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THE EFFECTS OF CONTEXT, AGE AND STIMULUS COMPLEXITY ON REFERENTIAL COMMUNICATION

by

Rae Banks

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

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Abstract

THE EFFECTS OF CONTEXT, AGE AND STIMULUS COMPLEXITY
ON REFERENTIAL COMMUNICATION

by

Rae Banks

Adviser: Professor Irwin Katz

This study explores the impact of the "functional systems" research strategy on the methodological and conceptual ambiguities resulting from previous studies of the effects of age, stimulus complexity and the formality of context on referential communication. This particular research strategy requires the integration of situational factors into the communication process both conceptually and methodologically. Therefore pragmatics, a perspective on language development that offered a conceptual framework and a research strategy that are both situation dependent, was used as an exploratory framework.

Seventy-two low-income children aged 5, 7 and 9 years were asked to encode simple, moderate, and complex stimulus arrays in either a formal, school-oriented context or an informal, game-like setting. Based on this 2 x 3 x 3 design, it was predicted that there would be main effects for age, stimulus complexity, and the relative formality of the context. In addition, it was predicted that 1) age and formality; 2) age and stimulus complexity; and 3) formality and complexity would interact.

As predicted, there were significant main effects for age, formality, and stimulus complexity. There were also significant interactions for stimulus complexity and formality, and for age and stimulus complexity. The predicted age-condition interaction was not significant.

But since the functional systems approach also allows the association of specific performance differences with variations in the relationship between situational factors, two age-dependent patterns of performance were also revealed. The patterns revealed that the younger children found the formal context disruptive and were distracted by the encoding demands of the more complicated arrays. In contrast, the older children were equally at ease in both contexts and were much less distracted when the complex arrays demanded multiple encodings.

The patterns described above led to the overall conclusion that, in this study at least, group differences in referential communication stem from the children's familiarity with the language rules of the contexts in which they were asked to communicate.

TABLE OF CONTENTS

Chapter

I. INTRODUCTION 1

Statement of the Problem 1
Review of the Literature 6
Variations in the Formality of Context 21
The Effects of Stimulus Complexity 25
Summary and Implications 29

II. METHODOLOGY 35

General Description of Method 35
Stimulus Materials 37
Instructions for Referential Communication Task .. 38
Scoring 39
Predictions 41

III. RESULTS 43

Analysis of Encoding Scores 43
Analysis of Other Dependent Variables 48

IV. DISCUSSION 59

V. SUMMARY AND CONCLUSIONS 65

.....

BIBLIOGRAPHY 67

LIST OF ILLUSTRATIONS

Figure

1. Encoding scores in formal and informal condition for three levels of complexity 46

2. Encoding scores of three age groups for three levels of complexity 47

3. Number of features encoded by three age groups in formal and informal conditions 50

4. Number of features encoded by three age groups at three levels of complexity 51

5. Number of features encoded in formal and informal condition for three levels of complexity 53

6. Number of contrastive encodings in formal and informal condition for three age groups 56

7. Number of contrastive encodings for three age groups at three levels of complexity 57

LIST OF TABLES

1. Analysis of Variance of Encoding Scores 44

2. Analysis of Variance of the Number of Features Encoded .. 48

3. Analysis of Variance of Redundant Encodings 52

4. Analysis of Variance of Contrastive Encodings 54

5. Analysis of Variance of Adjective Ordering 58

6. Number of Criterial Features Encoded 60

CHAPTER I

INTRODUCTION

Statement of the Problem

Referential communication has been a subject of increasing interest to psychologists and linguists alike in recent years and this interest has generated a considerable body of literature. In an early exploratory article Rosenberg and Cohen (1966) defined a referent to include those objects, events, properties and relationships about which individuals talk, write and gesture. A particular referent may have many names and conversely many referents may share a common name. Referential communication is the process wherein, " . . . the participants' task is to construct a message that enables someone else to know what that message refers to" (Glucksberg, Krauss and Higgins, 1975). As a linguistic and cognitive process it involves: 1) identifying and discriminating a particular referent from non-referents; 2) identifying the attributes that are critical to its identity; and 3) communicating those attributes in such a manner that a listener may identify the same referent.

In 1966 Glucksberg, Krauss and Weisberg reported on an adaptation of an existing experimental procedure to test the referential communication skills of children. This procedure had been used with adults in various forms by Rosenberg and Cohen (1966) and Werner and Kaplan (1963). The procedure calls for a pair of subjects, visually

separated by an opaque screen, to construct identical stacks of blocks imprinted with novel, graphic designs. On each trial the two subjects are supposed to construct identical stacks of six such blocks. The blocks are fed to the speaker by an apparatus designed to dispense one block at a time in random order. The speaker's task is to encode a message about each block that will enable the listener to decode the message and select an identical block from an array of blocks on his side of the screen. In the first study reported (Glucksberg, Krauss and Weisberg, 1966) there were no restrictions placed on the subjects' verbal exchanges and each subject played the role of the speaker and the listener.

As the description above suggests, referential communication is a complex cognitive, social and linguistic skill. Therefore it is reasonable to assume that research findings in this area would have implications for theory building in the field of language acquisition. But in what is, to date, the most comprehensive review of the referential communication literature, Glucksberg, Krauss and Higgins (1975) state unequivocally that this body of literature has provided little insight into language acquisition or language use. According to these reviewers, the source of the problem is both methodological and conceptual.

In methodological terms, the limited contribution of the findings in referential communication is attributable to a perspective on psychological phenomena that has direct implications for research. The perspective views group differences as end-products of some psychological capacity that a group does or does not possess. This capacity, in turn, is viewed as a static entity that group members do or

do not have, independent of any situational factors. According to Scribner and Cole (1974), this perspective is not new nor is it peculiar to research in referential communication. In fact, this "standard view" (Scribner and Cole, 1974) is found throughout the field of psychology. It leads the researcher to test hypotheses based on global, undifferentiated constructs, and to ignore the impact of situational factors on the ability to communicate.

In terms of the referential communication literature, the effect of variables such as age have been tested. But age, in and of itself, is not a causal variable and referential communication is a complex phenomenon no doubt involving many components. Hence, studies of age differences in overall dyadic performance can only " . . . provide . . . general information about the shape of the development of communication skills. These studies cannot, in themselves, provide much insight into the development of the component elements and processes that contribute to and underly the overall performance" (Glucksberg et al., 1975).

The role of situational factors has been the subject of a long-standing debate in the field of language development. According to Rosenberg and Cohen (1966) the ability to communicate is dependent upon the following: 1) the immediate social, physical and linguistic context; 2) the communicator's level of linguistic development; 3) previous interaction with the listener; and 4) the response the speaker intends to get from the listener. All of these factors must of necessity be incorporated into the study of communication. Glucksberg et al. (1975) concur with this view when they state that, ". . . communicative interaction can most usefully be viewed as the resultant of a set of

component processes, only some of which are linguistic in nature."

The global capacity perspective, with its attendant lack of emphasis on component processes and situational factors, makes it difficult to interpret research results unambiguously. As Medin and Cole (1975) point out, ". . . when we observe differences in behavior between two groups, we do not know what inferences are warranted concerning the mechanisms that give rise to the performance of individuals within each of the groups."

