INFORMATION TO USERS

This material was produced from a microfilm copy of the original document. While the most advanced technological means to photograph and reproduce this document have been used, the quality is heavily dependent upon the quality of the original submitted.

The following explanation of techniques is provided to help you understand markings or patterns which may appear on this reproduction.

1. The sign or "target" for pages apparently lacking from the document photographed is "Missing Page(s)". If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting thru an image and duplicating adjacent pages to insure you complete continuity.

2. When an image on the film is obliterated with a large round black mark, it is an indication that the photographer suspected that the copy may have moved during exposure and thus cause a blurred image. You will find a good image of the page in the adjacent frame.

3. When a map, drawing or chart, etc., was part of the material being photographed the photographer followed a definite method in "sectioning" the material. It is customary to begin photoing at the upper left hand corner of a large sheet and to continue photoing from left to right in equal sections with a small overlap. If necessary, sectioning is continued again — beginning below the first row and continuing on until complete.

4. The majority of users indicate that the textual content is of greatest value, however, a somewhat higher quality reproduction could be made from "photographs" if essential to the understanding of the dissertation. Silver prints of "photographs" may be ordered at additional charge by writing the Order Department, giving the catalog number, title, author and specific pages you wish reproduced.

5. PLEASE NOTE: Some pages may have indistinct print. Filmed as received.

University Microfilms International
300 North Zeeb Road
Ann Arbor, Michigan 48106 USA
St. John's Road, Tyler's Green
High Wycombe, Bucks, England HP10 8HR

AN EXPLORATION OF CHILDREN'S ABILITIES TO COMMUNICATE NONAMBIGUOUS MESSAGES

by

Nancy Zinn Schwartz

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

1977

This manuscript has been read and accepted for the Graduate Faculty in Speech in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

9-12-77

Chairman of Examining Committee

9-26-77

Executive Officer

Supervisory Committee

The City University of New York

Abstract

AN EXPLORATION OF CHILDREN'S ABILITIES
TO COMMUNICATE NONAMBIGUOUS MESSAGES

by

Nancy Zinn Schwartz

Adviser: Dr. Norma Rees

This study sought to explore the interaction of factors that affect the referential communication abilities of children five, seven, and nine years of age. It was hypothesized that the children's message coding abilities would vary as a function of manipulations made within the communication situation.

To assess the children's abilities to communicate nonambiguous messages to a listener, two sets of children from three age groups and a group of adults were tested under two experimental conditions. The amount of information to be conveyed, the nature of the information to be conveyed, and the kind of feedback received from a listener were the variables that were systematically manipulated. Both groups of children viewed identical sets of pictures and were required to code a nonambiguous message to a listener. The two experimental

conditions differed in the nature of the feedback given to the child from the listener when the child failed to communicate a nonambiguous message.

The results indicate that children's abilities to communicate nonambiguous messages will vary with alterations made in the communication situation. More specifically, it was demonstrated that manipulations in the level of difficulty of the stimulus caused changes in the subjects' abilities to respond correctly. A hierarchy of difficulty with regard to the informational content of the test stimuli emerged from the data. Subjects produced fewest errors on test stimuli requiring one item of information, and most errors on test stimuli requiring three items of information. In addition, subjects' abilities to respond varied with the kind of information required, that is, subjects' errors ranged from fewest to most on criterial elements in the following order: actor/subject, recipient of the action/object, location/preposition, attribute/modifier on the object, attribute/modifier on the subject.

A very strong effect of age emerged from the data: five-year-olds made more errors than seven-year-olds; seven-year-olds made more errors than nine-year-olds, and nine-year-olds made more errors than adults. Of interest is the observation that five-year-olds demonstrated an overall inability to perform on the task through

a significantly higher number of errors on simple test stimuli as compared to all other age groups. Seven-year-olds, on the other hand, demonstrated an ability to understand the basic requirements of the task in that they did as well as nine-year-olds on simple test stimuli.

The data indicated a high positive correlation between cognitive level and task performance. However, when the effect of cognitive level on performance was separated from the effects of age, it was seen that cognitive level alone could not predict overall experimental task performance. Further, these results show that cognitive level is not the underlying determining force for referential communication task performance as children's abilities to perform will vary with changes in the nature of the stimuli.

The results of this study demonstrate that the ability to utilize feedback increases with age. Additionally, explicit feedback was shown to be more helpful than implicit feedback for children who are developing referential communication skills.

Overall, variations in subjects' responses demonstrated that the referential communication ability is not dependent upon a single factor but rather requires the interaction of multiple components. Contributing factors reflect influences from perceptual, pragmatic, conceptual, and linguistic knowledge.

ACKNOWLEDGEMENTS

I wish to acknowledge and thank all those whose help allowed me to complete this undertaking:

The Burbank and Culver City YMCA's, for their cooperation and consideration, the children, for their patience and good humor;

My committee whose cooperation, encouragement, and knowledge helped to open new areas of interest and to bridge the miles between us;

My family whose faith in me has been unfaltering, my friends whose humor and warmth have kept me in touch with the "real world";

My dog who has had to endure long hours alone with an unfriendly me;

Above all others, I owe my greatest thanks to my husband who has spent innumerable hours with me bringing ideas from out of the darkness and whose belief in me has been steadfast and lifegiving.

N.Z.S.

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

LIST OF TABLES

LIST OF TABLES (Cont.)

LIST OF FIGURES

Chapter I

Introduction

The recent period of study in child language has been characterized by a new interest in language as an instrument of communication. In the last few years there have been important contributions to an understanding of the child as a developing conversationalist, of adult-child discourse, and of functional approaches to questions of what children can do with language ranging from infancy to adolescence.

One aspect of the use of language in communication that has received considerable attention is referential communication ability: the ability of a speaker to code a message that will enable a listener to discriminate a referent from among a set of nonreferents (Glucksberg and Krauss, 1967). A number of investigators have examined children's abilities to code nonambiguous message structures as determined by a single factor, such as the child's cognitive level, the child's age, task difficulty, or the type and amount of listener feedback. This study aims to identify further factors that contribute to children's referential communication abilities.

Motivation for the Study

A complete theory of how an individual uses language to communicate requires the union of a number of different theories—a theory of linguistic competence, a theory of linguistic performance, and a theory of pragmatics. The goal of research must be to recognize the existence of interaction among these individual domains.

In support of an interactive approach to language study, Givón (1974) posits that syntactic structure itself is patterned around the manipulations of the underlying information content. For example, old, shared information (presupposed information) may be carried in a deeply embedded clause whereas new information must be placed in the most accessible part of the syntactic structure, the main clause. Similarly, Lakoff (1969) has noted syntactic distributions that rely on underlying informational content rather than formal syntactic manipulations. She has observed that the quantifier "some" is used only when the underlying presupposition is positive, while "any" is used only when the underlying presupposition is negative or neutral. As an illustration, one would say, "I warn you that if you eat <u>any</u> candy I'll whip you" when no action is desired but he would utter, "I promise you that if you eat <u>some</u> candy, I'll give you ten dollars" when positive action is desired.

The inclusion of pragmatic considerations, such as

context, listener, and intent, within a theoretical approach to language study, forces one to recognize influence on message formation from multiple factors. In this vein, Moscovici (1967) considers the relationship of the speaker and the listener. He notes that the underlying intent of the speaker can alter the syntactic structure of the message. For example, a message intended to bring about an action differs from a message that is meant to change an attitude. A speaker will change the syntactic structure to reflect the points he desires to emphasize. Similarly, familiarity with the listener affects the form of the message. If the listener is a stranger, the speaker will tend to use a formal style of communication, one that is rich in nominative clauses, nouns and quantifiers. In contrast, if the listener is familiar, the speaker will tend to use an informal style, one that has short reference phrases, pronominalized structures, and few quantifiers (Moscovici, 1967). If a listener readily interacts with the speaker through feedback, then the speaker will gradually shorten his message length as he will be able to zero in quickly and accurately on the listener's informational needs (Krauss and Weinheimer, 1967).

Additionally, Olson (1970) demonstrates that a context can shape not only what is said but how it is said. A chosen label will be determined by the alternatives within the context. For example, a ball will be

called a "ball" if it is selected from among ball, hat, bat, and doll. However, the ball may be referred to as "the white one" if it is in contrast with a black ball, a green ball, and a yellow ball. These observations by Moscovici, Krauss and Weinheimer, and Olson emphasize that alterations of any one factor of communication causes adjustments throughout the system and leads to change in the resulting message formation.

Recently, pragmatic considerations have been included in child language research as well. One aspect of the application of pragmatic theory to child language study deals with factors that may determine what is said by the child. In this vein, a major focus of this study is the development of the child's ability to consider pragmatic factors when coding a message.

In 1974, Shatz focused on this pragmatic aspect when she concluded that the syntactic structure of messages produced by four-year-old children will vary with changes in situational constraints. She observed that four-year-olds' use of "that" complement, such as, "I know that it is an elephant," varied both with changes in listener and situation. When the situation was unstructured play and the listener was an adult, the child used a low percentage of "that" complements, but when the listener was a child, the frequency of "that" complements was increased. In contrast, in a structured

situation, the frequency of occurrence of "that" complements was reversed: more "that" complements were used when the child addressed an adult, while fewer were used when he addressed another child. Shatz concludes: "If extralinguistic factors do play so central a role in the speech modification process, then we must question the position that speech simplification derives from some syntax-specific ability" (page 12).

Limber (1973, 1976), on the other hand, recognizes the importance of considering informational content when analyzing children's language patterns. He observed that language samples of young children failed to include instances of the subject noun phrase relative clause structure, though they did include examples of relativized object noun phrases. In explaining his results, Limber theorized that the children's behavior merely reflected a typical pattern of information within the message rather than linguistic immaturity. This theory emphasizes further the need to include communication considerations when analyzing syntactic language behavior.

Slobin (1975) highlights the interaction of multiple factors when applying a communication framework to the study of language acquisition. He hypothesizes four basic ground rules for language structures. Language structures must

1. Be clear. The surface structure may not be

too different in format and organization from the underlying semantic structures.

2. Be processable. Language structure must conform to strategies of speech perception and production.

3. Be quick and easy. The speaker contracts and blurs forms in an effort to convey the maximum amount of information in the least amount of time.

4. Be expressive. The speaker may communicate an elaborate message which adjusts its focus according to the informational needs of the listener.

According to Slobin, message formulation is influenced simultaneously, even competitively, by all of these rules. Consequently, within a communication, a message structure is constrained according to meaning, listener need, informational thrust, the speaker's view of the listener, and the context.

Slobin suggests that children learning language are influenced initially by the first two rules. Later, the last two rules supply the impetus for further language development. It is through elaborated syntax that the child is able to convey his informational content so as to take account of both the needs of his listener and his own intent.

The application of a communication framework to child language study has encouraged the evaluation of the entire speech act rather than the linguistic structure

alone. The child's language facility is assessed through his ability to adjust his language content to the reality of the context and the listener. To this end, "studies consider exchanges of utterances rather than single utterances taken in isolation. It is in the analysis of such exchanges that the structural effects of the child's expectations about the awareness and behavior of others becomes visible" (Shields, 1975, page 3).

For example, Mueller (1972) and Garvey and Hogan (1973) observe that most language of even three-year-olds is highly social: clear, well-formed, and well-adjusted to the listener's perspective. Based on these observations, they conclude that the processes found to be important in the maintenance of verbal exchange are developed at these young ages and that young children have good communication skills.

The adoption of the speech act as the unit of analysis in child language study has shifted the focus from linguistic structure to social factors. Though this new focus has brought out many new and interesting findings, at times it has produced a narrower rather than a broader view of language use. For example, in a study of the interaction of twins 2.9 years of age in which sound repetition exchanges and exchanges of comments were observed (Keenan and Klein, 1975), the authors concluded

that the children had good communication skills as speaker and listener were interacting appropriately. While these authors did consider pragmatic factors such as social ability, cognitive awareness and immediate context, they did not consider linguistic ability or informational capacity when assessing communication skills. Hence, in this instance, the communication framework did not serve to encompass all aspects of language.

The consideration of all aspects of language behavior within a definition of "good communication" serves to alter the interpretation of the above findings. The language behavior reported by Keenan and Klein (1975), Mueller (1972) and Garvey and Hogan (1973) would no longer be considered evidence of good communication skills. It could be demonstrated that though the children had good pragmatic abilities they were not conveying specific information, utilizing mature syntactic structures, or accurately assessing the needs of the listener.

Another application of a communication model to child language study is found in research concerning referential communication. Referential communication is defined as "situations in which the participant's task is to construct a message that enables someone else to know what that message refers to, i.e., being able to select a target stimulus (the referent) from among a set

of implicit or explicit alternatives (nonreferents)" (Glucksberg, Krauss, and Higgins, 1975, page 305). According to this definition, factors contributing to the referential communication ability include cognitive, social, contextual, informational, and linguistic skills; thus, unlike the social interaction studies, analyses of responses to referential communication tasks would consider a broad range of language factors.

Study of referential communication offers an opportunity for a researcher to manipulate multiple language factors and thereby gain insight into the interaction of levels of language performance. Past studies have experimentally explored such factors as cognitive level, age level, awareness of listener feedback and awareness of listener informational need. Studies with adults have demonstrated that adjustments in any one factor will cause changes in the response (Moscovici, 1967; Krauss and Weinheimer, 1967; Olson, 1970; Osgood, 1971).

Studies with children have not produced well defined results. Research designs have confounded factors and thereby prevented definitive conclusions. For the most part, a concentration on cognitive factors has influenced interpretations of results. For example, language has often been viewed as a direct reflection of the child's cognitive ability rather than as a separate performance level and, hence, language ability and cognitive

ability have not been assessed separately.

The observations that adults and older children, all of whom have achieved mature cognitive functioning, do not perform equally as well on referential communication tasks and that any one individual's performance may vary with changes in environmental factors, have forced researchers to realize that factors other than cognitive level may contribute to task performance. The specific factors have yet to be assessed independently of each other. When the independent factors are isolated, explanations for response patterns will go beyond a discussion of cognitive level.

Recently consideration has been given to the overall nature of referential communication tasks. Researchers have begun to realize that different types of referential communication tasks will tap different cognitive levels (deVilliers and deVilliers, 1974). It is recognized that while one task may require complex switches in perspective another task may require knowledge of only one's own perspective. Thus, the former task taps an operational cognitive level, while the latter taps a preoperational cognitive level. These differences in cognitive prerequisites account for some of the differences in reported age findings among studies (Webb and Abrahamson, 1976; deVilliers and deVilliers, 1974; Flavell et al., 1968; Maratsos, 1973).

Studies with children on referential communication tasks have given little consideration to the control of difficulty level within test stimuli on any given referential communication task. Generally, performance abilities are approached as if the child can either execute the task with complete accuracy or not at all. It has not been recognized that aspects within the composition of the individual stimuli may influence performance.

Purpose

To understand referential communication ability, its component factors must be individually assessed. Each factor must be manipulated independently so that effects on message coding can be noted. In addition, the complexity of test stimuli must be controlled so that gradations in item difficulty can be recognized.

Based on the results obtained in prior research in the area of referential communication, the following questions have been raised:

1. Will the child's ability to formulate a non-ambiguous message change as a function of the difficulty of the task?

2. Will the difficulty of the task be determined by the amount of information to be coded?

3. Will the difficulty of the task be determined by the kind of information to be coded, i.e., the nature of the underlying semantic/syntactic components?

4. Will the kind of feedback received from the listener affect the child's overall performance on the experimental task?

5. Will the child use different syntactic styles in message coding as a function of task difficulty?

6. Will performance vary as a function of age and/or cognitive level?

To answer these questions, an experimental procedure was designed that independently assessed age and cognitive level, and individually manipulated difficulty of test items and type of feedback.

Chapter II

Theoretical Background and Related Literature

A review of the requirements for referential communication ability is presented to identify the theoretical framework for this study. Following the discussion of requirements for successful referential communication, studies pertaining to children's referential communication abilities are reviewed.

Requirements for Successful Referential Communication

Referential communication may be defined as communication in which the speaker codes a message to distinguish a referent from a set of non-referents for a listener (Glucksberg, Krauss & Higgins, 1975). Successful coding for the referential communication function of language therefore entails awareness of one's immediate environment, understanding the listener's point of view, and use of one's linguistic processes.

McCaffrey (1975) states that three distinct processes underlie referential verbal communication: perceptual (the speaker must make an informational analysis

of the stimulus array to identify the distinctive properties of the target); linguistic (the speaker must control a lexicon and grammar of a language to construct an adequate verbal message); and cognitive (the speaker must assess the informational needs of the listener through decision processes and comparative judgement). Other researchers have usually stressed and/or elaborated only one of these three processes. Flavell (1977) and Muma (1975), for example, emphasize and further specify the cognitive processes involved in role-taking ability as a key to referential communication ability. Flavell et al. (1968) state " . . . older children gave more informative communication both because they were more attuned to the listener's need and because, so attuned, they had better cognitive/verbal equipment with which to fulfill them." (p. 132)

Muma (1975) emphasizes that after eight years of age children can apply their newly-acquired cognitive role-taking skill in communication tasks and thereby become fully adaptive to the needs of the listener. The addition of this specific cognitive ability also highlights the importance of attending to feedback from the listener.

Glucksberg, Krauss, and Higgins (1975) note that the perceptual process must not only allow an individual to distinguish between the referent and the non-referent,

but must also determine which attributes of the referent are criterial. They point out that criterial elements are chosen both on a perceptual basis (are salient) and a cognitive basis (meet the needs of the listener). In addition, they emphasize a link between the perceptual and linguistic processes. It is not enough just to isolate the necessary elements, but these elements must also be coded in a form that allows the listener to distinguish among the referents. An evaluation component should therefore be added to the model. It is hypothesized, the speaker evaluates the message prior to its production, considering both the message content and the linguistic structures in terms of listener needs.

Rosenberg and Cohen (1966) also highlight the need for an evaluative component in a referential communication model. In an experiment, a referent stimulus, an underlined word in a word pair, was assigned to a speaker. The speaker had to provide a one-word response that would enable a listener to determine which member of the word pair was the referent. For example, if the speaker was given the word pair WOMAN-LADY with LADY as the assigned referent, an effective one-word response for the listener would include tramp, title, pink, whereas an ineffective response would include female, girl. The authors hypothesize that the speaker's referential processing begins with sampling from within his response repertoire. The

selected response is then compared with both the referent and the non-referent to assure that there are stronger associations between the target referent and the selected message than between the non-referent and the selected message. If stronger associations exist between the target referent and the message, that response is emitted; if not, sampling begins again. This approach implies that children not only must learn to code messages, but must also learn to inhibit messages below a certain level of adequacy (Glucksberg, and Krauss and Higgins, 1975).

In summary, the following are the contributing factors involved in referential communication:

1. Perceptual
    a. Exploration of the referent/nonreferent display
    b. Isolation of salient criterial elements
2. Cognitive
    a. Flexibility in thought processes to allow for
        (1) the determination of the specific informational needs of the listener
        (2) the evaluation of how well the chosen response meets the needs of the listener
        (3) the adjustment of information to feedback from the listener
3. Linguistic
    a. Coding the chosen message so as to allow the listener to distinguish the target referent with maximal ease
    b. Evaluating the lexicon and grammatical

structures chosen in the message structure to assure consonance with the linguistic capacities of the listener

c. Adjusting linguistic structures to feedback given by the listener.

In the following sections of this chapter it will be noted that some of these components have been studied while others have not. Some researchers have attempted to isolate certain components but results indicate confounding influences from other components. As with any hypothetical enumeration, many of the components overlap.

Review of the Literature

Referential communication ability as a function of age and task

The following studies show that the child's ability to respond on a referential communication task positively correlates with an increase in age.

Glucksberg, Krauss, and Weisberg (1966) designed an experimental paradigm that is often used in explorations of referential communication abilities. The task has the following steps: two children are seated on either side of a desk divided by an opaque screen; each child is given an identical set of blocks with various types of configurations drawn on them; one child is designated as the speaker and the other as the listener; the listener

selects one block and then must code a message that will enable the listener to identify the same block. This procedure was utilized originally with a group of nursery school children. The authors observed that 33-49 month old children could not perform the task even when familiar shapes rather than nonsense configurations were drawn on the blocks. On the other hand, 52-63 month-old children could perform the task with familiar configurations but not with novel ones. Glucksberg and Krauss (1967) ran the same procedure with third graders, fifth graders, and college-level subjects. The results indicate that the task discriminates through the age range yielding smooth changes in accuracy scores as a function of the age of the speaker. Therefore, Glucksberg and Krauss conclude that one or more forms of social editing develops with age. A later study by the same authors (Krauss and Glucksberg, 1969) shows that even at age ten children do not approach the adult level of skill performance.

Cohen and Klein (1968) utilized a similar paradigm employing written cues instead of visual configuration stimuli. The speaker was given a word pair, such as ball and bat, and had to offer the listener a clue that would enable him to select the underlined member of the pair. The subjects were nine, eleven, and thirteen years of age, and, again, an age trend was noted. An increase in accurate performance with age was observed although no

statistically significant difference was found between the eleven and thirteen-year-olds.

The results of the above-mentioned studies were readily accepted by researchers as a clear demonstration of the nature of the development of referential communication skills. Their conclusions were based upon Piaget's (1926) theoretical position that marked differences exist between the language of four/five-year-olds (self-centered, egocentric speech) and the language of seven/eight-year-olds (emergence of other-oriented, socialized speech). Therefore, these authors not only interpreted their findings to mean that referential communication abilities increase with age but also accepted the age ranges. They concluded that the results support the theory that, because socialized speech does not emerge until seven/eight years of age, referential communication skills should not develop until after that point in time.

More recent studies, however, indicate that referential communication skills may be demonstrated at far younger ages than previously believed. For example, Menig-Peterson (1975) shows that children as young as four years can modify their communication behavior as a function of different role attributes of the listeners. Children aged three to five years were asked to tell a listener, who was either knowledgeable or unknowledgeable, about a specific event. The results indicate that while

three-year-old children could not adapt their message formation to the needs of the listener, four-year-old children could. In 1974, deVilliers and deVilliers tested subjects aged 2.4 to 4.5 years on a perspective-taking task. They observed that from age three, children were adept at translating from the speaker's perspective to their own when it was necessary for comprehension of deictic terms this/that and my/your.

Both the deVilliers and deVilliers (1974) and Menig-Peterson (1975) findings are surprising in light of a Piagetian theoretical position. DeVilliers and deVilliers state that the key to why young children are able to handle the necessary switch in perspective may be the nature of the task. The terms this/that and my/your are frequently heard by young children when accompanied by clarifying gestures. DeVilliers and deVilliers make the significant point that the nature of the task and stimuli used in the experimental design will affect the age results obtained.

Age scores reported by Webb and Abrahamson (1976) further emphasize that different tasks require different performance levels. These researchers examined the use of this/that and found results indicating comprehension and production emerging at age seven—four years later than the age level reported by deVilliers and deVilliers. Webb and Abrahamson (1976) assert that this discrepancy

reflects task differences. The deVilliers and deVilliers (1974) paradigm consists of a naturalistic, game-like environment, while the Webb and Abrahamson (1976) paradigm consists of a highly structured test situation. Hence, the deVilliers and deVilliers task requires preoperational thought processes and primitive forms of other-oriented behavior, while the Webb and Abrahamson task requires systematic decentering characteristic of concrete operations. Referential communication therefore varies with task factors, it being plausible that one task requires more complex responding than another. Krauss and Glucksberg state:

> As we simplify the communication task, and thereby reduce the sheer cognitive load the child must deal with, the performance of even very young children begins to approach the adult level of competence. This suggests that the poor performance of children in particular communication situations may stem from something other than a generalized inability to take into account the perspective of another person. (1977, p. 10)

Researchers must therefore understand the components of the tasks they design. Task difficulty will vary with alterations in stimuli, setting, instructions, required response, etc. The specific factors that affect performance must be identified so that generalization about performance capacities are possible.

It can be observed that certain tasks appear more natural than others. For example, a study by Maratsos (1973) required children to identify a toy for a listener

who was either looking or not. On the other hand, an experiment by Flavell, Botkin, Fry, Wright and Jarvis (1968) required children first to learn the rules of a game through instructions given nonverbally and then to give the instructions verbally to a blindfolded or sighted listener. In this study, children ages seven years and thirteen years were tested and results indicate that performance changed with age, with thirteen-year-olds performing successfully. Maratsos tested three, four, and five-year-olds and did not find an age increment in task performance, that is, all children were able to modify their message structures according to listener need.

The Flavell, et al. (1968) task is highly unnatural as compared to the Maratsos task; this difference may have contributed to the observed age discrepancy. Throughout the literature on referential communication, it can be noted that many of the tasks presented in studies require very unnatural procedures. In fact, many of the tasks appeared to involve "meta-communication" abilities, requiring the child to consider how he is to communicate rather than what he is to communicate. Meta-communication abilities, as with all "meta-abilities," generally emerge later than the actual behavior because they require a judging of the behavior rather than just the behavior. The meta-communication aspect of experimental tasks must be taken into account in interpretation of

research findings.

Other sources of variation in task difficulty may lie within the nature of the complexity of the stimuli used. For example, Salatas and Flavell (1976) note that the complexity of the picture set utilized in their task affected the relative frequency of egocentric errors, i.e., more egocentric errors were made with complex picture sets. They note that this finding is consistent with past studies which have shown an increase in egocentric responding with an increase in task complexity (Hoy, 1974, Huttenlocher and Presson, 1973). Flavell (1977) also concludes that egocentric responding is a function of task conditions, all speakers risking lapses into egocentricity with increases in cognitive load.

The complexity of test stimuli in referential communication tasks may result from such sources as the nature of all the possible alternatives in the context or the nature of other stimuli within a given set. For instance, Olson (1972) notes that the amount of information children provide in their responses reflects the number of alternatives within the entire task rather than specific listener need on any one stimulus. There appears to be an upper limit on the amount of information children will provide, however. Both Ford (1971) and Randhawa (1973) observed that children at different age levels consistently offered the listener a set amount of

information that reflected the maximum amount of information they could process rather than listener need. In addition, Krauss and Weinheimer (1967) observed that a speaker can label a referent with greater ease when it appears in a set of dissimilar items than when it appears in a set of similar items. Therefore, coding complexity will vary both with the task stimuli in general and the nature of the contrasting items within a given set.

