = .01$. In grade 2, the main effect of reading skill was again significant, $F(1, 14) = 5.95$, $p = .03$. Further, for grade 2, performance on tell sentences was significantly better than on promise sentences, $F(1, 70) = 18.65$, $p < .01$. Within each main verb, however, there were no significant differences between blocked and mixed presentation list performance (Tukey

Critical Difference = 1.415). It would seem then, not to matter whether the presentation list is blocked or mixed. However, a clearer understanding of the data results from an examination of the performance of individual subjects on each type of list.

Table 6 shows the conditional probability that a subject's response category remained stable over the two types of presentation lists for

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Insert Table 6 about here.

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each verb and for each grade. The response category criteria were as follows: out of a maximum of five correct responses, 0 or 1 correct was classified as "never" correct; 2, 3, 4 as "sometimes" correct; and 5 as "always" correct. This categorization was identical with that used by Chomsky (1972) for promise sentences. With respect to tell sentences, 13 third-grade and 9 second-grade subjects showed the same performance on both lists. A sign test on the direction of change for the remaining 10 subjects showed that there was a probability of .39 associated with doing worse on the mixed than on the blocked list. With respect to promise sentences, 8 third-graders and 7 second-graders showed the same performance on both lists. A sign test on the direction of change for the remaining 17 subjects showed that there was a probability of .07 associated with doing worse on the mixed than on the blocked list.

Referring again to Table 5, it is also interesting to note the results for the active sentences. For the third grade and high skill second grade subjects, performance on the surface subject active (blocked tell list) approached ceiling level. However, the surface object actives for all groups, as well as the surface subject actives for

the low skill second graders were "sometimes" correct. That errors were made on active sentences is somewhat surprising since previous research has shown these to be understood by children as young as age two (Slobin, 1966; Brown, 1974). However, the comprehension task in this experiment, a verbal question requiring a verbal response, may be more difficult than the acting-out tasks used in the previous research.

In summary, performance tended to differ on the two presentation lists although whether this was due to list type, random variation and/or learning effects is not clear from these data.

Discussion

Overall, blocked or mixed presentation list did not significantly affect the response patterns exhibited. For both types of lists "always", "sometimes", and "never" correct responding occurred. Whether performance on the mixed list was better or worse than on the blocked list interacted with the individual subjects' level of performance. For tell, type of list appeared not to influence performance. For promise, however, only one-third of those subjects who were "always" correct on the blocked list remained "always" correct on the mixed list.

Thus, the discrepancy between the studies finding "Sometimes" correct performance on promise sentences (Exp. I; Chomsky, 1969; Kelleher, 1973) and Chomsky's (1972) failure to find such responding cannot be attributed solely to the presence of both tell and promise sentences in one presentation list. There may be a tendency on any list which requires the subject to use more than one strategy to be correct on all the sentences in the list toward finding "Always", "Sometimes", and "Never" correct responding. It is not unreasonable to suppose that this tendency would be strongest for those children

who are "not all that sure" that two strategies are necessary. The subjects in Chomsky's (1972) study, presented with five sentences of the same form, i.e. five Bozo + promises+ Donald + infinitive complement clause sentences could have adopted a response set that persisted throughout the list. If a subject chose the correct set, i.e. respond with the doll first named in the sentence, he was "Always" correct; but if a subject chose the incorrect set, i.e. respond with the doll named second in the sentence, he was "Never" correct. In the present study, the blocked promise list contained the surface object actives in order to prevent or at least alleviate the potential for subjects to adopt a one-strategy approach to the list. If the subject realized that two strategies were necessary to answer all sentences in the list correctly, the switching back and forth between the two may have enhanced the likelihood of making an error on any particular sentence in the list. The fact that mean performance was not at ceiling level for active sentences which required the surface object as a response to the question suggests that it may not be just tell or promise sentences which are influenced by "two strategy" mixed presentation lists but that any sentence which requires a strategy different from that required by other sentences in the list may suffer an increased error rate. This seems especially likely to happen if the child's mastery of a particular sentence structure is not well established.

However, regardless of the explanation of why the composition of the presentation list used to measure performance affects performance, the fact that only about one- half of the subjects showed the same response pattern for promise on both lists has serious implications with respect to the type of inferences made about underlying competence on

the basis of performance in a particular experimental situation. Conclusions about the reality of a transitional period, reflected in "Sometimes" correct performance, between not knowing and knowing how to analyze a particular syntactic structure may well be specific to the particular method used to measure performance.

The data of Experiment I indicate that reading comprehension of tell and promise sentences presented in isolation, i.e. in the absence of a meaningful context, is correlated with reading skill: low skill readers tended to be in Stage I and high skill readers in Stage IV. Despite the unequal distribution, there were, however, some cases of each reading skill group at each stage. Experiment III was conducted to determine whether embedding such isolated sentences in a meaningful discourse would facilitate the correct grammatical analysis of these sentences.

Two types of contexts were included in Experiment III: supportive and nonsupportive. The supportive context was expected to facilitate performance over the isolation level by encouraging the reader to anticipate a final proposition that agreed with the grammatically correct response to the tell or promise sentence, which concluded the discourse. The nonsupportive context encouraged the reader to anticipate a final proposition that was the opposite of the grammatically correct response. This condition was included to separate the effect of merely placing the sentence in a meaningful context from the effect of expectation on the comprehension of the sentence. If performance in the supportive and nonsupportive contexts was equal but better than the performance on isolated sentences, then the expectation manipulation did not influence performance. If performance in the supportive context was

better than in the nonsupportive and better than in isolation, then the expectation manipulation did facilitate performance. It was expected that Stage-in-isolation and reading skill would interact such that the facilitation of performance in the supportive context would be greatest for high skill readers who were "Sometimes" correct on promise-in-isolation, i.e. Stage II or Stage III.