An interesting counterperspective, the "functional systems" approach, has been recently formulated by Scribner and Cole (1974). According to this view the researcher's task is to, ". . . identify the processes actually employed by different subjects and to determine how these processes were coordinated to handle the task at hand." The implication is that when referential communication is viewed as a cognitive and linguistic process as opposed to a fixed capacity, and when hypotheses that incorporate situational factors are tested, then unambiguous findings will result.

In addition to the methodological problems cited above, the lack of an adequate theoretical model from which to view referential communication is also a major contributing factor in our general lack of insight into referential communication. In fact, Glucksberg et al. (1975) contend that, ". . . the available models describing the nature of the specific skills or processes underlying communicative competence are relatively primitive. . . ." They argue that the principal reason for the lack of an adequate theoretical model is an overemphasis, on the part of both linguists and psychologists, on language acquisition as opposed to language use. This narrowed perspective

places conceptual limits on one's view of how language skills develop. The way out of this dilemna depends, according to Glucksberg et al. (1975), on ". . . integrating our conceptions of the communication process with our conceptions of language" or, in other words, developing a functional approach to the study of language.

What the discussion above implies is that conceptual models lead to methodological strategies. Conceptual constraints, then, determine the nature of the hypotheses tested, the relationship between the resulting data and theory and consequently one's understanding of the phenomenon observed. This, in turn, means that the conceptual model used as a framework must, in some logical fashion, allow for the development of appropriate hypotheses and at the same time, afford unambiguous explanations of the resulting data and causal links between the data and theory. Therefore, an integrated conceptual-methodological framework must be applied to the study of referential communication.

The rationale for a logically integrated approach is provided by Medin and Cole (1975) when they state:

> In recent years there has been a growing concensus that cognitive mechanisms can be viewed more appropriately as processes than as stable, fixed quantities or discrete entities. Since processes might be brought to bear in a number of situations producing a variety of performances, it seems more pertinent to ask what kind of mechanism is at work in some population or situation than to ask how much capacity or ability subjects in that population possess. Since the kinds of processes or abilities . . . are hypothetical constructs, such as memory, it is almost a necessity that comparisons be made within a theoretical context. In short, some kind of theory is needed to guide our interpretation and to order the phenomenon we are studying.

In terms of referential communication the rationale offered by Medin and Cole (1975) implies that until a process-oriented methodo-

logical strategy incorporating situational factors is applied within the confines of an appropriate interpretive framework, persistent questions such as the relationship between age and communication and the effects of stimulus complexity will remain unanswered. Moreover, no consistent patterns of performance will be obtained.

Review of the Literature

Developmental Studies

The most consistent finding in the referential communication literature is a developmental trend. Many researchers, often with very different hypotheses and research goals, have found that younger children do not perform as effectively as older children in communication tasks.

As stated previously, Glucksberg, Krauss and Weisberg(1966) conducted the first referential communication experiment with young children. Using what can be called the standard dyadic referential communication procedure, four- and five-year-old dyads (33 to 49 months and 52 to 63 months, respectively) sitting on opposite sides of an opaque screen encoded and decoded messages about blocks imprinted with pictures of animals. One trial consisted of constructing identical stacks of six such blocks. By using the animal blocks on a pretrial basis the experimenters hoped to insure that all their subjects understood the procedure correctly. However, the results of the pretrial showed that none of the younger (33 to 49 months) dyads could complete even one perfect trial; therefore, they were excluded from the experimental phase. In the experimental phase the five-year-old (52 to 63 months) dyads followed the same procedure using blocks imprinted with

novel graphic forms. None of the dyads could complete even one errorless trial and none improved over trials. Rechecking to rule out the possibility that their subjects did not understand the procedure, Glucksberg et al. (1966) readministered the animal blocks (pretrial blocks) and the five-year-olds encoded and decoded without error. The experimenters concluded that the subjects' difficulties were attributable to the novel graphic forms.

To check further for the possibility that a set had been established when the animals had been used, the experimenters then devised a task using colors. Since all the subjects met the criterion of at least one errorless trial, the set hypothesis was not confirmed.

In a second experiment by Glucksberg et al. (1966) subjects were first asked to produce their own encodings for the novel stimuli. Then they were asked to use their self-encodings (e.g., flying saucer, throwing sticks, strip-stripe) to decode messages in the standard dyadic procedure with the experimenter as the speaker. Now their performance was nearly perfect. The researchers concluded that the subjects' poor performance on the original task was due to their inability to take another individual's perspective into account.

Krauss and Glucksberg (1969) next designed a study using the same procedure with kindergarten, first-, third-, and fifth-grade subjects matched for age. The dyads differed in terms of their rate of improvement over trials with the youngest group showing no improvement over eight trials. Since the dyads were matched for age, the experimenters next used a check to rule out the possibility that these results were due to the listener's ability to decode. Krauss and Glucksberg provided adult subjects with the children's encodings

and asked them to identify the matching referent or graphic form. The results varied as a function of the subject's age, with the oldest subject's (fifth grade) encodings permitting the greatest number of correct identifications by the adults.

In a second, unpublished experiment, Krauss and Glucksberg varied the ages of the dyad members in an effort to determine the relative contributions of the speaker's versus the listener's role to overall dyadic performance. The results showed that the speaker's and the listener's ages were both significantly related to communicative effectiveness and that the speaker accounted for most of the variance found. Although Krauss and Glucksberg (1969) felt they had answered the question as to how much the younger (kindergarten) listeners' inability to decode contributed to their poor performance, they pointed out that these results may not hold for all situations.

These initial explorations into referential communication with children provided a relatively solid basis for the now well-established developmental trend. That is, the researchers (Glucksberg, Krauss and Weisberg, 1966; Krauss and Glucksberg, 1969) conducted multiple experiments that served to rule out some possible rival explanations for their results. Glucksberg et al. (1966) conducted additional studies to rule out the possibility that the inadequate communication of young (33 to 49 months) subjects was due to the fact that the animal figures had established a response set or that the subjects did not understand the task. Their suggestions that the subjects' communicative difficulties were attributable to the novel forms was later borne out in a study by Longhurst and Turnure (1971).

The developmental study by Krauss and Glucksberg (1969) was followed by two additional studies that ruled out the possibility that the listener's ability to decode contributed more to the variance in performance than the speaker's ability to encode. But even then Krauss and Glucksberg (1969) cautioned against generalizing from these results, since variations of situational factors might have produced different results.

It should also be noted, however, that Glucksberg et al. (1966) did not adequately rule out alternative explanations of their finding that when subjects decoded using their own encodings their performance was "near perfect". Since no significant delay was reported between generating these encodings and decoding them as a listener, it could be, as Asher and Oden (1976) later suggested, that the subjects simply remembered the encodings associated with each block as opposed to decoding them.

Several developmental studies were conducted to test Rosenberg and Cohen's (1966) "stochastic" theory of referential communication. These researchers contended that a speaker's choice of words from his repertoire is largely probabilistic. Their description of referential communication views the speaker's process as a "concantenation" of two separate and distinct psychological stages, a sampling and a comparison stage. In the sampling stage the speaker chooses a response to a referent based on its associative value. In the comparison stage that follows the speaker weighs the relative associative strengths of the stimulus and his response. In other words, the speaker evaluates his response in terms of other possible responses. If the speaker judges his response to be adequate he emits it and if it is judged to be

inadequate he returns to the sampling stage to begin the process again. Responses rejected in the comparison stage, however, are not erased, but are again placed into the sampling repertoire. Rosenberg and Cohen go on to define the listener's process, on the other hand, as primarily an evaluative one. The sampling stage is bypassed and the listener weighs the associative strength of the speaker's utterance to the referent.