One additional source of variation in task complexity lies in the nature of the message coding required of the child. McCaffrey (1975) and Sinclair (1975) report observing two different kinds of pragmatic language capacities: language for analyzing and differentiating static events, and language for the description of the passage of events over time and space. The former language is used in description tasks, such as Glucksberg and Krauss' (1967), wherein the predominant function of the message is to identify distinctive features that categorize and differentiate salient characteristics of the target. The latter is used in noting a succession of events occurring in a temporal sequence.

Sinclair (1975) and McCaffrey (1975) state that these two kinds of language uses develop at different rates. While McCaffrey maintains that the difference in the syntactic requirements contributes to different task responding, Sinclair does not. Sinclair asserts that

elicited language for the description of the passage of events over time and space closely parallels the child's normal spontaneous language in form and content. On the other hand, the linguistic form used in the description of objects is primarily an extended noun phrase, i.e., multiple adjectives plus a noun, a linguistic form that is usually not found in the spontaneous speech of children. Further, she maintains that the abbreviated idiosyncratic messages encountered in this object-descriptive task are more reflective of the child's limited control of logic at this age than his control of syntax. Therefore, though Sinclair notes the discrepancy in coding requirements, she has attributed the major difference between the two types of language use to underlying cognitive requirements. For the most part, other researchers have failed to recognize the influence that the coding requirement itself can have on task performance.

In general, it can be seen that the individual components of referential communication tasks must be identified. In this way, task difficulty can be controlled and then developmental trends might emerge clearly. As deVilliers and deVilliers (1974) state, it appears that the developmental sequence is similar across different referential communication tasks although the particular tasks are mastered at different ages. The research has shown performance improvement with age increments on

referential communication tasks but specific age-related abilities have yet to be systematically related to task requirements.

Effect of listener interaction on message formation

Feedback

Investigations with adult subjects have shown that listener feedback affects speaker message production, with differential effects produced by the kind of feedback. Leavitt and Mueller (1951) show an inverse relationship between the number of restrictions placed on listener feedback and the amount of information communicated by the speaker. For example, if a listener offers extensive feedback, the speaker will gradually shorten his message as he will know the listener's needs. From the other extreme, if the listener offers no feedback, the speaker will code a long message as the listener's needs will be unknown. In research conducted by Krauss and Weinheimer (1966), speakers were offered two kinds of feedback from a listener: concurrent and confirmation. In the concurrent condition, utterances indicating agreement and acceptance were given by the listener as the message was being formulated. In the confirmation condition, the speaker derived confirmation from listener behavior subsequent to the speaker's message. In the presence of both types of feedback, subjects utilized shorter reference phrases as compared with message production in the absence of feedback.

Longhurst and Siegel (1973) note that speakers altered their message structures when they observed increased listener failure, i.e., an increase in negative feedback. For example, when distortion was introduced into the auditory channel, causing interference in message reception by the listener and thereby inducing failure on task performance, speakers chose to lengthen their descriptions, reduce type token ratio, and reduce speech rate.

Valian (1975) explored adults' abilities to respond to two kinds of feedback from a listener: a "what?" query and an explicit request for clarification. She observed that under both feedback conditions speakers changed an originally distorted syntactic structure and repeated an originally clear syntactic structure. However, a "what?" query elicited an increase in loudness and a clarification of articulation while the explicit request did not.

These studies support the conclusion that listener's feedback can alter message formation by adult subjects. The following reported information will show that the studies conducted with children are not as conclusive.

Glucksberg and Krauss (1967) assert that in "egocentric encoding the speaker's 'name' for a referent is relatively unaffected by his listener's post-message utterances" (page 312). This position conforms with Piaget's (1926) concept of nominalism: "the tendency to treat a 'name' as an integral attribute of an object, an attribute

which is invariant and not subject to arbitrary change" (page 98). To assess the above hypothesis, Glucksberg and Krauss (1967) explored the effects of three feedback conditions on message formation of kindergarten, first grade, third grade, fifth grade, and college-level subjects. They used their original experimental paradigm (see page 17). In this case, however, the listener was one of the experimenters and had a set sequence of responses to offer the speaker. For all subjects on blocks numbers 1, 3, and 6, the experimenter responded with "O.K." indicating understanding; while for one set of twelve subjects, on blocks numbers 2, 4, 5, the experimenter said, "I don't understand which one you mean." For another set of twelve subjects, on blocks numbers 2, 4, 5, the experimenter said, "Tell me all about it," and for the last set of twelve subjects, on blocks numbers 2, 4, 5, the experimenter said, "I don't understand which one you mean, tell me all about it." The authors found that all three feedback conditions elicited the same answers. They were able to conclude only that younger children failed to modify their messages in socially appropriate ways and that social editing develops with age.

It should be noted that the lack of differential results might have occurred as the result of the experimental paradigm used. It did not allow for the use of appropriate feedback, i.e., positive and negative feedback

were predetermined and not contingent upon the accuracy of the speaker's actual message production. Further, the three types of negative feedback conditions utilized gave essentially the same information to the speaker thereby inhibiting differential responding.

The last point mentioned above was confronted in a study by Peterson, Danner, and Flavell (1972) when they explored how children ages four and seven respond to three types of negative feedback. In this experiment, the listener indicated communication failure in one of the following patterns: implicit nonverbal feedback (facial expressions that indicated lack of understanding); implicit verbal feedback (the statement, I don't understand, I don't think I can guess"), explicit verbal feedback (the statements: "Look at it again? What else does it look like? Can you tell me anything else about it?") The results of this study indicate differential responding to the three types of feedback. In both age groups, the fewest message reformulations were made in response to implicit nonverbal feedback while all subjects produced message reformulations in response to explicit verbal feedback. These results, therefore, support the conclusion that children, like adults, can respond to feedback offered by the listener. These positive findings suggest that the lack of differential findings in the Glucksberg and Krauss (1967) study may have resulted from the lack of

real difference among the types of feedback.

Fishbein and Osborne (1971) specify further the use of feedback by children. On a referential communication task that was almost identical to the classical paradigm outlined by Glucksberg and Krauss (see page 17), they compared three feedback conditions: delayed corrective feedback (after six items, the experimenter removed the screen and showed the subjects how they matched or mismatched the blocks); serial noncorrective feedback (the experimenter told the subjects whether or not they correctly matched the blocks after each block); terminal noncorrective feedback (after six blocks, the experimenter told the subjects how many correct matches they had made). It was observed that fifth graders benefited the most from any kind of feedback and that all children benefited more from delayed and serial feedback than terminal feedback. Fishbein and Osborne conclude that the feedback condition is a primary contributer to effective communication.

In conclusion, it appears that while children do utilize feedback offered by a listener, not enough is known about the effects of feedback and their relation to such factors as age and task difficulty. In addition, it seems that certain kinds of feedback facilitate children's reformulation of message structures.

Listener need

In 1963, Ratner and Rice demonstrated that message formulation in adults fluctuates as a function of listener's knowledge of the referent. Specifically, as the amount of shared information between the speaker and the listener increase, the less complete become the speaker's statements with fewer words and repetitions. Other studies (Longhurst and Siegel, 1973; Krauss and Weinheimer 1966) confirm these results and acknowledge that the ability of the speaker to assess the needs of the listener is a necessary component of referential communication.

Studies in the development of referential skills have focused particularly on the development of the child's ability to assess listener need. Flavell, et al. (1968) found a regular grade increase in the amount of information sent in response to listener need (see page 21). Other studies, however, produced conflicting results to those of Flavell, et al.

As described earlier (see page 21), Maratsos (1973) found that children as young as three years of age were able to adjust their messages to the needs of the listener while Flavell, et al. (1968) found that children were unable to do so until thirteen years of age. This discrepancy in age findings may result from task differences. The Maratsos task required the coding of short reference

statements while the Falvell, et al. task required the coding of lengthy explanations. These results would suggest that the ability to assess listener's needs is not an all-or-none skill and is itself contingent upon the interaction of other factors within the communication situation.

Menig-Peterson (1975) notes that four-year-old children are able to adapt their message structures to the needs of a listener. She observed that they specifically coded more references for a naive listener than they did for a knowledgeable listener (see page 19). These findings supply further evidence that the developmental trends alluded to by Flavell, et al. (1968) could not have been caused solely by gradually increasing awareness of listener need.

A group of studies examined children's abilities to assess listener need by using stimuli that gradually increased in amount of information as opposed to changes in listener perspective. Ford (1971) conducted a study in which subjects aged four and seven years were required to code messages for a listener. Messages were descriptions of stimuli differing on one to five features, therefore requiring one to five adjectives. The results indicate that for both four and seven-year-olds, the number of attributes coded remained constant regardless of listener need for one, two, three, four, or five adjectives. It was

observed that both groups of children produced messages wherein some specific items of information were consistently overlooked while others were consistently given regardless of communication value. This behavior was noted in the response patterns: four-year-olds' messages usually contained two adjectives while seven-year-olds' usually included three adjectives.

Randhawa (1973) also explored children's (aged 5, 8, 12) message-coding ability as related to informational needs of a listener. In this task, the amount of information required by the listener ranged from one item to eight items. Randhawa observed that each age group offered a set amount of information, i.e., five-year-olds offered two items, eight-year-olds offered five items, and twelve-year-olds offered seven items.

It appears from these two studies that even twelve-year-olds were not constructing messages entirely according to the needs of the listener. Instead, as Olson (1972) comments, "The sentences children come to use reflect the alternatives in the context as a whole up to the maximum processing level for any given child. Thus the description of an object is determined not by the given stimulus but by the range of alternatives to the object in the total task context" (page 147). It should be noted that the results obtained on the Ford and Randhawa studies may have been a reflection of the nature of

the task. The required response in both studies was an expanded noun phrase. At times the expanded noun phrase required a listing of as many as eight adjectives, a very unnatural linguistic structure.

In an interpretation of earlier studies, Glucksberg, Krauss and Higgins (1975) state that the ability to assess listener need develops with age. They note that ninth graders were the only group of children to alter their message structure as a result of listener need. Unlike kindergarteners, second, third, and fifth graders, ninth graders initially produced messages that were relatively long but which decreased systematically over trials. Therefore, these researchers conclude that "if length of an initial message can be taken as an indication of that message's adequacy, then only ninth graders could be said to be tailoring their messages to listener needs" (page 330).

One problem with the Glucksberg, et al. (1975) interpretation is a failure to separate the dimensions of awareness of success and awareness of listener need as equal contributers to message formation. The ninth graders' decrease in message length may have been a reflection of successful task performance, i.e., the children shortened their message structure as a result of correct item selection (a form of positive feedback) by the listener and not necessarily awareness of listener need. Although these

two factors may be difficult to separate, it remains possible that some children may be able to determine what information is needed by the listener while being unable to code that information in a form that would permit correct item selection by the listener (i.e., success). An example would be inclusion of all necessary items of information within an ambiguous sentence structure. In this instance, though the needed information is present, the listener would be unable to select the correct picture. Under these circumstances, it would seem doubtful that shorter message production would result. The Glucksberg, et al. interpretation is drawn from a Piagetian theoretical position in which success on a referential communication task is viewed as dependent upon the child's abilities to decenter and hence to recognize listener need.

It can be concluded that, though adults do utilize listener need as a contributing factor in message formation, the evidence is inconclusive with regards to children. Children's abilities seem to depend upon the nature of the task.

Referential communication task performance as a function of cognitive level

A review of studies in this topic reveals that a conclusive statement cannot be made concerning the

relationship of cognitive task ability to referential communication task ability. In 1926, Piaget stated that "before the age of seven or eight, children have no conversation bearing upon logical or causal relations, the reason is that at that age they hardly understand one another . . . the effort to understand other people and to communicate one's thought objectively does not appear in children before the age of seven or seven and a half" (page 40).

In addition, Piaget and Inhelder (1969) state that "the speech of subjects between four and six years of age is not intended to provide information, ask questions, etc., but consists of collective monologues in the course of which everyone talks to himself without listening to others, in fact each subject speaks only for himself and fails to establish cooperative contact" (page 120). This description of children's speech would lead one to conclude that accurate performance on a referential communication task would be "cognitively" impossible for a child below the age of seven because he would be unable to assume the listener's point of view.

Many researchers exploring the area of referential communication ability have attributed obtained results to children's lack of cognitive maturity, and, in particular, to the egocentric quality of their speech which was thought to be a reflection of the cognitive inability to

decenter. These researchers were referring to Piaget's (1926) description of egocentric speech which he states "is termed thusly because the child speaks only about himself but chiefly because he doesn't attempt to place himself at the point of view of his listener. The child asks for no more than apparent interest, though he has the illusion of being heard and understood. He feels no desire to influence his hearer or to tell him anything" (page 9).

Slobin (1975) states that the child's limited ability to decenter precludes much of discourse dynamics, while Muma (1975) notes that prior to the age of eight, communication efforts are governed by limitations in cognitive development that define communication effort as egocentric.

Flavell (1971) says: "In a communication game, young children tend to produce messages that are grossly maladapted to the listener's informational need. We interpret such communication behaviors as reflecting a relative inability to take the role of the listener, i.e., a form of cognitive egocentrism" (page 200).

Recent explorations into the area of egocentricity reveal that this characteristic may not reflect a unitary cognitive stage. According to Cromer (1971), Piaget himself states that the child learns to decenter, i.e., separate himself from the rest of the world, in different

stages. For example, there is some basic separation of self from others at the sensorimotor level of cognitive development while there is further separation of self from others during the preoperational stage. In essence, Piaget appears to be emphasizing the continuous qualitative development of the decentering ability. If the development of the decentering ability is continuous, then egocentric type behaviors must vary qualitatively as they reflect the different stages of development (Cromer, 1971). Shields (1975) notes that nursery school children's discourse performance reflects some degree of awareness of how others perceive a given context. He further concludes that "discourse explorations (i.e., children's abilities to adapt to others, etc.) in child language have been blocked off for many years by the theory of child egocentricity which held that the child is emotionally disinclined and cognitively unable to take account of the viewpoint of others" (page 2).

Experimental evidence has begun to emerge that supports that the extent of egocentric behavior in children will vary. DeVilliers and deVilliers (1974) observed that when giving instructions four-year-olds could translate into the listener's perspective. Therefore it is incorrect to propose that the four to five-year-old child has a cognitive inability to shift perspectives and to take account of another's point of view. Shantz (1975)

notes that the nature of the task will determine the degree of egocentricity of the child's response. She observed that four-year-olds could not adjust their perspectives to another's point of view on the three mountain Piagetian task but they could do so if familiar objects with clearly identifiable sides were used. Therefore, to judge all inaccurate responses on referential communication tasks as reflective merely of egocentric behavior obliterates the nature of the development of the skill.

Studies have examined specifically the nature of the relationship of cognitive development to referential communication task performance. As indicated above, cognitive development has been considered the primary causal factor in referential communication ability. That is, once the child has developed the cognitive ability to assess the listener's needs, he should be able to communicate an appropriate message. In this view, language is a direct reflection of the child's cognitive ability. As Flavell (1971) asserts, linguistic output in a communication task gives us an indirect measure of cognitive level. Therefore, the child's language is taken as the basis for inference about his cognitive abilities. Language performance is seen to reflect egocentricity, while the only evidence given for egocentricity is language performance. Both the circularity of this reasoning and the recognition

that other factors may influence referential communication skills suggest the need for research that seeks separate measures of language ability and cognitive development with regard to referential communication tasks.

Glucksberg, Krauss, and Higgins (1975) note that in the few studies in which role-taking, egocentrism, and communication ability were assessed separately, the data are merely suggestive. For example, Cowan (1967) found a strong relationship between spatial perspective-taking (decentering tasks) and measures of egocentric speech, and a weak relationship between spatial perspective-taking and communication accuracy with nine-year-olds but no relationships were found with eight-year-olds. Higgins (1973) found little relationship between role-taking and communication ability while Kingsley (1971) found a correlation of egocentric scores and communication scores for eight-year-olds but not for five-year-olds. The statement that both referential communication skills and cognitive skills improve with age is the strongest conclusion that can be drawn from these findings. However, as Glucksberg, Krauss and Higgins (1975) point out, this statement sheds little light on the functional relationship between these variables.

Glucksberg, Krauss, and Higgins (1975) note that by eight years most children should be beyond the point where egocentrism is an important factor in their behavior

and yet on some referential communication tasks thirteen and fourteen-year-olds are not performing on adult level. Therefore, it would appear that factors other than cognitive underpinnings influence one's ability to perform accurately on a referential communication task. In summary, it may be stated that a clear understanding of the relationship between cognitive development and referential communication skills does not emerge from the findings of prior research.

Chapter III

Research Design

To explore children's abilities to communicate nonambiguous messages to a listener, two sets of children from three age groups were tested under two experimental conditions. The amount of information to be conveyed, the nature of the information to be conveyed, and the kind of feedback received from a listener were the variables that were systematically manipulated. Both groups of children viewed identical sets of pictures and were required to code a nonambiguous message to a listener. The two experimental conditions differed in the nature of the feedback given to the child from the listener when the child failed to communicate a nonambiguous message.

The hypotheses for each of the variables are presented below. Accompanying each hypothesis is a discussion of motivating factors for the prediction and a description of pertinent aspects of the research design. Following the hypotheses is a detailed presentation of the research design.

Hypotheses

1. The general hypothesis:

The subjects' message coding abilities will vary as a function of manipulations made within the communication situation.

Over all, the literature reviewed indicates that the ability to perform accurately on a referential communication task is subject to variations. These variations result from changes made within the communication setting.

The research design manipulated three aspects of the communication setting: the amount and kind of information to be coded and the type of feedback received from the listener.

2. The hypothesis relating to the amount of information to be coded:

An increase in the number of elements to be coded in the picture sets will produce a decrease in the subjects' abilities to code a nonambiguous message.

The literature has indicated that the difficulty of the stimuli will influence task performance. For example, Salatas and Flavell (1976) note that the complexity of the pictures utilized in their task affected the relative frequency of egocentric errors. Nonetheless, little research has been done to determine the constitution of a difficult test item as compared to a

simple test item.

Some consideration has been given to the amount of information to be coded (see Ford, 1972 and Randhawa, 1973, page 32). However, these studies required the listing of unrealistic amounts of classification-type information, i.e., the inclusion of seven to eight attributes within one message. The present research sought to examine further the effects that changes in the amount of information have upon message coding.

This variable was explored by manipulating the number of criterial elements in the message. Each message required one, two, or three criterial elements.

Responses were tabulated to determine if more errors occurred on three element messages than on two element messages and on two element messages than on one element messages. In addition, responses were examined to ascertain if more errors on a particular type of semantic/syntactic element occurred on three element messages than on two element messages or two element messages than on one element messages.

3. The hypothesis relating variations in the subjects' abilities to code nonambiguous messages to differences in the kind of underlying semantic/syntactic components of the message:

Subjects will make fewer errors on actor/subject and recipient of the action/object components as compared to

location/preposition, attribute/modifier on the object and attribute/modifier on the subject components.

Recently, there have been no attempts to determine if manipulations of the underlying semantic/syntactic nature of the intended message has differential effects on the child's coding ability and hence could be another determinate of stimulus difficulty. Traditionally, linguistic theory has drawn a distinction between subjects and objects, on the one hand, and prepositions and attributes on the other. The former have been considered as obligatory major constituents of a simple sentence and the latter as structurally dispensible constituents of the sentence (Lyons, 1968). A performance ramification of this distinction would be differential responding to the constituents on a message coding task.

This variable was explored by manipulating the semantic/syntactic nature of the criterial elements. The picture elements that varied were: actor/subject, recipient of the action/object, location/preposition, attribute/modifier on the object, attribute/modifier on the subject. Each type of semantic/syntactic component appeared alone and in all possible combinations with every other semantic/syntactic component in pairs and in triads.

Responses were analyzed in terms of the number of errors on each type of semantic/syntactic component.

4. The hypothesis relating to age:

The ability to code nonambiguous message structures will improve with age.

As was clearly shown in the literature, improvement on referential communication tasks correlates positively with increasing age.

Subjects chosen for the study were grouped according to age. There were five-year-olds, seven-year-olds, nine-year-olds, and adults.

Responses from each group were tabulated separately and then compared.

5. The hypothesis relating to cognitive level:

The ability to code a nonambiguous message will correlate highly with cognitive level.

Although the results of prior research could not demonstrate a causal relationship between cognitive development and performance on referential communication tasks, it has been demonstrated that both cognitive level and performance on referential communication tasks improve with age.

The subjects' cognitive levels were assessed prior to the presentation of the experimental task. Specifically, two standard procedures were administered to measure the subjects' levels of egocentric and decentering behaviors.

In analysis, responses from the five-year-olds and seven-year-olds were regrouped according to the subjects' cognitive ability and then statistically assessed for

differences.

6. The hypotheses relating to the effects of feedback:

a. The oldest subjects (in age and in cognitive level) will benefit from both directive and nondirective feedback offered by the listener.

b. The intermediate subjects (in age and in cognitive level) will benefit primarily from the directive feedback offered by the listener.

c. The youngest subjects (in age and in cognitive level) will not benefit from either type of feedback offered by the listener.

As was demonstrated in prior research, children learn to utilize feedback offered by a listener. However, certain feedback types seem to be more facilitating than others for message formation) (Fishbein and Osborne, 1971; Peterson, et al., 1973). This research attempted to identify further feedback types that would aid the child who is still developing his communication abilities.

Each age group was divided into two sections. One section received directive feedback while the other section received nondirective feedback.

Responses from each group were tabulated separately and then compared.

7. The hypotheses relating to stylistic variations in message formation:

a. An increase in the number of elements subjects

successfully code will be accompanied by a tendency to use compact syntactic structures and, hence, a minimum of words.

b. An increase in the level of difficulty of the semantic/syntactic components to be coded will elicit an increase in the number of words and/or extraneous elements in the message structure.

In general, the current research has ignored the role that syntax might play in influencing message formulation not only when programing test stimuli but also when analyzing responses. Slobin (1975) hypothesizes that there is a tendency for a speaker to use a compact syntactic style in an attempt to convey the maximum amount of information in the shortest length of time. However, no research has been conducted to prove or disprove this assertion. In addition, Flavell, et al. (1968) states, "The ability not to say more than is necessary begins to look like a high-level communicative refinement rather than a low-level fundamental" (page 131).

For each age group, the average number of words and the average number of extraneous elements were tabulated for one, two, and three element messages. In addition, the average number of words and the average number of extraneous elements were tabulated for each type of semantic/syntactic component in one, two, and three element messages.

Data Collection

Subjects

Forty-eight subjects participated in the experiment: 12 five-year-olds, 12 seven-year-olds, 12 nine-year-olds, and 12 adults. Within each age group, half of the subjects were male and half were female. All the subjects lived in the same middle-class neighborhood and all of the children attended the local YMCA. They were all monolingual English language speakers. All subjects had scored 50% or better on the pretraining task.

Pretraining procedures

One week prior to the experimental procedure, a perceptual pretraining task was administered to all subjects. It was designed to measure subjects' perceptual abilities and to alert the subjects to the possible criterial elements that would be relevant on the experimental task.

Materials

Ten sets of pictures were used. Each set of pictures consisted of three identical pictures and one picture that differed in one criterial element. A total of four pictures were used so that the picture layout would be identical to that of the experimental task.

1. actor/subject
2. recipient of the action/object

3. location/preposition
4. attribute/modifier on the object
5. attribute/modifier on the subject

There were two sets of pictures depicting variations of each of these elements. All the pictures were in color and had appropriate backgrounds that included three additional actors (see Appendix A).

To determine the order of the stimuli, one example of each type of picture was randomly assigned an order and the order of the second half of the stimuli replicated that of the first half.

Administration of pretraining tasks

Each child was trained individually. Because this session was the first contact with the child, time was spent establishing rapport and introducing the reinforcer, a token stystem. For every correct response, the child was given one token, and five tokens could be traded for one of several types of candy or trinkets. This was the only time during the entire study in which the reinforcement was contingent upon correct response. In all of the other tasks, the child was reinforced for any response.

The child was instructed to: "Find the picture that does not belong, the one that is different." If the child selected the correct picture, the tester reinforced the child and explained why that was the correct response. For example, "Yes, that's the one where the boy is fat.

In all the other pictures, the boy is skinny." If the child selected the wrong picture, he was told that it was incorrect and to try again. If he still did not succeed, the tester showed him the correct picture and explained why it was the right one.

Assessment of cognitive level

One week prior to the administration of the experimental task (during the pretraining session), the child's cognitive level was assessed. Specifically, the child's levels of egocentric and decentering behaviors were measured.

Test of conservation

To assess the child's egocentric behavior, subtests from the Concept Assessment Kit-Conservation (Goldschmid and Bentler, 1968) were utilized. The subtests chosen tested the child's abilities to conserve number, two dimensional space and substance.

Test of perceptual perspective-taking

To assess the child's decentering behavior, a subtest from the Early Childhood Curriculum: A Piagetian Program (Lavatelli, 1970) was utilized. The subtest is an adaptation of Piaget's "Three Mountain" experiment (Piaget and Inhelder, 1948).

Experimental procedures

The experimental task was designed to assess the child's ability to communicate a nonambiguous message to a listener.

Materials

Fifty sets of pictures were utilized. Each set of pictures consisted of four related pictures, all of which were identical except for variations in one, two, or three criterial elements. As in the stimulus for the pretraining task, the elements that varied were:

1. actor/subject
2. recipient of the action/object
3. location/preposition
4. attribute/modifier on the object
5. attribute/modifier on the subject

There were two sets of pictures depicting each variation or combination of variations. The pictures were in color and had backgrounds that included three actors and other appropriate details. Each picture was six inches by six inches and all were placed in a notebook.