Experiment III

Method

Design. Experiment III was a four factor repeated measures design with two between-subjects factors: Reading Skill and Stage-in-Isolation. Reading Skill had two values: high or low. The Stage factor had four values: I, II, III, and IV and corresponded to those used in Experiment I and in Chomsky (1969). There were two within-subjects factors: Verb and Type of Context. The Verb factor had two values: tell or promise. Type of Context had three values: none (isolation), supportive, and nonsupportive. Each subject was tested four times in each of the six within cells. Response patterns in the no context or isolation condition defined the stage of each subject, resulting in unequal subject frequencies for the between factor cells. The dependent measure was accuracy in reporting the implicit subject of the infinitive complement clause.

Subjects. The 32 low and 32 high skill readers used in Experiment I served as the subjects for Experiment III. Each subject participated in Experiment III five weeks after serving in Experiment I.

Materials. Sixteen sentences of the form

_____ + tells/promises + _____ + infinitive complement clause.

Name 1 Name 2

were constructed. For each sentence, two three sentence paragraphs were written. The paragraphs were designed to build up an expectation about the likely (pragmatically implied) subject of the infinitive complement clause of the tell/promise sentence that concluded the paragraph.

All of the paragraphs described some shared activity, some task that the two people named in the first sentence were going to cooperate on. The predicates of sentences two and three described two "jobs" necessary to accomplish the task and the final sentence involved the doing of a third related job. The assumption in these paragraphs was that if two people are going to share some activity, it is not likely, or fair, for one person to do everything. Sensitivity to this convention among the sample was tested by a pretest consisting of four sample paragraphs similar in form to the ones used in the experiment proper. However, instead of a tell or promise sentence concluding the paragraph, the question "Who do you think should 'infinitive complement clause'?" was asked. The pretest was actually administered at the conclusion of Experiment I and only those children who answered three out of four questions correctly, i.e. in line with the experimenter defined likely subject of the infinitive complement clause were used in the study.

The structure of the materials for Experiment III and for the pretest can best be understood by reference to an example:

Kim and Joan are planning a birthday party for Sam. Kim is buying the pop. Kim is making the decorations. Kim tells Joan to bake the cake. (Supportive Tell)
or
Kim promises Joan to bake the cake. (Nonsupportive Promise)

In this example, the paragraph supports the grammatically correct interpretation of the tell sentence and is the Supportive context for Tell

but encourages the grammatically incorrect interpretation of the promise sentence and is the Nonsupportive context for Promise. However, in

> Kim and Joan are planning a birthday party for Sam. Joan is buying the pop. Joan is making the decorations. Kim tells Joan to bake the cake. (Nonsupportive Tell)
> or
> Kim promises Joan to bake the cake. (Supportive Promise)

the paragraph supports the grammatically correct interpretation of the promise sentence and is the Supportive context for Promise but encourages the grammatically incorrect interpretation of the tell sentence and is the Nonsupportive context for Tell.

Invariant in the paragraphs was the first sentence, including the order of the names and the predicates of the two propositions following the introductory sentence. The names used in Experiment I were used in the materials of Experiment III. As noted in the description of Experiment I, the printed frequency of the words in the infinitive complement clauses of Experiments I and III was matched. In addition, all the words in the contexts of Experiment III were above 25/million for the third grade (Carroll, Davies, and Richman, 1971). (See Appendix D for the full set of experimental and pretest materials.)

Four lists of paragraphs were constructed with Verb and Paragraph Context type, supportive and nonsupportive context, counterbalanced across lists. The order of the paragraphs within each list was randomly determined with the constraint that the same type of paragraph did not occur successively in the list. Paragraphs were counterbalanced across subjects such that each paragraph appeared equally often in the four Paragraph context conditions: Supportive Tell,

Nonsupportive Tell, Supportive Promise, and Nonsupportive Promise. Further, within each reader group each of the four lists was presented to eight subjects.

Procedure. Each subject was tested individually. All subjects were retested on reading comprehension of isolated tell and promise sentences using the listening comprehension task list of Experiment I. Performance on this retest of comprehension of isolated sentences was used to classify each subject with respect to Stage-in-Isolation and was the baseline against which comprehension in the two Paragraph context conditions was compared. In the Paragraph context condition, each subject read aloud 16 paragraphs which had been typed one to an index card. After each paragraph had been read, the card remained in front of the subject while he was asked a series of questions about the text. The first question, the Before - probe question, asked for the implicit subject of the infinitive complement clause of the tell or promise test sentence. This was followed by two verbatim questions on the paragraph, e.g. Who is buying the pop? and Who is making the decorations? . The fourth question, the After - probe question was the same as the Before - probe question. The probe procedure was used to assess comprehension of the paragraph and to see if forcing the subject to attend to the passage before answering the implicit subject question would affect performance. Subjects were told that they would be asked a series of questions on each paragraph regardless of the answers previously given and that they would not be told whether their answers were right or wrong. As in Experiment I, the experimenter corrected any word recognition errors made by the subject.

Results

The frequency distribution of subjects within Stages on the isolation condition is shown in the upper panel of Table 7.

Insert Table 7 about here.