In a reinterpretation of the basic developmental trend first revealed in the Glucksberg et al. (1966) study, Cohen and Klein (1968) reasoned that the original findings could just as easily be explained in terms of either the limited vocabularies of the younger subjects or some undefined deficiencies in the comparison stage processes. Using the Rosenberg and Cohen word game technique they found that third-, fifth-, and seventh-grade subjects differed in their ability to communicate, with older subjects performing most effectively. Glucksberg, Krauss and Higgins (1975) report that, "on the basis of internal analyses of their data" Cohen and Klein (1968) concluded that these differences were due to limited associative repertoires (vocabularies) as opposed to defects in the comparison stage. Glucksberg et al. (1975), however, felt that these particular results were "equivocal" and did not provide a definitive test of either contention.

In subsequent studies by other researchers, the Cohen and Klein (1968) conclusion was neither completely confirmed nor denied. Asher (1972) conducted three studies designed to determine children's use of sampling and comparison processes in communication tasks. In the first study second-, fourth-, and sixth-grade children were given a word communication task under two conditions--referent and nonreferent related

and referent and nonreferent unrelated. For example, if the stimulus word was DOG, an unrelated referent-nonreferent pair might be BOAT-PET, while a related pair might be CAT-PET. In the first example friend might be an effective clue while in the second example the clue word friend would have to be compared with other possible clues before it was emitted. The reasoning behind the use of these two conditions was that in the referent-nonreferent unrelated condition the speaker would only be required to use sampling processes to communicate a clue word so that a listener could select the correct referent. In the referent-nonreferent related condition the speaker would be called upon to utilize both sampling and comparison processes.

The clue words were then given to adults whose performances were used as the standard for the speakers' effectiveness. The results revealed that the children's clues for the unrelated pairs were high for all grade levels. On related pairs, however, there was a differential effect based on age, with the sixth-grade subjects proving to be the best communicators.

A second study by Asher (1972) required each subject to select the better of two clue words for pairs of referents and nonreferents. For example LORD and PALACE might be clue words for LADY-WOMAN. By providing clues and alternative clues, Asher reasoned, the sampling stage is bypassed, whereas when called upon to produce their own alternative clues, both the sampling and comparison stages are used. Even when the subjects were provided with alternate clue words, the younger subjects did not perform as well as the older subjects. According to Asher (1972), these results seemed to indicate that the comparison stage is crucial and may be the source of the difficulties younger children experience.

The third study required that the subjects identify good versus bad clue words and the results revealed that the subjects could make the distinction regardless of their age when asked to do so. The experimenter felt, however, that generally the younger subjects did not force themselves to do so when faced with a communication task.

The study by Saunders (1969) reported in Glucksberg et al. (1975) represents another attempt to explore the Rosenberg and Cohen (1966) theory that referential communication consists of two separate stages. Using pairs of animal-like figures, subjects learned to associate names with the figures. Two types of names, one that could be associated with either one of the pair of figures and one associated with only one of the figures, were used with the experimenter manipulating their associative strengths by regulating the number of pairings of each type. After training on these figures, Saunders then administered them in the standard dyadic referential communication task. The results of the communication task showed that the younger the subjects the more likely they were to be more influenced by the associative strength of a figure as opposed to the informative value of the names.

Hypothesizing that younger children lack the ability to discriminate between good and poor clues and are therefore unable to emit choices based on their informative value, Pietrinferno (1973) used third- and fifth-grade subjects in a discrimination task. Clue words were scaled for their informative value in discriminating between pairs of referent and nonreferent words. The results of this study confirmed the hypothesis. Fifth-grade subjects performed on a level comparable to adults but were somewhat less efficient than adults in rejecting

poor clues. The third-grade subjects, on the other hand, did not perform even as well as the fifth graders in their rate of rejection for poorer clues.

The net result of the studies cited above is a fairly limited amount of descriptive information and many more questions than answers about the process of referential communication. Perhaps the only solid finding emerging from the studies designed in accordance with the Rosenberg-Cohen (1966) model is the finding that younger children do not reject poor clues as readily as older children (Pietrinferno, 1975). When the results of the several other studies are compared it is found that very little light has been shed on sampling and comparison processes--the crux of the Rosenberg-Cohen model. The work by Cohen and Klein (1968) did not offer any insight into how the model operated since they actually repeated the original study by Glucksberg et al. (1966). The only differences were that they used words as opposed to figures and that they interpreted their results differently. In addition, they failed to measure vocabulary and communication skills separately and apparently assumed that vocabulary increases with age. Therefore, it is difficult to make inferences about one separate and apart from the other. Although their assumption about the relationship between age and vocabulary is a fairly safe one, the results obtained could just as easily be attributed to some factor or factors besides vocabulary deficiencies.

The study by Saunders (reported in Glucksberg et al., 1975) is another case in point. Her conclusion that younger subjects are more likely to be influenced by association than by the information con-

tained in the stimuli could just as easily be explained by the principle of least effort (Whitehurst, 1976), since it was probably an easier strategy to remember the labels associated with the figures.

The studies by Asher (1972) seem to contradict one another. The first two studies seemed to indicate that younger subjects lacked the ability to use comparison processes but the third study seemed to show that the ability was there but remained untapped. It could be that the particular tasks that were a part of his first two studies did not elicit the processes that the third study revealed.

Taken together the studies cited above neither confirm nor deny Rosenberg and Cohen's (1966) theory that the speaker's process in a referential communication task consists of a sampling and a comparison stage since the studies by Cohen and Klein (1968) and Saunders (1969) provide no compelling evidence that would rule out other explanations for their results. The studies by Asher (1972), while providing no direct insight into the comparison processes in a referential communication task, do make a strong case for taking situational factors into account, since his youngest (second grade) subjects' ability to use comparison processes was dependent upon the task with which they were presented.

Another series of developmental studies was conducted by Flavell and his associates (1968). They drew on theorists such as Mead, Vygotsky and Piaget in order to explain, at least partially, the frequent finding that younger children have difficulty in referential communication tasks. According to Mead (Flavell et al., 1968), the ability to use symbols is a fundamental human skill that is viable only when it elicits the same symbols in others. Like Piaget and Vygotsky, Mead sees this skill as

a developmental problem in that we begin by understanding only ourselves and others' attitudes towards us. It is somewhat later that we begin to understand the attitudes of others. Piaget calls this lack of the ability to take another's role egocentrism and points out that it affects the child's cognitive, linguistic and perceptual abilities. Vygotsky feels that this egocentrism remains with us but is tempered by an ever increasing social orientation as we get older. He bases this idea on language, our most important link to thinking. He feels that speech is initially private and overt. In other words, one speaks from a self-orientation. Later private speech becomes covert while social speech is elaborated and overt.

