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THE INFLUENCE OF CONTEXTUAL PERFORMANCE
ON SENTENCE IMITATION ABILITIES
OF THREE-YEAR-OLDS

By

Margaret Mary Green

B.S., University of Minnesota, 1972

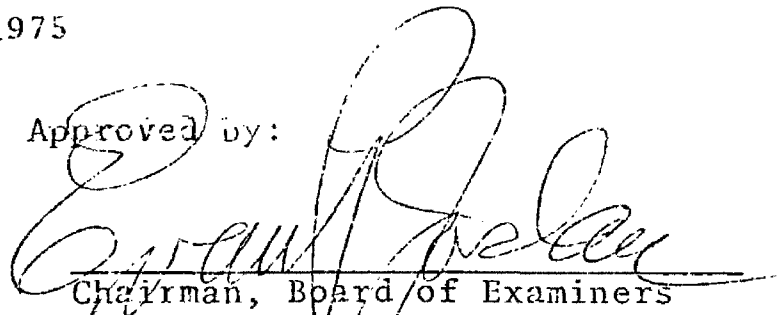
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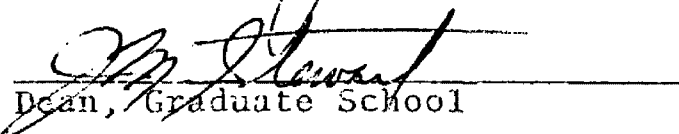
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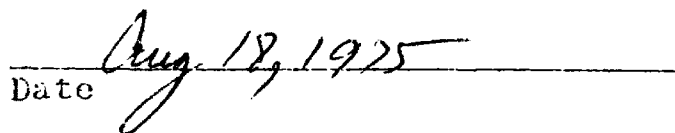
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The Influence of Contextual Performance on Sentence Imitation
Abilities of Three-Year-Olds (47 pp.)

Director: Dr. Evan P. Jordan

The purpose of the study was to make an investigation to determine if contextual support would affect sentence imitation performance in three-year-old children.

Fifteen males and fifteen females from the Missoula area served as subjects. Twelve stimulus sentences were presented for imitation in three different conditions randomly ordered: sentence imitation with no contextual cues, sentence imitation with picture cues and sentence imitation with cues resident in a play situation.

The three factors evaluated were context, sex, and order. Significant main effects occurred for the latter two factors at the .05 level of confidence. Males as a whole made more errors than females in all conditions. Further analysis of the main effects of order revealed that performance on the first presentation was significantly worse than both the second and third presentations.

It was found that there was no significant context effect. However, there was a significant interaction between sex and context in that females made fewer errors and males made more errors in the condition utilizing picture cues.

It is not uncommon for females to perform better than males on language related tasks, accounting for the significant sex difference. Also, since pictures are symbolic representations of objects and events, it was proposed that females in this study were able to utilize the pictures to aid recall of the sentence stimuli, while males in this study were only distracted by the pictures. A learning effect and/or familiarity with the task and experimenter were suggested as reasons for a significant difference between the first and second and first and third presentations.

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Gratitude is also extended to the nursery schools and day cares in the Missoula area who assisted in securing the subjects for this study, as well as to William Platzek, the artist, who made the sketchings.

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CHAPTER I

INTRODUCTION

One means of assessing expressive language skills in children has been through analyzing a sample of the child's language. However, what a child says is often dependent upon what he is doing or seeing. Therefore, a representative sample of the child's linguistic skills is not always obtainable due to contextual constraints limiting which grammatical structures the child will produce. A more recent procedure for assessing expressive language abilities has been through elicited imitation of sentences. According to Bloom (1970), if the sentence exceeds the auditory memory span of the child, the attempted repetition of the sentence should provide evidence for how well the child understood the sentence, by how much of the meaning is retained, as well as his skill at speaking such sentences. Recently, Carrow (1974) has developed a comprehensive list of sentence constructions and morphemes for purposes of assessing these abilities. She has prepared normative data on these sentences in children ranging in ages from 3.0 to 3.11 years. In an elicited imitation task, such as Carrow's, two factors are missing which are usually present in the spontaneous

production of utterances by children, that is, the intent to speak and contextual support (Slobin 1968). In the absence of these two factors, Peter, a subject in Bloom, Hood and Lightbown's study was not able to reproduce accurately in an elicited imitation task sentences identical to ones he had produced spontaneously the day before in play. This paper will attempt to deal with the question of whether or not the contextual factor plays an important role in the ability of children to imitate sentences.

Review of the Literature

Imitation in Relation to Sentence Length and Sentence Structure

Early studies on sentence imitation dealt primarily with sentence length, not accounting for the structure of the sentence stimuli being presented. Stutsman (1926) studied children's abilities to imitate words, phrases and sentences and found that the number of words repeated by children 17 to 34 months old was related to their ability to combine words in spontaneous conversation. Gesell (1940) developed norms on the number of syllables children two to six years of age were able to repeat successfully in sentences by having one hundred children imitate sentences of differing lengths. Two-year-olds were able to repeat sentences of three to four syllables, and four-year-olds repeated one-third of the sentences containing twelve to thirteen syllables. Five-

year-olds were somewhat more proficient and six-year-olds were able to repeat twelve to thirteen syllables successfully, erring on sixteen to eighteen syllables.

Brown and Fraser (1963) looked at both length and verb development. They studied six children between the ages of twenty-five to thirty-five months old and found that the mean lengths of imitations were equal to the mean lengths of these children's spontaneous utterances. Mean length of utterance was also related to which verbs the children included in their imitative utterances. For example, children with MLU's below 3.2 omitted forms of the verb "to be" but children with MLU's above 3.2 included this form.

Menyuk found sentence structure to be an important variable in children's ability to imitate sentences (Menyuk 1963, 1964, 1969). In normal populations of children in preschool and kindergarten, sentence structure influenced sentence repetition more than sentence length. Studies on adult populations (Savin and Perchonak 1965, and Mehler 1963) have also shown sentence structure to be a contributing factor in sentence imitation, that is, transformations were more difficult than simple, active declarative sentences to recall.