A Chi square test of independence revealed that this distribution was not independent of reading skill, $\chi^2 = 15.6$, df = 3, $p < .01$. The obtained correlation coefficient of Reading Skill and Stage-in-Isolation, controlling for IQ and age, was also significant, $r = .24$, df = 46, $p < .05$. Note that only two low and three high skill readers were in Stage II, having failed to be "Always" correct on tell. Further, a weighted means analysis of variance on the number of correct responses in the supportive and nonsupportive context conditions revealed that Stage-in-Isolation accounted for 43% of the between-subjects variance while reading skill accounted for only 17%. Consequently, effects due to type of context were analyzed within each Stage and separately for each Verb. Within each Stage, Reading Skill was the between-subjects factor and the within factor, type of context, had three levels: isolation, supportive paragraph context and nonsupportive paragraph context.

Both the number correct on the Before - probe and on the After-probe questions were used as dependent measures. However, only the results for the Before - probe question are reported since these data did not differ from the data on the After - probe question.

Table 8 shows the mean number correct on each Verb within each Stage for each of the three types of context. Although there were some

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Insert Table 8 about here.

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significant F's obtained for tell in Stages I, III and IV, examination of the cell means suggests that these effects are artifacts. They can be attributed to ceiling performance on tell-in-isolation in combination

with small error terms associated with variability among subjects within groups (MS_{error}). In Stage II, there were no significant effects. Thus, performance on tell-in-isolation was at ceiling level and essentially did not change in the supportive and nonsupportive paragraph contexts.

The same situation exists with respect to promise performance in Stage IV: ceiling performance on promise-in-isolation and a small MS_{error}. There were no significant effects found in Stages II and III for promise. In Stage I, however, performance in the supportive and nonsupportive paragraph contexts was significantly better than performance on promise-in-isolation, $F(1, 48) = 28.79$, $p < .01$. The reading skill groups were affected equally. Note that there was no effect associated with supportive versus nonsupportive paragraph context.

However, examination of the cell means in Table 8 suggests that supportive context tended to be slightly, though nonsignificantly, better than nonsupportive context. In order to determine whether or not mean performance masked individual differences, each subject was classified with respect to the difference in performance between the supportive and nonsupportive contexts. If a subject's score was higher for supportive than for nonsupportive context, he was classified as context dependent (sensitive), i.e. he was correct more often when context-correct was also grammatically correct than when context-correct was grammatically incorrect. If the reverse was true, and a subjects nonsupportive context score was greater than his supportive score, he was classified as context independent, i.e. the context expectation did not seem to determine his choice and the grammatically correct answer was chosen despite the context. Finally, there were

those subjects whose performance was equal in both supportive and nonsupportive contexts, and they may also be considered to be context independent. The frequency distribution resulting from applying this procedure is shown in Table 9. The data are presented for each

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Insert Table 9 about here.

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skill group within each Stage. High skill readers in all Stages tended to be context independent, exhibiting either the same performance in both supportive and nonsupportive contexts, 59%, or better performance in the nonsupportive than supportive context, 25%. For the low skill readers, 53% showed the same performance in both contexts, 28% better performance in supportive than nonsupportive and 19% better performance in nonsupportive than supportive context. However, a Chi - square test of independence did not provide statistical support for a relationship between reading skill and context dependence - independence, $\chi^2 = 1.54$, df = 2, p = .46.

Each subject was also assigned to a Stage based on performance in the supportive and nonsupportive paragraph context conditions, using the following criteria: out of a maximum score of 8 on each verb, 0, 1 and 2 were classified as "Never" correct; 3, 4, 5, and 6 as "Sometimes" correct and 7 or 8 as "Always" correct. The bottom panel of Table 7 reports the resulting frequency distribution which was again not independent of reading skill, $\chi^2 = 15.17$, df = 3, $p < .01$. However, none of the reading task frequency distributions, i.e. Experiment I - reading comprehension task, Experiment III - isolation, and Experiment III-supportive and nonsupportive paragraph contexts, were significantly different from each other, all F's < 1. Since only

five subjects in the isolation and seven in the paragraph contexts showed less than "Always" correct performance on tell sentences, changes in Stage frequency distributions are largely attributable to individual variation in promise performance.

Table 10 shows the ratios associated with performance on

Insert Table 10 about here.

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promise-in-paragraph context given the response pattern exhibited on the isolation retest. Out of 26 subjects who were "Never" correct on promise-in-isolation, 54% were "Sometimes" correct on promise-in-context. For those subjects who began with some correct performance on promise, 63% continued to show "Sometimes" correct performance, 25% were "Always" correct and 11% showed performance decrements in context. Finally, all but two of the subjects who began with "Always" correct performance on promise maintained that level. A sign test on those 23 subjects whose performance changed from isolation to context showed that the probability of doing worse in context than in isolation was .001.

Discussion

There was no startling effect of the supportive and nonsupportive paragraph context manipulation. With the exception of those subjects who were "Never" correct on promise-in-isolation, placing the test sentence in a discourse did not alter performance significantly. Where there was a facilitative effect, high and low skill readers were equally affected. Finally, whether a supportive or nonsupportive context preceeded the test sentence made no difference: for the majority of subjects, performance was equal and essentially independent of the expectation built up in the paragraph.

There are, however, at least two problems associated with this experiment which make it difficult to draw conclusions about general effects of context on the comprehension of complex syntactic structures. The first is that of ceiling effects in performance for all but the Stage I subjects. The relatively high level of performance in isolation for Stages II, III, and IV subjects leaves little room for improvement. This problem is further complicated by that of the second source of interpretative difficulties: the correlation between reading skill and promise performance and the resulting unequal 'n' design. While there do appear to be differences among cell means that "ought to be significant" especially in Stage II and IV, there are only two subjects in each of these cells. What is significant with respect to these data however, is exactly this correlation. Of 32 low skill readers, only two were "Always" correct on promise and of 32 high skill readers only seven were "Never" correct on promise for reading comprehension of isolated sentences. Further, this isolation level, independent of reading skill, was the more important factor in performance on the promise sentences in the supportive and nonsupportive paragraph contexts.