Integrating these theorists, Flavell and his associates conducted a series of experiments that were characterized as "developmental-descriptive" rather than "antecedent-consequent" (Flavell et al., 1968). In the first series of communications studies reported, Flavell and his associates used subjects from the second through the eighth grades. The subjects were taught to play a board game nonverbally and were then called upon to teach the game to an adult experimenter. Half of the subjects taught the game to a sighted experimenter while the other half taught the game to a blindfolded experimenter. Regardless of the condition, however, the listeners could not say anything nor could anyone touch the game or any of its parts. For the second- and eighth-grade subjects there was one additional trial where subjects were asked to teach a second blindfolded experimenter.

The results of this particular task were analysed in terms of the differences between the messages to the sighted versus the blindfolded

experimenter. The experimenters felt that this difference should increase as a function of the subject's age since it was hypothesized that there would be an increasing sensitivity to the listener's needs. The predicted effect of age on the differences between messages was significant only for the amount of game information given. The analysis of the second- and eighth-grade subjects' additional task resulted in further confirmation of the interactional hypothesis.

The second study in this series of experiments involved each subject in the process of sending a single message to several listeners. The subjects were asked to play the role of a police chief who was sending a message to three policemen who were in three different cars. Half the subjects were to send the numbers of a combination lock to the policemen that would allow one of them, using information he already had, to open the safe alone, while the other half had to send the appropriate numbers so that the policemen could pool the information and open the safe together. The former condition was considered to be easier than the latter condition. Again the age trend was as predicted with the older subjects demonstrating a greater ability to send the correct message. The data also suggested to these researchers that the age range from eight to ten was that period of time in which the most developmental change occurred.

In a second series of five studies using the same sample, subjects were asked to 1) retell a story, first for an adult and then for a child; 2) describe a visual display so that another person could either draw it or distinguish it from other displays; 3) persuade another individual; 4) act out particular roles; and 5) tell what makes an inadequate

message inadequate. The results of the studies by Flavell and his associates (1968) provide additional confirmation for the developmental trend in referential communication that was first revealed in the 1966 study by Glucksberg, Krauss and Weisberg.

In addition to the work of Flavell et al. (1968), Glucksberg et al. (1975) reported on several other developmental studies of the relationship between egocentrism and communication. One study by Bailey (1971) utilized a graded series of tasks that required increasingly complex perspectives in order for the speaker to communicate adequately. After grading these tasks on a Guttman scale, Bailey asked first-, third-, fifth- and seventh-grade children to select the most adequate messages for their listeners. Bailey (1971) found a positive relationship between grade level and the Guttman scale level derived from the complexity of the task.

A study by Cowan (1967) found correlations between a spatial perspective test of egocentrism, communication style and accuracy. A strong, positive relationship was found between the spatial perspective and egocentric or nonegocentric communicative styles of eight-, nine-, and ten-year olds and a weak relationship between the spatial test and communicative accuracy for nine- and ten-year olds. This latter relationship did not hold for the eight-year-old group.

Kingsley (1971) used nine measures (three measures of communication skills; three measures of egocentrism; two measures of tasks specifically related to communication and one measure of communication related to egocentrism) with kindergarten and third-grade subjects and found no relationship between communication and egocentrism for the younger of the two groups. When Kingsley intercorrelated these nine

measures, it was found that about one quarter of the variance could be attributed to the subjects' performances on the perceptual and verbal measures. The third-grade subjects' performance in communication was related to their performance on both the pictorial and spatial egocentrism tasks with about one quarter of the variance in communication scores being attributed to the former measures. However, when substituting the Glucksberg et al. (1966) communication task, none of the other tasks were correlated with the subjects' performance on the communication task.

At the intersect of the stochastic and the egocentric models is a study by Asher and Oden (1976) that sought to examine the validity of the two models. Using third- and fifth-grade subjects Asher and Oden (1976) asked their subjects to construct a message for an imaginary listener in a referential communication task with word clues. Poor communicators were found to be less effective in comparison activities and less effective than good communicators even when using their own self-encodings.

Asher and Oden (1976) cautioned that the egocentrism construct may provide a questionable interpretation of children's poor communication since the results of studies measuring egocentrism are often equivocal (Kingsley, 1971; Cowan, 1967; Asher and Oden, 1976). Asher and Oden (1976) compared their subjects' performances in the standard dyadic procedure both with and without a delay between generating their own encodings and the standard procedure. Their results also called into question the previous finding by Glucksberg et al. (1966) that using self-encodings improved communicative effectiveness. Asher and Oden

found that when the effects of memory were minimized, poor coummunicators did no better with their own self-encodings than they did with another individual's encodings.

The evidence seems to suggest that explorations into the relationship between age, egocentrism and communication have yielded mixed results. The results of several of the studies are uninterpretable in that they do not rule out other explanations. The studies by Bailey (1971), Kingsley (1971), and Cowan (1967) provide us with no patterns, no generalizations and many possible explanations for the results. What these data seem to indicate is that any correlations between egocentrism and communication are sensitive to the task at hand and the age of the individual. Both Cowan (1967) and Kingsley (1971) obtained correlations between very different tasks at different ages and Kingsley (1971) found no relationship between egocentrism and communication for the youngest subjects. In addition, when the Glucksberg, Krauss and Weisberg (1966) communication task was substituted for the other communication task in the Kingsley study, no relationship between any one of the nine measures and communication was found. Given the fact that about 25 percent of the variance found in the results was due to perceptual and verbal differences, it could well be that the inability to discriminate or articulate the difference in these novel forms and not egocentrism caused these results.

The research by Flavell and his associates (1968) has given us some insight into the communication process in different situations and has provided support for the developmental trend. The results of this research were not left to conjecture mainly because of the research

strategy used. The hypotheses tested by Flavell et al. (1968) were derived from their observations and were viewed as explanations of the phenomenon observed. However, no causal link between egocentrism and communication was established since the basic thrust of this research was developmental-descriptive as opposed to causal-analytic. What is clear from the studies by Flavell et al. (1968) is that all of the following abilities are age-related: 1) to adjust the amount of information according to the listener's needs; 2) to send a single message to several listeners; 3) to retell a story differently depending on the listener's age; 4) to persuade another individual; 5) to distinguish a poor from a good message; and 6) to describe a visual display so that it could be reproduced or discriminated from other displays.

In other studies where age was a factor this same developmental trend can be seen.[1] But no satisfactory explanation for this phenomenon has emerged and to date any intermediate variables that may determine the relationship between age and communication have not been conclusively isolated. One principal reason is that, as Flavell et al. (1968) point out, the determinants of a particular utterance are likely to be multiple and complex. For example, an incorrect message may be caused by 1) the speaker's lack of awareness of the listener's needs; 2) an inability to assess the listener's needs; or 3) the inability to to articulate the appropriate information.

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[1]Studies on the effects of feedback (Fishbein and Osborne, 1971; Glucksberg and Krauss, 1967; Peterson, Danner and Flavell, 1972; Jarvis, 1968); social class (Krauss and Rotter, 1968); task analysis (Longhurst and Turnure, 1971; Whitehurst, 1976); situational variables (Shatz and Gelman, 1973; Meissner and Apthorp, 1975) all report age-related findings that are consistent with this general trend.

Given the fact that these particular variables, as well as others, have not been explored systematically it is difficult to determine what the mediators of the relationship between age and referential communication might be and even more difficult to determine, based on these studies, where to direct one's research efforts in the future.