Ten of the picture sets were made up of pictures that differed in one criterial element only. For example, in one set, the pictures differed according to the actor/subject element: <u>boy</u> throws ball, <u>girl</u> throws ball, <u>man</u> throws ball, <u>woman</u> throws ball.

Twenty of the picture sets were made up of pictures that differed in combinations of two criterial elements. For example, (actor/subject—recipient of the action/object),

boy rides bike, boy rides scooter, girl rides bike, girl rides scooter. The total possible combinations of two criterial elements were:

1. actor/subject—recipient of the action/object
2. actor/subject—location/preposition
3. actor/subject—attribute/modifier on the object
4. actor/subject—attribute/modifier on the subject
5. recipient of the action/object—location/preposition
6. recipient of the action/object—attribute/modifier on the object
7. recipient of the action/object—attribute/modifier on the subject
8. location/preposition—attribute/modifier on the object
9. location/preposition—attribute/modifier on the subject
10. attribute/modifier on the object—attribute/modifier on the subject

Twenty of the picture sets were made up of pictures that differed in combinations of three elements. For example (attribute/modifier on the subject—actor/subject—recipient of the action/object), brown dog bites bone, brown cat bites bone, brown dog bites ball, white dog bites bone. The total possible combinations of three criterial elements were:

1. attribute/modifer on the subject—actor/subject—recipient of the action/object
2. actor/subject—recipient of the action/object—attribute/modifier on the object

3. actor/subject—recipient of the action/object—location/preposition
4. actor/subject—attribute/modifier on the object—location/preposition
5. recipient of the action/object—attribute/modifier on the object—location/preposition
6. attribute/modifier on the subject—attribute/modifier on the object—actor/subject
7. attribute/modifier on the object—attribute/modifier on the subject—recipient of the action/object
8. attribute/modifier on the object—attribute/modifier on the subject—location/preposition
9. attribute/modifier on the subject—recipient of the action/object—location/preposition
10. attribute/modifier on the subject—actor/subject—location/preposition. (See Appendix C)

The first 25 picture sets presented contained one example of each possible criterial variation or combination of variations. The order of the sets was predetermined so that, with the exception of the first set, no criterial element that was varied in a given set appeared either in the preceding or succeeding sets. In addition, within every group of four sets, every manipulated criterial element appeared twice (see Appendix B). Picture placement within each set was prearranged as well. The target picture appeared in each position 25% of the time. The order and picture placement of the second half of the picture sets replicated that of the first twenty-five sets.

In addition to the tester, an adult listener was present, and was seated with her back turned towards the child so that she could not view the pictures.

Administration

Each subject was tested individually by the same tester. The experimental test material was administered in one session with a five-minute break between the first and second halves of the picture sets.

Throughout the procedure, the child received token reinforcement for any response.

The instructions given to the child were as follows: "Tell (listener) about this picture (tester points) so that she knows that you're talking about this one, and not this one, not this one, and not this one. Tell her only what she needs to know."

Each child was given three practice trials involving sets of pictures containing variations of picture criterial elements other than those in the test material (e.g., action/verb, action/verb—recipient of the location/object of the preposition, action/verb—recipient of the location/object of the preposition—attribute/modifier on the object of the preposition). The practice trials assured the tester that the child understood the nature of the task and thereby reduced the effects of "warming up" to the task.

Experimental group I

This group of subjects received directive feedback from the listener. That is, if the child's message to the listener about the target picture did not enable the listener to isolate the correct picture, then the listener pointed to the picture described by the child. The picture choice made by the listener was determined by those criterial elements included (or excluded) within the child's message. For example, if the picture set was boy rides bike (target picture), girl rides bike, boy rides scooter, girl rides scooter, and the child's message had been, "I see a boy" then the listener would have chosen the third picture, Boy rides scooter. The subject was given one opportunity to recode his message after he received the feedback.

Experimental group II

This group of subjects received nondirective feedback from the listener. That is, if the child's message to the listener about the target picture did not enable the listener to isolate the correct picture, the listener turned to the subject and stated, "I don't know which picture you mean." The subject was given one opportunity to recode his message.

Adult group

This group served primarily as a control. They were

given the same instructions as the children and viewed the same sets of pictures. They too were split into two groups: Group I received directive feedback and Group II received nondirective feedback.

Scoring

Responses from the subjects were transcribed and scored as correct or incorrect. A correct response was one in which the message would enable a naive listener to select the target picture from among the set of four pictures. Responses were tallied as correct or incorrect, first trial, and if incorrect on the first trial, correct or incorrect on the second trial, for the first 25 stimuli and then the second 25 stimuli. A trial was a message coding, and it was therefore possible to have two trials per set of pictures if the first trial did not enable the listener to select the target picture.

The nature of the coded message was analyzed according to:

1. which criterial elements were coded
2. the total number of words in the message
3. the number of extraneous elements in the message (an extraneous element was defined as a piece of information which was not essential for the coding of a nonambiguous message and which most adult subjects did not include in their message formation (see Appendix D)
4. the general syntactic structure of the message.

If the subject did not formulate a nonambiguous message on his first trial for a particular set of pictures, then his second trial was scored correct or incorrect. In addition, the nature of the message was analyzed. This second trial message was surveyed to determine the correction strategy utilized by the subject. A winning strategy (i.e., one that allowed for the formulation of a nonambiguous message) may have been any of the following types:

1. recode—the subject repeated the entire message including those necessary criterial elements that were properly coded on the first trial, along with any additional necessary criterial elements that had been previously omitted or distorted.

2. partial recode—the subject repeated only one of the two necessary elements that had already been correctly stated in trial I, along with any criterial elements that had been omitted or distorted previously.

3. isolation—the subject stated only the element(s) that had been omitted or distorted previously.

A losing strategy (i.e., one in which the subject's response on trial II did not serve to isolate the target picture from among the set of four) may have been any of the following types:

1. partial isolation—only one or two of the necessary elements were successfully stated

2. extraneous—the subject gave additional information in his message that did not serve to aid the listener in his picture selection.

3. repetitious—the subject repeated exactly what he had said on trial I, possibly with prosodic change.

4. unspecified—the subject noted the elements that were needed by the listener but stated them ambiguously (e.g., that one is red and that one is blue) (see Appendix E).

Table 1 presents a glossary of all measurements collected on each subject in addition to the scoring system used on each variable.

Table 1: A glossary of the measurements collected on each subject.

	Scoring
Age	
Cognitive level:	
conservation	
number, two dimensional space, substance	wrong response = 1; right response, no explanation = 2; right response, explanation = 3 (max. = 9)
decentering	
demo	# correct out of 4 possible trials
test	# correct out of 6 possible trials (max. = 10)
Pretraining task:	
actor/subject, recipient of the action/object, location/preposition, attribute/modifier on the object, attribute/modifier on the subject	incorrect on both trials = 1; correct on one trial = 2; correct on both trials = 3 (max. = 15)
Experimental task responses:	
overall error assessment	
sumcor	total # correct (max. = 50)
first	weighted scoring of # correct on first half (max. = 50)
second	weighted scoring of # correct on second half (max. = 50)
cor 1	# of items correct on first trial first half (max. = 25)
cor 2	# of items correct on first trial second half (max. = 25)
win	# of winning strategies used (max. = 50)
lose	# of losing strategies used (max. = 50)
improvement rate	second- first (max. = 50)

Table 1 (Cont.)

error assessment relating to the number of criterial elements

elem 1	.....	# of errors in 1 element items (max. = 10)
elem 2	.....	# of errors in 2 element items (max. = 20)
elem 3	.....	# of errors in 3 element items (max. = 20)
average word 1	.....	average # of words for 1 element items, first trial
average word 2	.....	average # of words for 2 element items, first trial
average word 3	.....	average # of words for 3 element items, first trial

error assessment relating to semantic/syntactic nature of elements

sem 1 (actor/subject)	
sem 2 (recipient of the action/object)	# errors on each type of semantic/syntactic element which gets corrected on Trial II (max. = 22)
sem 3 (location/preposition)	
sem 4 (attribute/modifier on the object)	
sem 5 (attribute/modifier on the subject)	
sem 6 (actor/subject)	
sem 7 (recipient of the action/object)	# errors on each type of semantic/syntactic element which remains incorrect on trial II (max. = 22)
sem 8 (location/preposition)	
sem 9 (attribute/modifier on the object)	
sem 10 (attribute/modifier on the subject)	

Table 1 (Cont.)

one 1 (actor/subject)	
one 2 (recipient of the action/object)	# of errors on each type of semantic/ syntactic element in one element test items (max. = 4)
one 3 (location/preposition)	
one 4 (attribute/modifier on the object)	
one 5 (attribute/modifier on the subject)	
two 1 (actor/subject)	
two 2 (recipient of the action/object)	# of errors on each type of semantic/ syntactic element in two element test items (max. = 16)
two 3 (location/preposition)	
two 4 (attribute/modifier on the object)	
two 5 (attribute/modifier on the subject)	
three 1 (actor/subject)	
three 2 (recipient of the action/object)	# of errors on each type of semantic/ syntactic element in three element test items (max. = 24)
three 3 (location/preposition)	
three 4 (attribute/modifier on the object)	
three 5 (attribute/modifier on the subject)	
correction rate on actor/subject	100X sem 1/(1+sem1 + sem 6)
correction rate on recipient of the action/object	100X sem 2/(1+sem2 + sem 7)
correction rate on location/preposition	100X sem 3/(1+sem3 + sem 8)
correction rate on attribute/modifier on the object	100X sem 4/(1+sem4 + sem 9)
correction rate on attribute/modifier on the subject	100X sem 5/(1+sem5 + sem 10) (max. = 1)

Chapter IV

Results

This chapter reports the results of the statistical analysis. The data relating to each of the original hypotheses were subjected to statistical manipulations to determine the significance of the results obtained. For the convenience of treating the results, the hypotheses will be examined in the following order:

1. the hypotheses relating to the effects of feedback

   a. the oldest subjects (in age and in cognitive level) will benefit from both types of feedback offered by the listener

   b. the intermediate subjects (in age and in cognitive level) will benefit primarily from the directive feedback offered by the listener

   c. the youngest subjects (in age and in cognitive level) will not benefit from either type of feedback offered by the listener

2. the hypothesis relating to age:

   the ability to code nonambiguous message structures will improve with age

3. the hypothesis relating to cognitive level:

   the ability to code a nonambiguous message will correlate highly with cognitive level

4. the hypothesis relating to the amount of information to be coded:

an increase in the number of elements to be coded in the picture sets will produce a decrease in the subjects' abilities to code a nonambiguous message.

5. the hypothesis relating to variations in the child's ability to code nonambiguous messages to differences in the kind of underlying semantic/syntactic components of the message:

the subject will make fewer errors on actor/subject and recipient of the action/object semantic/syntactic components as compared to location/preposition, attribute/modifier on the object, and attribute/modifier on the subject semantic/syntactic components.

6. the hypotheses relating to stylistic variations in message formation:

a. an increase in the number of alternatives a subject successfully codes will be accompanied by a tendency to use compact syntactic structures and, hence, a minimum of words.

b. an increase in the level of difficulty of the semantic/syntactic components will elicit an increase in the number of words and/or extraneous elements in the message structure.

Effects of Feedback on Message Reformulation

The first analysis was to identify an effect that could be attributed to the type of feedback received from the listener. To do so, each age group (N=12) was divided into groups of six: those who had received directive feedback contrasted with those who had received

nondirective feedback. Generally, the results of a series of t-tests on the data supported all hypotheses pertaining to the influence of feedback on message coding. However, the data did not uphold these hypotheses as strongly as had been predicted. The mean scores and significance levels for both feedback groups for all age groups can be seen in Table 2.

Nine-year-olds and adults

For the most part, it was observed that the nine-year-old and adult subjects made so few errors that the effects of the feedback could not be noted. When an error was made, either feedback was effective in aiding correction. There were no statistically significant differences found between mean scores based upon a directive/nondirective feedback distinction. This finding supports hypothesis 1a (see Table 2).

Seven-year-olds

The seven-year-old group was the only group to demonstrate any positive effect due to directive feedback. The seven-year-olds in the nondirective feedback group used significantly more losing strategies than did the seven-year-olds in the directive feedback group (see Table 2). This finding shows that the children receiving directive feedback were able to utilize that feedback to guide them in accurate reformulation of their original

Table 2: Assessment of feedback conditions

Age	5-year-olds		7-year-olds		9-year-olds		adults	
Feedback type	Directive	Nondirective	Directive	Nondirective	Directive	Nondirective	Directive	Nondirective
N	6	6	6	6	6	6	6	6
Variables:								
sumcor	22.00	22.30	44.50	43.00	50.00	48.83	50.00	49.67
first	20.67	18.83	39.83	38.00	47.17	44.67	49.17	47.50
second	17.17	21.67	41.67	39.33	47.67	46.50	49.67	49.50
cor 1	9.17	8.67	17.67	16.67	22.17	20.67	24.17	22.67
cor 2	6.67	9.50	19.33	17.67	22.67	21.67	24.50	24.83
win	35.10	27.90	83.60	68.88	100.00	95.60	83.33	69.44
lose	77.31	76.26	16.40 i	44.95	0.0	6.94	0.0	13.89
improvement rate	-3.50 i	2.83	1.83	1.30	.50	1.83	.33	2.17

Significance of differences between adjacent feedback groups within mean scores of age groups:

i	$p < .05$
ii	$p < .01$
iii	$p < .001$

message. In addition, the mean scores of the two seven-year-old groups showed a consistent trend for the directive feedback group to produce fewer errors than did the nondirective feedback group. Thus both the trend and the significant finding lend support to hypothesis 1b.

Five-year-olds

Over all, the data from the five-year-olds indicate that they did not benefit from either type of feedback condition. The mean scores from the two feedback groups showed a lack of trends within the error patterns, i.e., at times the directive feedback group performed better than the nondirective group and at times the reverse occurred. A significant internal group finding appeared but the direction of the distinction was counterintuitive: the nondirective feedback group performed better on the second half of the stimuli than did the directive feedback group (see Table 2: Improvement rate variable). These results, taken along with behavioral observations (to be reported in Chapter V), support hypothesis 1c.

For all subsequent analyses, the distinction between directive and nondirective feedback types was collapsed and each age group was viewed as a whole (N=12).

Referential Communication Ability as a Function of Age and Task

In this analysis, the age groups were contrasted

to examine the effects of age on the ability to code a nonambiguous message. A series of t-tests on all variables were performed contrasting five-year-olds with seven-year-olds, nine-year-olds, and adults; seven-year-olds with nine-year-olds and adults; and nine-year-olds with adults. Over all, a very strong effect of age was observed, as can be noted in Tables 3 and 4. Table 3 presents the mean scores across all age groups on variables that allow for overall error assessment, while Table 4 presents the mean scores across all age groups on variables pertaining to amount and kind of information to be coded.

Five-year-olds

The strong effect of age on experimental task performance can clearly be seen when contrasting the mean scores of the five-year-olds with those of the seven-year-olds. The five-year-olds made significantly more errors over all than did the seven-year-olds (see Table 3). More specifically, Figure 1 shows that for every two and three element comparison, the five-year-olds made more errors than the seven-year-olds, significant at least at the .01 level. This level of significant difference is also true for one element items except for insignificant differences on the semantic/syntactic components of attribute/modifier on the object and attribute/modifier

Figure 1.--The mean number of errors on semantic/syntactic components for each age group in one,* two, and three element test stimuli.

*The ordinate for one element errors has been magnified to permit plotting of fractional quantities.

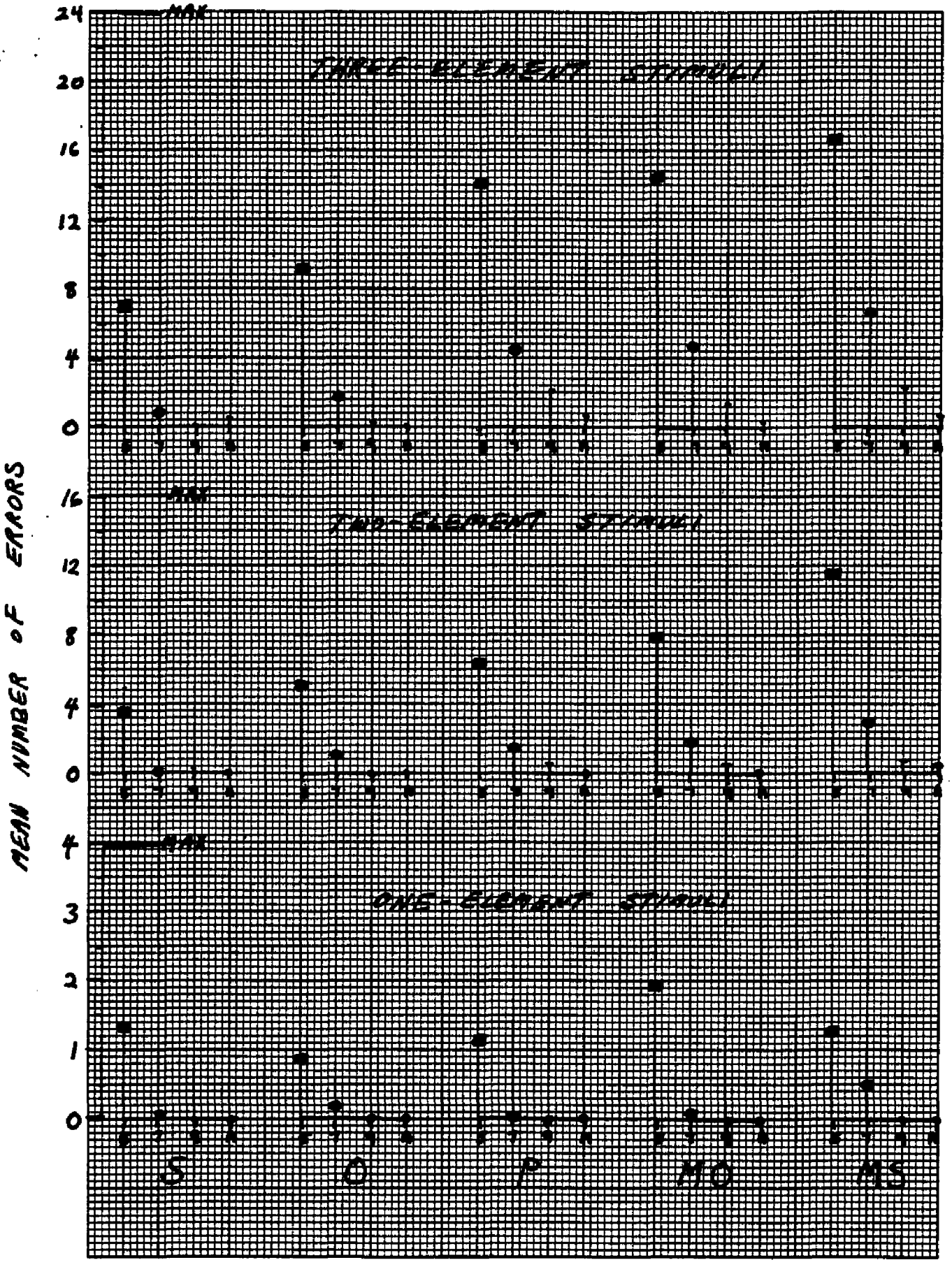

MEAN NUMBER OF ERRORS
24
20
16
12
8
4
0
MAX
THREE-ELEMENT SERIAL
MAX
TWO-ELEMENT SERIAL
MAX
ONE-ELEMENT SERIAL
4
3
2
1
0
S
O
P
MO
MS

Table 3: Performance summaries for the 4 age groups on overall error assessment variables

Age	5-year-olds		7-year-olds		9-year-olds		adults
N	12		12		12		12
	mean scores		mean scores		mean scores		mean scores
sumcor	22.17	iii	43.75	i	49.42		49.83
first	19.75	iii	38.92	i	45.92	i	48.30
second	19.42	iii	40.50		47.08	ii	49.58
cor 1	8.92	iii	17.17	i	21.42	i	23.42
cor 2	8.08	iii	18.50		22.17	ii	24.67
win	31.50	iii	76.24	ii	97.80		76.39
lose	76.79	iii	30.68	ii	3.47		6.94
improvement rate	-.33		1.58		1.17		1.25

Significance of differences between adjacent age groups: i $p < .05$ ii $p < .01$ iii $p < .001$.

Table 4: Performance summaries for the 4 age groups on variables pertaining to amount and kind of information to be coded

Age		5-year-olds		7-year-olds		9-year-olds		adults	
N		12		12		12		12	
		mean scores		mean scores		mean scores		mean scores	
sem	1 (subj)	1.75	i	.50		.08		.42	
	2 (obj)	1.42		1.67	i	.17		0.0	
	3 (prep)	2.75		2.00		2.00	ii	.33	
	4 (mo)	3.25		3.42		1.75	ii	.17	
	5 (ms)	3.42		3.58		2.70	i	.83	
	6 (subj)	5.08	ii	.25		0.0		0.0	
	7 (obj)	6.75	ii	.67		0.0		0.0	
	8 (prep)	9.42	iii	1.92		.33		.08	
	9 (mo)	10.25	ii	1.50		.08		.08	
	10 (ms)	13.83	iii	3.25	i	.17		0.0	
one	1 (subj)	1.33	i	.08		0.0		0.0	
	2 (obj)	.83		.17		0.0		0.0	
	3 (prep)	1.17	ii	0.0		0.0		0.0	
	4 (mo)	1.90	iii	.08		0.0		0.0	
	5 (ms)	1.25		.50		0.0		0.0	
two	1 (subj)	3.58	ii	0.0		.08		0.0	
	2 (obj)	5.00	ii	.92	i	0.0		0.0	
	3 (prep)	6.30	ii	1.30		.50	i	0.0	
	4 (mo)	7.83	ii	1.67		.50	ii	0.0	
	5 (ms)	11.58	iii	3.00		.75		.33	
three	1 (subj)	7.00	ii	.75	i	0.0		.42	
	2 (obj)	9.17	iii	1.83	i	.17		0.0	
	3 (prep)	14.08	iii	4.50		2.08	i	.50	
	4 (mo)	14.33	iii	4.67	i	1.42		.33	
	5 (ms)	16.58	iii	6.50	i	2.33	ii	.50	

Table 4 (Cont.)

Age	5-year-olds		7-year-olds		9-year-olds		adults
	12		12		12		12
	mean scores		mean scores		mean scores		mean scores
correction rate on							
(subj)	47.61	iii	89.58		100.00		100.00
(obj)	33.14	iii	90.28		100.00		100.00
(prep)	35.56	ii	73.09		89.78		95.83
(mo)	36.05	iii	84.49	i	98.80		97.22
(ms)	24.24	iii	71.02	ii	97.42		100.00
elem 1	6.50	iii	.83		0.0		0.0
2	34.33	iii	6.92		1.83	i	.33
3	61.17	iii	18.25	i	6.00	ii	1.75

Significance of differences between adjacent age groups: i $p < .05$ ii $p < .01$ iii $p < .001$.

on the subject. In addition, though there were no consistent significant differences for five-year-olds vs. seven-year-olds on errors that were made on Trial I, but corrected on Trial II (see Table 4, note: seml-sem5), there were significant differences in the number of errors that remained incorrect after Trial II (see Table 4, note: sem6-seml0, correction rate of subject—correction rate of attribute/modifier on the subject). Therefore, it could be stated that a major difference between these two groups lies not only in the number of errors that they make but in their abilities to self correct as well.

This conclusion is further supported by the significant differences found between the groups' uses of win and lose strategies and their abilities to use feedback (see Table 3). The five-year-olds used significantly more losing strategies than did the seven-year-olds, and the seven-year-olds used significantly more winning strategies than did the five-year-olds. Further, the five-year-olds did not benefit from either feedback condition while the seven-year-olds benefited from directive feedback. The mean scores for the improvement rate variable indicates lack of improvement by the five-year-olds while the seven-year-olds' mean score indicates improvement.

The five-year-olds' general inability to perform accurately on the experimental task can be further noted by their significantly higher number of errors on one element stimuli when compared with all other age groups

(see Table 3, note: one 1—one 5, elem1; see Figure 1, note: one element stimuli).

Seven-year-olds

The effect of age is further supported by the differences in performance by the seven and nine-year-old groups. The seven-year-olds made significantly more errors over all than did the nine-year-olds (see Table 3). However, it must be noted that when the foci of the errors of the seven-year-olds were examined, a pattern emerged. For less difficult items, one and two element stimuli, and the semantic/syntactic components of actor/subject and recipient of the action/object, the seven-year-olds performed similarly to the nine-year-olds (see Table 4, note: no significant differences were found for: elem 1, one1—one5, two1, two3—two5, correction rate of actor/subject, correction rate of recipient of the action/object). Conversely, the significant differences between the seven and nine-year-olds on the more difficult items, three element stimuli and the semantic/syntactic components of attribute/modifier on the object, attribute/modifier on the subject (see Table 4, note: elem3, seml0, correction rate of the attribute/modifier on the object, correction rate on the attribute/modifier on the subject, three 1, three 2, three 4, three 5) indicate that the seven-year-olds' message formation abilities tended to collapse under adverse conditions. Thus, unlike the

five-year-olds, the seven-year-olds did demonstrate a basic understanding of the requirements of the experimental task.

However, though the seven-year-olds were performing similarly to the nine-year-olds in many instances, their performance was rarely comparable to adult level (see Table 4).

Nine-year-olds

The strong effect of age diminishes when the nine-year-olds are contrasted with the adults. The data show a significant difference between the two groups when errors on Trial I are examined alone (see Tables 3 and 4, note: cor 1, cor 2, first, second, sem 3, sem 4, sem 5). However, when corrected items are included in overall computation of number correct, there were no significant differences between the two groups (see Tables 3 and 4, note: sumcor, sem6—sem10, correction rate on actor/subject—correction rate on attribute/modifier on the subject). As was the pattern for the seven-year-olds vs. the nine-year-olds, the nine-year-olds tend to contrast with the adults primarily on the more difficult items (see Table 4, note: two 3, two 4, three 1, three 3, three 4, three 5, elem 2, elem 3).