Conclusion and Implications

Conclusions about the effect of context on the comprehension of particular sentence structures are unwarranted based on Experiment III. The problems in methodology raised in the discussion of these data preempt meaningful interpretation of the context manipulation. Specifically, the magnitude of the context facilitation in Stage I was small and the finding of no difference between reader groups needs to be replicated before inferences can be drawn.

There were however, two findings of significance in these experi-

ments. For this subject population, reading skill level was a better predictor of performance than was IQ or age. It is the case that reading skill level and IQ are positively correlated and that reading skills generally increase with age so that investigations into the acquisition of linguistic skills which compare different grade levels, e.g. 2, 5, and 7, are useful. However, differences in reading skill level between and within grade level need to be examined with respect to such acquisition. It seems unlikely that a child's age or IQ alone can predict his linguistic ability; the ten year old reading at grade level is probably going to perform better on a range of linguistic tasks than the ten year old reading below grade level. However, any causal or directional statements about reading skill level and syntactic analysis skills are premature. As pointed out in the introduction, the definition of reading skill level is not independent of the difficulty level of the text which is comprehended. And text difficulty level is, in part, measured by the complexity of the sentences within the text. Specification of the nature of the interaction among exposure to more complex language, the comprehension of such language and reading skill level awaits further research.

A second important implication of the present studies is the caution which must be exercised in extrapolating competence from specific performance measures. For the majority of subjects in Experiment II, two different types of presentation lists resulted in two different types of performance. Chomsky's (1969) analysis of the mastery of the Minimum Distance Principle as a linguistic processing strategy and the awareness that promise is an exception to this principle is based on the performance of a small sample of children on one measure: a mixed pre-

sentation list of tell and promise sentences. If inferences about competence are to be made, it seems clear that performance measures on a set of tasks which are thought to converge on that competence need to be gathered. Only then does it seem justifiable to make claims about the development of linguistic competence when such competence must be inferred from performance.

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Table 1

Definition of Stages

Stage	Correct on TELL	Correct on PROMISE
I	Always	Never
II	Sometimes	Sometimes
III	Always	Sometimes
IV	Always	Always

There was a maximum score of 4 in each of the experimental conditions of Exps. I & II. Thus, Always = 4 correct, Sometimes = 2 or 3 correct and Never = 0 or 1 correct.

Table 2

Group Means for Subjects in Experiments I & III

Reader Group	Raw Score Met. Reading Test Elem. Form	Age (mos.)	IQ (Otis Lennon)
Low Skill Readers (n=32)	16.19	108.10 (95-138)	101.67 (80-132)
Medium Skill Readers (n=32)	27.56	112.38 (96-128)	106.72 (91-127)
High Skill Readers (n=32)	35.28	118.72 (97-136)	111.06 (94-137)

Table 3

Observed Frequencies of Low, High and Medium Skill Readers Within Each Stage for the Listening Comprehension and for the Reading Comprehension Task in Experiment I

	Listening Comprehension				
Reader Skill Group	Stage I	II	III	IV	Unc.
Low	9	9	4	2	8
Med.	4	8	11	6	3
High	5	5	11	7	4

	Reading Comprehension				
Reader Skill Group	Stage I	II	III	IV	Unc.
Low	19	6	3	2	2
Med.	10	5	13	4	0
High	8	2	11	11	0

Unc. = unclassifiable with respect to the stages.

Table 4

Simple and Multiple Correlations of the Population Variables of Reading Skill (2), IQ (3) and Age (4) with Performance on Six Criterion Measures in Experiment I

Population Variable	Tell Comprehension		Promise Comprehension		Stage	
	Listening (5)	Reading (6)	Listening (7)	Reading (8)	Listening (9)	Reading (10)
Reading Skill (2)	.26*	.19*	.26*	.42*	.36*	.44*
IQ (3)	.17	.15	.18*	.29*	.33*	.27*
Age (4)	.04	.16	.01	.15	.05	.20*

*p<.05.

Multiple Correlations and Beta Weights

$r_{7.23} = .271$	$\beta_2 = .224$	$r_{23} = .42*$
	$\beta_3 = .086$	$r_{34} = -.35*$
$r_{8.23} = .432$	$\beta_2 = .372$	$r_{24} = .44*$
	$\beta_3 = .114$	
$r_{9.23} = .41$	$\beta_2 = .269$	
	$\beta_3 = .217$	
$r_{10.234} = .44$	$\beta_2 = .51$	
	$\beta_3 = -.0002$	
	$\beta_4 = -.167$	

Table 5

Mean Number Correct by Grade and Reader Skill Group within Grade on Tell, Promise, and Active Sentences Presented in Two List Conditions

	Tell		Promise		Subject Question	Object Ouestion
	Block	Mix	Block	Mix	(Block Tell List)	(Block Promise List)
3H	4.75	4.75	4.88	4.63	4.88	3.94
3L	4.00	4.38	3.5	3.5	4.88	3.75
2H	4.75	4.63	3.0	2.25	4.63	4.00
2L	3.25	3.5	2.5	2.5	3.00	3.88

Table 6

Conditional Probability of Performance on the Mixed Presentation List Given Performance on the Blocked List for Tell and Promise Sentences Presented in Isolation