Interestingly enough, however, a fairly recent group of studies that attempt to explore variations in task and context, not only provide direction for further study, but also provide the first indications of a developmental countertrend since they indicate that even three-and a-half-year-old children can be effective communicators.

Variations in the Formality of Context

With the exception of the studies by Flavell et al. (1968), the studies cited above employ relatively formalized experimental situations. These situations provide an artificial, somewhat contrived context in which to tap a skill that we can assume most children learn and use in more naturally occurring situations. As Labov (1970), Cazden (1970) and others have pointed out, the formality of the context in which language skills are tested is an important determinant of linguistic performance. Generally, it has been found that children perform language tasks differently depending upon whether they are in a formal, school-like setting or in an informal, real-life setting. For example, Labov's (1970) research showed that using a formalized context with clear status differences between the experimenter and the subject depressed verbal output. On the other hand, when the experimenter sat on the floor and ate a snack with his subjects total verbal output increased.

Cazden (1970) cites a number of studies that indicate that children talk longer and more spontaneously, use more complex sentences and ask more questions when they are asked to talk about topics they are interested in (Cowan, Weber, Hoddinott, Klein, 1967; Strandberg and Griffin, 1969; Berlyne and Frommer, 1966; Williams and Naremore, 1969; Labov, 1968; Moffet, 1968).

Some recent studies have attempted to manipulate the formality of context in order to determine its effect on referential communication. Maratsos (1973) asked three- to five-year-old subjects to play a game with an experimenter who was blindfolded or sighted. Subjects were required to tell the experimenter which two toys from each of twelve arrays he wanted to be placed in a car that would then roll down a hill. The arrays varied in terms of their level of difficulty. It was found that regardless of age or the level of difficulty of the array the children in the blindfolded condition gave significantly more adequate verbal responses. According to Maratsos this finding stemmed from the fact that subjects in the normal vision condition did not bother to encode adequate messages since it was not required. In other words, they operated under the principle of least effort.

Meissner and Apthorp (1975) adapted Maratsos' (1973) design by asking four-year-old subjects to play store with an experimenter who was blindfolded or sighted. Given four arrays varying in terms of their complexity it was found that the children switched from a gestural to a verbal mode of communication to a significant extent when necessary.

In three separate but related studies Shatz and Gelman (1973) studied four-year-old children's ability to adjust their speech to peers, adults and two-year-olds. In the first study spontaneous speech

was compared with the speech used to explain how a toy worked to an adult and a two-year-old separately. It was found that the age of the listener had a significant effect on total verbal output, mean length of utterance, and communicative style. The subjects used shorter utterances and more attentional words in their communication with the two-year-olds than with peers or adults. There was no significant difference between the spontaneous and experimental situations in terms of the mean length of utterance. In two subsequent studies of spontaneous speech, one to peers and one to peers versus adults, it was found that four-year-olds did not differentiate between peers and adults. However, the mean length of utterance differed significantly from the two-year-old to the adult listeners, with the two-year-olds receiving shorter messages. Shatz and Gelman (1973) concluded that all subjects had the ability to adjust their speech as a function of the listener and further that, ". . . evidence that young children have rudimentary communication skills depends both on the domain in which the task is set and on the simplicity or naturalness of the task itself."

In summary then, this small but significant group of studies seems to indicate that the ability to communicate effectively is dependent upon the context in which communication is elicited and, further, that informal, game-like contexts seem to facilitate communication for children as young as three and a half years. Although other studies using informal contexts had previously been conducted (Flavell et al., 1968), until these particular experiments were carried out, only formal experimental studies had been done with this very young age group. These experiments demonstrate that the speech of very young children is not necessarily rendered ineffective by their egocentricity. All of the

studies cited make it evident that very young children can and do take their listener's needs into account by adjusting the length and style of their messages, switching from gestures to words when appropriate, and giving the appropriate amount of information necessary to select a referent from a nonreferent.

Although these studies (Mueller, 1972; Maratsos, 1973; Meissner and Apthorp, 1975; Shatz and Gelman, 1973) shed additional light on the process of communication, they do present problems when any attempt is made to generalize from their results. An integral part of the problem is the fact that the studies differ from each other in many respects. For example, whether or not speech is spontaneous, the experimenter is present or absent or the situation is relatively unstructured are all contextual variables that can affect the outcome of these studies. Another, equally important aspect of the same problem is that the tasks involved in the studies cited above differ greatly from the standard communication experiment described earlier in many ways and are generally much simpler. At present it is not clear what the effects of these differences are on the ability to communicate and on specific findings such as the age trend generally found. What is needed are additional, more controlled studies to determine these effects.

In addition, there are some conflicting findings on the effects of the complexity of the stimulus array. Maratsos (1973) found no effect for the complexity of the stimuli for his three- to five-year-old subjects who spoke to a blindfolded experimenter. On the other hand, in the study by Meissner and Apthorp (1975) subjects of the same age could not encode more complex arrays adequately. This conflict in results could be attributed to any one of the many factors cited above.

The Effects of Stimulus Complexity

A number of investigations have attempted to determine the effect of the stimulus on the ability to communicate (Longhurst and Turnure, 1971; Ford and Olson, 1975; Whitehurst (1976). Contending that previous studies had confounded different communicative variables, Longhurst and Turnure (1971) devised an experiment to test visual discrimination and communication separately. They used children of approximately the same age (33 to 56 months), and using the same stimuli that Glucksberg, Krauss and Weisberg (1966) and later Krauss and Glucksberg (1969) had used. Each subject played both the speaker's and the listener's role in two sessions separated by a one-week interval. Reasoning that the speaker's and listener's tasks were very different in the two previous studies cited above and further that the former role was more complex than the latter, Longhurst and Turnure (1971) incorporated this inequity into their visual discrimination task. Thus, in the listening condition the subject had the advantage of having all the stimuli in front of him. His only tasks were to listen and make a selection. In contrast the speaker condition required visual discrimination, verbal encoding and memory since all the stimuli were not visible. In keeping with Glucksberg, Krauss and Weisberg's (1966) procedures the speakers' stimuli were kept in a dispenser from which cards could be drawn only one at a time. When the data were analysed it was found that the younger subjects made significantly more errors than the older subjects and that more errors were made in the speaker condition than in the listener condition. The interaction between age and condition was not significant. The researchers concluded that what had been previously interpreted as communicative ineffectiveness may

well have been a lack of skill in visual discrimination.

In 1975 Ford and Olson conducted investigations into a) children's ability to use contrastive responses in selecting a referent from non-referents; b) the acquisition of adjective ordering rules, and c) the amount of information children can reasonably manage in a communication task. Ford and Olson (1975) defined contrastive responses as attributes that distinguish the referent from the nonreferents. Their five- to six-year-old subjects were divided into groups depending on the number of dimensions (one, two, three or a random assortment of dimensions) involved in producing an adequate message. The stimulus arrays consisted of wooden blocks varying in terms of shape (circle and triangle), size, and color (black and white). The subjects were administered the standard dyadic communication task. The only variation on the standard dyadic procedure was the absence of the screen between the speaker and the listener.