Sentence length as well as sentence structure have been found to be important variables in studies dealing with language-delayed populations. Menyuk's results on language-delayed children indicated that both sentence structure and

sentence length had an effect on their ability to imitate sentences two to nine words in length (Menyuk 1964). Graham (1968) studied the effects of short-term memory on the ability of Educationally Subnormal children to repeat different sentence types eight words in length. Both sentence structure and short-term memory were significant variables in determining performance. Menyuk and Looney (1972) using sentence stimuli of only three to five words in length found both structure and length had an effect on language-delayed children, with the exception of the three-word sentence, and neither structure nor length affected the results of their normal population of four- and five-year-olds. Menyuk hypothesized that because three words were probably within the memory span of the language-delayed population, the particular structure of the sentences would not have an effect because the children were probably repeating these sentences by rote imitation. Possibly this held true for all of the sentence stimuli given to the normal population. Again, both sentence type and sentence length were factors in Semmel and Dolley's study of imitation on forty Down's Syndrome children (1971). Their subjects were better able to imitate simple active declarative sentences than transformational sentences and were unable to hold the longer transformed sentences in immediate memory.

There has been one study in the literature in which

sentence length independent of sentence structure has been found to be the influencing variable in an imitation task. Miller (1973) controlled for sentence structure and length in an imitation task on preschool children four to five years old. Sentence types were categorized as active, negative, "wh" questions, and passive sentences. Each construction was presented in sentences ranging from five to nine words in length. Sentence length was found to affect sentence imitation in a consistent manner; as sentence length increased, correct imitation decreased. The particular sentence types compared in this study had no significant effect on the age range tested. Males and females were compared in this study, and Miller found no significant differences between their performance.

Both sentence length and structure have been found to be important variables in the ability of children to repeat sentences modeled by an adult. Slobin and Walsh found that "structured sentences will reveal aspects of the child's theory of syntax only if the stimuli are chosen to put stress on immediate memory" (as quoted in Carrow 1974).

Imitation in Relation to Production

Fraser, Bellugi and Brown (1963) compared three-year-old children's abilities to imitate, comprehend and produce sentences. The children were able to imitate sentences which they could neither comprehend nor produce. The authors

therefore concluded that imitation is a perceptual-motor skill independent of comprehension. On the production task in which pictures were used as contextual cues the children changed the sentence, "The woman gives the bunny the teddy" to "The woman gives the teddy to the bunny," indicating that if the children "had decoded the sentences into meanings, as they do on the production task, the same transformation ought to have occurred" on the imitation task. However, on the imitation task the children either correctly repeated the originals or made errors that did not change the transformation. Therefore, the authors concluded that the children's imitations were not accurate representation of their production skill, but instead, imitation was a perceptual motor skill independent of comprehension. The authors also point out that the length of the sentences was within the memory span of the children being tested. If the sentences had been repeated by children with shorter memory spans, possibly the children would have "internally processed" more words than they could have imitated, reversing the results. Two-year-olds presented with the same task performed similarly (Lovell and Dixon 1967).

Imitation preceded production again in Menyuk's study (1964). Menyuk presented sentences containing the various transformation types and ungrammatical forms found in children's grammar to fourteen nursery school children and

fifty kindergarten children. A significant number of children in both groups were able to imitate transformations which they did not use in their own speech. Menyuk also stated that the children, especially in the nursery school group, were using rules in their own grammar to modify the transformations and correct the ungrammatical forms.

Spontaneous imitated utterances, those spontaneously imitated from an adult model in a play situation, have been compared with free utterances by several researchers. Ervin (1964) studied the imitations of five two-year-olds. She wrote grammatical rules for the free sentences and the spontaneous imitated utterances were tested for their consistency with these rules. She found that four of the children were using the same rules for both free and spontaneous imitations. The imitative utterances in the fifth child were shorter and less complex than her own free productions.

Brown and Bellugi (1964) found that Adam and Eve spontaneously imitated adult utterances by reducing them in length to the range of two to four morphemes characteristic of their own free productions. Both the children's spontaneous imitations and their free productions were of a telegraphic nature, that is, they contained mainly contentives.

Rodd and Braine (1971) lent support to Ervin's and Brown's data by looking at three two-year-old children's

imitations of adult model sentences using toys and pictures for content. They concluded from their results that "young children's spontaneous imitations differ very little from their spontaneous productions."

Bloom, Hood and Lightbown (1974) found results differing from the above researchers. They studied six children with MLU's of 1.0 to 2.0, finding that the children spontaneously "imitated only words and structures in their speech which they appeared to be in the process of learning. They tended not to imitate words and structures that they themselves used spontaneously and so presumably knew, or did not use spontaneously at all and so presumably did not know." However, results of an elicited imitation task varied considerably from results of spontaneous imitations. One of their subjects, Peter, age thirty-two months, was presented with the task of imitating sentences that he had produced spontaneously the day before in play. Without the intent to speak and any contextual support, Peter was unable to reproduce his own sentences in the elicited imitation task.

Statement of the Problem

In reviewing the literature there appears to be a need to explore further the importance of context in relation to the ability of children to perform an imitation task. Children have been observed to usually talk about what they are doing or seeing. Bloom (1970) cited the example of a child

climbing a tricycle and announcing "ride trike." Adults, when talking to young children, also often limit their speech to topics centered around something the child does or sees (Bloom 1970). Most studies equating imitation abilities with actual productions of children have used spontaneous imitations, that is, the sentences were modeled for the child in a play context, rather than a task of elicited imitation which lacks any contextual cues (Ervin 1964; Brown and Belugi 1964; and Rodd and Briane 1971). The purpose of this study was to compare children's abilities to imitate sentences in the absence of any contextual cues, in the presence of representative pictures, and in a representative play situation. It was hypothesized that the children's imitations would be closer to the model's sentence stimuli in the two contextual situations than in the absence of any contextual cues.

CHAPTER II

PROCEDURES

Subjects

Fifteen males and fifteen females ranging in age from 3-0 to 3-11 years, obtained from seven different private nursery schools and day cares in the Missoula area, participated in the study. Socioeconomic status of the sample (Appendix A) included ratings of one through six with a mean rating of 3.2 as based on the seven-point Warner Scale for rating occupations (Warner, Meeker, and Eels 1963). The age range chosen was thought to be more cooperative, more intelligible, and less variable in language skills than two-year-olds, and children older than this age range might be less dependent upon contextual cues in their production of sentences. An additional criterion for selection was a score falling between the sixteenth and eighteenth percentile on the Peabody Picture Vocabulary Test, which is within one standard deviation of the mean percentile score.