Blocked List Response Pattern		Mixed List Response Pattern: Always Correct	Sometimes Correct	Never Correct
	Tell sentences			
Third Grade	Always Correct n=12	.83 (10)	.16 (2)	
	Sometimes Correct n=3	.67 (2)	.33 (1)	
	Never Correct n=1		1.00 (1)	
Second Grade	Always Correct n=10	.70 (7)	.30 (3)	
	Sometimes Correct n=3	.67 (2)	.33 (1)	
	Never Correct n=3		.67 (2)	.33 (1)
	Promise Sentences			
Third Grade	Always Correct n=12	.5 (6)	.5 (6)	
	Sometimes Correct n=2	.5 (1)	.5 (1)	
	Never Correct n=2		.5 (1)	.5 (1)
Second Grade	Always Correct n=3		1.0 (3)	
	Sometimes Correct n=9	.11 (1)	.55 (5)	.34 (3)
	Never Correct n=4		.5 (2)	.5 (2)

Table 7

Observed Frequency of High and Low Skill Readers within each Stage for the Isolation and Context Comprehension Conditions of Experiment III

	Isolation Comprehension				
Reader Skill Group	Stage I	II	III	IV	Unc.
Low	19	2	9	2	0
High	7	3	5	17	0

	Context Comprehension				
Reader Skill Group	Stage I	II	III	IV	Unc.
Low	13	5	10	4	0
High	2	1	10	18	1

Unc. = unclassifiable with respect to the stages.

Table 8

Mean Performance on Tell and Promise in the Three Context Conditions of Experiment III for High and Low Skill Readers in Each of the Four Stages

	TELL				PROMISE			
	Isolation	Supportive	Nonsupportive		Isolation	Supportive	Nonsupportive	
Stage I								
Low n=19	4.00	3.58	3.74		.21	1.16	1.05	
High n=7	4.00	3.86	3.86	(MS = .259) Error	.43	1.57	1.43	(MS = .535) Error
Stage II								
Low n=2	3.00	4.00	3.00		1.50	3.50	4.0	
High n=3	2.33	3.33	3.67	(MS = .741) Error	1.67	1.0	1.33	(MS = 1.167) Error

Table 8 - cont'd

	TELL			PROMISE		
	Isolation	Supportive	Nonsupportive	Isolation	Supportive	Nonsupportive
Stage III						
Low n=9	4.00	3.78	3.33	2.44	2.44	2.22
High n=5	4.00	3.6	3.4	2.8	2.8	3.2
			(MS = .402) Error			(MS = 1,132) Error
Stage IV						
Low n=2	3.5	4.0	3.0	4.0	4.0	2.0
High n=17	3.94	3.94	4.0	4.0	3.76	3.88
			(MS = .107) Error			(MS = .261) Error

Table 9

Frequency of Context Dependence and Context Independence for High and Low Skill Readers within each Stage, Experiment III

Stage	High Skill			Low Skill		
	Depen.	Independence		Depen.	Independence	
	S > N	S = N	N > S	S > N	S = N	N > S
I (n=19 L 7 H)	3	3	1	5	11	3
II (n=2 L 3 H)	1	0	2	1	1	0
III (n=9 L 5 H)	1	2	2	2	4	3
IV (n= 2 L 17 H)	0	14	3	1	1	0
	5	19	8	9	17	6

S = Supportive Paragraph Context
N = Nonsupportive Paragraph Context

Table 10

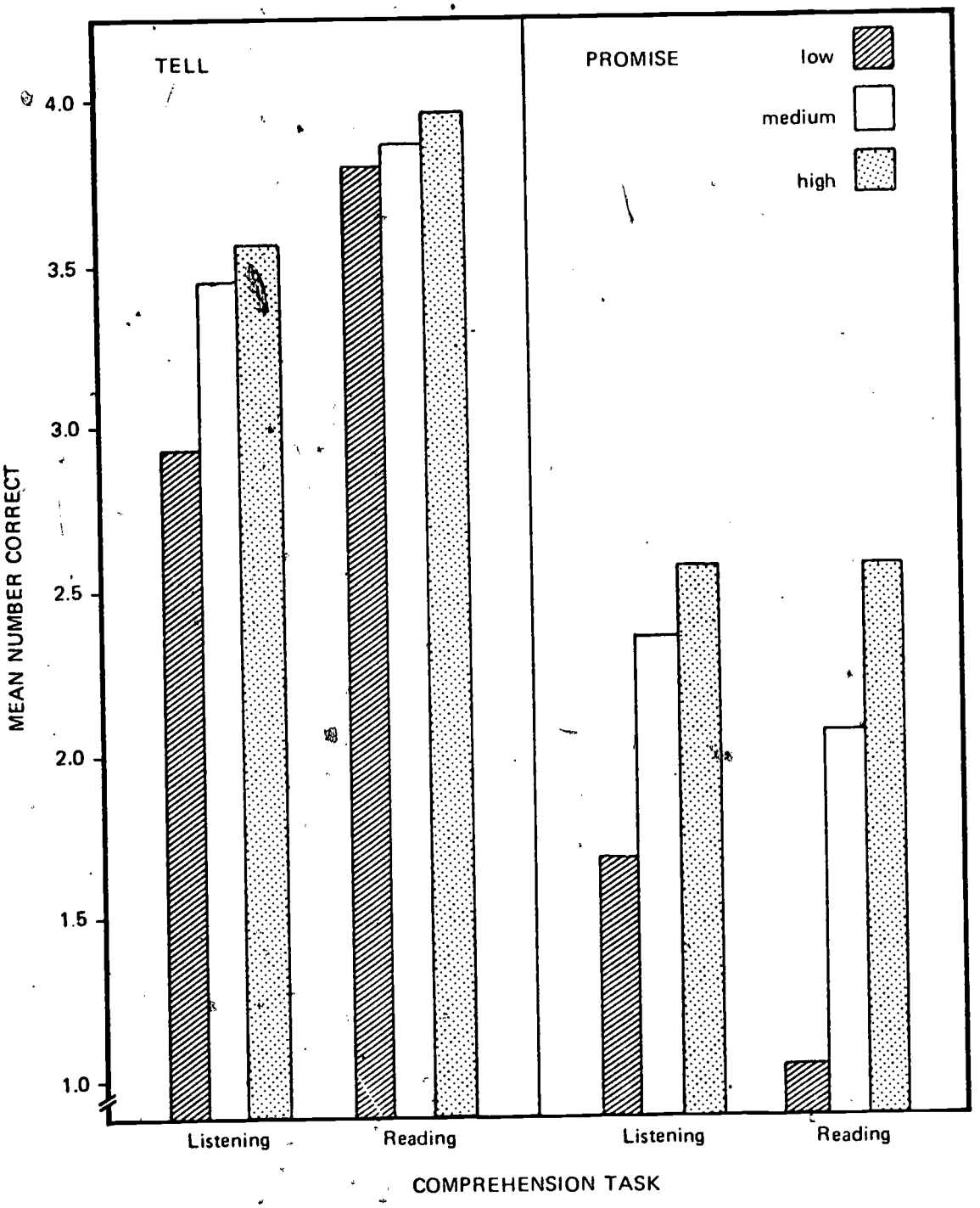
Performance on Promise-in-Context given Performance-in-Isolation