In general the above evidence strongly supports hypothesis 2. Variations in the child's ability to formulate a nonambiguous message correlate with age.

Referential Communication Ability as a Function of Cognitive Level

This analysis explored the relationship between the child's cognitive level and his ability to perform on the experimental task. A positive correlation between conservation ability and message coding was observed. However, when cognitive level was examined as a predictive factor for experimental task performance, a positive conclusion could not be drawn. An initial scan of the data, as presented in Table 5, produces this negative statement and highlights a number of unexpected results.

Although five-year-olds differed significantly from seven-year-olds on abilities to conserve, they did not differ significantly from seven-year-olds on their ability to decenter. The ability to decenter cannot therefore be considered a predictive factor. In addition, seven-year-olds did not differ significantly from nine-year-olds in their conservation or decentering abilities. This observation indicates that neither decentering nor conservation abilities could be considered to be controlling influences for accurate performance on the experimental task. The lack of significant differences between adults and nine-year-olds on conservation tasks further support this conclusion.

To explore further the relationship between the cognitive skills tapped during pretesting and performance

Table 5: Comparison of all age groups on cognitive tasks

Age	5-year-olds		7-year-olds	9-year-olds		adults
N	12		12	12		12
conservation of number	1.33	i	2.17	2.83		3.00
conservation of 2 dimensional space	1.33	iii	2.67	3.00		3.00
conservation of substance	1.08	iii	2.33	2.83		3.00
decentering demo	2.83		3.33	3.83		4.00
decentering type I	1.33		1.92	2.33	i	3.00
decentering type II	.42	ii	1.50	2.17	iii	3.00

Significance of differences between adjacent age groups: i $p < .05$ ii $p < .01$ iii $p < .001$.

on the experimental task, the five-year-olds and the seven-year-olds were regrouped twice. The two age groups were collapsed and reordered according to cognitive performance rather than age. The first reordering was based on conservation performance: poor conservers (i.e., no appearance of a score of 3 and for the most part, all 1's on all three conservation tasks) vs. good conservers (i.e., at least one score of 3). This distribution resulted in two groups of 12 each: two seven-year-olds were placed with 10 five-year-olds, and two five-year-olds were placed with 10 seven-year-olds. The second reordering was based on decentering performance: low decenterers (i.e., a summed score of 4 or less) vs. high decenterers (i.e., a summed score of 6 or more). The resulting groups had 11 and 13 members respectively: three seven-year-olds were placed with eight five-year-olds and four five-year-olds were placed with nine seven-year-olds.

The data from these new groupings were subjected to a series of t-tests. The findings from this analysis are presented in Table 6. The results show no significant differences in performance of the two decentering groups, but do show significant differences in performances of the two conservation groups on variables that indicate overall performance levels and improvement abilities: sumcor, corl, cor2, first, second, win, sem6—seml0 (see Table 6).

Table 6: Competing categorization of the 24 youngest subjects according to age/conservation ability/decentering ability

	Age			Conservation			Decentering		
N	5 | 7 12 | 12			Good | Bad 12 | 12			High | Low 11 | 13		
	mean scores	mean scores	t value	mean scores	mean scores	t value	mean scores	mean scores	t value
sumcor	22.17	43.75	5.56***	38.83	24.08	2.87**	35.23	27.00	1.42
first	19.75	38.92	5.47***	33.50	21.67	2.34*	30.62	24.00	1.21
second	19.42	40.50	4.74***	36.75	20.17	3.16**	32.92	23.18	1.62
cor 1	8.92	17.17	4.60***	14.83	9.58	2.17*	13.62	10.55	1.18
cor 2	8.08	18.50	4.38***	16.58	8.17	2.98**	14.69	9.64	1.59
improvement rate	-.33	1.58	.90	3.25	-1.50	2.36*	2.31	.82	1.45
win	31.50	76.24	5.06***	81.49	36.20	2.79	60.00	60.56	.04
com 6 (subj)	5.08	.25	3.37**	.67	4.67	2.59*	1.85	3.62	1.03
7 (obj)	6.75	.67	3.83**	1.17	6.25	2.92	2.85	4.73	.93
8 (prep)	9.42	1.92	4.17***	2.75	8.58	2.83**	4.15	7.45	1.43
9 (mo)	10.25	1.50	3.96**	2.42	9.33	2.78*	6.37	7.24	1.41
10 (ms)	13.83	3.25	5.53***	4.17	12.92	3.81***	6.08	11.45	1.96
correction rate on									
(subj)	47.61	89.50	3.94***	81.94	55.25	2.10*	73.4	62.92	.76
(obj)	33.14	90.28	7.73***	81.25	42.17	3.38**	68.38	53.83	1.04
(prep)	33.56	73.09	3.23**	69.48	39.17	2.42*	64.24	42.61	1.62
(mo)	36.05	84.49	4.60***	77.84	42.70	2.77*	69.64	49.20	1.43
(ms)	24.25	71.02	5.62***	66.02	28.45	3.80***	55.16	38.74	1.31

Significance levels:
* $p < .05$
** $p < .01$
*** $p < .001$

The above data suggest that good conservers were better able to improve and therefore used more winning strategies, had fewer remaining errors, corrected more elements, and did better on the second half of the stimuli than the "poor conservers."

The results from the regrouping of the five and seven-year-old subjects permit the conclusion that while the decentering ability tapped on the pretest did not have any predictive power for performance on the experimental task, the conservation ability did. Those young children who were "good conservers" were more likely to show facility in reformulating an originally ambiguous message. Therefore, their overall performance was better than that of the "poor conservers." This regrouping allows one to observe that conservation skills are a better predictor of improvement rate than age as there was no significant difference found between five and seven-year-olds on the improvement rate variable while there was a significant difference on improvement rate between "poor conservers" and "good conservers" (see Table 6). The predictive power of conservation is, however, reflected only at the five and seven-year-old levels.

These results, taken along with the original observations with regard to the relationship of cognitive level to the level of performance on the experimental task, tend to support a negative conclusion: cognitive level

alone cannot predict performance on the experimental task. Age is a better predictor. There were a greater number of significant differences and larger t-values on all variables with an age grouping as compared to a conservation grouping (see Table 6). Nonetheless, the ability to conserve correlates positively with good performance on the experimental task (see Table 7). The data may be therefore said to support hypothesis 3.

Referential Communication Ability as a Function of Perceptual Performance

It is possible that a subject's performance on the experimental task could have been an artifact of his ability to perceive the elements that were to be coded. The data presented in Table 8 suggest otherwise, however. Response patterns on the pretraining task indicate that five-year-olds did not differ significantly from seven-year-olds, nine-year-olds and adults in ability to perceive the semantic/syntactic elements. In addition, seven-year-olds were not significantly different from nine-year-olds or adults on the pretraining task, nor were nine-year-olds significantly different from adults (see Table 8). These findings permit the conclusion that significant perceptual differences do not exist among the groups, and hence cannot be the basis for success or failure in coding nonambiguous messages in this experiment.

Table 7: Correlation coefficients of conservation skills with experimental task performance.

	Conservation of number	Conservation of two dimensional space	Conservation substance
cor 1	0.49***	0.70***	0.77***
cor 2	0.46**	0.75***	0.73***
sumcor	0.48**	0.73***	0.77***
first	0.49***	0.72***	0.79***
second	0.47**	0.75***	0.75***
improvement rate		0.38*	
correction on actor/subject	0.39**	0.55**	0.66***
correction on recipient of the action/object	0.47**	0.69***	0.76***
correction on location/ preposition	0.47**	0.58***	0.74***
correction on attribute/ modifier on the object	0.43**	0.64***	0.77***
correction on attribute/ modifier on the subject	0.53***	0.74***	0.75***
win	0.57***	0.70***	0.81***

Significance levels: * $p<.05$
** $p<.01$
*** $p<.001$

Table 8: Performance summaries of the 4 age groups on perceptual pretraining tasks

Age	5-year-olds	7 year-olds	9-year-olds	adults
N	12	12	12	12
	mean scores	mean scores	mean scores	mean scores
subject	2.25	2.58	2.92	3.00
object	2.92	2.83	2.92	3.00
preposition	2.50	2.75	2.92	3.00
modifier on object	2.42	2.42	2.92	2.92
modifier on subject	2.17	2.50	2.50	2.83

* $p < .05$

** $p < .01$

*** $p < .001$

Referential Communication Ability as a Function of Message Content

Next, the data were examined for within group differences regarding task difficulty. The goal was to discover a hierarchy of task difficulty based on either the number of or the semantic/syntactic nature of the informative elements to be coded. In general, the findings enumerated below support that a change in either the amount of information or the kind of information to be coded influenced subjects' message formation abilities.

The effects of the amount of information

A series of pair-wise t-tests were performed on the combined data of the five- and seven-year-old subjects. Proportionalized mean scores and significance levels shown on Table 9 clearly indicate that, for the most part, increasing the number of elements increases the difficulty of the test stimulus. More specifically, the trends of the mean scores and the significance levels of one versus two and one versus three elements show that when errors are summed over all semantic/syntactic types five- and seven-year-olds performed better on test stimuli that required only one item of information as opposed to two or three items. In addition, trends indicate that subjects performed better on test stimuli that required coding only two items of information as opposed to three items of information.

Table 9 also presents the mean scores of errors made by five- and seven-year-olds on each type of semantic/

Table 9: The proportionalized* mean # of errors on each semantic/syntactic element related to # of elements for five- and seven-year-olds

	Mean Scores in 1 Element	Mean Scores in 2 Elements	Mean Scores in 3 Elements	1 Element vs. 2 Elements	1 Element vs. 3 Elements	2 Elements vs. 3 Elements
Subject	4.26	2.68	3.88	t = 2.43*	t = 0.36	t = 1.03
Object	3.00	4.44	5.50	t = 2.53*	t = 2.27*	t = 0.82
Preposition	3.48	5.74	9.29	t = 2.33*	t = 5.59***	t = 2.56*
Modifier on object	6.00	7.12	9.50	t = 1.06	t = 2.40*	t = 1.32
Modifier on subject	5.28	10.93	11.54	t = 9.11***	t = 5.74***	t = .458
Σ	22.02	30.94	39.71	t = 0.90	t = 0.94	t = 0.42

Significance levels: * $p<.05$ ** $p<.01$ *** $p<.001$

*Note: Scores were adjusted for unequal opportunities for error:
- scores for 1 element items were multiplied by 6.
- scores for 2 element items were multipled by 1.5.

syntactic component when embedded within test stimuli requiring one element vs. two elements vs. three elements of information. It shows, for example, that the five- and seven-year-olds made the fewest errors coding the recipient of the action/object component when it was the only element required in the message as compared to performance on the recipient of the action/object when it was among two or three required elements. Also, they made fewer recipient of the action/object errors on the two item test stimuli as compared to the three-item test stimuli. This pattern was preserved for all types of semantic/syntactic components with the exception of the actor/subject in the one element condition. This exception may have resulted from the order of presentation of the test stimuli. The actor/subject in the element condition was the first stimulus of the experimental task.

The error patterns of the adults and nine-year-olds confirmed the impression that increasing the amount of information required in the message structure increased the difficulty of message coding. As seen in Fig. 1, neither the nine-year-olds nor the adults committed any errors on one item test stimuli, a few emerged on two item stimuli and most appeared on three item stimuli.

The above results clearly demonstrate that increasing the number of items of information required in the message magnifies the difficulty of the response. Therefore, the ability to produce a nonambiguous message

decreases with an increase in the amount of information to be conveyed thus confirming hypothesis 4.

The effects of the kind of information

Continuing the search for a hierarchy of task difficulty, the error patterns of all subjects were examined to discern what effects the distinctive types of underlying semantic/syntactic components of the message might have on coding ability. Hypothesis 5 predicted that fewer errors would be made on actor/subject and recipient of the action/object components as compared with location/preposition, attribute/modifier on the object, and attribute/modifier on the subject components. This prediction was maintained and, in addition, a more complete hierarchy emerged. Subjects' errors ranged from fewest to most on the criterial elements in the following order: actor/subject, recipient of the action/object, location/preposition, attribute/modifier on the object, attribute/modifier on the subject. For the most part, the data given in Tables 10 and 11 and Figure 1 on five and seven-year-olds' error patterns support this hierarchy. Furthermore, though both nine-year-olds and adults had no errors on one element items, in two element items the adults erred only on the attribute/modifier on the subject component (the most difficult component), while the nine-year-olds had more attribute/modifier on the subject errors than attribute/modifier on the object errors, and more

Table 10: Differences of semantic/syntactic component errors in one, two, and three element grouping for 5 and 7-year-olds

One element (one 1 → one 5)	Two element (two 1 → two 5)	Three element (three 1 → three 5)
subject errors < modifier on object errors	subject < object ***	subject < object *
subject < modifier on subject	subject < preposition ***	subject < preposition **
object < preposition	subject < modifier on object ***	subject < modifier on object **
object < modifier on object	subject < modifier on subject ***	subject < modifier on subject **
object < modifier on subject	object < preposition	object < preposition **
preposition < modifier on object	object < modifier on object	object < modifier on object *
preposition < modifier on subject	object < modifier on subject *	object < modifier on subject ***
	preposition < modifier on object	preposition < modifier on object
	preposition < modifier on subject	preposition < modifier on subject (1 tail) *
	modifier on object < modifier on subject (1 tail) *	modifier on object < modifier on subject *

Significance levels:
* $p < .05$
** $p < .01$
*** $p < .001$

Table 11: Distribution of semantic/syntactic component errors regardless of # of elements in 5 and 7-year-olds

Errors on Trial I that were corrected on Trial II (sem 1→ 5)		Errors on Trial I that remained incorrect on Trial II (sem 6→ 10)	
subject < object	***	subject < object	***
subject < preposition		subject < preposition	***
subject < modifier on object	**	subject < modifier on object	**
subject < modifier on subject	**	subject < modifier on subject	***
object < preposition	*	object < preposition	**
object < modifier on object	**	object < modifier on object	**
object < modifier on subject	*	object < modifier on subject	***
preposition < modifier on object		preposition < modifier on object	
preposition < modifier on subject		preposition < modifier on subject	
modifier on object < modifier on subject		modifier on object < modifier on subject	

Significance levels:

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

location/preposition errors than recipient of the action/object errors. In three item test stimuli, the adults had more attribute/modifier on the subject errors than attribute/modifier on the object errors while the nine-year-olds had more modifier on the subject errors than modifier on the object errors and more location/preposition errors than recipient of the action/object errors (see Figure 1).

When errors were summed over five, seven, and nine-year-olds, the following pattern was observed both in two item stimuli (pairs) and three item stimuli (triads):

> If the actor/subject component was required, the actor/subject elicited the fewest errors in message coding;
>
> If the actor/subject component was not required, and the recipient of the action/object component was required, the recipient of the action/object elicited the fewest errors in message coding;
>
> If the actor/subject or recipient of the action/object component were not required, and the location/preposition component was required, the location preposition component elicited the fewest errors in message coding;
>
> If the actor/subject component or recipient of the action/object or location/preposition were not required, and the attribute/modifier on the object component was required, the attribute/modifier on the object elicited the fewest errors in message coding.

Hence, there appears to be a consistent ordering of increasing difficulty of components: actor/subject,

recipient of the action/object, location/preposition, attribute/modifier on the object, attribute/modifier on the subject. Tables 12, 13, and 14 display these error patterns for each type of semantic/syntactic component when alone (Table 12) and when combined with every other type of semantic/syntactic component in pairs (Table 13) and in triads (Table 14). In these tables, a left-to-right ordering of increasing errors can be noted.

These findings support a hierarchy of difficulty for the semantic/syntactic components. That is to say, the child's ability to code the message will decrease when, for example, he must code a message involving an attribute/modifier on the subject and an attribute/modifier on the object as compared to his ability when he must code a message involving an actor/subject and a recipient of the action/object. Further, within each of these messages, respectively, the child will have less difficulty coding the attribute/modifier on the object as compared to the attribute/modifier on the subject, and less difficulty coding the actor/subject as compared to the recipient of the action/object.

An interaction effect

The hierarchy of difficulty is not entirely simple, however. Further analysis reveals an interaction effect between the number of elements and the semantic/syntactic nature of the elements. A comparison of the average sum

Table 12: Number of errors on each type of semantic/ syntactic component when alone.

	S	O	P	MO	MS	$=\Sigma$
alone:	17	12	13	24	20	86

Legend:

S = actor/subject

O = recipient of the action/object

P = location/preposition

MO = attribute/modifier on the object

MS = attribute/modifier on the subject

Table 13: Number of errors on each type of semantic/syntactic component when it is paired with every other type of semantic/syntactic component, as produced by five, seven, and nine-year-olds.

	S	O	P	MO	MS	≈	Σ
PAIRS ↓	9	13					22
	9		16				25
	4				22		26
		13		21			34
		14	25				39
	21			24			45
			14		43		57
			40	43			83
		30			57		87
				26	65		91
Σ →	43	70	95	114	187		509

Legend:

S = Actor/subject
O = Recipient of the action/object
P = Location/preposition
MO = Attribute/modifier on the object
MS = Attribute/ modifier on the subject
The pairs are connected by dotted lines

Table 14: Number of errors on each type of semantic/syntactic component when in triads with every other combination of semantic/syntactic components, as produced by five, seven, and nine-year-olds.

TRIADS ↓	S	O	P	MO	MS	=	Σ
	5		23		32		60
	11	16			43		70
		15		38	39		92
	14		40	38			92
	25	25		45			95
		15	50	33			98
	21	32	50				103
		26	36		59		121
	21			37	71		129
			42	52	61		155
Σ →	97	129	241	243	305		1015

Legend:

S = Actor/subject
O = Recipient of the action/object
P = Location/preposition
MO = Attribute/modifier on the object
MS = Attribute/modifier on the subject
The triads are connected by dotted lines

of errors for each type of semantic/syntactic component when in a pair with the average sum of errors in a triad reveals an increase in errors for all semantic/syntactic types (see Tables 13 and 14). In fact, the average error sum across all semantic/syntactic component errors rises from 25.45 in pairs to 33.83 in triads. This type of increase can also be seen when one moves from one element to two elements (see Tables 12 and 13). Except for the actor/subject, the number of errors on each component when unpaired is less than when paired.

From the above evidence, it appears that the number of elements in a message is the controlling force over difficulty. An increase in the number of items of information serves to increase the overall amount of errors while the order of difficulty of the semantic/syntactic components remains constant (see Figure 1). However, this controlling force is not fully consistent, and though for the most part, the behavior of a triad can be predicted from the behavior of the corresponding pairs, it is not always the case (see Table 15).

Table 15 schematizes the relationship of each triad to its corresponding pairs. The number circled above each triangle is the ratio of the summed errors in the triad to the sum of the errors in all corresponding pairs. A perfect fit would equal .66. Therefore, though the occurrence of error in a triad may correspond to the error

Table 15: Schematization of behavior of triads as compared with behavior of pairs.

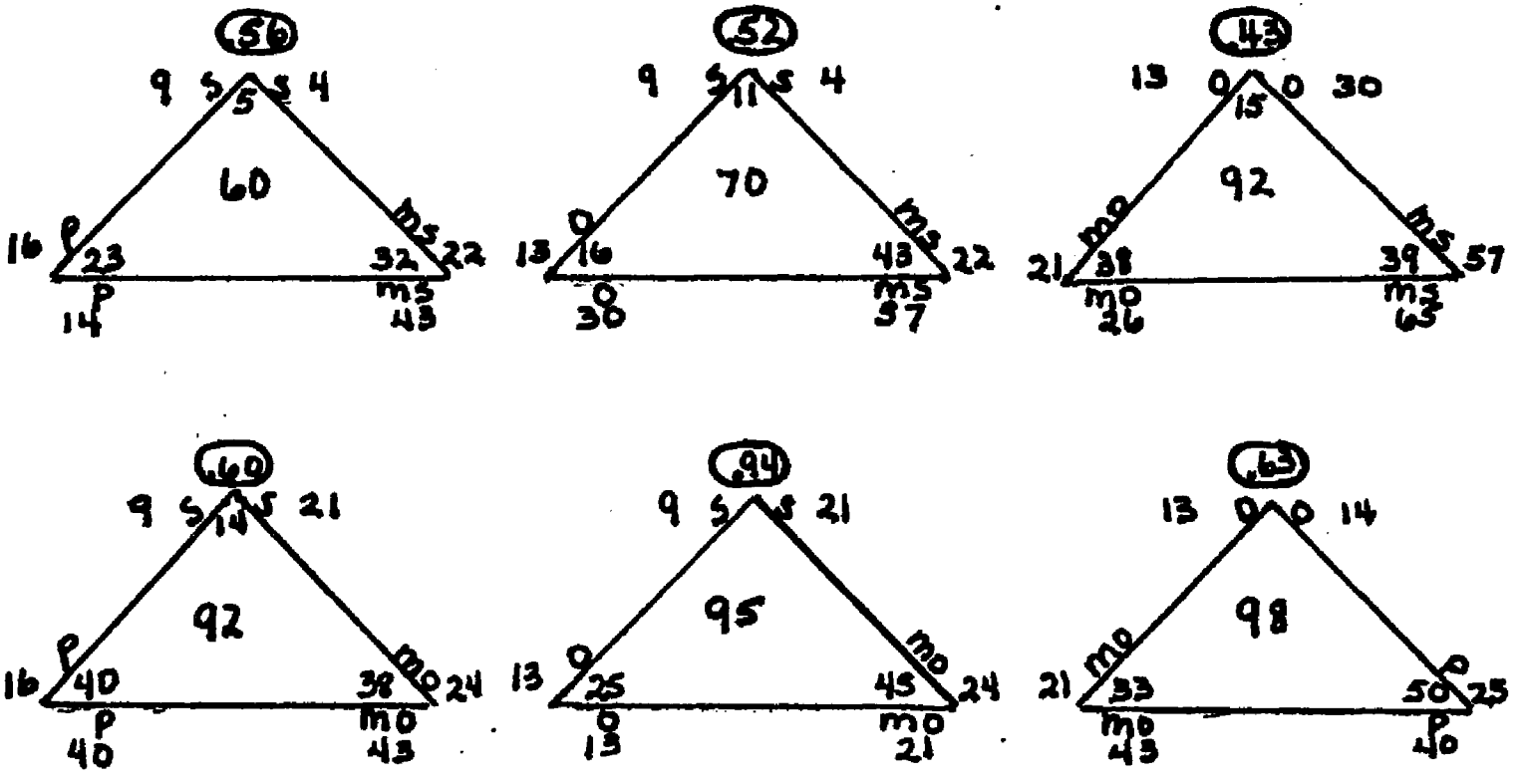
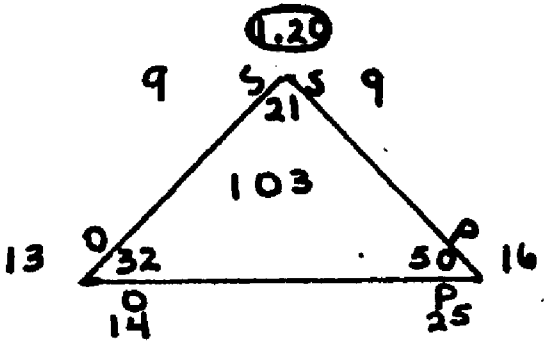
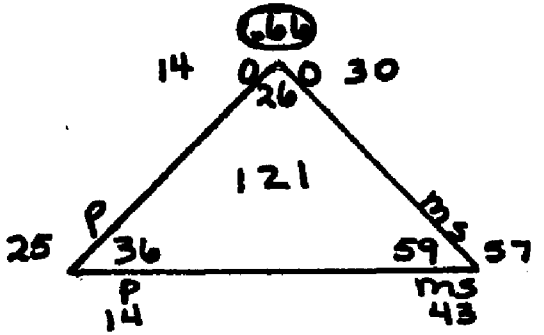
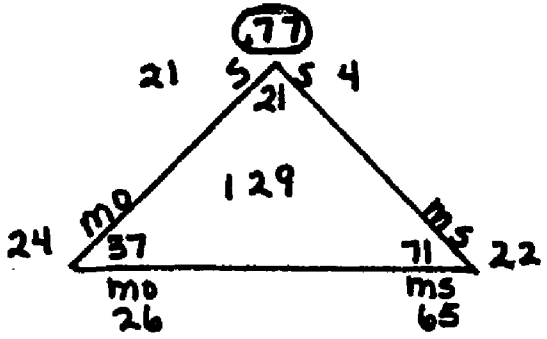
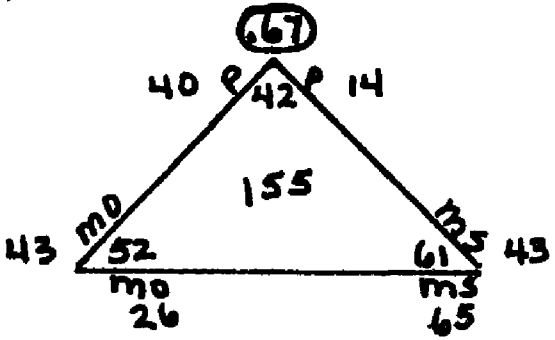


Table 15 (Cont.)









above = ratio of error on triad: sum of all errors in pairs
central # = sum of errors on all semantic/syntactic components when in triad
#'s in corners within the triangle = error on each component of triad
#'s outside of the triangle = # of errors on that component when paired with the component on the same line

S = actor/subject, O = recipient of the action/object
P = location, MO = attribute/modifier on the object
MS = attribute/modifier on the subject

pattern in the pairs, as with attribute/modifier on the subject—recipient of the action/object—location/preposition, or attribute/modifier on the subject—attribute/modifier on the object—location/preposition, it may not, as with actor/subject—recipient of the action/object—location/preposition or attribute/modifier on the subject—attribute/modifier on the object—recipient of the action/object. An explanation for the deviations might lie within the nature of the semantic/syntactic components themselves. For example, certain combinations of semantic/syntactic components may form natural units (e.g., attribute/modifier on the object + recipient of the action/object) which may have a cleansing effect on the entire triad. Table 16 lists error patterns of the semantic/syntactic components as a function of their combinations (to be discussed in detail in Chapter V).