Stimuli

Stimuli were twelve sentences, eight words in length,

representing transformational rules as used by Graham (1968) in a sentence imitation task. The twelve sentences used as stimuli in this study were similar to Graham's (1968) sentences with the exception of some word substitutions to rectify dialectal differences as well as to provide stimuli readily representable in a play situation (Appendix B). Graham controlled for vocabulary by using only those words familiar to children between the ages of three and five years. It was determined that Graham's sentences were suited for this study through a pilot study using sentence stimuli from several different sources in a sentence imitation task free of any contextual cues. The sentences needed to be difficult enough to produce a fairly high rate of errors in the proposed most difficult condition in order to allow for an improvement in scores in the other two conditions.

Materials

Sentence stimuli were recorded on a Uher 4000 Report-L tape recorder with the speed selector at 7½ ips for High Fidelity recordings. The microphone was kept at a distance of approximately eighteen inches, which is within the range of twelve to twenty inches recommended for recording speech. Responses from the subjects were recorded on a Sony Solid State Cassette-Recorder.

Twelve pictures were sketched (Appendix C) and toys,

puppets, and objects were manipulated (Appendix D) to convey the meaning of each of the sentences for the picture condition and play condition respectively.

Experimental Procedure

The experimental procedure was administered to each child in one sitting lasting approximately twenty to thirty minutes. Initially, the experimenter administered the Peabody Picture Vocabulary Test (Form B) for screening purposes. The three experimental conditions were then presented to the children who passed the screening test. The same recording of the sentence stimuli was presented for each condition. Order of presentation varied randomly among the subjects.

Instructions for initial presentation were: "We are going to play a game. This is a tape recorder. Listen to the lady and say just what she says. Listen." Presentation of the three practice sentences followed the initial instructions. If the condition containing no cues followed, no further instructions were given.

Instructions prior to the picture and play conditions were: "Now we are going to look at some pictures/toys and do the same thing."

Failure to respond by any of the children was followed by the statement, "You say it," and if the child still failed to respond, the sentence stimulus was repeated.

These prompts were rarely necessary. The first utterance following presentation of the taped stimulus sentence was considered the child's imitative response. Only a few exceptions to this occurred when children clearly generated responses to other stimuli than the stimulus sentence or when they responded to a question stimulus. In these instances the experimenter said, "Say just what the lady says. Listen" and then the taped stimulus sentence was repeated.

The children were trained for the task during three practice sentences of a Simple Active Declarative type. If any child failed to understand the task or was unintelligible within the three practice presentations he was not included in the study. Only one child was lost through failure to meet these criteria. The experimenter encouraged cooperation by saying, "You are doing a good job" or "You are working really hard."

Any errors were transcribed immediately onto prepared forms containing three sets of sentences, one for each condition. Responses were tape-recorded and this information was used if the experimenter needed to recheck any of the child's responses.

Sentences were scored according to Carrow's procedures for scoring the Carrow Elicited Language Inventory (1974). Basically there were five categories that were scored as

errors: substitutions, omissions, additions, transpositions,
and reversals.

CHAPTER III

RESULTS

Three sentence-imitation error scores for each of fifteen males and fifteen female children 3-0 to 3-11 years old were obtained under the following contextual conditions:

1) no contextual cues; 2) picture cues; and 3) cues resident in a play situation. A three-way analysis of variance with repeated measures on two factors was used for evaluating the three factors involved: sex, context, and order of presentation. The hypothesis presented was that three-year-olds would make fewer errors imitating sentences in the presence of pictures and a play situation than in the condition containing no contextual cues. It was predicted there would be no significant sex difference. The means and standard deviations of the overall error scores by sex, order of presentation, and stimulus context are presented in Appendix E.

Results of an analysis of variance for the overall data are summarized in Table 1. There was a significant sex effect with females ($\bar{X} = 19.9$) performing better (lower error scores) than males ($\bar{X} = 33.3$). In addition, scores differed significantly according to order and there was a significant sex by context interaction.

TABLE 1

Summary of the Analysis of Variance of Scores on Three
Sentence Imitation Tasks Differing Contextually

Source	Sum of Squares	Degrees of Freedom	Mean Squares	F Ratio
BETWEEN GROUPS	23001.560	29		
Sex	4053.511	1	4053.511	5.659*
Context x Order	1013.416	2	506.708	.07
Context x Order x Sex	743.029	2	371.514	.519
Error	17191.604	24	716.317	
WITHIN GROUPS	1699.596	60		
Context	96.955	2	48.478	2.401
Order	223.026	2	111.513	5.523*
Context x Order	45.359	2	22.680	1.123
Context x Sex	184.288	2	92.144	4.563*
Order x Sex	53.683	2	26.842	1.329
Context x Order x Sex	127.089	2	63.544	3.147
Error	969.196	48	20.192	
TOTAL	24701.156	89		

*p 0.05

Table 2 represents the F ratios of post hoc analysis using Scheffe contrasts on the mean scores for order, disregarding sex and context. There was a significant difference

TABLE 2

Comparison of Mean Error Values for Order
Using Scheffe Contrasts

Comparison	Means	F Value
First vs. Second	28.8 - 25.9	6.169*
First vs. Third	28.8 - 25.1	10.088*
Second vs. Third	25.9 - 25.1	.481

*p 0.10

between the means for those sentences presented first and those sentences presented second. Similarly, the mean for sentences presented first was significantly different from the mean for sentences presented third. The difference between the means for sentences presented second and sentences presented third was minimal and was not significant.

The mean error score and standard deviation for males and females for each of the contexts, as well as mean differences between males and females is summarized in Table 3, with the interaction between sex and context graphically represented in Figure 1 by the mean difference between males and females. It is apparent that in the picture-sentence condition males in this sample erred more and females in this sample erred less than in the other two conditions.