Performance-in-Isolation	Performance-in-Context: Never Correct		Sometimes Correct		Always Correct	
Never Correct n=26	12/26	(46%)	14/26	(54%)	0	
Sometimes Correct n=19	2/19	(11%)	12/19	(63%)	5/19	(26%)
Always Correct n=19	0		2/19	(11%)	17/19	(89%)

Figure Captions

Figure 1. Performance on tell and promise in the listening and reading comprehension tasks for high, medium and low reading skill groups in Experiment I.

Figure 1


TELL
PROMISE
low
medium
high
4.0
3.5
3.0
2.5
2.0
1.5
1.0
MEAN NUMBER CORRECT
Listening
Reading
Listening
Reading
COMPREHENSION TASK

APPENDIX A

Design for Experiment I--Tell and Promise Sentences in Isolation

	Verb: Tell	Verb: Promise
Listening Comprehension Task	4	4
Reading Comprehension Task	4	4

APPENDIX B

Experimental Materials for Experiment I--Tell and Promise Sentences in Isolation

List I	List II	List III	List IV
1. Peter tells Fred to find the children.	1. Peter promises Fred to find the children.	1. Kim tells Joan to prepare the vegetables.	1. Kim promises Joan to prepare the vegetables.
2. Tony promises Mike to come on the streetcar.	2. Tony tells Mike to come on the streetcar.	2. Alice promises Cathy to catch butterflies.	2. Alice tells Cathy to catch butterflies.
3. Neil is helped by Eric.	3. Eric helps Neil.	3. Robert is looked for by Bruce.	3. Bruce looks for Robert.
4. Betty promises Lucy to jump up and down.	4. Betty tells Lucy to jump up and down.	4. Judy promises Susan to measure the windows.	4. Judy tells Susan to measure the windows.
5. Cynthia finds Theresa.	5. Theresa is found by Cynthia.	5. Eve chooses Dotty.	5. Dotty is chosen by Eve.
6. Ann promises Sally to finish the cheese.	6. Ann tells Sally to finish the cheese.	6. Jim promises Bill to count the dishes.	6. Jim tells Bill to count the dishes.
7. Paul tells Ted to stamp the letter.	7. Paul promises Ted to stamp the letter.	7. Tom tells John to heat up the soup.	7. Tom promises John to heat up the soup.
8. Margaret is trusted by Karen.	8. Karen trusts Margaret.	8. Douglas is dressed by Gary.	8. Gary dresses Douglas.
9. Dan promises Mark to make some pies.	9. Dan tells Mark to make some pies.	9. Mary promises Jane to order the parts.	9. Mary tells Jane to order the parts.
10. Barbara tells Debby to choose the bike.	10. Barbara promises Debby to choose the bike.	10. Pat tells Linda to hum the song.	10. Pat promises Linda to hum the song.
11. Dave calls James.	11. James is called by Dave.	11. Diane catches Gail.	11. Gail is caught by Diane.
12. David tells Joe to sniff the flowers.	12. David promises Joe to sniff the flowers.	12. Ed tells Steve to burn the box.	12. Ed promises Steve to burn the box.

APPENDIX C

Materials for Exp. II

BLOCKED PROMISE SENTENCES:

1. Tony promises Mike to [illegible]t on the (bicycle) chain.
2. Peter promises Fred to water the plants.
3. Betty promises Lucy to clean up.
4. Mary promises Jane to walk the dogs.
5. Ed promises Steve to collect the money.

MIXED PROMISE SENTENCES:

1. Kim promises Joan to bake the cake.
2. Tom promises John to pick up the cleaning.
3. Alice promises Cathy to buy popcorn.
4. Pat promises Lind to do the sewing.
5. Paul promises Ted to scrape the fish.

BLOCKED TELL SENTENCES:

1. Judy tells Susan to paint the roof.
2. Eve tells Betty to push the swing.
3. Dan tells Mark to find some (baseball) uniforms.
4. Kim tells Joan to prepare the vegetables.
5. Ann tells Sally to finish the cheese.

MIXED TELL SENTENCES:

1. Jim tells Bill to clean the windows.
2. Barbara tells Debby to sell the tickets.
3. David tells Joe to vacuum the floor.
4. Betty tells Lucy to jump up and down.
5. Eric tells Neil to count the dishes.

ACTIVE SENTENCES:

1. James telephones Dave.
2. Cynthis finds Theresa.
3. Judy kicks Susan.
4. Alice chases Cathy.
5. Robert looks for Bruce.