If the hierarchy of message difficulty were totally shaped by the amount of information to be conveyed, the following error pattern would emerge: an attribute/modifier on the subject component in a one item test stimulus would have fewer errors than an actor/subject component in a two item stimulus and an attribute/modifier on the subject in a two item test stimulus would have fewer errors than an actor/subject in a three item test stimulus. However, in this task, there were instances in which control from the nature of the semantic/syntactic

Table 16: Interactions of semantic/syntactic elements

	Pair	Triad
Subject	Best: with modifier on subject Worst: with modifier on object	Best: with object + modifier on subject Worst: with object + modifier on object
Object	Best: with subject modifier on object	Best: with modifier on object + modifier on subject preposition + modifier on object
	Worst: with modifier on subject	Worst: with subject + preposition
Preposition	Best: with subject	Best: with subject + modifier on subject
	Worst: with modifier on object	Worst: with modifier on object + _____
Modifier on object	Best: with object	Best: with object + preposition
	Worst: with preposition	Worst: modifier on subject + preposition
Modifier on subject	Best: with subject	Best: subject + preposition
	Worst: with modifier on object	Worst: subject + modifier on object

components seemed to override the influence from the amount of information to be conveyed. For instance, the actor/subject component in a three element test stimulus had significantly fewer errors than attribute/modifier on the object or the attribute/modifier on the subject components in two element test stimuli, thereby demonstrating that the semantic/syntactic nature of the component might elicit more errors than might the number of the components within the entire message.

In conclusion, it can be stated that there exists a hierarchy of difficulty in message structure from one to three elements. Furthermore, a herarchy exists within the types of semantic/syntactic components: actor/subject < recipient of the action/object < location/preposition < attribute/modifier on the object < attribute/modifier on the subject. For the most part, an increase in the number of elements to be coded will bring out more errors on each type of semantic/syntactic omponent while still maintaining the expected order of semantic/syntactic component difficulty. However, there are instances in which the semantic/syntactic nature of the combination produces variations in the expected error patterns. From these results it is clear that many influences contribute to a child's ability to code a message, and coding difficulty cannot be ascribed solely to number of elements.

The Effects of Message Difficulty on Syntactic Style

The remaining experimental questions examined the average number of words and extraneous elements of messages in order to evaluate syntactic style. Over all, the data did not support the original hypotheses.

Tabulation of the average word measure involved a count of every word and contraction, examined separately in one, two, and three element messages. Across age groups, there were no significant differences in the average number of words per message, thus giving only tenuous support to the hypothesis that the ability to code more information is accompanied by the tendency to use compact syntactic structures.

Effects of the amount of information were examined within groups as well. In addition to the average word measure, the amount of extraneous information was tabulated for one, two, and three element test stimuli. An extraneous element was defined as information which was not essential for the coding of a nonambiguous message and which must adult subjects did not include. Neither measure produced significant findings and the resulting trends were in opposite directions. It was observed that the average number of words increased with one to three element test stimuli, while the amount of extraneous information either remained constant (across 5, 7, and 9-year-olds) or decreased (with adults) as the demand for

information increased.

One further analysis of the data compared the average number of words in a correct response with the average number of words in an incorrect response within groups. Again, no significant differences were observed.

Over all, findings indicate no support for hypothesis 6a.

Each combination of semantic/syntactic components represented a different field of focus. Therefore, the question of syntactic differences as relates to semantic/syntactic categories could not be explored. The search appeared to be futile since there were no meaningful results when summed over all one element, two element, and three element stimuli.

It would appear that, on this task, manipulation of informational content did not result in changes of syntactic style. This research design was probably not optimal for investigating questions confronting syntactic style.

Chapter V

Discussion

This study sought to explore the interaction of factors that affect children's abilities to formulate nonambiguous messages for a listener. This chapter summarizes the major findings of the study. A discussion of the results, in which the originally posed questions are answered with regard to these findings and others reported in Chapters I and II, follows. Finally, implications for working with children are considered.

Summary of the Major Findings

1. The general hypothesis:

The subjects' message coding abilities will vary as a function of manipulations of factors in the communication situation.

The findings clearly support this general hypothesis. Across all age groups it was demonstrated that manipulations in the level of difficulty of the stimulus caused alterations in the subjects' abilities to respond correctly. In addition, with seven-year-olds, modifications in the kind of feedback offered to the child produced changes in the response pattern.

2. The hypothesis relating to the amount of information to be coded:

An increase in the number of elements to be coded in the picture sets will produce a decrease in the subjects' abilities to code a nonambiguous message.

This hypothesis was strongly supported by the data. It was observed that an increase in the amount of information required in the message caused an increase in the number of errors. Therefore, the original question posed on this topic was answered in the affirmative. In this experiment increasing the number of elements of information required in the message appears to magnify the difficulty of the response.

3. The hypothesis relating variations in the subjects' abilities to code nonambiguous messages to differences in the kind of underlying semantic/syntactic components of the message:

Subjects will make fewer errors on actor/subject and recipient of the action/object components as compared to location/preposition, attribute/modifier on the object and attribute/modifier on the subject components.

This hypothesis was strongly supported by the findings, thereby permitting the conclusion that the semantic/syntactic nature of the underlying components of a message contribute to task difficulty. However, the data demonstrated a more specific hierarchy of difficulty than

originally predicted: actor/subject < recipient of the action/object < location/preposition < attribute/modifier on the object < attribute/modifier on the subject.

In addition, an interaction effect between the number of elements and the semantic/syntactic nature of the components was noted. An increase in the number of elements required in the message served to increase the overall amount of errors while the order of difficulty of the semantic/syntactic components remained constant.

4. The hypothesis relating to age:

The ability to code a nonambiguous message structure will improve with age.

A very strong age effect emerged from the data: five-year-olds made more errors than seven-year-olds; seven-year-olds made more errors than nine-year-olds, and nine-year-olds made more errors than adults. The five-year-olds demonstrated their overall inability to perform on the task through a significantly higher number of errors on simple test stimuli as compared with all other groups. Seven-year-olds demonstrated an ability to understand the basic requirements of the task in that they did as well as the nine-year-olds on simple test stimuli. However, they differed significantly from the nine-year-olds on difficult test stimuli. The strong effect of age diminishes somewhat when the nine-year-olds are contrasted with the adults. Nonetheless, the

nine-year-olds did differ significantly from the adults on the most difficult test items.

5. The hypothesis relating to cognitive level:

The ability to code a nonambiguous message will correlate highly with cognitive level.

The data indicated a high positive correlation between cognitive level and task performance. However, when the effect of cognitive level on performance was separated from the effects of age, it was seen that cognitive level alone could not predict overall experimental task performance. It should be noted, that while age was the better predictor of overall task performance, conservation ability was a stronger predictor of improvement than age.

6. The hypotheses relating to the effects of feedback

a. The oldest subjects (in age and in cognitive level) will benefit from both types of feedback offered by the listener.

b. The intermediate subjects (in age and in cognitive level) will benefit primarily from the directive feedback offered by the listener.

c. The youngest subjects (in age and in cognitive level) will not benefit from either type of feedback offered by the listener.

The effects of feedback on subject performance did not emerge as strongly as had been predicted. Nevertheless,

trends in mean scores and some significant findings support all three hypotheses. The oldest subjects made few errors and when an error was committed, both feedback types produced accurate message reformulation. On the other hand, the seven-year-olds appeared to benefit primarily from the directive feedback: subjects receiving directive feedback were better able to correct their original errors. The five-year-olds did not benefit from either feedback type.

7. The hypotheses relating to stylistic variation in message formation

a. An increase in the number of elements subjects successfully code will be accompanied by a tendency to use compact syntactic structures and, hence, a minimum of words.

There were no significant differences in the average number of words per message across the age groups, thereby giving tenuous support to the hypothesis. However, when the relationship of the number of elements required in the message to syntactic style (as evidenced by the average number of words) was examined, it was noted that trends within age groups failed to support the hypothesis. If there is more information to be conveyed, then more words will be utilized in message formation. It was noted, nonetheless, that adult subjects tended to reduce the amount of extraneous information

when there was an increase in the amount of information required by the listener.

b. An increase in the level of difficulty of the semantic/syntactic components to be coded will elicit an increase in the number of words and/or extraneous elements in the resulting message structure.

The question of syntactic style as related to each semantic/syntactic type could not be addressed, because no significant results were obtained when differences were observed over groupings of one element, two element, and three element stimuli.

Discussion of Findings

Determinants of test stimuli difficulty level

The findings of this study reveal a hierarchy of difficulty within the test stimuli. For the most part, researchers have focused on a study of the influence that the general nature of the task can have on the ability of children to respond. DeVilliers and deVilliers (1974) confront this point when they state that the overall sequence of development may remain constant while specific age acquisitions will fluctuate with task requirements. For example, the differences in the overall task requirements between the Webb and Abrahamson (1976) study and the deVilliers and deVilliers (1974) study reportedly accounts for the discrepancy observed in age

trends. The two tasks tap different levels of cognitive functioning and thus elicit different age trends. It must, therefore, be recognized that different types of tasks within the same topic of study will elicit different overall results. Moreover, within a given type of task there may be gradations in difficulty of test items. These gradations will result from factors relating to the construction of the items and will serve to elicit differential responding. This study has isolated two factors that contribute to the determination of the level of difficulty: the amount of information to be coded and the semantic/syntactic nature of the information to be coded.

Referential communication ability as a function of the amount of information

The results of this study indicate that increasing the number of criterial elements required for the formulation of a nonambiguous message increases the level of difficulty of the test stimulus. For example, it was observed that subjects made fewer errors on messages requiring only one criterial element as compared to messages requiring two or three criterial elements. In addition, if one message required the coding of only the recipient of the action/object element while another message required the coding of both the recipient of the action/object and the location/preposition elements, then subjects

would make more errors on the recipient of the action/object element in the latter message than in the former. Unlike the Ford (1971) and Randhawa (1973) studies, the type of criterial elements varied over five kinds of elements so subjects could not pattern their responses according to a single type of task requirement. In the Ford and Randhawa studies, the children were able to learn that attributes were the only type of criterial elements to be varied, and responded by coding as many attributes as their total capacity permitted regardless of particular test item requirements. In this study, the subjects were unable to pattern as the focus of attention was shifted with each test stimulus.

These results support the conclusion that one source of variation in difficulty of test stimuli is the amount of information required for coding. Since all test stimuli involved pictures of equal complexity and consistent type of task, it becomes clear that increasing the amount of information for coding can hamper the subject's ability to communicate a message.

Referential communication ability as a function of the kind of information

In addition to the amount of information, this study has demonstrated that the nature of the information to be coded can be another determinant of level of difficulty within test stimuli. In the literature, little

consideration has been given to the effects that the nature of the message content may have on coding ability. This omission is particularly noticeable in the classical studies on referential communication ability (Glucksberg and Krauss, 1967, 1969). These studies were based on a task that required the coding of extended noun phrases, i.e., multiple attributes plus a label. There was no intent to replicate normal language usage in ordinary conversational settings nor to examine the effects of message content on coding ability.

In this study, the manipulation of message content produced complex variations in response patterns. Of particular interest is the hierarchy of difficulty that emerged when the data were examined for differential effects due to the kind of criterial element. Subjects' errors ranged from fewest to most on the criterial elements in the following order: actor/subject, recipient of the action/object, location/preposition, attribute/modifier on the object, attribute/modifier on the subject.

Other investigators, in related areas of language study, have observed similar hierarchies within the semantic/syntactic components of language. For example, Keenan and Comrie (1972) report the existence of an "accessibility hierarchy" in the order subject, direct object, indirect object, oblique, genitive, and object

of the complement (from most to least accessible). This hierarchy reflects a "relativization order," i.e., those noun phrases on the upper end of the "accessibility hierarchy" are universally easier to relativize than those on the lower end. It has been observed that some languages have relative-clause-forming rules which apply to subjects only while other languages have rules that apply to subject and direct object. According to the "accessibility hierarchy," if a language has a relative-clause-rule for an indirect object, it will also have such rules for direct object and subject.

Johnson (1974) describes an "advancement continuity principle" that yields evidence for the order of the accessibility hierarchy. He notes that if a language can advance phrases that are low on the accessibility hierarchy to the subject role then it can advance all intermediate positions. For instance, if a language has a locative voice, it will necessarily have a passive voice.

These observations give support to the possibility that the hierarchy of difficulty in kind of information may not be task-specific, but may rather reflect a pervasive characteristic of language. However, no explanations for the hierarchy appear to exist in the literature although an explanatory basis can be established for portions of the observed hierarchy.

Actor/subject < recipient of the action/object.

Linguists have sought to define the characteristics of "subjectness," and have noted certain qualities of the subject syntactic role. Keenan (1976) notes that "subjectness" is determined by the number of subject-like properties that a noun phrase possesses. For instance, a subject is an obligatory constituent of the sentence, i.e., its elimination from the sentence would result in a grammatically incomplete utterance. Fillmore (1968) adds that a subject can be identified as the relationship between a noun phrase and an immediately dominating sentence, while a direct object can be equated with the relationship that holds between a noun phrase and an immediately dominating verb phrase. Therefore, a subject is viewed as a more basic element of the sentence. In addition, if there is an actor in the message content, it becomes the subject of the sentence. Perfetti and Goldman (1975) state that when the subject and the object of a sentence are equal to the actor and the recipient of the action respectively, then the subject is the better clue for the recall of that sentence. It appears that the subject noun phrase plays a special syntactic role. Therefore, the ordering of actor/subject < recipient of the action/object within the hierarchy seems to have both evidential support and a possible explanatory basis.

Actor/subject, recipient of the action/object<

attribute/modifier on the object, attribute/modifier on the subject. An explanation for the ordering of actor/subject, recipient of the action/object < attribute/modifier on the object, attribute/modifier on the subject may lie within the role of the modifiers. Martin (1969) notes that subject and object must be considered to be more basic to sentence formation than adjectives on both common sense and logical grounds. According to a commonsense position, one must decide what one is going to talk about before one can decide what one is going to say about it. From a logical standpoint, it must be noted that to make the choice of adjectives in a context-sensitive procedure, i.e., to choose the adjective appropriately, it is necessary to consider the relationship between the modified noun and the property denoted by the adjective.

Furthermore, linguists have asserted that a subject-object string is a basic sentence string. The addition of an adjective to a basic sentence serves to specify further and/or discriminate the contents. The use of a modifier reflects the speaker's awareness of specific listener need. These theoretical positions allow one to accept the ordering of actor/subject, recipient of the action < attribute/modifier on the object, attribute/modifier on the subject.

Attribute/modifier on the object < attribute/modifier on the subject. It was observed that subjects made fewer errors on the attribute/modifier on the object element than on the attribute/modifier on the subject element. This order may be explained by Chafe (1972). He notes that in normal language use subject noun phrases usually carry foregrounded information, and hence require little linguistic specification. While object noun phrases are less foregrounded than subject noun phrases and therefore require greater linguistic encoding to specify the intended referent. Based upon this informational distribution, object noun phrases appear to require the use of modifiers more often than subject noun phrases. Limber (1973) noticed this pattern in the language of two-three-year-olds. He observed that while their complex sentence structure involved object complementation, it did not involve subject complementation. Hence, due to information patterns within normal language use, subjects have less difficulty modifying the object sentence position than the subject sentence position.

Location/preposition < attribute/modifier on the object, attribute/modifier on the subject. An explanation for the occurrence of fewer errors on location/preposition than on either attribute/modifier may lie within

the informational content of the preposition. The preposition introduces a new piece of information, whereas the modifiers specify existing information. In addition, Keenan (1976) introduces the concept of "basic sentence." This is a privileged subset of sentences in any language that is semantically more basic and syntactically simpler than any other group of sentences. Subject—verb—object, subject—verb, and subject—verb—preposition are all considered to be basic sentences. The addition of a modifier to a basic sentence would make it a nonbasic sentence as its meaning would then be dependent upon the unmodified structure.

It is of interest to note that the order within the observed hierarchy does not reflect developmental patterns. The order of acquisition at the one and two word stage has been reported to be object < subject (Bloom, 1970; Bowerman, 1973). In addition, according to Ervin-Tripp (1970), children learn to give specific information in the following order: object, preposition, action, attribute, subject. These findings are consistent with other evidence in the literature that the order of acquisition is not a perfect predictor of degree of difficulty on language tasks.

Interaction effect of amount and kind of element

When examined further, the hierarchy of item

difficulty is seen to include an interaction effect between the number of elements and the semantic/syntactic nature of the elements. Generally, the number of elements within a given test stimulus served as the controlling force over the error pattern that emerged. An increase in the number of items of information served to increase the overall amount of error while the order of difficulty of the semantic/syntactic components remained constant.

Moreover, combinations of elements affected the resulting error pattern in different ways. For example, the recipient of the action/object—location/preposition combination produced a large number of location/preposition errors. This finding can be explained by the syntactic structure required in the message. A complete sentence for the recipient of the action/object—location/preposition message requires subject + verb + object + preposition + object of the preposition, or two syntactic branches. Other combinations with location/preposition result in more basic sentence structures. For example, actor/subject—location/preposition requires the use of subject + verb + preposition + object of the preposition. The difficulty of the recipient of the action/object—location/preposition combination is observed in the triad combination as well. At first glance, the actor/subject—recipient of the action/object—location/preposition triad

appears to produce an error pattern that was not predicted by the sum of the errors in the pair (see Table 15). However, as already shown, the recipient of the action/object—location/preposition combination elicits a greater number of errors than either actor/subject—location/preposition or actor/subject—recipient of the action/object. The errors produced on the triad can be predicted by proportionately increasing the errors observed on the recipient of the action/object—location/preposition combination.

The requirements of the experimental task served to focus subjects' attention on certain aspects of the pictures. On the pretraining task, the subjects were alerted to the need to focus on individual elements in the search for differences among the pictures. The need to focus appears to be a detrimental force when confronting certain combinations of elements. For instance, when either of the combinations actor/subject—attribute/modifier on the object or attribute/modifier on the subject—recipient of the action/object were required, there was an increase in errors on actor/subject and recipient of the action/object, respectively. The modifiers demand additional specification of the corresponding element and thereby force the subject to focus on those elements while ignoring other criterial elements.

On the other hand, the ability to attend to one

focal point can be an advantage in combinations such as attribute/modifier on the subject—actor/subject or attribute/modifier on the object—recipient of the action/object. These combinations appear to form complete units. As soon as a subject attends to the special modification required, the basic semantic/syntactic element is automatically included, resulting in a reduction of the number of errors on actor/subject and recipient of the action/object, respectively.

The attribute/modifier on the object and the attribute/modifier on the subject elements appear to have different effects on error patterns. The addition of the attribute/modifier on the object element usually elicited an increase in errors throughout the pair or triad, whereas the addition of the attribute/modifier on the subject did not. Therefore, it appears that the attribute/modifier on the object element was an influential force over error patterns while the attribute/modifier on the subject was a weak element that was eliminated without affecting other elements. This pattern was brought out further in the attribute/modifier on the object—attribute/modifier on the subject combination: the errors were 26 and 65, respectively.

It has been shown that the informational content of a message may vary with both the amount of information to be coded and the semantic/syntactic nature of the

information. Because this study did not separate the dimensions of semantics and syntax, no conclusion is possible regarding which underlying dimensions of the criterial elements shaped the hierarchy. Further research is needed to explore the effects of separate manipulations of these two dimensions. Separation of these two factors would allow for insight into the universality of the observed phenomenon. Also, it would be interesting to see if the same hierarchy among the semantic/syntactic elements would emerge on memory and perceptual tasks.

In conclusion, it must be emphasized that, even when the same overall skill is tapped consistently by a referential communication task, there may be variations in the ability to code a message due to the informational content of the individual test items.

Referential communication as a function of age

The analysis of the data from this study clearly demonstrated a strong age effect. Of all the variables tabulated prior to the experimental task, age has been shown to have the strongest predictive power for experimental task performance.

Through error patterns and the nature of their responses, five-year-olds demonstrated that they could not fulfill the requirements of the task. Glucksberg and Krauss (1967) report that five-year-olds occasionally

pointed and gestured while saying, "It goes like this," when communicating to a listener who could not observe their actions. This behavior was observed in this study as well. For example, a five-year-old said, "That one right there"(while pointing), and "he's sitting on the chair and it's right there but not right there" (while pointing). This type of response was noted in a number of five-year-olds but was never observed within any other age group. There were other behaviors that typified the five-year-old group:

1. the tendency to key into one kind of element, such as color, and to include it in all the messages regardless of the relevancy to that particular item;
2. the inclusion of all possible elements, i.e., the child would describe every detail of the picture: for example, a correct coding of item 11, "with a table, green table, part of the way table and a shelf and a table with a white table and white chairs, a boy sitting down with a blue shirt, yellow hair and orange book with fours minus two, fours and with a white chair, with a red girl with black hair and white ears and face, black eyes, and black eyebrows and a black mouth with an orange book with zero, two, three, and plus and plus one and a lady read, showing boys and girls reading, with a blue dress and white hands and with black and white face and black glasses with a red book and a girl with a purple dress with two legs and a girl with two black shoes and a

yellow socks";

3. the extensive use of pronouns without attempts to clarify referents, for example, the incorrect coding of item #2, "she's writing that";
4. the inappropriate use of labels, such as the use of proper nouns;
5. the use of inferential statements, making it unclear to the listener if the message was a description of the picture or a reporting of a related event. (see Appendix F)

There were some five-year-olds who could extract accurately the information needed by the listener, but who had limited control over syntactic structures. For example, a five-year-old coded correctly test item #10 as "a lady gots a blue dress, another lady gots a blue dress too. A man picking out red hat and it blue where he pickin' the hat up and gots purple lips and he not sad and he happy and he gots a feather on and he got blue dress." Occasionally, errors in syntactic structures caused ambiguous message structures (see Appendix E).

The analysis of the seven-year-olds' test scores indicated that they were performing on a level comparable to the nine-year-olds on simple test items while on difficult items, they were performing similarly to the five-year-olds. This error pattern lends support to Krauss and Glucksberg's (1977) statement, "When the demands of the task become heavy enough, children may

not have the opportunity to bring into play the social communication skills they possess" (page 104).

In addition, to the error patterns, other characteristic test behavior can be isolated for the seven-year-olds:

1. the use of a separate phrase for each required element, e.g.(item #5): it's red, it's a brown box, and the girl's smiling."
2. the extensive use of pronouns, although, unlike the five-year-olds, the referents for the pronouns were specified, as in item #1, "she's little, she's drinking something on a chair that's really too big for her and it's a girl."
3. the inclusion of contrasting information from non-target pictures, e.g. (item #33): "it's a boy instead of a girl, and he's putting the doll on the chair instead of under the chair." (item #17) "It's the one where he's putting the orange car but not a girl putting in a orange car but with the boy." Occasionally, as can be seen, the inclusion of the contrasting information served to elicit complex sentence structure. At times, the extra information was embedded in inaccurate syntax which ambiguated the message (e.g.,"this one has a sad face and this one has a happy face").
4. the addition of inferential statements to the basic message, as in item #27, "it's the one where the girl is holding out the plate, the blue plate, to get some food, I think."

(see Appendix G)

The behaviors of both the five and seven-year-olds are consistent with the findings of Muma (1976), who states, "It's not that infants and preschoolers don't communicate, but, rather, that these children are not adept in playing the communication game to overcome obstacles" (page 278).

The error scores of the nine-year-olds, taken along with their overall test behaviors, firmly establishes that they were performing almost on adult level. Some of the response patterns that typified the nine-year-olds:

1. there were few, if any, inferences included within the messages.
2. there were few pronouns used. All elements were explicitly labeled, for example, "the boy rides the bike" was more likely to be coded even though "he rides the bike" would have communicated the intent of the message. The nine-year-olds, like the adults, usually offered some redundancy within the message to allow for complete sentence structure.
3. modifiers were incorporated into the sentence structure, producing compact rather than complex sentence structure. For example, "the girl has a red doll" appeared in nine-year-olds' responses rather than "it's a girl and she has a red doll."
4. there was a tendency to give some extraneous information on the beginning test items but as experience was gained, only the criterial

> elements were included; e.g., on item #1, "It's a little girl in a purple suit and another girl with a fat face and a lady doing dishes and the time is thirty-five minutes after five. The cat is laying on the ground, the table is orange with yellow flowers," whereas on item #26, "the girl is throwing a red ball."

A listing of the characteristic test behaviors of the adult group would be identical to those given for the nine-year-olds (see Appendix F). It is important to note that there were both fluctuations in communication ability and stylistic patterns among the adults. For the most part, the stylistic variations did not interfere with the accuracy of the response. For instance, some adults chose to code only the criterial elements, thereby producing a telegraphic type language pattern (e.g., item #20, "chubby boy—red ball). Other adults offered complete sentence structures: "the chubby boy is kicking the red ball."

In general, the age range for accurate performance on this task was somewhat younger than those observed on other structured referential communication tasks. Krauss and Glucksberg (1969) report that at ten years of age, children's performance does not equal adult performance. Cohen and Klein (1968) also report older age ranges for successful task performance. This discrepancy in age findings probably reflects the difference in task requirements. This task required the use of natural, descriptive

language structures while the two other studies required the use of expanded noun phrases. According to McCaffrey (1975) and Sinclair (1975) language for the description of the passage of events over time and space is easier than language for analyzing and differentiating static events.

It should be noted, however, that the age differences reported in this study are later than those reported by Menig-Peterson (1975) and deVilliers and deVilliers (1974). Again, the explanation for the inconsistency can be found in task differences. The Menig-Peterson and deVilliers and deVilliers studies are naturalistic in format while this study can be viewed as a meta-communication task. This task does not allow for normal discourse manipulations of information since the criterial elements are defined for the child.