TABLE 3

Mean and Standard Deviations for Error Scores by Sex
and Context, and Mean Differences
Between Males and Females

SEX	STIMULUS CONTEXT					
	<u>Sentence Alone</u>		<u>Sentence and Picture</u>		<u>Sentence and Play</u>	
	\bar{X}	s	\bar{X}	s	\bar{X}	s
Males	31.2	16.5	35.0	14.8	33.8	14.2
Females	19.9	16.4	17.5	13.6	22.3	14.5
Difference	11.1		17.5		11.5	

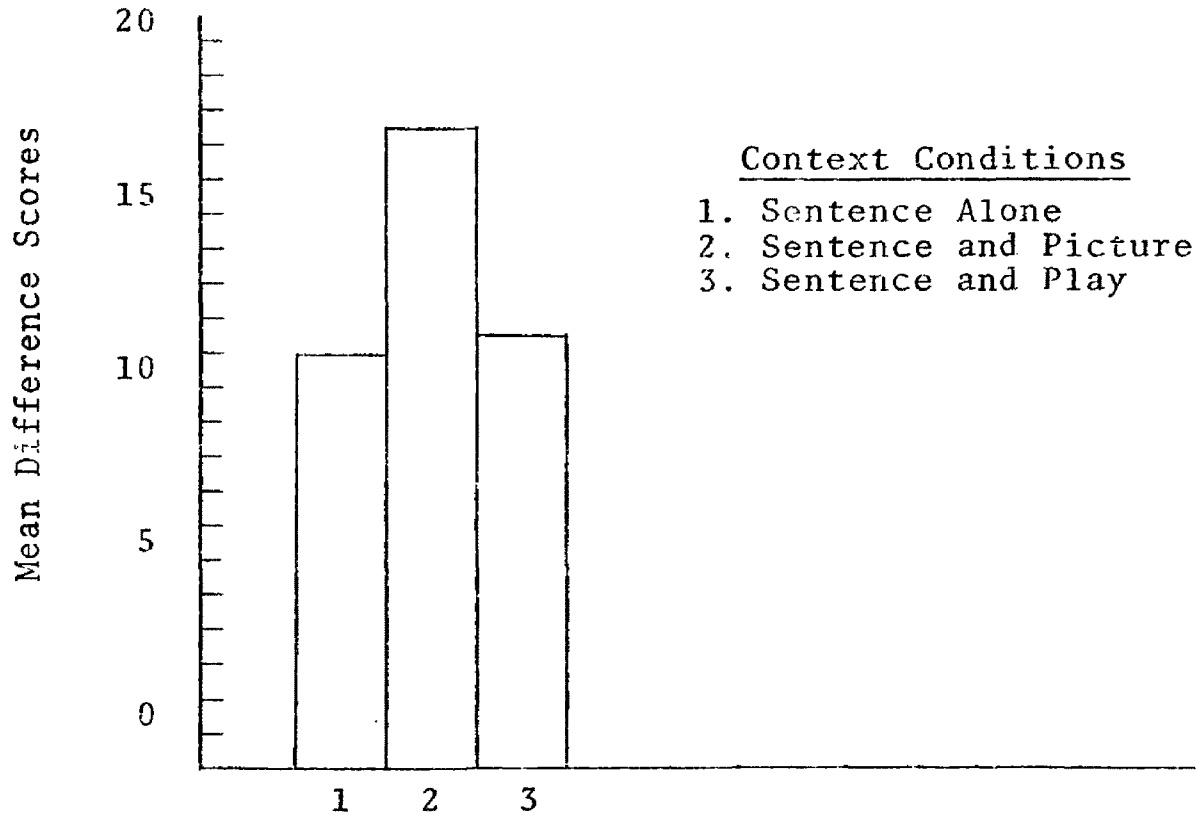


FIGURE 1. Mean Differences Between Males and Females Error Scores Under Each Context Condition

CHAPTER IV

DISCUSSION

This study was conducted in order to determine whether three-year-olds' language abilities as measured by a sentence imitation task are dependent upon contextual support such as pictures, or a play situation.

Results indicated that context, when considered separately from sex and order of presentation, did not have a significant effect on three-year-olds' abilities to imitate sentences. Therefore, sentence imitation does not appear to underestimate three-year-olds' language abilities due to absence of the contextual cues usually present in their spontaneous language production. However, there was a significant sex by context interaction in which the girls in this sample performed better with pictures than with either no contextual cues or a play situation, while the boys in this sample performed worse under the picture condition compared to the other two conditions. Generalization of this sample to the general population of three-year-old girls leads to the consideration that girls of this age attend more to semantically relevant aspects of pictures than do boys of the same ages.

Since pictures are considered symbolic representations of objects and events, these results support the contention that the acquisition of symbolic skills is more rapid in females than in males. Attention to the pictures may have aided these females to recall the experimental sentences, whereas, for these male subjects, the pictures may have served more as distractions, thus diverting their attention from the stimulus sentences, causing them to err more under this particular condition. Investigation of this hypothesis is a possibility for further research. For example, would the lowest tenth percentile of three-year-olds as measured by the Peabody Picture Vocabulary Test be hindered by pictures in a sentence imitation task and the highest tenth percentile be aided by the pictures?

Sex, as considered separate from order and context, was significant, in that girls scored consistently better than boys in all three conditions. In spite of the fact that Miller (1973) found no significant sex differences for sentence imitation, a significant sex effect, though not predicted, is not surprising. Carrow's data (1974), involving imitation of sentences, reflected a sexual difference that approached conventional levels of significance. In general, literature on child development refers to the "more precocious speech and language of girls" (Lee 1974). Templin (1957) reported that girls obtained a greater

proportion of higher scores than boys in the development of articulation, sound discrimination and sentence structure. Girls scored significantly higher on Carrow's (1973) Test of Auditory Comprehension of Language, and Lee found differences by sex at the four-, five- and six-year levels in the analysis of Developmental Sentence Scores, DSS (1974). It is not unusual, then, for girls to perform better than boys on language tasks, and sentence imitation apparently is one of these tasks.

The other significant main effect in this study, order of presentation, was not unanticipated. Some improvement is predictable either from learning of the stimulus sentences occurring due to the sentences being presented three times or from increasing familiarity with the task and the experimenter. Since the large difference in scores occurred between the first and second and first and third presentations with essentially no difference between the second and third presentations, it seems more likely that the latter was more of a causal factor. It is probable that the second and third presentations, when performance stabilization has occurred, reflect more accurately the actual language level of the children as gathered through the sentence imitation task. If so, this would indicate that an adequate assessment of language ability measured by sentence imitation would require some practice sample. On the other hand, it

could be argued that learning of the test sentences occurred between each presentation with the effects of fatigue counterbalancing the learning effect, and thus concealing any improvement in scores between the second and third presentations.