The analysis of the resulting data revealed that only those subjects whose arrays differed on one feature gave contrastive descriptions significantly above the level of chance. Those subjects in the mixed dimension condition produced more redundant responses than contrastive. In analysing adjective ordering it was found that older subjects were more inclined to violate adjective ordering rules (i.e., a red, big truck as opposed to a big, red truck) and unordered utterances were mainly conjunctive in style for the older subjects. Lastly it was found that subjects in both age groups increased the length of their utterances as the complexity of the array increased.

A similar experiment by Ford and Olson (1975) tested the effects of stimuli of even greater complexity (shape, size, color, stripe, dot

were the variables) by presenting the arrays on cards. The results of this study confirmed the first study in that the older children produced significantly longer and more informative messages. However, the older subjects differed from the younger subjects only in terms of four- and five-dimensional arrays. Age had no effect on performance with arrays varying on one, two or three dimensions. In contrast to their first experiment, the results revealed that varying the number of critical dimensions had no effect on the length of the utterance.

As a result of these findings Ford and Olson concluded that 1) even very young subjects can produce contrastive responses; 2) older subjects tend to use elaborate contrastive messages when one word would suffice and 3) younger subjects cannot effectively manipulate more than three dimensions simultaneously.

Based on Ford and Olson's (1975) findings, Whitehurst (1976) sought to investigate developmental changes in three types of communications, incomplete, redundant and contrastive. Using subjects from kindergarten, first, second and fourth grades, Whitehurst (1976) controlled his stimulus arrays in order to control the amount of information necessary to produce an accurate message. Subjects were involved in the standard referential communication task (Glucksberg, Krauss and Weisberg, 1966) and were asked to communicate the attributes of a cup that contained a marble. Since the arrays crossed three value attributes (color, size, pattern), and since arrays consisted of two or three cups, messages had to take these factors into account in order to be effective.

The Whitehurst results only partially confirmed Ford and Olson's (1975) findings in that incomplete responses decreased across increasing

age levels and increased with the level of difficulty of the array. Redundant descriptions increased with age but not significantly so and contrastive responses were more likely to occur with two cups as opposed to the more difficult three-cup problems.

Whitehurst concluded that: 1) message accuracy increases with age; 2) children seem to use the principle of least effort in constructing their messages; and 3) incomplete responses increase with increasing stimulus complexity, while contrastive responses decrease with the more difficult arrays.

The results of the studies by Longhurst and Turnure (1971); Ford and Olson (1975) and Whitehurst (1976) seem to raise more questions than they provide answers. It is interesting to note that the mean age of Longhurst and Turnure's (1971) older subject group was $4\frac{1}{2}$, the age at which other researchers have reported mostly poor communication, particularly with ambiguous stimuli (Glucksberg, et al., 1966; Glucksberg and Krauss, 1969). This contrasting picture may be at least partly explained by the fact that Longhurst and Turnure (1971) simulated the task demands of the standard communication experiment but only required that their subjects find the correct referent. They did not ask their subjects to construct messages conveying the appropriate information. True, if stimuli cannot be discriminated, they cannot be communicated. But when they can be discriminated, there is no guarantee that they can be communicated. The finding by Longhurst and Turnure (1971) strongly suggests that before generalizations can be made about age and communication, these two components (discrimination and communication) of the task must be looked at separately.

Whitehurst's attempt to analyse the development of different communication styles confirmed Ford and Olson's (1975) finding on redundancy and age as well as their finding on constrastive responses. Contrastive responses were constant across all age levels but were influenced by stimulus complexity. These results suggest that the developmental trend found may be due to the ability to produce a particular type of response. Although they are inconclusive, they do provide some understanding of the effects of stimulus complexity in a formalized experimental context. Younger subjects seem less capable of discriminating and communicating about stimuli that vary on several dimensions simultaneously.

Summary and Implications

Based on the foregoing review, it is clear that relatively little is understood about the relationship between referential communication, on the one hand, and age, context, and stimulus complexity, on the other hand. This lack of understanding is attributable to the methodological and theoretical ambiguities of past research on 1) overall dyadic performance, and 2) the component processes of referential communication.

In terms of methodology, the literature has shown that when researchers study overall dyadic performance as opposed to the component processes of referential communication, the results cannot be interpreted unambiguously. This is due, in part, to the fact that studies of overall dyadic performance do not incorporate situational factors into the research design. The studies by Cohen and Klein (1968), Saunders (1969), and Krauss and Glucksberg (1969) provide examples of

the difficulties inherent in interpreting results when situational factors are ignored. Another important reason why results cannot be clearly interpreted is that when overall dyadic performance is explored the subject's performance must be inferred from performance deficiencies. The studies by Glucksberg et al. (1966), Saunders (1969), Asher (1972), and Bailey (1971) provide examples of attempts to draw inferences from a lack of performance. As stated earlier, the reasons for a subject's performance are rarely singular, making it difficult, at best, to determine what particular factor or factors contribute to his or her performance.

In contrast to the studies described above, the literature does point out that when situational factors are incorporated into the researcher's design, and when studies of the components of communication are conducted, clearcut, descriptive information is obtained. The research by Flavell (1968), Shatz and Gelman (1973), and Meissner and Apthorp (1975) are examples of studies that investigated components of referential communication and incorporated situational factors. The results of these studies yielded descriptions of how the component processes operate in different situations.

What must be pointed out, however, is that the meaning of this descriptive information is obscured by the lack of an interpretive framework. For example, Shatz and Gelman (1973) found that even young children ($3\frac{1}{2}$ years old) could adjust their messages according to their listeners' perceived needs. But the question remains: To what can this finding be attributed? More importantly, since all of the studies cited yielded similar descriptive information, a pattern may be emerging.

But without an interpretative framework, to what are we to attribute what appear to be rule-ordered patterns of performance? Without guidelines then, these results too are uninterpretable, since, according to Scribner and Cole (1974), "Demonstrating that there are variations in the situations within which people manifest a particular cognitive process may be a good beginning, but it is not psychologically meaningful unless we can specify the rules underlying the patterns of behavior that we see in different situations." What both this review and Scribner and Cole (1974) imply is that a process-oriented research strategy carried out within an interpretive framework is the most productive means of generating unambiguous research findings and systematic explanations of behavior.

This particular strategy fits within the framework of the "functional systems" approach recently formulated by Scribner and Cole (1974). This integrative conceptual and methodological perspective views the cognitive processes, not as singular, static capacities, but as organized groups of processes applied to cognitive problems. It implies that cognitive processes vary as a function of the situation and that, therefore, situational variables should be incorporated into the research design. In addition, when this research strategy is applied within a theoretical framework, the researcher can, ". . . sort out what observed differences are differences in" (Medin and Cole, 1975), since the resulting data should point to specific situational factors that are the sources of these differences. By implication then, this conceptual framework should also be situation dependent.

But, as stated earlier, the role of situational factors in language development has been a long-standing problem in the field. In her article characterizing situational variables as "neglected," Cazden (1970) pointed out the need to incorporate context into our notions of communicative competence, since the ability to communicate implies the ability to speak in socially appropriate ways. As reported previously, Cazden (1970) cites several studies where situational variables were manipulated and whose results lend support to the notion that the scope of linguistics should be broadened to include context.

But even with this increasing emphasis on context, it was not until the development of the current movement called pragmatics that context was viewed as an integral part of language.