Over all, the age differences observed on this task correspond with expectations derived from theoretical and experimental positions. In addition, the findings are in agreement with the general conclusion: the ability to perform on a referential communication task improves with age.

Referential communication ability as a function of cognitive level

The findings of this study reveal a positive correlation between cognitive level and experimental task

performance. In fact, some researchers (Flavell, 1971; Sinclair, 1975) would assert that the age differences observed give direct evidence for claiming the existence of a causal relationship between the two. This claim would be motivated by a Piagetian approach to cognitive development. According to Piaget (1926), five-year-old children are highly egocentric and cannot assess listener need due to cognitive immaturity. On the other hand, seven-year-olds are beginning to gain flexibility of thought and awareness of others' points of view, while nine-year-olds are beginning to demonstrate role playing abilities which reflect their cognitive capacity to decenter. It, therefore, could be claimed that the age differences observed are in accordance with a Piagetian cognitivist position and, hence, the language behaviors recorded are a reflection merely of the underlying cognitive level.

Upon closer examination, the findings fail to support the above conclusion. Some children aged five and seven produced messages that demonstrate an ability to isolate the informational needs of the listener, but an inability to structure the message efficiently. The information was not coded in a way that could permit the listener to select the intended referent. For example, one child incorrectly coded item #11 as "that book is blue but not red" (correct response is "that book is red

but not blue"). Thus, the child demonstrated his awareness of the listener's need for the attribute/modifier on the object information but failed to code it in a nonambiguous form. Such responses indicate that the child can assess the informational needs of the listener thereby demonstrating that the child has the cognitive capacity to assume the listener's point of view.

It appears that the child's ability to code a nonambiguous message for a listener may break down either as a result of his inability to assess listener informational need or his inability to structure the message in a way that is processable for the listener. More specifically, his problem in message structure may be linked to particular syntactic failures or to general organizational deficiencies. An example of a syntactic failure would be a child's inability to manipulate a syntactic form with "instead," i.e., if the target referent were blue, he would state, "the red one instead of the blue one."

On the other hand, a general organizational deficiency may reflect the violation of certain conversational maxims that are ordinarily adhered to by a speaker within discourse, and which may result in a message structure that is not processable for the listener. Grice (1975) outlines several conversational maxims: 1) make your contributions as informative as required;

2) do not make your contributions more informative than required;

3) try to make your contributions true;

4) don't say that for which you lack evidence.

Many five-year-olds violated one or more of these maxims. For instance, some five-year-olds offered great amounts of extraneous information in addition to the required information, thereby violating the second maxim. Occasionally, a five-year-old would give an inaccurate description of the picture along with the needed information, hence violating the third maxim. At times, a five-year-old would create a story about the picture thus offering inferred rather than factual information.

From these observations and the realization that most subjects demonstrated variations in their message coding ability as a function of item difficulty, it must be stated that the cognitive ability to assess listener informational need cannot be considered the underlying determining factor of performance on this referential communication task. Cognitive ability is one factor among many that shapes performance.

As previously stated, the analysis of the data does indicate a high correlation between experimental task performance and cognitive level. However, as both are known to improve with age, the existence of a correlation yields little information about the relationship between

the two. When age is held constant within the data analysis, the relationship of cognitive level to experimental task begins to emerge. It can be seen that the cognitive decentering task had little predictive power for performance on the experimental task. This finding may have been a result of the specific decentering task chosen for assessment of cognitive level. As has been noted in prior research (Cromer, 1972, Rubin, 1973), the ability to decenter develops gradually. The particular task used may have required a higher level of decentering ability than is required for accurate performance on a referential communication task. Further research is needed to explore the relationship of cognitive decentering abilities to referential communication tasks before conclusions can be drawn.

Conservation ability did have predictive power for performance on the experimental task. It was observed that children who were "good conservers" were more likely to show facility in reformulating an originally ambiguous message. This observation is in agreement with other behaviors one would expect from an individual who can "conserve." According to Piaget and Inhelder (1969), the ability to conserve is based upon nonegocentric type thinking, i.e., flexible thought patterns that do not focus on one aspect of a situation. Therefore, the child who can conserve will also be able to change his response

structure to adapt to newly acquired information.

Generally, it can be concluded that cognitive level is one factor, among many, that contributes to children's performance on a referential communication task. As Krauss and Glucksberg (1977) state, "Although egocentrism may contribute to the poor performance of younger children, it cannot account for the overall pattern of performance" (page 104). This conclusion is further emphasized when one realizes that adults, as well as children, vary in their ability to perform on a referential communication task.

The effects of feedback on message reformulation

The results of this study indicate that the ability to utilize feedback increases with age. Five-year-olds were unable to modify their messages to the needs of the listener even when those needs were explicitly defined through feedback. For the most part, five-year-olds in both feedback groups used losing strategies for message reformulation. In addition, they indicated through comments that they were unaware that the speaker shaped the listener's response (e.g., "she's dumb, she can't get it right." "I did tell her, why did she get it wrong?") If questioned prior to the listener's response, they could not predict whether the listener would or would not perform accurately.

Seven-year-olds were able to modify their responses for the listener, but they benefited more from explicit directive feedback than implicit nondirective feedback. They appeared to utilize directive feedback as a guide for reformulating the message. The group receiving directive feedback used more winning strategies than the nondirective feedback group. Seven-year-olds indicated that they were aware of their control over the listener's responses. For example, the following comments were recorded: "I know she'll get this one." "She shoulda known, I told her what was important."

Nine-year-olds and adults were able to modify their original messages as soon as they were informed of an error. Either type of feedback was effective.

For the most part, these results agree with the conclusions drawn by Fishbein and Osborne (1971) and Peterson, et al. (1972): explicit feedback facilitates responding on a referential communication task. It is possible that on a very difficult task, nine-year-olds and adults require explicit feedback for accurate responding, and that on a simple task five-year-olds may benefit from some form of feedback.

The utilization of feedback requires that the child evaluate his original message. The ability to evaluate, theoretically, can occur both on the cognitive and linguistic levels. Cognitively, the child must evaluate his

message to determine if it contains the criterial elements needed by the listener, and if it has stronger associations with the referent than the nonreferent. Linguistically, the child must judge the lexicon and grammatical structures to be consonant with the linguistic capabilities of the listener. From the responses of the children, it is obvious that an inability to evaluate on either level can cause a breakdown in both message formation and reformulation.

When manipulating the effects of feedback on message reformulation, this study did not separate these evaluative levels. It would be of interest to see if an experimental task could be designed that would effectively separate them.

The effects of message difficulty on syntactic style

The hypotheses relating to variations in syntactic style were not supported by the data. These hypotheses had been motivated by Slobin's (1975) third charge concerning language: be quick and easy. Slobin maintains that a speaker will attempt to condense as much information as possible into the shortest amount of time. In this way, the speaker can convey the maximum amount of information while he holds the listener's attention. It is not believed that the lack of support evidenced in these findings alter the feasibility of Slobin's

contention. Rather, the nature of the experimental task did not present conditions that would elicit systematic stylistic variations in message formation. Slobin's position relates to the syntactic structuring of old versus new information within the context of discourse. The experimental task of this study did not offer a speaker an opportunity to confront patterns of messages within discourse. Isolated message formation does not require the manipulation of information that is comparable to the organization of information within discourse.

Research is needed to explore stylistic variations in syntax. It would be interesting to see if the nature of the message content, i.e., the amount of information to be coded and the kind of information to be coded, have differential effects on syntactic style. To be most meaningful, however, the experimental design would have to explore the flow of messages within discourse.

Conclusion

This study examined the effects that manipulation of various factors within a communication situation has on the ability to code nonambiguous messages. Variations in subjects' responses demonstrated that the referential communication ability is not dependent upon a single factor but rather requires the interaction of multiple components. For example, though a child might demonstrate

awareness of listener need, the use of inaccurate syntactic structures could prevent the coding of non-ambiguous messages.

Approaching language study from within a communication model forces one to acknowledge the interaction of syntactic and pragmatic factors. Hence, when teaching a particular syntactic structure to a child with a language problem, the teacher must be aware of the situation, the context, the discourse, the listener, etc. If the teacher is not aware of these pragmatic considerations, a distortion of normal language use will result. Instances of distortion can be noted in the following situations:

1. teacher: What do you want?
   child: The ball.
   teacher: No, say: I want the ball.
2. Both the teacher and the child are looking at the same picture. The teacher asks the child to tell her all about the picture.
3. teacher: What is this? (holding up a ball)
   child: A ball.
   teacher: No, a red ball.

In the first example, the teacher has failed to consider the normal flow of discourse, while in the second and third examples, the teacher has ignored the importance of information exchange and contextual constraints.

In each of the above situations, there is little hope for generalization of learning. Outside of the clinical setting no one would demand that the child utter "I want the _____" in response to "What do you want?", nor would one expect a child to describe a picture that is in full view of both the speaker and the listener.

A referential communication task forces one to consider multiple pragmatic factors when training a syntactic structure. A syntactic structure that is trained within an appropriate communication setting will have potential for generalization to situations outside of therapy.

There have been attempts to train the referential communication ability in children (Fry, 1966; Shantz and Wilson, 1972; Wood, 1975; Blue 1975). However, the training paradigms have been constructed without complete understanding of the parameters of referential communication ability.

Shantz and Wilson (1972) trained seven and a half-year-olds to fully describe pictorial designs and to isolate criterial elements of pictures. The results indicate learning, in that children who had been trained were better able to perform on similar tasks than children who had not been trained. The trained children, however, demonstrated only a moderate degree of transfer of

learning to other types of referential communication tasks. The researchers were unable to account for this lack of transfer as they identified the ability to assess the listener's need as the only underlying factor of referential communication ability. Thus, it is demonstrated that without adequate understanding of the multiple components contributing to referential communication ability, response patterns cannot be meaningfully evaluated and the source of breakdown cannot be identified.

The findings of this study contribute to our further understanding of language in use and suggest areas of additional study.

APPENDIX

Appendix A: A listing of picture topics of the pre-training task.

		the target element
1.	Baby on table (3x's) Baby under table (target) >	location/preposition
2.	Boy push red car (3x's) Boy push blue car (target) >	attribute/modifier on the object
3.	Boy pull wagon (3x's) Girl pull wagon (target) >	actor/subject
4.	Brown dog bark (3x's) Yellow dog bark (target) >	attribute/modifier on the subject
5.	Girl push ball (3x's) Girl push car (target) >	recipient of the action/ object
6.	Boy sit on box (3x's) Boy sit in box (target) >	location/preposition
7.	Man hold purple magazine (3x's) Man hold yellow magazine (target) >	attribute/modifier on the object
8.	Woman hold package (3x's) Man hold package (target) >	actor/subject
9.	Skinny boy runs (3x's) Fat boy runs (target) >	attribute/modifier on the subject
10.	Lady holds package (3x's) Lady holds ball (target) >	recipient of the action/ object

Appendix B: A listing of the picture topics corresponding to each combination of semantic/syntactic elements.

actor/subject:
item #1: the little girl is drinking milk
item #26: the girl is throwing the ball

recipient of the action/object:
item #6: the dog is biting the chair
item #31: the duck has a flower

location/preposition:
item #21: the dog is in the basket
item #46: the dog is on the toybox

attribute/modifier on the object:
item #11: the teacher has a red book
item #36: the girl has a red ball

attribute/modifier on the subject
item #16: the black dog is running
item #41: the black cat is playing

Pairs

actor/subject- recipient of the action/object
item #4: the boy is riding the bike
item #29: a girl rolls a ball

actor/subject- location/preposition
item #19: the boy is in the box
item #44: a girl sits on a table

actor/subject- attribute/modifier on the object
item #9: the girl is holding a blue ball
item #34: the boy kicks the red ball

actor/subject- attribute/modifier on the subject
item #14: the yellow dog is eating the lunch
item #39: a black dog plays with a ball

recipient of the action/object- location/preposition
item #8: the girl is putting the shoe in the box
item #33: the boy puts the doll on the chair

recipient of the action/object-attribute/modifier on the object
item #13: a baby is chasing a blue ball
item #38: the girl blows a blue horn

recipient of the action/object- attribute/modifier on the subject
item #24: a fat boy has flowers
item #49: the fat girl holds a doll

location/preposition- attribute/modifier on the object
item #23: the boy is playing with a red car on the table
item #48: the man puts the blue paint on the table

location/preposition- attribute/modifier on the subject
item #3: the brown dog is lying on the bed
item #28: a yellow cat is on the box

attribute/modifier on the object- attribute/modifier on the subject
item #18: the fat girl holds the red ball
item #43: the fat woman holds a red sweater

Triads

actor/subject- recipient of the action/object- location/preposition
item #17: the boy is taking the car out of the box
item #42: the lady has a cup on the saucer

actor/subject- recipient of the action/object- attribute/modifier on the object
item #2: the man is reading the red book
item #27: a girl is holding a blue plate

actor/subject- recipient of the action/object- attribute/modifier on the subject
item #22: the brown dog is chewing the bone
item #47: a yellow cat plays with a ball

actor/subject- location/preposition-attribute/modifier on the object
item #25: the boy is putting yellow books on the table
item #50: the man puts the red hat in the box

actor/subject- location/preposition-attribute/modifier on the subject
item #12: the yellow cat is in the basket
item #37: the yellow duck is in the wheelbarrel

recipient of the action/object- location/preposition-attribute/modifier on the object
item #15: the mother is putting the blue plate on the table
item #40: a man put yellow flowers in a bag

recipient of the action/object- location/preposition-attribute/modifier on the subject
item #10: a happy clown puts a hat in a bag
item #35: a happy lady puts a dress in a trunk

location/preposition- attribute/modifier on the subject-attribute/modifier on the object
item #5: the happy girl puts the red doll in the box
item #30: a happy boy puts a red plane in a box

actor/subject- attribute/modifier on the object-attribute/modifier on the subject
item #7: the fat boy is driving the red car
item #32: the skinny girl is riding the red bike

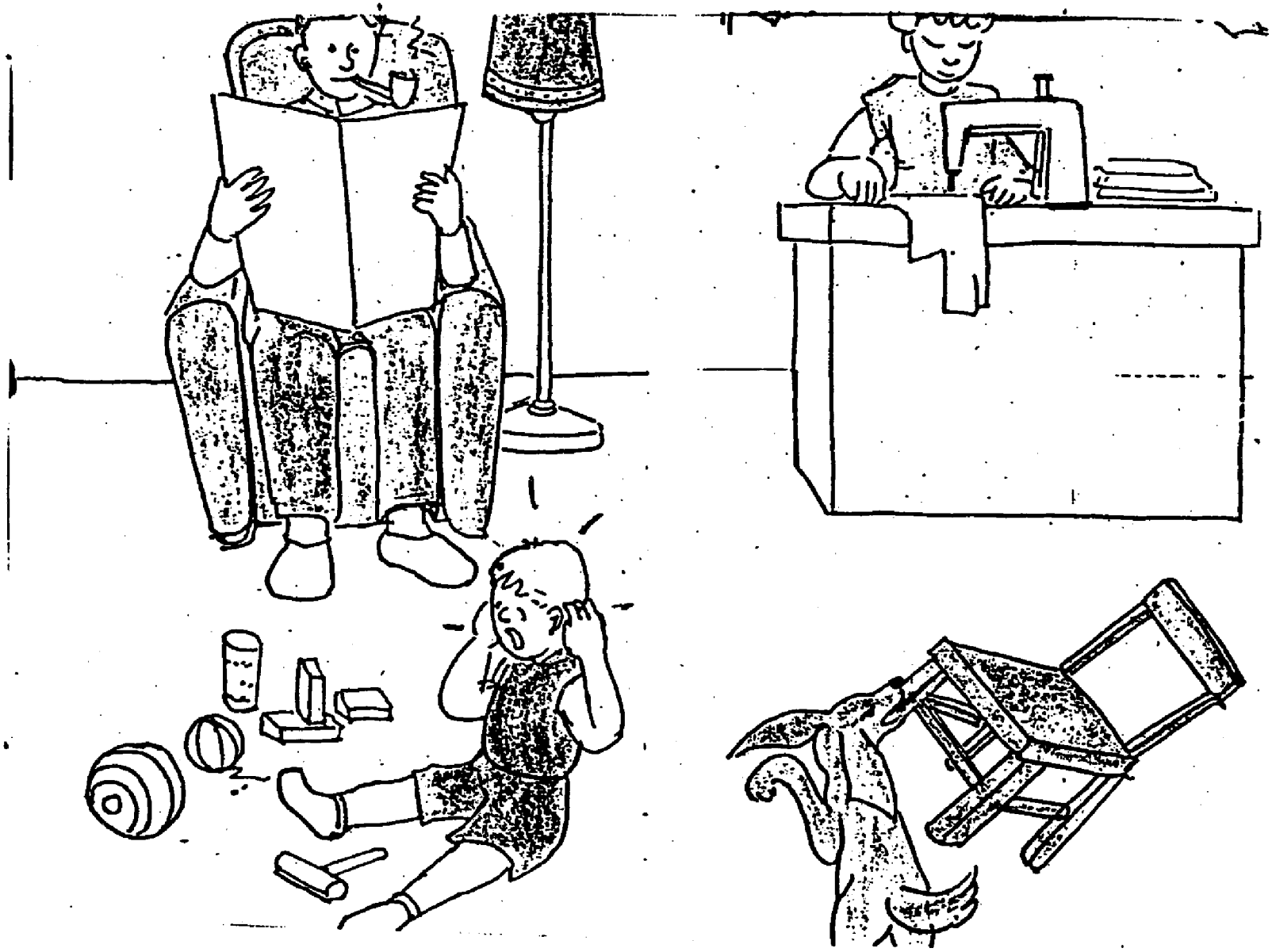
recipient of the action/object- attribute/modifier on the object- attribute/modifier on the subject
item #20: the fat boy is hitting the red ball
item #45: a fat boy kicks a yellow ball

Appendix C: Sample pictures

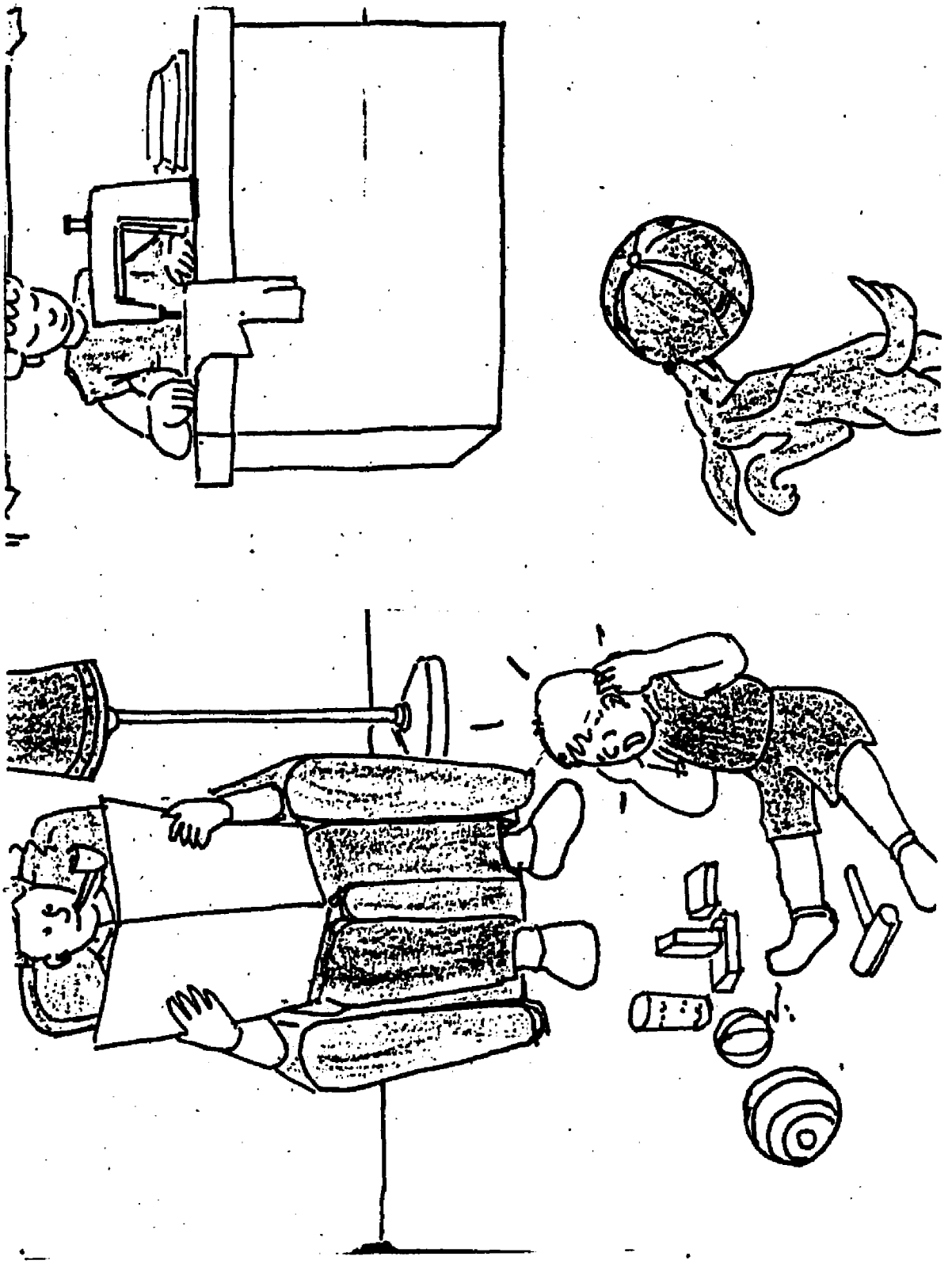
Set I = item #6 (recipient of the action/object)

Set II = item #4 (actor/subject - recipient of the action/object)

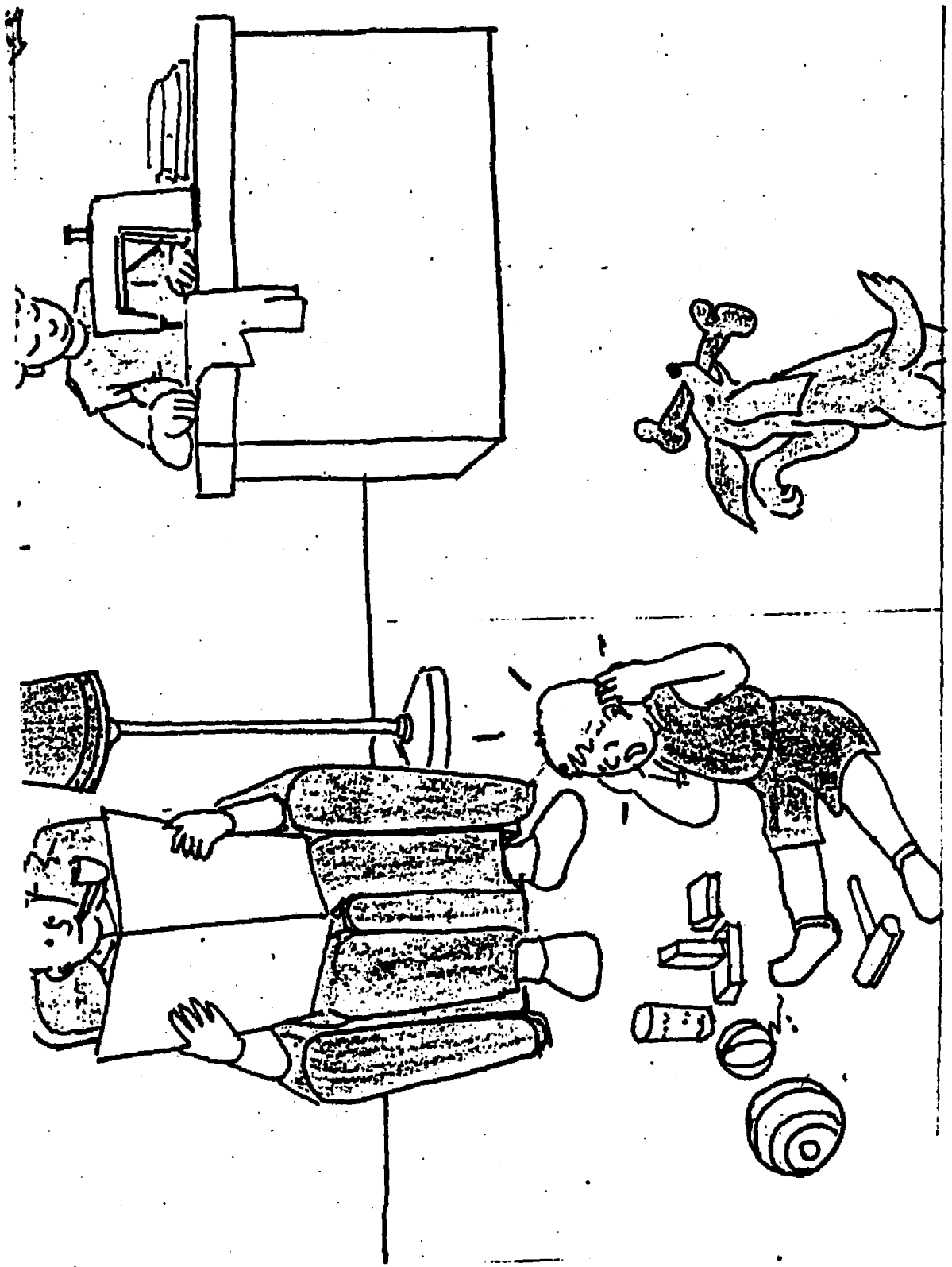
Set III = item #10 (attribute/modifier on the subject- location/preposition-recipient of the action/object)