QUESTIONS FOR BLOCKED PROMISE LIST:

1. Who is telephoned?
2. Who is found?
3. Who is kicked?
4. Who is cased?
5. Who is looked for?

QUESTIONS FOR BLOCKED TELL LIST:

1. Who telephones?
2. Who finds?
3. Who kicks?
4. Who cases?
5. Who looks?

APPENDIX D
Experimental materials for Experiment III
Context effects on comprehension of tell and promise sentences

Paragraph & Condition	
I ST	Kim and Joan are planning a birthday party for Sam. Kim is buying the pop. Kim is making the decorations. Kim tells Joan to bake the cake.
I NSP	Kim and Joan are planning a birthday party for Sam. Kim is buying the pop. Kim is making the decorations. Kim promises Joan to bake the cake.
I SP	Kim and Joan are planning a birthday party for Sam. Joan is buying the pop. Joan is making the decorations. Kim promises Joan to bake the cake.
I NST	Kim and Joan are planning a birthday party for Sam. Joan is buying the pop. Joan is making the decorations. Kim tells Joan to bake the cake.
II ST	Betty and Lucy are running a backyard carnival. Betty is setting up the games. Betty is collecting all the prizes. Betty tells Lucy to clean up.
II NSP	Betty and Lucy are running a backyard carnival. Betty is setting up the games. Betty is collecting all the prizes. Betty promises Lucy to clean up.
II SP	Betty and Lucy are running a backyard carnival. Lucy is setting up the games. Lucy is collecting all the prizes. Betty promises Lucy to clean up.
II NST	Betty and Lucy are running a backyard carnival. Lucy is setting up the games. Lucy is collecting all the prizes. Betty tells Lucy to clean up.
III ST	Mary and Jane are starting a dog sitting service. Mary will brush the dogs. Mary will feed the dogs. Mary tells Jane to walk the dogs.
III NSP	Mary and Jane are starting a dog sitting service. Mary will brush the dogs. Mary will feed the dogs. Mary promises Jane to walk the dogs.
III SP	Mary and Jane are starting a dog sitting service. Jane will brush the dogs. Jane will feed the dogs. Mary promises Jane to walk the dogs.

APPENDIX D (cont'd.)

III NST	Mary and Jane are starting a dog sitting service. Jane will brush the dogs. Jane will feed the dogs. Mary tells Jane to walk the dogs.
IV ST	Judy and Susan are building a bird house. Judy is cutting the boards. Judy is nailing them together. Judy tells Susan to paint the roof.
IV NSP	Judy and Susan are building a bird house. Judy is cutting the boards. Judy is nailing them together. Judy promises Susan to paint the roof.
IV SP	Judy and Susan are building a bird house. Susan is cutting the boards. Susan is nailing them together. Judy promises Susan to paint the roof.
IV NST	Judy and Susan are building a bird house. Susan is cutting the boards. Susan is nailing them together. Judy tells Susan to paint the roof.
V ST	Dan and Mark are forming a baseball team. Dan is getting the boys for the team. Dan is looking for a good field to play on. Dan tells Mark to find some uniforms.
V NSP	Dan and Mark are forming a baseball team. Dan is getting the boys for the team. Dan is looking for a good field to play on. Dan promises Mark to find some uniforms.
V SP	Dan and Mark are forming a baseball team. Mark is getting the boys for the team. Mark is looking for a good field to play on. Dan promises Mark to find some uniforms.
V NST	Dan and Mark are forming a baseball team. Mark is getting the boys for the team. Mark is looking for a good field to play on. Dan tells Mark to find some uniforms.
VI ST	Jim and Bill are washing the car. Jim is soaping the body. Jim is rinsing the soap off. Jim tells Bill to clean the windows.
VI NSP	Jim and Bill are washing the car. Jim is soaping the body. Jim is rinsing the soap off. Jim promises Bill to clean the windows.
VI SP	Jim and Bill are washing the car. Bill is soaping the body. Bill is rinsing the soap off. Jim promises Bill to clean the windows.
VI NST	Jim and Bill are washing the car. Bill is soaping the body. Bill is rinsing the soap off. Jim tells Bill to clean the windows.

APPENDIX D (cont'd.)

VII ST — Tom and John are helping their father with the shopping. Tom is going to the market. Tom is returning the empty pop bottles. Tom tells John to pick up the cleaning.

VII NSP — Tom and John are helping their father with the shopping. Tom is going to the market. Tom is returning the empty pop bottles. Tom promises John to pick up the cleaning.

VII SP — Tom and John are helping their father with the shopping. John is going to the market. John is returning the empty pop bottles. Tom promises John to pick up the cleaning.

VII NST — Tom and John are helping their father with the shopping. John is going to the market. John is returning the empty pop bottles. Tom tells John to pick up the cleaning.

VIII ST — Paul and Ted are going fishing. Paul is carrying the poles. Paul is baiting the hooks. Paul tells Ted to scrape the fish.

VIII NSP — Paul and Ted are going fishing. Paul is carrying the poles. Paul is baiting the hooks. Paul promises Ted to scrape the fish.

VIII SP — Paul and Ted are going fishing. Ted is carrying the poles. Ted is baiting the hooks. Paul promises Ted to scrape the fish.

VIII NST — Paul and Ted are going fishing. Ted is carrying the poles. Ted is baiting the hooks. Paul tells Ted to scrape the fish.

IX ST — Pat and Linda are making doll clothes. Pat is cutting the patterns. Pat is making sure they will fit the dolls. Pat tells Linda to do the sewing.