In her comprehensive overview of linguistics, Bates (1976) states that the term pragmatics was taken from the American philosopher Charles Peirce (1932) who, along with William James, was a major figure in the American philosophical school of thinking called pragmatism. Adapting Peirce's work to the study of human language, Charles Morris (1946) divided the study of language into three areas: syntactics, semantics, and pragmatics (i.e., the relations between signs and their human users). In her attempt to delineate the pragmatic model, Bates (1975) states:

> Pragmatics is perhaps best defined as rules governing the use of language in context. As such, it does not define a separate kind of linguistic structure or 'object'. Rather, all of language is pragmatic to begin with. We choose our meanings to fit contexts, and build our meanings into those contexts in such a way that the two are inseparable, in the same way that 'figure' is definable only in terms of 'ground'. According to this view, every act involved in the construction of meaning is in itself a pragmatic act. The act of reference, the selection of of lexical items to stand for one or more referents, and the combination of acts of reference into the core unit of semantics, the proposition, are all contextually-based uses of language.

Pragmatics offers a perspective that views the relationship between context and language in a way that has implications for research in the area of child language in general and for referential communication in particular.

From the viewpoint of pragmatics, the very process of referential communication is determined by rules of context. Context, then, is an integral part of the structure and functioning of communication. Bates (1975) reinforces this point when she states that, ". . . context does not just cause language, but is an integral part of the structure of language." This means specifically that the ability to 1) discriminate the referent from other nonreferents; 2) identify those attributes critical to the referents's identity; and 3) encode those attributes or features adequately is partly dependent upon the context in which the task is embedded. The pragmatic perspective suggests then, that the structure of the referential communication process will vary with the context, and, by implication, specific features of that context.

But further, pragmatics also has a direct bearing on the research strategy employed. This interpretive framework demands a process-oriented research strategy because it implies that referential comunication is not a static end-product that develops at a certain age or under a particular set of circumstances. Instead referential communication from this perspective is an ever-changing phenomenon, dependent upon the cognitive and social demands of the situation. What this means functionally is that children are, ". . . continually redefining the appropriate contexts for various 'language games' " (Bates, 1975). In other words, it is a functional skill brought to bear in a particular form in a given situation.

This present study is an attempt to explore one component of the referential communication process from the pragmatic perspective by 1) varying situational factors to determine how children handle the encoding process in specific situations, and 2) using the obtained patterns of performance to explain the rules governing the relationship between these situational variables and referential communication as a functional skill.

More concretely, this study will vary three situational factors--age, stimulus complexity, and the formality of context--to determine their effect on the encoding process in a referential communication task. In addition, the patterns of performance obtained from the interaction of these variables will explain the underlying contextual rule or rules governing the communication process.

Given the research objectives described above, three separate but related findings are hypothesized: It is hypothesized that the ability to encode a referent will vary as a function of 1) the relative formality of the context in which the task is presented; 2) the age of the speaker-listener dyad; and 3) the level of complexity of the stimuli to be encoded. Further, it is hypothesized that the interaction of these situational variables will result in rule-ordered patterns of encoding behavior.

CHAPTER II

METHODOLOGY

General Description of Method

Research Design

A 2 x 3 x 3 research design with two instructional conditions (formal and informal), three age levels (approximately five, seven, and nine years), and three levels of stimulus complexity (one, two or three dimensions) was used. Each subject was tested at all levels of complexity, in either the formal or the informal condition.

Subjects

The subjects for this study were 72 male and female, lower-income Black children enrolled in a publicly funded preschool program and a public elementary school in New York City. There were 12 subjects per cell.

Procedure

Subjects were randomly selected from age-appropriate classes and tested in same-age dyads in one of the instructional conditions. The referential communication task was embedded in a setting and a series of tasks appropriate to the condition. Subjects were brought into a room or an area in the facility that was similar to a regular classroom by either the experimenter (a Black female) or an assistant (a Black or a White female). The experimenter and an assistant alter-

nately tested or assisted in testing the dyads. The role of the assistant required operating a Sony tape recorder, writing the speaker's messages and arranging the stimulus arrays.

In the formal condition the subjects first completed two formalized, school-like tasks, a digit span and a verbal analogies task. The youngest subjects (5 years) were given only the digit span task. Although there was no time limit imposed for these tasks, subjects generally completed the task within 8 to 12 minutes. Then the standard dyadic referential communication task was administered. Subjects were seated on either side of a screen and were instructed to encode and decode messages about concrete, familiar items arranged in arrays that varied in complexity. Both the speaker and the listener had identical stimulus arrays on each trial.

In the informal condition subjects first participated in an age-appropriate and familiar board game, Candyland. This commercially produced gamed requires that the participants alternately move to the appropriate color coded space based on the color of the cards drawn. The cards are randomized and also require the participants to move backwards and forward. The game continues until one participant reaches Candyland and becomes the winner.

The referential communication task in the informal condition was embedded in a shopping game. The speaker was the shopper and the listener played the role of the storekeeper. The storekeeper stood behind the counter facing the inner shelves and the shopper faced the outer shelves of a commercially produced, freestanding cardboard store. Subjects were asked to encode and decode messages about identical arrays of the same stimuli used in the formal condition with three differences:

1) the encodings involved a naturally occurring task, making a purchase; 2) the subjects in this condition were not told which item was the referent and which were nonreferents; and 3) there was no screen between the speaker and the listener, but the shelves displaying the stimuli were placed in such a way that neither subject could see the other. The arrays were constructed so that no matter which referent the speaker chose he or she was required to encode the same number of dimensions as his or her counterpart in the formal condition. In other words, the communication task simulated a real shopping situation where the shopper made his or her own choice. To complete this setting, a toy cash register, play money, and a shopping bag were used. When the speaker described a choice, the listener made a selection from an identical array and placed it in the bag.

In both conditions subjects had two practice and six test trials (two for each level of complexity). The order of the six experimental arrays was randomized and the order of presentation was identical in both conditions. The entire procedure was recorded.

Stimulus Materials

The stimulus arrays consisted of toys and blocks that were familiar and varied along several dimensions. The one- and two-dimensional arrays consisted of four items, while the three-dimensional arrays were made up of six items. The increase in the number of array items for these latter arrays was necessary in order to constrain the subjects in the informal condition to encode three dimensions (these subjects chose their own referents).

Description of the Arrays

1 - Practice. Four plastic boats with white sails differing only in color. Referent - The blue boat.

2 - Practice. Two small green toy cars and two small, red toy cars differing only in terms of the color of the hood and the color of the car. Referent - The red car with the black hood.

3 - Trial 1. Four toy cars of four different colors. Referent - The red car.

4 - Trial 2. Four small white plastic toy milk bottles, two with decals and two without decals; two with tops on and two with no tops. Referent - The one with no top and a decal.

5 - Trial 3. Four wooden doll-like figures representing a Black family, consisting of a mother, father, son and daughter. Referent - The boy.

6 - Trial 4. Six plastic circles, three red and three yellow; three large and three small; three with a black line across the middle and three without a line. Referent - the big, red one with a line on it.

7 - Trial 5. Six plastic triangles, three red and three blue; three large and three small; three with a black dot in the middle and three with no dot. Referent - The big, red one with the dot.

8 - Trial 6. Four plastic triangles, two blue and two red; two large and two small. Referent - The small blue one.