As a whole, results tend to indicate that in establishing a child's language ability through sentence imitation, presentation of sentences in conjunction with a meaningful context is not an important factor at this age level. It is possible that children of a younger age, still in the initial stages of language development, are more dependent upon context than three-year-olds. If any effect at a younger age level were to occur it seems that it would be reflected in an improvement in scores for the play condition, assuming that the picture condition requires more skill, since it involves interpretation of a symbolic representation.

Further, some discrimination between males and females in sentence imitation tasks is indicated in future research and analysis. Norms for imitating tasks, for example, might include separate norms for males and females.

It is suggested that further investigation be conducted for clarification of the factors behind the contradictory results between males and females in the picture condition.

Finally, the question of whether or not familiarity with the task would result in fewer errors, with a closer approximation of actual language ability, could be explored further.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this study was to make an investigation to determine if contextual support would affect sentence imitation performance in three-year-old children.

Fifteen males and fifteen females from the Missoula area, scoring within one standard deviation of the mean percentile score on the Peabody Picture Vocabulary Test, served as subjects. Twelve stimulus sentences were imitated in three conditions randomly ordered: sentence imitation with no contextual cues, sentence imitation with picture cues and sentence imitation with cues resident in a play situation.

The three factors evaluated were context, sex, and order. Significant main effects occurred for the latter two factors (.05 level of confidence). Females erred less than males in all three conditions. Further analysis of the main effects of order revealed that performance on the first presentation was significantly worse than both the second and third presentations.

The effect of major interest to this study, that of context, was not significant. It was hypothesized that

performance would be better in the picture and play conditions than in the condition containing no contextual cues. However, there was a significant interaction between sex and context, in that girls made fewer errors and boys made more errors in the condition utilizing picture cues.

Discussion of results reflected that it is not uncommon for females to perform better than males on language-related tasks, accounting for the significant sex difference. It was also proposed, since pictures are symbolic representations of objects and events, that girls were able to utilize the pictures to aid recall of the sentence stimuli, while boys, somewhat less precocious, were only distracted by the pictures.

A learning effect and/or familiarity with the task and experimenter were suggested as reasons for a significant difference between the first and second and first and third presentations.

Recommendations were to explore further the factors involved in the interaction between sex and context, as well as the possible effects of familiarizing the subjects with the task. Finally, in the future, discrimination in scores on sentence imitation tasks should be made between males and females.

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A P P E N D I C E S

A P P E N D I X A

Percentage of Sample Present Under Each Rating
of Socio-Economic Status by Sex*

SEX	Ratings						
	Upper 1	2	3	4	5	6	Lower 7
Males	3.3	13.3	13.3	6.6	-	13.3	-
Females	10.0	13.3	13.3	6.6	-	6.6	-
Both	13.3	16.6	26.6	13.2	-	19.9	-

*Warner, Meeker, Eels 1963.