IX NSP — Pat and Linda are making doll clothes. Pat is cutting the patterns. Pat is making sure they will fit the dolls. Pat promises Linda to do the sewing.

IX SP — Pat and Linda are making doll clothes. Linda is cutting the patterns. Linda is making sure they will fit the dolls. Pat promises Linda to do the sewing.

IX NST — Pat and Linda are making doll clothes. Linda is cutting the patterns. Linda is making sure they will fit the dolls. Pat tells Linda to do the sewing.

X ST — David and Joe are cleaning their room. David is putting away the toys. David is dusting the furniture. David tells Joe to vacuum the floor.

APPENDIX D (cont'd.)

X NSP	David and Joe are cleaning their room. David is putting away the toys. David is dusting the furniture. David promises Joe to vacuum the floor.
X SP	David and Joe are cleaning their room. Joe is putting away the toys. Joe is dusting the furniture. David promises Joe to vacuum the floor.
X NST	David and Joe are cleaning their room. Joe is putting away the toys. Joe is dusting the furniture. David tells Joe to vacuum the floor.
XI ST	Peter and Fred are planting a garden. Peter is raking the dirt. Peter is planting the seeds. Peter tells Fred to water the plants.
XI NSP	Peter and Fred are planting a garden. Peter is raking the dirt. Peter is planting the seeds. Peter promises Fred to water the plants.
XI SP	Peter and Fred are planting a garden. Fred is raking the dirt. Fred is planting the seeds. Peter promises Fred to water the plants.
XI NST	Peter and Fred are planting a garden. Fred is raking the dirt. Fred is planting the seeds. Peter tells Fred to water the plants.
XII ST	Ann and Sally are taking their cousin Roy to the playground. Ann is taking Roy on the sliding board. Ann is helping Roy climb the monkey bars. Ann tells Sally to push the swing.
XII NSP	Ann and Sally are taking their cousin Roy to the playground. Ann is taking Roy on the sliding board. Ann is helping Roy climb the monkey bars. Ann promises Sally to push the swing.
XII SP	Ann and Sally are taking their cousin Roy to the playground. Sally is taking Roy on the sliding board. Sally is helping Roy climb the monkey bars. Ann promises Sally to push the swing.
XII NST	Ann and Sally are taking their cousin Roy to the playground. Sally is taking Roy on the sliding board. Sally is helping Roy climb the monkey bars. Ann tells Sally to push the swing.
XIII ST	Alice and Cathy are going to the zoo. Alice is bringing old bread for the ducks. Alice is buying peanuts for the elephants. Alice tells Cathy to buy popcorn.

APPENDIX D (cont'd.)

XIII NSP Alice and Cathy are going to the zoo. Alice is bringing old bread for the ducks. Alice is buying peanuts for the elephants. Alice promises Cathy to buy popcorn.

XIII SP Alice and Cathy are going to the zoo. Cathy is bringing old bread for the ducks. Cathy is buying peanuts for the elephants. Alice promises Cathy to buy popcorn.

XIII NST Alice and Cathy are going to the zoo. Cathy is bringing old bread for the ducks. Cathy is buying peanuts for the elephants. Alice tells Cathy to buy popcorn.

XIV ST Barbara and Debby are having a magic show. Barbara is doing the rabbit trick. Barbara is doing card tricks. Barbara tells Debby to sell the tickets.

XIV NSP Barbara and Debby are having a magic show. Barbara is doing the rabbit trick. Barbara is doing card tricks. Barbara promises Debby to sell the tickets.

XIV SP Barbara and Debby are having a magic show. Debby is doing the rabbit trick. Debby is doing card tricks. Barbara promises Debby to sell the tickets.

XIV NST Barbara and Debby are having a magic show. Debby is doing the rabbit trick. Debby is doing card tricks. Barbara tells Debby to sell the tickets.

XV ST Tony and Mike are fixing an old bicycle. Tony is straightening the handle bars. Tony is patching the tires. Tony tells Mike to put on the chain.

XV NSP Tony and Mike are fixing an old bicycle. Tony is straightening the handle bars. Tony is patching the tires. Tony promises Mike to put on the chain.

XV SP Tony and Mike are fixing an old bicycle. Mike is straightening the handle bars. Mike is patching the tires. Tony promises Mike to put on the chain.

XV NST Tony and Mike are fixing an old bicycle. Mike is straightening the handle bars. Mike is patching the tires. Tony tells Mike to put on the chain.

XVI ST Ed and Steve are sharing a newspaper route. Ed is picking up the papers. Ed is delivering the papers. Ed tells Steve to collect the money.

XVI NSP Ed and Steve are sharing a newspaper route. Ed is picking up the papers. Ed is delivering the papers. Ed promises Steve to collect the money.

APPENDIX D (cont'd.)

XVI SP	Ed and Steve are sharing a newspaper route. Steve is picking up the papers. Steve is delivering the papers. Ed promises Steve to collect the money.
XVI NST	Ed and Steve are sharing a newspaper route. Steve is picking up the papers. Steve is delivering the papers. Ed tells Steve to collect the money.

Experimental materials for Sensitivity-to-sharing pretest

I	Carol and Nancy agreed to clean up Mr. Brown's yard. Carol is trimming the bushes. Carol is pulling the weeds. Who should cut the grass?
II	Jeff and Richard are babysitting for some neighborhood children. Jeff is taking them swimming. Jeff is coloring pictures with them. Who should play tag with them?
III	Lisa and Becky are in charge of their club's bake sale. Lisa is telling people about it. Lisa is picking up the cakes and cookies. Who should set up the booth?
IV	Donald and Larry are going on an overnight hiking trip. Donald is mapping the route. Donald is getting the tent. Who should get the cooking gear?