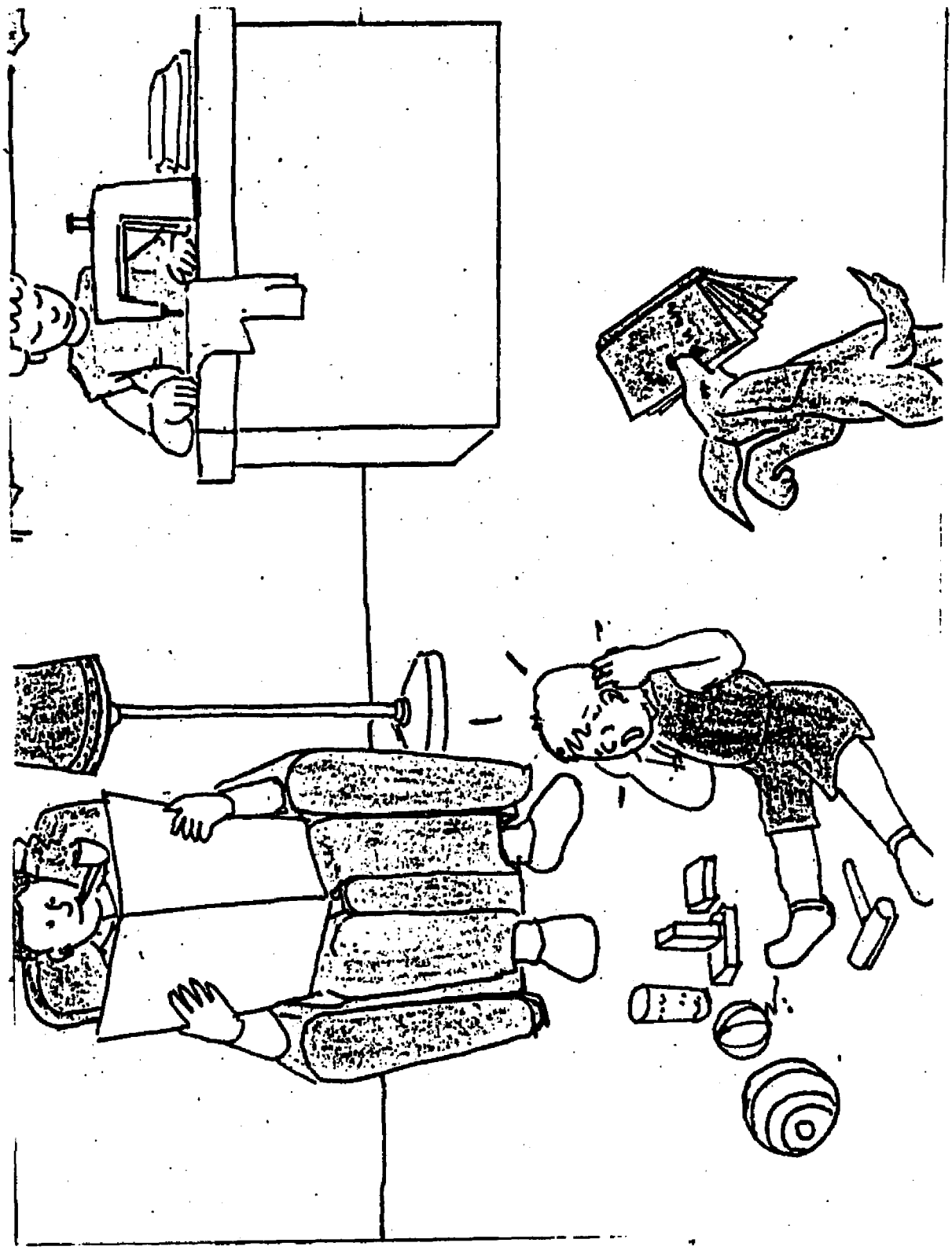
Set I Target Picture



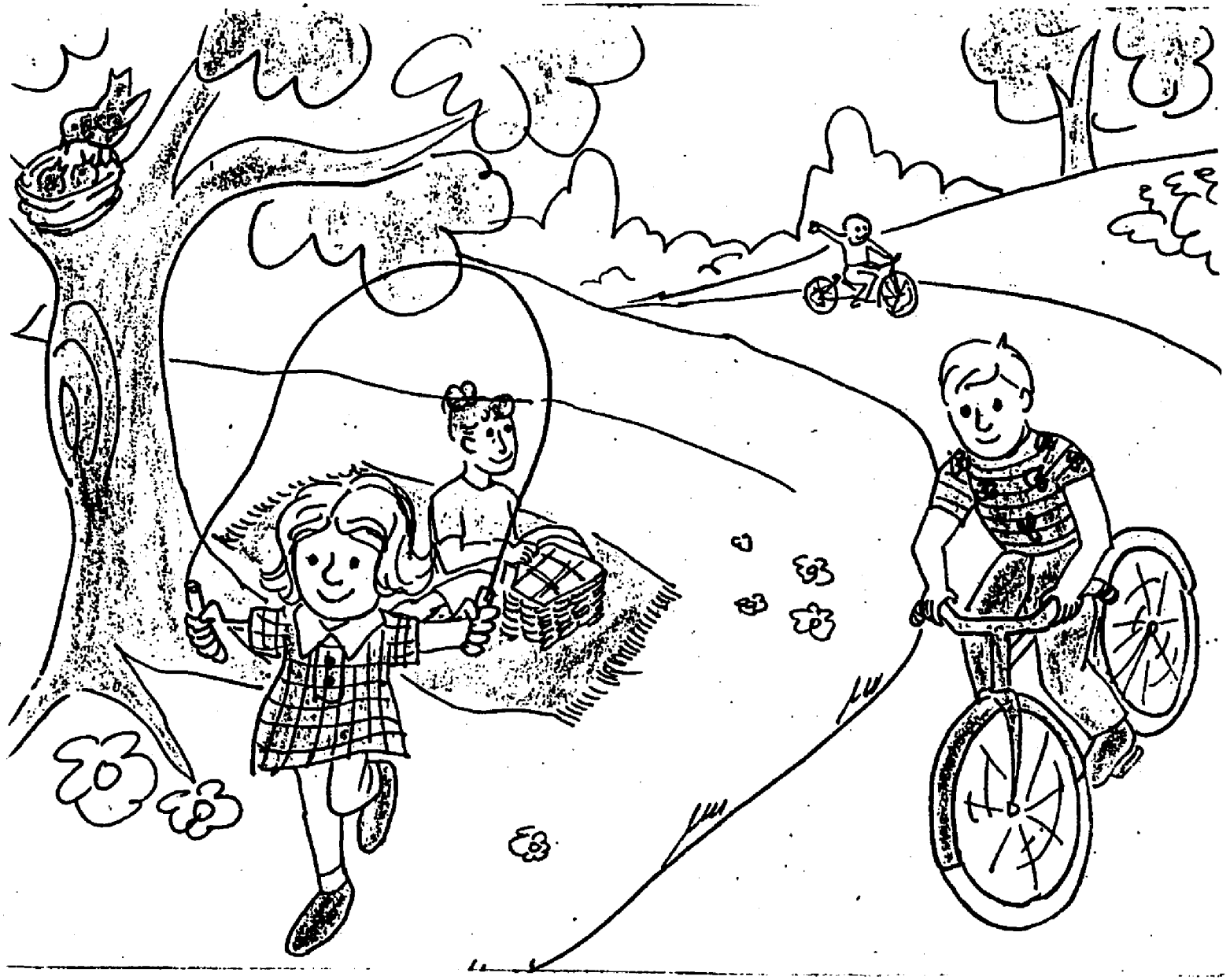
Set I



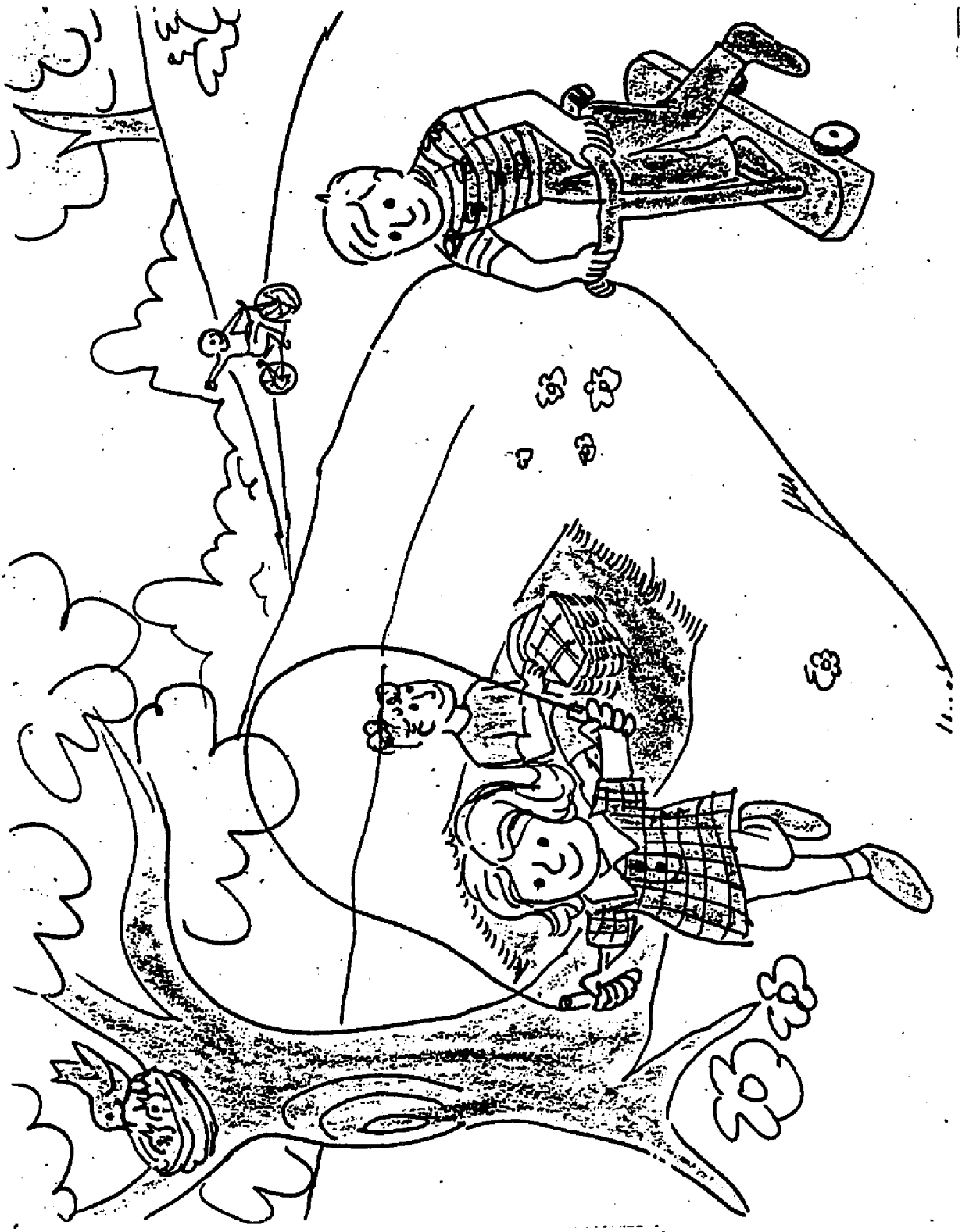
Set I



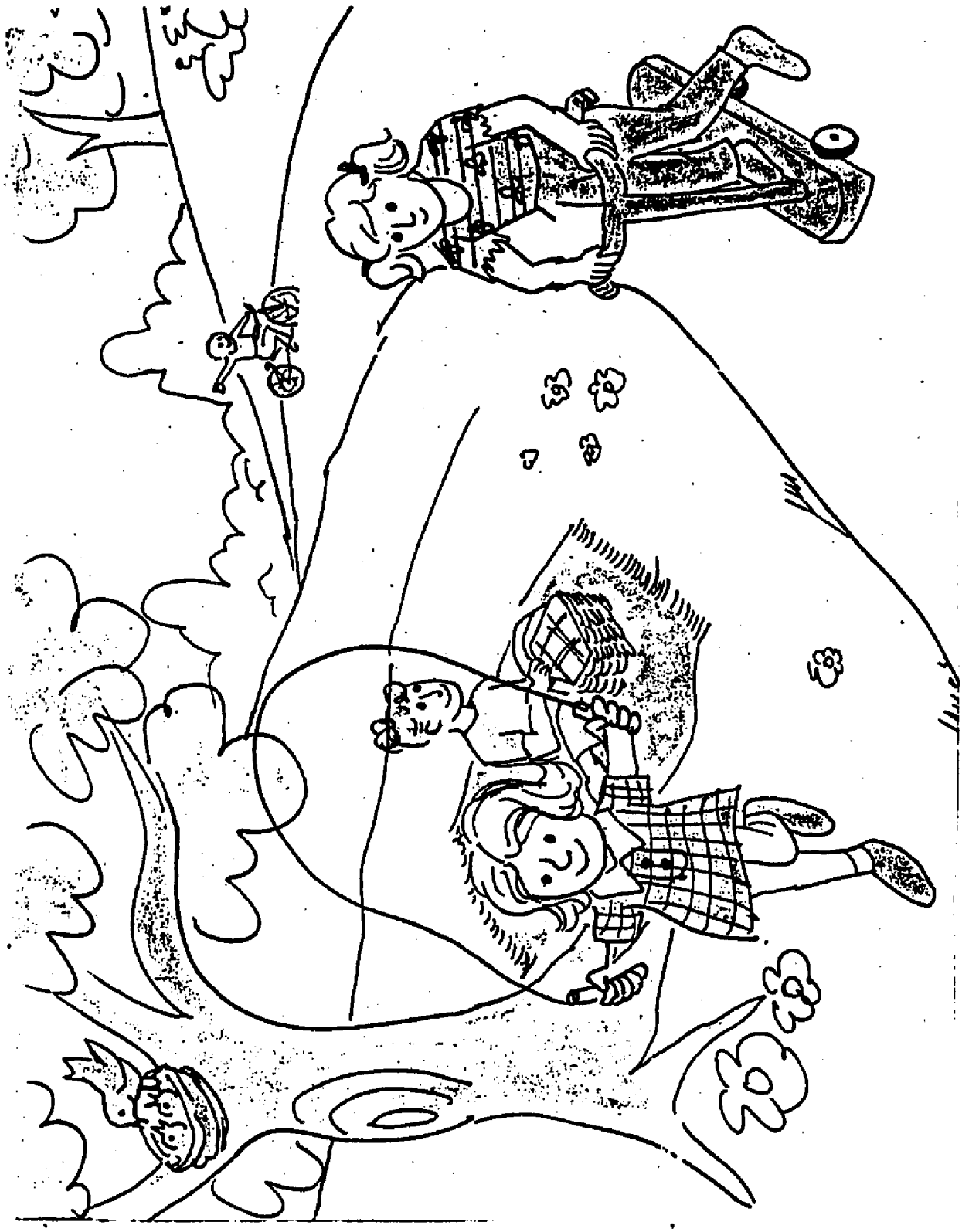
Set I



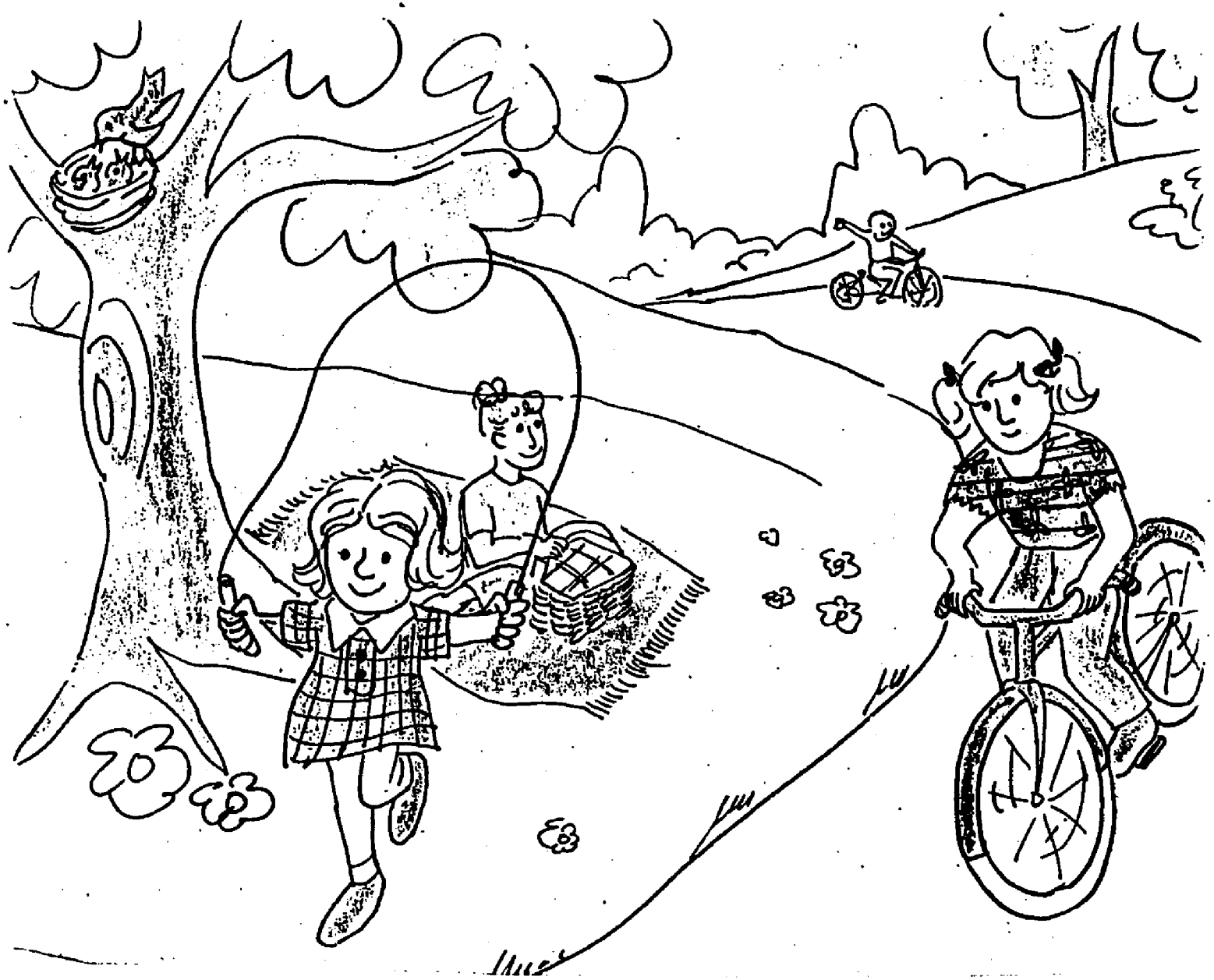
Set II Target Picture



Set II



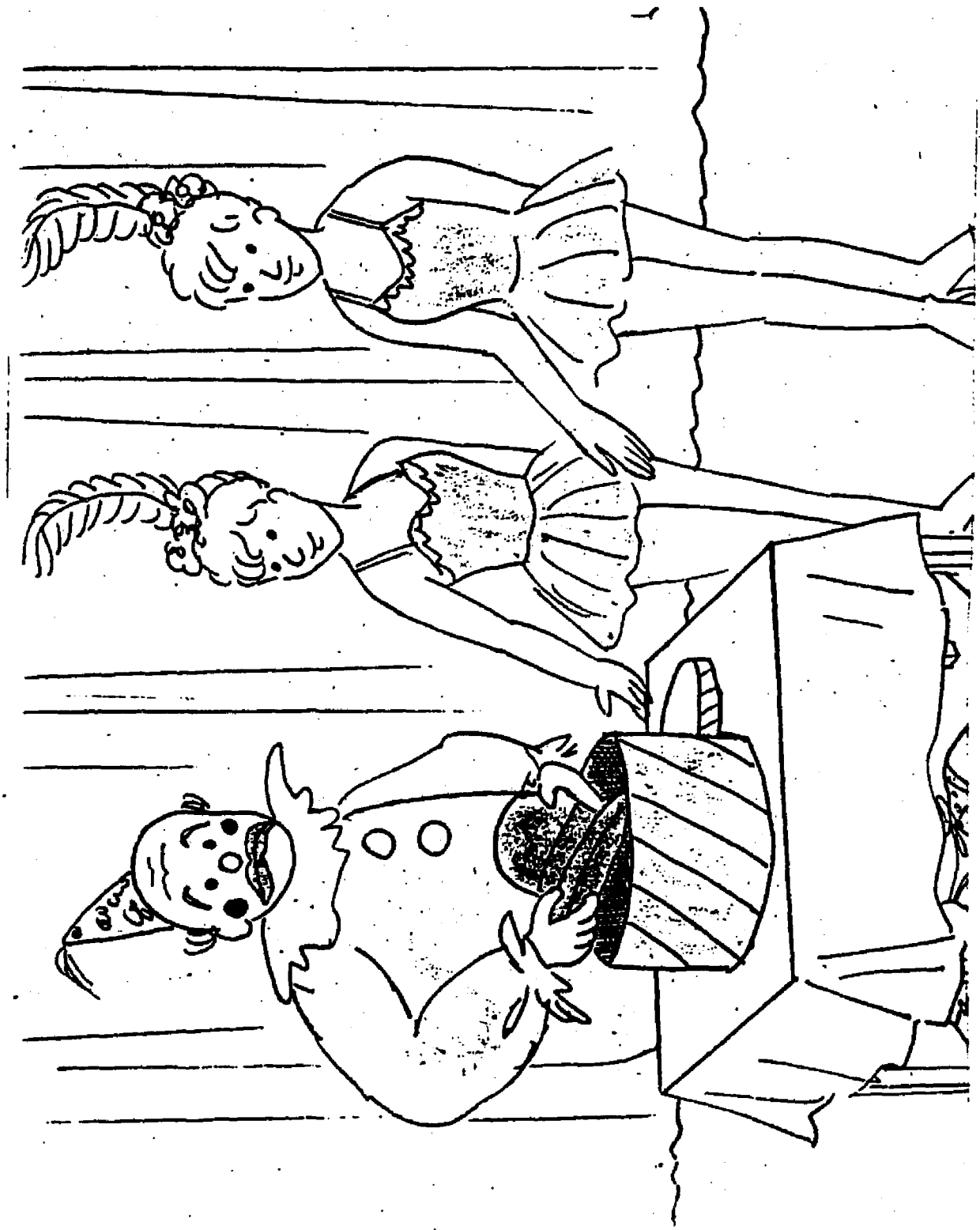
Set II



Set II

Set III Target Picture

Set III



Set III

Set III

Appendix D: adult level responses: none of the elements included in the responses below were judged as extraneous

1. (actor/subject)
the little girl is drinking milk.

2. (actor/subject- attribute/modifier on the object-recipient of the action/object)
the man is reading the red book.

3. (attribute/modifier on the subject- location/preposition)
the brown dog is lying on the bed.

4. (actor/subject- recipient of the action/object)
the boy is riding the bike.

5. (attribute/modifier on the subject- attribute/modifier on the object- location/preposition)
the happy girl puts the red doll in the box

6. (recipient of the action/object)
the dog is biting the chair.

7. (attribute/modifier on the subject- actor/subject-attribute/modifier on the object)
the fat boy is riding the red wagon.

8. (recipient of the action/object- location/preposition)
the girl is putting the shoe in the box.

9. (actor/subject- attribute/modifier on the object)
the girl is holding a blue ball.

10. (attribute/modifier on the subject- location/preposition- recipient of the action/object)
a happy clown is putting a hat in the box.

11. (attribute/modifier on the object)
the teacher has a red book.

12. (attribute/modifier on the subject- actor/subject-location/preposition)
the yellow cat is in the basket.

Appendix D cont.

13. (attribute/modifier on the object- recipient of the action/object)
a baby is chasing a blue ball.

14. (attribute/modifier on the subject- actor/subject)
the yellow dog is eating the lunch.

15. (attribute/modifier on the object- recipient of the action/object- location/preposition)
the mother is putting the blue plate on the table.

16. (attribute/modifier on the subject)
the black dog is running.

17. (actor/subject- recipient of the action/object- location/preposition)
the boy is taking the car out of the box.

18. (attribute/modifier on the subject- attribute/modifier on the object)
the fat girl holds the red ball.

19. (actor/subject- location/preposition)
the boy is in the box.

20. (attribute/modifier on the subject- recipient of the action/object- attribute/modifier on the object)
the fat boy is throwing the red ball.

21. (location/preposition)
the dog is in the basket.

22. (attribute/modifier on the subject- actor/subject- recipient of the action/object)
the brown dog is chewing the bone.

23. (location/preposition- attribute/modifier on the object)
the boy is playing with a red car on the table.

24. (attribute/modifier on the subject- recipient of the action/object)
a fat boy has flowers.

25. (actor/subject- location/preposition- attribute/modifier on the object)
the boy is putting yellow books on the table.

Appendix D cont.

26. (actor/subject)
the girl is throwing the ball.

27. (actor/subject- attribute/modifier on the object-recipient of the action/object)
a girl is holding a blue plate.

28. (attribute/modifier on the subject- location/preposition)
a yellow cat is on the box.

29. (actor/subject- recipient of the action/object)
a girl rolls a ball.

30. (attribute/modifier on the subject- attribute/modifier on the object- location/preposition)
a happy boy puts the red airplane in the box.

31. (recipient of the action/object)
the duck has a flower.

32. (attribute/modifier on the subject- actor/subject-attribute/modifier on the object)
the skinny girl rides the red bike.

33. (recipient of the action/object- location/preposition)
the boy puts the doll on the chair.

34. (actor/subject- attribute/modifier on the object).
the boy kicks the red ball.

35. (attribute/modifier on the subject- location/preposition- recipient of the action/object)
the happy lady puts a dress in the trunk.

36. (attribute/modifier on the object)
the girl has a blue ball.

37. (attribute/modifier on the subject- actor/subject-location/preposition)
the yellow duck is in the wheelbarrel.

38. (attribute/modifier on the object- recipient of the action/object)
the girl blows a blue horn.

39. (attribute/modifier on the subject- actor/subject)
a black dog plays with a ball.

Appendix D cont.

40. (attribute/modifier on the object- recipient of the action/object- location/preposition)
a man puts yellow flowers in a bag.