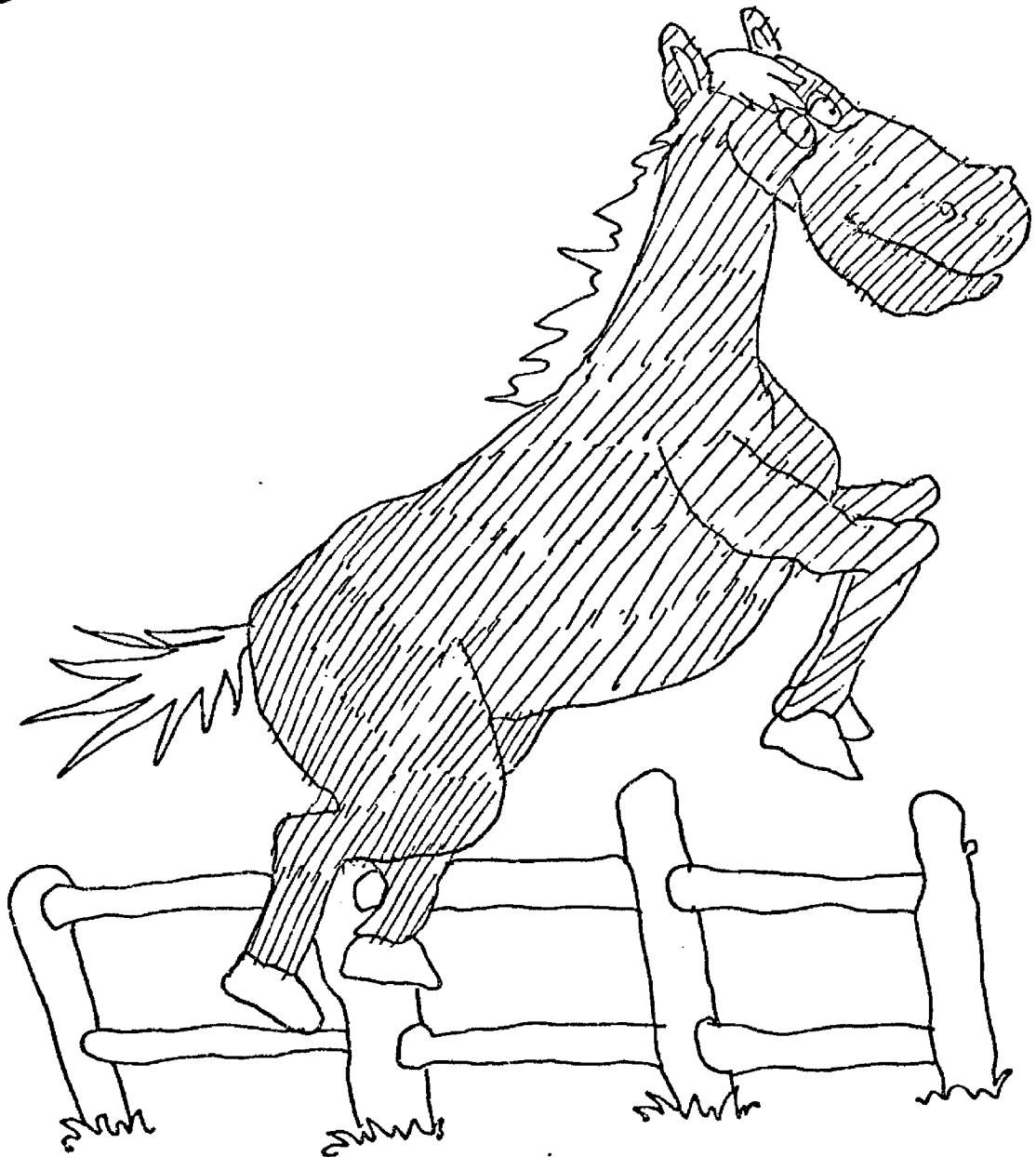
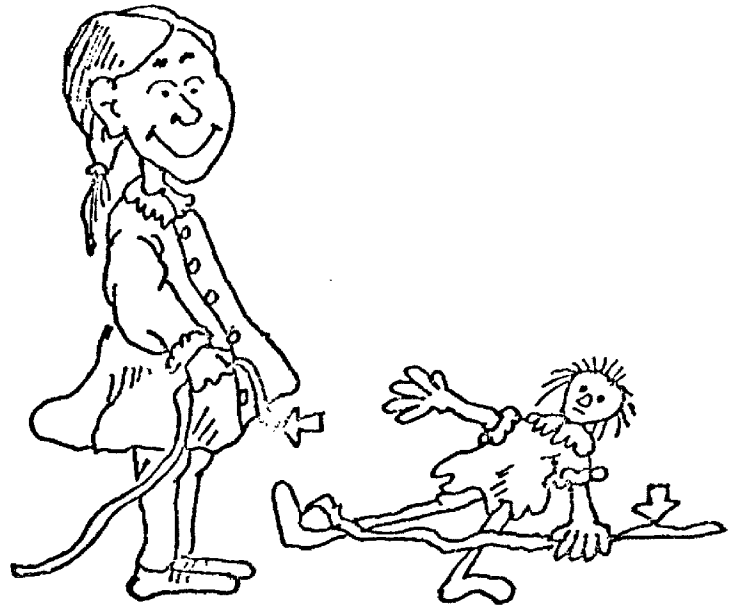
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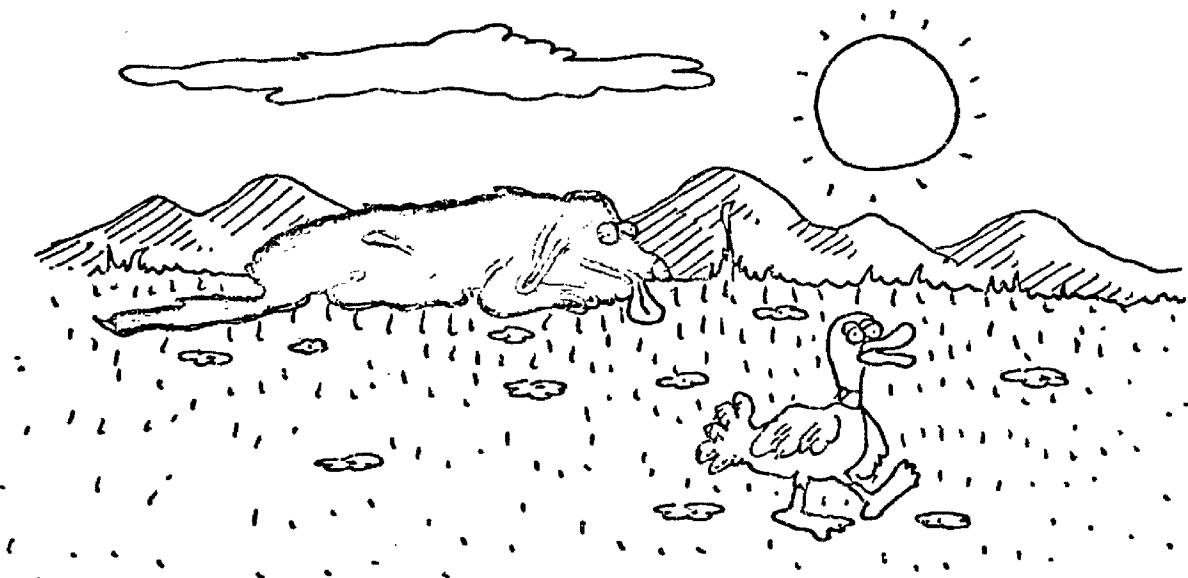
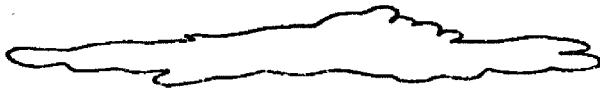
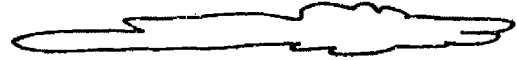
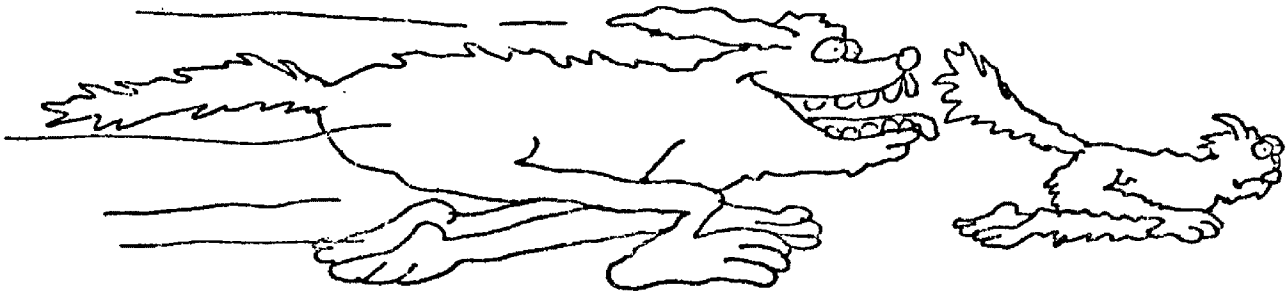
Transformations represented and actual sentences used.

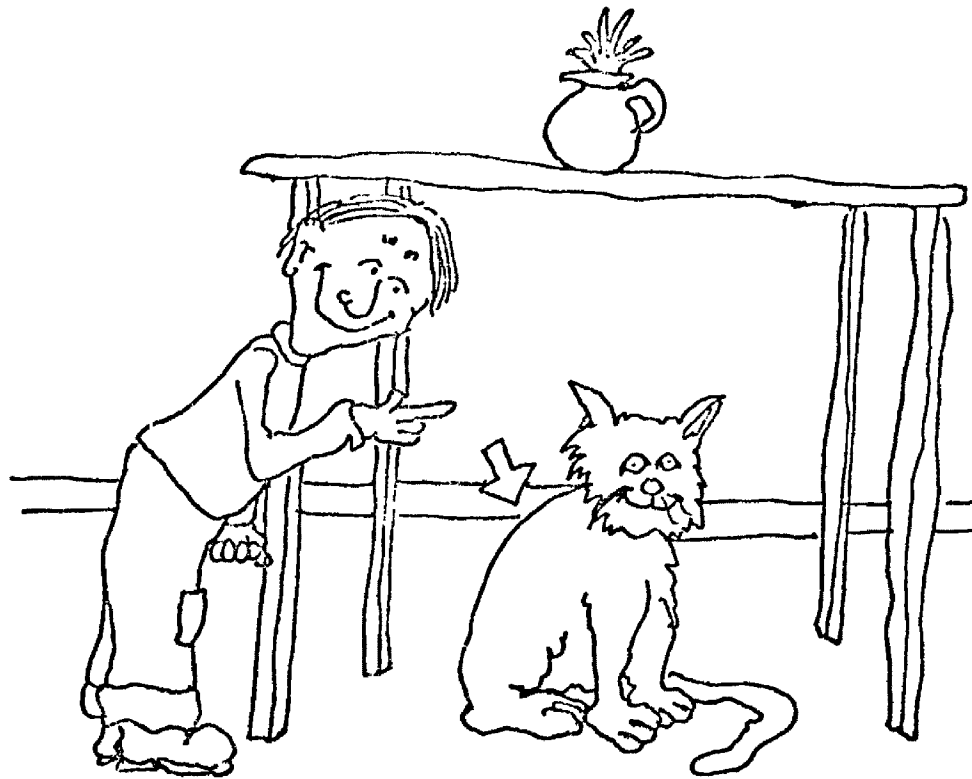
Transformation

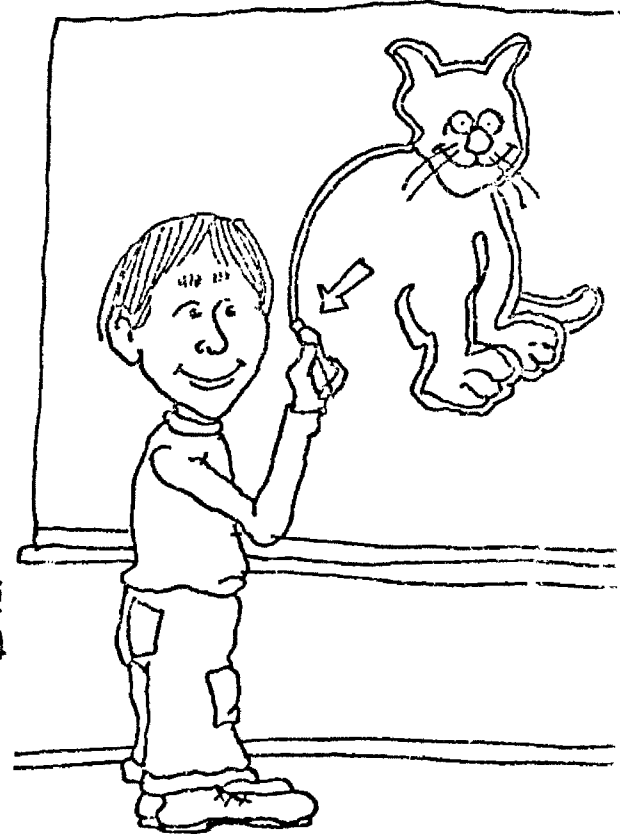
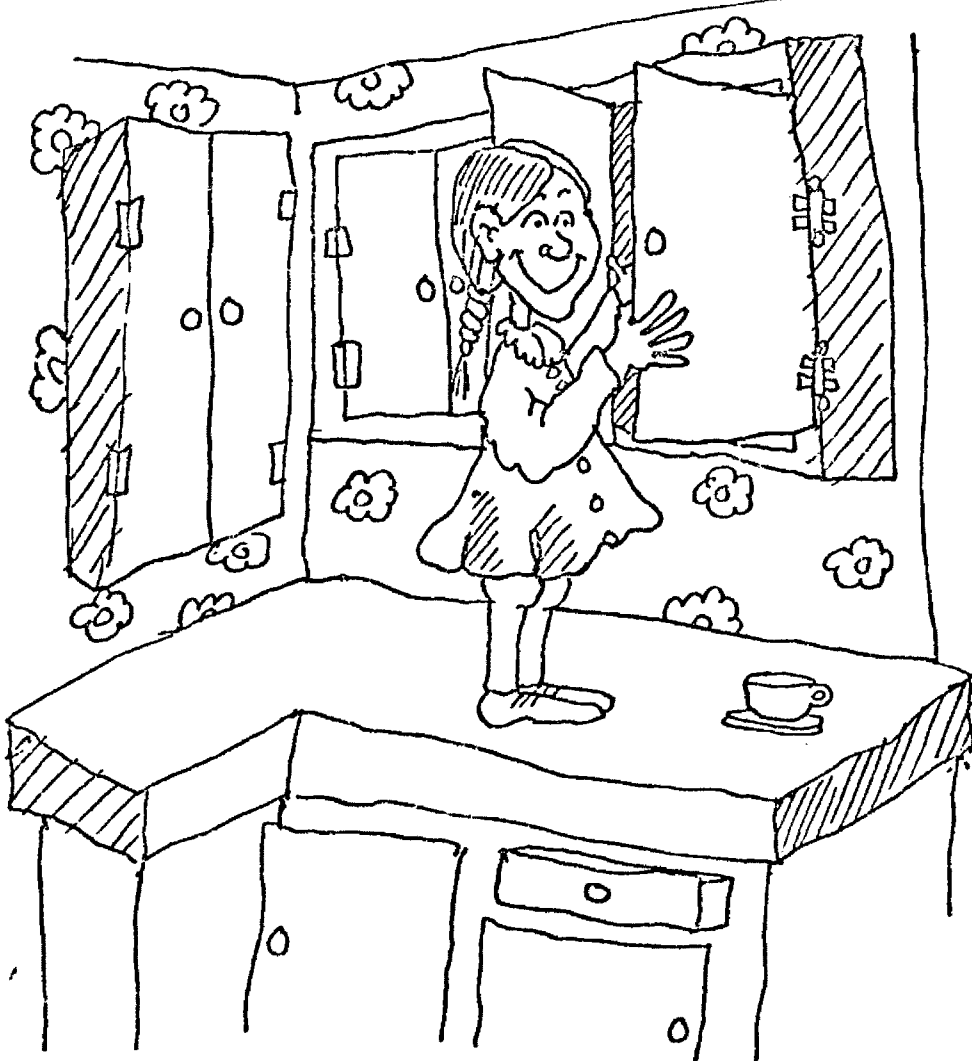
- | | |
|---------------------------|--|
| 1. Negative | He does not have mud on his face. |
| 2. Iterative....AND SO... | Mary has a ribbon and so has dolly. |
| 3. Adjectivalization | The black horse is jumping over the fence. |
| 4. Passive | The cat is being chased by the dog. |
| 5. ...IF... | Shoes are black if the socks are white. |
| 6. Relative clause | The dog that chased the duck is black. |
| 7. Complement-----ING | He found a kitten hiding under the table. |
| 8. Auxiliary verb HAVE | Johnny has spilled the milk on the floor. |
| 9. Nominalization---ING | The pulling of her hair made her cry. |
| 10. Complement: TO | She tells the boy to wipe the floor. |
| 11. Relative question | What is the girl putting in the cupboard? |
| 12. Question | Is Johnny drawing a cat on the board? |