41. (attribute/modifier on the subject)
the black cat plays with a string.

42. (actor/subject- recipient of the action/object- location/preposition)
the lady holds a cup on the saucer.

43. (attribute/modifier on the subject- attribute/ modifier on the object)
the fat woman holds a red sweater.

44. (actor/subject- location/preposition)
a girl sits on the table.

45. (attribute/modifier on the subject- recipient of the action/object- attribute/ modifier on the object)
a fat boy kicks a yellow ball.

46. (location/preposition)
the dog is in the toybox.

47. (attribute/modifier on the subject- actor/subject- recipient of the action/object)
a yellow cat plays with a ball.

48. (attribute/modifier on the object- location/preposition)
the man puts the blue bucket on the table.

49. (attribute/modifier on the subject- recipient of the action/object)
the fat girl holds a doll.

50. (actor/subject- location/preposition- attribute/ modifier on the object)
the man put the red hat in the box.

Appendix E: Examples of reformulation strategies

Winning Strategies

Recode: Item = actor/subject- recipient of the action/ object- location/preposition

trial I: there's a boy with a crown on who's picking up a little car.

trial II: there's a boy with a crown on who's picking up a yellow car in the toybox.

Partial recode: Item = attribute/modifier on the subject- actor/subject- attribute/modifier on the object

trial I: it's a girl, a girl's riding a red bike.
trial II: the girl's more skinnier there.

Isolation: Item = attribute/modifier on the subject- recipient of the action/object

trial I: there is a girl that is holding a doll.
trial II: a fat girl.

Losing Strategies

Partial Isolation: Item = attribute/modifier on the subject- location/preposition- recipient of the action/object

trial I: taking a red hat not a ball.
trial II: there's a smiling clown instead of a sad clown.

Extraneous: item = attribute/modifier on the subject- location/preposition

trial I: the dog's on the bed.
trial II: cause the boy's reading a book.

Repetitious: Item = attribute/modifier on the subject- location/preposition- attribute/ modifier on the object

trial I: she's erasing the chalkboard.
trial II: she's erasing the chalkboard.

Appendix E Cont.

Unspecified: Item = actor/subject- location/preposition-
attribute/modifier on the object

trial I: he's holding the book.
trial II: the boy is holding the book under the table
and now he's putting it on the table.

Appendix F: A sample of five-year-old level responses

1. (actor/subject)
   trial I: the man is sucking it.
   trial II: I see a baby.

2. (actor/subject- attribute/modifier on the object-recipient of the action/object)
   trial I: I wish it was that one, I see him and her and her.
   trial II: I see a empty desk.

3. (attribute/modifier on the subject- location/preposition)
   trial I: dog's on the bed.
   trial II: the boy is reading on the bed and another boy.

4. (actor/subject- recipient of the action/object)
   a sign, and another boy on a bicycle.

5. (attribute/modifier on the subject- attribute/modifier on the object- location/preposition)
   trial I: that girl's sad and that girl's happy.
   trial II: she's reading and she's writing.

6. (recipient of the action/object)
   the dog is biting a chair and not a book.

7. (attribute/modifier on the subject- actor/subject-attribute/modifier on the object)
   trial I: I see a dog, a trash can.
   trial II: N.R.

8. (recipient of the action/object-location/preposition)
   that shoe in there.

9. (actor/subject- attribute/modifier on the object)
   trial I: the girl's running after the dog.
   trial II: the girl has the ball.

Appendix F Cont.

10. (attribute/modifier on the subject- location/preposition- recipient of the action/object).
trial I: that one's happy and that one's sad.
trial II: that the puppy's there.

11. (attribute/modifier on the object).
trial I: she's looking in the book.
trial II: N.R.

12. (attribute/modifier on the object- actor/subject- location/preposition)
trial I: they're swinging.
trial II: the boy's eating and the girl's not.

13. (attribute/modifier on the object- recipient of the action/object)
trial I: a baby's catching after a ball.
trial II: he's reading a newspaper.

14. (attribute/modifier on the subject- actor/subject)
trial I: the dog is eating some bread, he's eating it.
trial II: they're playing football.

15. (attribute/modifier on the object- recipient of the action/object- location/preposition)
trial I: two girls have two plates and a boy.
trial II: he's goona sit down.

16. (attribute/modifier on the subject)
trial I: the boy is running after the dog.
trial II: there is a boy looking at this rock.

17. (actor/subject- recipient of the action/object- location/preposition)
trial I: they are standing on the seat.
trial II: there's a boy lookin' in the box.

18. (attribute/modifier on the subject- attribute/modifier on the object)
trial I: that the boy is drinking.
trial II: that the two girls are gonna hold hands but they're not.

19. (actor/subject- location/preposition)
I got it, the boy's in the box.

20. (attribute/modifier on the subject- recipient of the action/object- attribute/modifier on the object)
trial I: that the boy is skinny and the boy is fat.
trial II: that the stick is there instead of the ball.

Appendix F Cont.

21. (location/preposition)
that the dog is in.

22. (attribute/modifier on the subject- actor/subject- recipient of the action/object)
trial I: the cat has the bone and the dog has the bone.
trial II: they're all bone, the dog has instead of the ball.

23. (location/preposition- attribute/modifier on the object)
trial I: that the car is on the table not under.
trial II: that she's doing it under the couch instead of on.

24. (attribute/modifier on the subject- recipient of the action/object)
trial I: that one instead of the book.
trial II: that its over there.

25. (actor/subject- location/preposition- attribute/modifier on the object)
trial I: he's holding the book.
trial II: the boy is holding the book under the table and now he's putting it on the table.

26. (actor/subject)
the girl's hiding and the girl's going to throw the ball to the other girl.

27. (actor/subject- attribute/modifier on the object- recipient of the action/object)
trial I: the girl's holding the plate down and not the mother.
trial II: that the butter's in the middle and not the bread.

28. (attribute/modifier on the subject- location/preposition)
trial I: that its on the box.
trial II: and the little boy is riding the bike.

29. (actor/subject- recipient of the action/object)
trial I: that the two girls are playing in the sandbox.
trial II: the girl's reading the book.

Appendix F Cont.

30. (attribute/modifier on the subject- attribute/modifier on the object- location/preposition)
trial I: that the boy is happy and the other boy's sad.
trial II: that the girl's holding the doll.

31. (recipient of the action/object)
that the duck has the flower.

32. (attribute/modifier on the subject- actor/subject- attribute/modifier on the object)
trial I: that a girl's riding a bike.
trial II: that the girl had a little thing in her hand and the other girl has a purse in her hand.

33. (recipient of the action/object- location/preposition)
trial I: that the boy baby has the doll.
trial II: that the boy baby is putting it under that table and the other baby is putting it on the chair.

34. (actor/subject- attribute/modifier on the object)
trial I: the boy's crying.
trial II: and he's sitting.

35. (attribute/modifier on the subject- location/preposition- recipient of the action/ object)
trial I: I think I got it, that lady is happy and that lady is sad.
trial II: the big girl is gonna hang her clothes up.

36. (attribute/modifier on the object)
trial I: the girl has a ball in her hand.
trial II:that the boy is sliding down on the slide.

37. (attribute/modifier on the subject- actor/subject- location/preposition)
trial I: that the duck is in the wheelbarrel.
trial II: that the cow is laying on the grass and there's a boy.

38. (attribute/modifier on the object- recipient of the action/object)
trial I: that the girl has three bottles of something.
trial II: the girl has a horn.

Appendix F Cont.

39. (attribute/modifier on the subject- actor/subject)
trial I: the dog is playing with the ball.
trial II: that the boy is looking at nothing.

40. (attribute/modifier on the object- recipient of the action/ object- location/preposition)
trial I: that the boy is putting flowers in the bag.
trial II: N.R.

41. (attribute/modifier on the subject)
trial I: that the girl is sewing.
trial II: that the girl, I mean the boy has a picture of a fish,

42. (actor/subject- recipient of the action/ object- location/preposition)
trial I: that the baby has a plate.
trial II: that the girl's eating and its here.

43. (attribute/ modifier on the subject- attribute/ modifier on the object)
trial I: that the girl has the coat.
trial II: that the boy's on the bed.

44. (actor/subject- location/preposition)
trial I: that the boy has flower picture and the girl's reading.
trial II: that the girl's sitting under the table and that the girl's reading on the table.

45. (attribute/modifier on the subject- recipient of the action/object- attribute/modifier on the object)
trial I: the baby is fat instead of skinny.
trial II: N.R.

46. (location/preposition)
that the dog is on the box.

47. (attribute/modifier on the subject-actor/subject- recipient of the action/object)
that a, that the girl, the kitty's playing with a ball.

48. (attribute/modifier on the object- location/preposition)
trial I: that the girl is jumproping and that the boy's licking the ice cream.
trial II: N.R.

Appendix F Cont.

49. (attribute/modifier on the subject- recipient of the action/object
trial I: that the girl's riding the scooter.
trial II: that the girl has a doll.

50. (actor/subject- attribute/modifier on the object- location/preposition)
trial I: that the clown has a hat and he's goona put it in the box.
trial II: that the boy and the girl and the other girl.

Appendix G: A sample of seven-year-old level responses

1. (actor/subject)
   that one has a girl drinking and not a lady.

2. (actor/subject- attribute/modifier on the object-recipient of the action/object)
   trial I: there's a man instead of a lady.
   trial II: he has a red book.

3. (attribute/modifier on the subject- location/preposition)
   trial I: it's a brown dog not a black dog.
   trial II: the brown dog's on top of the bed not under the bed.

4. (actor/subject- recipient of the action/object)
   there's a boy riding a bike instead of a scooter.

5. (attribute/modifier on the subject- location/preposition- attribute/modifier on the object)
   trial I: it's a red doll instead of a blue doll.
   trial II: it's a red doll NOT a BLUE doll.

6. (recipient of the action/object)
   this one's easy- it's a dog playing with a chair instead of a bone, doll or book.

7. (attribute/modifier on the subject- actor/subject-attribute/modifier on the object)
   trial I: there's a boy in a red wagon not a girl in a red wagon
   trial II: he's not in a blue wagon, in a red wagon.

8. (recipient of the action/object- location/preposition)
   the shoe in the box not on it - not a book.

9. (actor/subject- attribute/modifier on the object)
   its a girl with a blue beach ball instead of a red beach ball.

10. (attribute/modifier on the subject- location/prepotion- recipient of the action/object
    trial I: taking a red hat not a ball.
    trial II: Now I know, there's a smiling clown instead of a sad clown.

Appendix G Cont.

11. (attribute/modifier on the object)
the teacher's- there's a red book instead of a blue and a green book.

12. (attribute/modifier on the subject- actor/subject-location/preposition)
there's a girl in a red dress not there's a boy- there's a yellow cat in a basket instead of a orange cat and a dog.

13. (recipient of the action/object- attribute/modifier on the object)
'cause a boy with a blue beach ball instead of an orange ball and a orange car and a blue car.

14. (actor/subject- attribute/modifier on the subject)
there's a yellow dog instead of a yellow bird and a black bird and a black dog.

15. (recipient of the action/object- attribute/modifier on the object- location/preposition)
trial I: there's a blue dish that she's put down instead of a blue dish and a glass and a small dish.
trial II: I dont's know, there's a green table cloth- there's a blue dish instead of a red dish, and a blue dish and a big green dish.

16. (attribute/modifier on the subject)
there's a black dog instead of a orange dog and a brown dog and a yellow dog.

17. (actor/subject-recipient of the action/object-location/preposition)
trial I: a boy instead of a girl.
trial II: one's playing with a ball and one's has an orange car and it has a brown box and it says "toybox."

18. (attribute/modifier on the subject- attribute/modifier on the object)
trial I: there's a red ball instead of a yellow ball.
trial II: there's flowers by the log not by the teetertotter.

19. (actor/subject- location/preposition)
there's a boy under the box instead of a girl under the box and a girl on top of the box and a boy on top of the box.

Appendix G Cont.

20. (attribute/modifier on the subject- recipient of the action/object- attribute/modifier on the object)
trial I: there's a red ball and a blue ball and a pair of pliers getting throwed.
trial II: there's a fat boy instead of a skinny boy.

21. (location/preposition)
there's a dog in the basket instead of out of the basket.

22. (actor/subject- recipient of the action/object- attribute/modifier on the subject)
trial I: there's a dog with a bone instead of a cat with a bone.
trial II: there's a dog with a bone instead of a baseball.

23. (attribute/modifier on the object- location/preposition)
there's a boy with a red car on top of the table and not with a blue car under the table and not with the red car under the table and blue car on top of the table.

24. (recipient of the action/object- attribute/modifier on the subject)
trial I: there's a boy with flowers instead of a pink book.
trial II: there's a man with pink flowers with blue pants and a red shirt and yellow hair.

25. (actor/subject- attribute/modifier on the object- location/preposition)
a man with a yellow book on top of the table not under the table and not a lady with a yellow book on top of the table not with a man with a purple book on top of the table.

26. (actor/subject)
there's a girl with a red ball instead of a boy with a red ball.

27. (actor/subject- recipient of the action/object- attribute/modifier on the object)
there's a girl with a blue- it's not a red dish, not a man with a blue dish and not a girl with a blue cup.

Appendix G Cont.

28. (attribute/modifier on the subject- location/preposition)
trial I: its a yellow cat not a orange cat.
trial II: and the yellow cats on top of the box.

29. (actor/subject- recipient of the action/ object)
there's a girl with a baseball not a boy with a baseball not a girl with an orange car not a boy with an orange car.

30. (attribute/modifier on the subject- location/preposition- attribute/modifier on the object)
trial I: there's a boy with a red airplane not a blue airplane.
trial II: its a green box.

31. (recipient of the action)
there's a yellow duck with a blue flower not a worm.

32. (attribute/modifier on the subject- actor/subject- attribute/modifier on the object)
trial I: there's a girl on a red bike not with a boy on a red bike and not with a girl on a purple bike.
trial II: there's white trees instead of green trees there's green trees instead of a white tree.

33. (recipient of the action/object- location/preposition)
there's a boy standing up with a doll not a boy sitting down with a doll.

34. (actor/subject- attribute/modifier on the object)
there's a boy with a red ball not a girl with a red ball not a girl with a blue ball not a girl with a blue ball.

35. (attribute/modifier on the subject- location/preposition- attribute/modifier on the object)
trial I: there's a boy standing up not sitting down.
trial II: there's a purple dress and the doors closed and a boy and a girl standing up.

36. (attribute/modifier on the object)
there's a girl with a blue ball not a yellow ball and not a girl with green ball and not a red ball.

Appendix G Cont.

37. (attribute/modifier on the subject- actor/subject-location/preposition)
the yellow duck and not a black duck in the wheelbarrel.

38. (recipient of the action/object- attribute/modifier on the object)
the girl with the trumpet the girl with the blue trumpet and not an orange trumpet not an orange balloon not a blue balloon.

39. (attribute/modifier on the subject- actor/subject)
it's a black dog with a red ball.

40. (recipient of the action/object- attribute/modifier on the object- location/preposition)
there's a man putting a , there's a man puttin' in a yellow flower in a bag instead of a yellow ball.

41. (attribute/modifier on the subject)
a black cat is playing with red yarn.

42. (actor/subject- recipient of the action/object-location/preposition)
trial I: a boy eating and drinking instead of eating.
trial II: there's a lady that has a cup she's not drinking and not with a saucer over it.

43. (attribute/modifier on the subject- attribute/modifier on the object)
trial I: red coat not a blue coat.
trial II: there's a lady with a red coat not a blue coat.

44. (actor/subject- location/preposition)
there's a girl sitting on a table instead of a boy instead of a girl under a table instead of a boy under a table.

45. (attribute/modifier on the subject- attribute/modifier on the object- recipient of the action/object)
trial I: there's a boy with a yellow ball instead of a green ball.
trial II: there's a boy with a yellow ball instead of a pail.

46. (location/preposition)
there's a brown dog in the box is on the top of the box on top where it says "toy" on it.

Appendix G Cont.

47. (actor/subject- recipient of the action/ object-attribute/modifier on the subject)
there's a yellow cat with purple ball instead of a purple car and a brown cat with a purple ball instead of a dog with a purple bal.

48. (attribute/modifier on the object- location/preposition)
trial I: there is a fat man instead of a skinny man.
trial II: there is a girl jumping rope.

49. (attribute/modifier on the subject- recipient of the action/object)
trial I: there's a girl on a scooter instead of a girl with a doll and school book and a doll again
trial II: there's a girl with a blue doll instead of a school book

50. (actor/subject- attribute/ modifier on the object-preposition)
there's a man puttin' a red hat in instead of a blue hat.

LIST OF REFERENCES

LIST OF REFERENCES

Bloom, L. 1970. Language Development: Form and Function in Emerging Grammars. Mass.: MIT Press.

Blue, C. 1975. The marginal communicator. Language, Speech and Hearing Services in the Schools. 6: 32-38.

Bowerman, M. 1973. Early Syntactic Development: A Cross-Language Study with Special Reference to Finnish. England: Cambridge University Press.

Chafe, W. 1972. Discourse structures and human knowledge. In J. Carroll and R. Freedle (eds.), Language Comprehension and the Acquisition of Knowledge. New York: John Wiley and Sons.

Cohen, B. and Klein, J. 1968. Referent communication in school age children. Child Development. 39: 597-609.

Cowan, P. 1967. "The Link Between Cognitive Structure and Social Structure in Two-child Verbal Interaction." Paper presented at the meeting of the Society of Research in Child Development.

Cromer, R. 1971. The development of the ability to decenter in time. British Journal of Psych. 62(3) : 353-365.

deVilliers, P. and deVilliers, J. 1974. On this, that and the other: nonegocentrism in very young children. Journal of Exp. Child Psych. 18: 438-447.

Ervin-Tipps, S. 1970. Discourse agreement: how children answer questions. In J. Hayes (ed.), Cognition and the Development of Language. New York: John Wiley and Sons.

Fillmore, C. 1968. The case for case. In E. Bach and R. Harmes (eds.), Universals in Language Theory. New York: Holt, Rinehart and Winston.

Fishbein, H. and Osborne, M. 1971. The effects of feedback variations on referential communication of children. Merrill Palmer Quarterly. 17: 243-250.

Flavell, J. 1971. The uses of verbal behavior in assessing children's cognitive abilities. In D. Green, M. Ford, and G. Flamer (eds.), Measurement and Piaget. New York: McGraw Hill.

Flavell, J. 1977. Cognitive Development. New Jersey: Prentice-Hall, Inc.

Flavell, J., Botkin, P., Fry, C., Wright, J., Jarvis, P. 1968. The Development of Role-taking and Communication Skills in Children. New York: John Wiley and Sons.

Ford, W. 1971. "Information and Communication in Child's Language." (Master's dissertation, University of Toronto.)

Fry, C. 1966. Training children to communicate to listeners. Child Development, 37: 674-685.

Garvey, C. and Hogan, R. 1973. Social speech and social interaction: egocentrism revisited. Child Development, 44: 562-568.

Givón, T. 1974. "Towards a Discourse Definition of Syntax." Los Angeles.

Glucksberg, S. and Krauss, R. 1967. What do people say after they have learned to talk? Studies of the development of referential communication. Merrill-Palmer Quarterly, 13: 309-316.

Glucksberg, S., Krauss, R., and Higgins, T. 1975. The development of communication skills in children. In F. Horowitz (ed.), Review of Child Development Research (vol. 4). Chicago: University of Chicago Press.

Glucksberg, S., Krauss, R., and Weisberg, R. 1966. Referential communication in nursery school children: method and some preliminary findings. Journal of Exp. Child Psych. 3: 333-342.

Goldschmid, M. and Bentler, P. 1968. Concept Assessment Kit: Conservation. San Diego: Educational Testing Service.

Greenfield, P. and Smith, J. 1976. Communication and the Beginning of Language: The Development of Semantic Structure in One Word Speech and Beyond.

Grice, H. 1975. Logic and conversation. In P. Cole and J. Morgan (eds.). Syntax and Semantics: Speech Acts. New York: Academic Press.

Higgins, E. 1973. "A Social and Developmental Comparison of Oral and Written Communication Skills." (Ph.D. dissertation, Columbia University.)

Hoy, E. 1974. Predicting another's visual perspective: a unitary skill? Developmental Psych. 10: 462.

Huttenlocher, G. and Presson, C. 1973. Mental rotation and the perspective problem. Cognitive Psych. 4: 277-299.

Johnson, D. 1974. "Towards a Theory of Relationally Based Grammar." (Ph.D. dissertation, University of Chicago.)

Keenan, E. L. 1976. Towards a universal definition of subject. In C. Li (ed.), Subject and Topic. Aca. Press, New York.

Keenan, E. L. and Comrie, B. 1972. "Noun Phrase Accessibility and Universal Grammar." Paper presented at the 47th annual meeting of LSA, Atlanta, Georgia.

Keenan, E. and Klein, E. 1975. Coherency in children's discourse. J. of Psycholing. Res. 4(4): 365-379.

Kingsley, P. 1971. "The relationship between Egocentrism and Children's Communication." Paper read at the meeting of the Society for Research in Child Development.

Krauss, R. and Glucksberg, S. 1969. The development of communications: competence as a function of age. Child Development, 40: 255-256.

Krauss, R. and Glucksberg, S. 1977. Social and nonsocial speech. Scientific American, 236(2): 100-106.

Krauss, R. and Weinheimer, S. 1966. Concurrent feedback, confirmation and the encoding of referents in verbal communication. J. of Personality and Social Psych. 4: 343-346.

_____. 1967. Effect of referent similarity and communication mode on verbal encoding. JVLVB. 6: 359-363.

Lakoff, R. 1969. Some reasons why there can't be any some/any rule. Language. XLV: 608-615.

Lavetelli, C. Early Childhood Curriculum: A Piaget Program. New York: American Science and Engineering, Inc.

Leavitt, H. and Mueller, R. 1951. Some effects of feedback on communication. Human Relations. 4: 401-410.

Limber, J. 1973. The genesis of complete sentences. In T. Moore (ed.), Cognitive Development and the Acquisition of Language. New York: Academic Press.

Limber, J. 1976. Unraveling competence, performance and pragmatics in the speech of young children. J. of Child Language 3(3): 309-319.

Longhurst, T. and Siegel, G. 1973. Effects of communication failure on speaker and listener behavior. JSHR 16(1): 128-140.

Lyons, J. 1968. Introduction to Theoretical Linguistics. New York: Cambridge at the University Press.

McCaffrey, A. 1975. "Communicative competence: How it can be Measured and How it can be Fostered in Young School Children." Paper presented to the third international symposium on child language. England.

McLean, J. and Snyder, L. 1977. A Transactional Approach to Early Language Training: Derivation of a Model System. U.S. Dept. of Health, Education and Welfare.

Maratsos, M. 1973. Nonegocentric communication abilities in preschool children. Child Development. 44: 697-700.

Martin, J. Semantic determinants of preferred adjective order. JVLVB. 8: 697-704.

Menig-Peterson, C. 1975. The modification of communicative behavior in preschool children as a function of the listener's perspective. Child Development. 46: 1015-1018.

Moscovici, S. 1967. Communication processes and language. In L. Berkowitz (ed.), Advances in Experimental Social Psychology. vol. 3. New York: Academic Press.

Mueller, E. 1972. The maintenance of verbal exchanges between young children. Child Development. 43: 930-938.

Muma, J. 1975. The communication game: dump and play. JSHD. 40 (3): 296-310.

Muma, J. 1976. Reply to Knight's comment on "The communication game: dump and play." JSHD. 41 (2): 278-280.

Olson, D. 1972. Language uses for communicating, instructing and thinking. In J. Carroll and R. Freedle (eds), Language Comprehension and the Acquisition of Knowledge. Washington, D.C.: V. H. Winston and Sons.

Osgood, C. 1971. Where do sentences come from? In D. Steinberg and L. Jakobovitz (eds.), Semantics: An Interdisciplinary Reader in Philosophy, Linguistics and Psychology. New York: Cambridge at the University Press.

Perfetti, C. and Goldman, I. 1975. Discourse functions of thematization and topicalization. J. of Psycholing. Res. 4 (3): 257-278.

Peterson, C., Danner, F., and Flavell, J. 1972. Developmental changes in children's responses to three indications of communication failure. Child Development. 43: 1463-1468.

Piaget, J. 1926. The Language and Thought of the Child. New York: Harcourt, Brace.

Piaget, J. and Inhelder, B. 1969. The Psychology of the Child. New York: Basic Books.

Randhawa, B. 1973. Perceptual information processing of different visual stimuli by eight-year-old children. J. of Exp. Child Psych. 16: 55-62.

Ratner, S. and Rice, F. 1963. The effect of the listener on the speaking interaction. Psych. Review. 73: 208-231.

Rubin, K. 1973. Egocentrism in childhood: a unitary construct? Child Development. 44: 102-110.

Salatas, H. and Flavell, J. 1976. Perspective taking: the development of two components of knowledge. Child Development. 47: 103-109.

Shantz, C. 1975. The development of social cognition. In M. Hetterington (ed.), Review of Child Research. vol. 5: 257.

Shantz, C. and Wilson, K. 1972. Training communication skills in young children. Child Development. 43: 693-698.

Shatz, M. 1974. "Beyond Syntax: the Influence of Conversational Rules on Speech Modifications." Paper read at conference on linguistic input and association. Boston.

Shields, M. 1975. "Cognition and communication in the acquisition of language. Paper read at the third international child language symposium. England.

Sinclair, A. 1975. "Some aspects of verbal communication among four-year-old children. Paper read at the third international child symposium. England.

Slobin, D. 1975. The more it changes... on understanding language by watching it move through time. Papers and Reports on Child Language. Stanford: Stanford University Press.

Valian, V. 1975. "What's what: Talkers help listeners hear and understand by clarifying sentential relations." City University of New York.

Webb, P. and Abrahamson, A. 1976. Stages of egocentrism in children's use of 'this' and 'that': a different point of view. J of Child Language. 3: 349-367.

Wood, B. 1976. Children and communication. New Jersey: Prentice Hall.