A P P E N D I X C









A P P E N D I X D

Descriptions of the objects used and the activity in the play condition for each stimulus sentence.

1. A male doll is shown covered with mud with the exception of his face.
2. A female puppet and a smaller doll both with ribbons in their hair are shown.
3. A black toy horse jumps over a white fence with the action not completed until after the stimulus sentence is finished.
4. A toy dog chases a toy cat with the action not completed until after the stimulus sentence is finished.
5. A pair of black shoes are put on a doll wearing white socks.
6. A black toy dog chases a duck and then the stimulus sentence is presented.
7. A male puppet searches and finds a toy kitten hiding under a toy table and then the stimulus sentence is presented.
8. The male puppet spills some milk on the floor and then the stimulus sentence is presented.
9. The male puppet pulls the hair on a doll that has tears and a sad face and then the stimulus sentence is presented.
10. The female puppet hands a bucket and sponge to the male puppet and motions to the floor while the stimulus sentence is being presented.
11. The female puppet puts something into the cupboard without the child seeing what it is during the presentation of the stimulus sentence.
12. The male puppet begins to draw a cat on the board while the stimulus sentence is being presented.

A P P E N D I X E

Mean and Standard Deviations for Raw Scores (number of errors) by Sex, Order of Presentation and Context

ORDER OF PRESENTATION	STIMULUS CONTEXT					
	<u>Sentence Alone</u>		<u>Sentence and Picture</u>		<u>Sentence and Play</u>	
	\bar{X}	s	\bar{X}	s	\bar{X}	s
<u>Males</u>						
First	29.8	18.0	36.8	12.1	37.4	13.8
Second	36.8	17.5	32.2	14.0	32.0	12.8
Third	27.0	11.8	40.0	11.0	32.0	15.2
<u>Females</u>						
First	30.4	16.4	11.4	7.3	27.0	16.6
Second	9.8	6.7	20.4	11.9	14.6	7.8
Third	19.6	16.5	20.8	17.3	25.2	14.5

A P P E N D I X F

Summary of error raw scores by age, context and order.

MALES				FEMALES			
S #	Sentence Alone	Sentence & Picture	Sentence & Play	S #	Sentence Alone	Sentence & Picture	Sentence & Play
	First	Second	Third		First	Second	Third
1.	22	19	17	16.	54	33	43
2.	18	27	26	17.	17	8	17
3.	27	35	31	18.	41	34	42
4.	65	58	61	19.	32	22	16
5.	17	22	25	20.	8	6	8
	Third	First	Second		Third	First	Second
6.	22	39	23	21.	21	23	20
7.	40	44	45	22.	9	7	20
8.	42	52	50	23.	10	9	9
9.	13	33	19	24.	0	2	2
10.	18	16	23	25.	9	16	22
	Second	Third	First		Second	Third	First
11.	12	5	16	26.	47	49	51
12.	35	37	39	27.	30	33	37
13.	67	59	59	28.	5	5	8
14.	34	38	33	29.	12	11	30
15.	36	41	40	30.	4	6	9

A P P E N D I X G

Number of errors on each stimulus sentence by sex, context and order

M A L E S										
Transformations	Sentence Alone			Sentence and Picture			Sentence and Play			Total
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	
1. Negative	10	10	4	5	8	13	11	0	10	71
2. Iterative..AND SO..	15	32	21	27	21	25	18	24	26	209
3. Adjectivilization	9	9	4	9	12	10	11	5	12	81
4. Passive	9	13	14	13	12	15	13	18	11	118
5. ..IF..	15	14	17	30	13	17	21	20	14	151
6. Relative clause	16	24	17	23	26	23	22	15	17	183
7. Complement--ING	16	16	8	12	13	13	17	14	10	119
8. Auxiliary Verb HAVE	10	6	7	16	8	5	7	5	6	70
9. Nominalization--ING	15	20	15	9	14	20	17	23	22	155
10. Complement: TO	13	16	9	11	17	19	22	10	15	132
11. Relative question	9	10	12	6	8	7	14	12	12	90
12. Question	12	14	7	13	10	13	14	8	9	100

F E M A L E S

Transformations	Sentence Alone			Sentence and Picture			Sentence and Play			Total
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	
1. Negative	12	5	1	2	2	5	10	2	4	43
2. Iterative..AND SO..	21	16	11	13	22	11	15	12	24	145
3. Adjectivization	12	3	3	5	5	3	5	1	7	44
4. Passive	19	10	1	4	8	9	7	12	10	80
5. ..IF..	14	11	4	6	8	14	16	4	12	89
6. Relative clause	15	9	7	7	14	14	15	12	17	110
7. Complement---ING	13	7	3	2	8	5	9	8	9	64
8. Auxiliary Verb HAVE	3	4	5	2	6	5	8	3	8	144
9. Nominalization--ING	20	9	8	8	15	11	17	10	19	117
10. Complement: TO	8	8	3	4	8	12	9	7	9	68
11. Relative clause	6	11	1	0	4	9	9	2	3	45
12. Question	9	5	2	4	4	6	15	0	8	53