Instructions for Referential Communication Task

Formal Condition

I'm going to show both of you some things. One of these things is special and I am going to show you, (speaker's name), which one is the special one. But (listener's name) won't know which one it is because we're going to put this between you. (Experimenter places a screen between the subjects.) Then your job is to tell (listener's name) what the special one looks like because he (she) won't be able to see it.

(Listener's name), your job is to listen carefully to what he (she) says so you can pick the one he's (she's) talking about from the ones you have that are just like his (hers). When you decide which one is the special one, point it out (experimenter points to an item from the listener's array, behind the screen and out of the view of the speaker.) Do you know what to do? Let's practice a couple of times.

Informal Condition

This is a toy store. (Speaker's name), why don't you be the shopper and (listener's name), why don't you play the storekeeper. Now (speaker's name), there are toys on each shelf and you can buy one toy from each shelf. But you can't touch the shelves so you have to tell (listener's name) what the one you want looks like so he (she) can get it for you and put it in this bag. Now (listener's name), you have to listen to what he (she) says so you can give him (her) what he (she) wants. O.K.? (Subjects were corrected on practice trials when necessary, otherwise no mention of practice was made in this condition.)

Scoring

In this study communicative effectiveness was determined by the speakers' encoding scores, which reflected the speakers' ability to encode the necessary number of critical attributes to distinguish the referent from the nonreferents. Since the number of necessary critical attributes varied with the complexity of the stimulus array, subjects were given a score of 1 for correctly encoding each of the two one-dimensional arrays; 2 for correctly encoding each of the two two-dimensional arrays; and 3 for correctly encoding each of the two three-dimensional arrays.

As a check for the accuracy of scoring, the subjects' protocols were also scored by two independent scorers who were blind to the hypotheses and the general purpose of this particular study. When the independent scores were correlated with the experimenter's scores the

reliability coefficient for the experimenter and the first rater was .82, and between the experimenter and the second rater, the coefficient was .84.

In addition to overall communicative effectiveness, other measures previously explored in the literature were also employed. The number of features encoded is a measure roughly equivalent to the mean length of the utterance (MLU) used in the studies by Shatz and Gelman (1973) and Ford and Olson (1975), for examples. Since, as the description of the arrays above suggests, the stimuli used in this experiment have many features that can be readily encoded, it may be of particular interest to note any rule-ordered variations in the amount of information given.

The adequacy of the information or features was also measured by looking at two complementary measures, the number of redundant and the number of contrastive features. Redundant features are those features that are nondistinguishing, while contrastive features are distinguishing features. For example, if an array consists of four wooden blocks that differ only in terms of color, the encoding, "a block," is a redundant or nondistinguishing encoding, while the message, "the green one," is contrastive.

If it has been shown that there are rule-ordered variations in the number of redundant features encoded (Whitehurst, 1976), then it follows logically that differences in the number of contrastive responses would occur and, in fact, the literature does support this notion (Whitehurst, 1976; Ford and Olson, 1975).

The final measure to be explored was the effect of variations in adjective ordering (Ford and Olson, 1975). The encoding, "the red, big truck," is an example of a violation in normal adjective ordering rules.

This particular measure, then, is of interest as a factor in the overall communicative effectiveness of the subjects in this study.

Predictions

Since this study is basically concerned with communicative effectiveness, predictions will be confined to this particular measure. Other factors such as the measures described above (number of features encoded, etc.) are expected to vary, but in this particular study are considered contributing factors in overall communicative ability. Taking an exploratory perspective, then, one objective of this study is to explore whether or not these factors contribute to the process, and if so, how.

Based on 1) the findings of studies of the effects of context, age, and stimulus complexity on referential communication mentioned in the review of the literature, and 2) the pragmatic perspective as an interpretive framework, three main effects were predicted:

1) It is predicted that the speakers' encoding scores will be higher in the informal condition than in the formal condition;

2) It is predicted that the youngest subjects (5 years old) will have the lowest speaker encoding scores and the oldest subjects (9 years old) will have the highest speaker encoding scores;

3) It is predicted that the encoding scores for one-dimensional arrays will be higher than encoding scores for the three-dimensional arrays, with the encoding scores for two-dimensional arrays occupying the intermediate position.

In addition, three significant interactions were predicted:

4) It is predicted that formal-informal conditions will interact with age such that the informal condition will have a more facilitative effect on encoding scores for the youngest subjects (5 years) than for the two groups of older subjects (7 and 9 years).

5) It is predicted that stimulus complexity will interact with formal-informal condition such that the informal condition will have a more facilitative effect on encoding scores for the easiest (one-dimensional) arrays) than for the more complex (two- and three-dimensional) arrays.

6) It is predicted that age and stimulus complexity will interact so that the effect of age on encoding scores will be more apparent as the arrays become more complex.

CHAPTER III

RESULTS

Analysis of Encoding Scores

As described earlier, scoring was based on whether or not the speaker encoded the number of critical attributes necessary to distinguish the referent from the nonreferents in the stimulus array. But since the number of critical attributes ranged from one to three per array, and since there were two stimulus arrays for each of the three levels of complexity, the possible scores ranged from 0 to 2 for the one-dimensional arrays, 0 to 4 for the two-dimensional arrays, and from 0 to 6 for the three-dimensional arrays. Since the resulting raw scores increased as a function of stimulus complexity, they were converted to proportions and the Arcsin transformation was carried out. A 3 x 3 x 2, repeated measures analysis of variance with two between variables (three age levels and two instructional conditions) and one within variance (three levels of stimulus complexity) was conducted on the transformed data.

Table 1 presents a summary of the analysis of variance of the speakers' encoding scores. The significant main effect ($F = 6.477$, $p < .05$) for the formal versus the informal condition ($M = 1.93$ and $M = 2.24$, respectively) confirms the hypothesis that communicative effectiveness is facilitated in an informal, game-like context.

TABLE 1

ANALYSIS OF VARIANCE OF ENCODING SCORES

Source	df	Sum of Squares	Mean Square	F-Ratio
Between subjects				
Age (A)	2	26.7994	13.3997	16.4294**
Formal-Informal (B)	1	5.2828	5.2828	6.4773*
A x B	2	2.5176	1.2588	1.5434
Error between subjects	66	53.8290	0.8156	
Within subjects				
Complexity (C)	2	17.9986	8.9943	26.3955**
A x C	4	10.5945	2.6486	7.7729**
B x C	2	5.4687	2.7343	8.0244**
A x B x C	4	1.2421	0.3005	0.9113
Error within subjects	132	44.9791	0.3408	

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

The significant main effect for age ($F = 16.429$, $p < .01$) in Table 1, confirms the prediction that communicative effectiveness varies as a function of the age of the speaker. The speakers' mean encoding scores for the five-, seven- and nine-year-olds were, respectively, 1.665, 2.065, and 2.527. A Newman-Keuls comparison shows that the only significant difference occurred between the five-year-olds and the nine-year-olds ($C_{diff} = .548$, $p < .001$), the least effective and the most effective communicators, respectively.

The hypothesis that communicative effectiveness diminishes as stimulus complexity increases is only partly confirmed. Although there is a significant main effect ($F = 26.396$, $p < .01$) for stimulus complexity the effect is nonlinear. The encoding means for the simple,

moderate and complex arrays are, respectively, 2.45, 1.74 and 2.07. The Newman-Keuls comparison shows significant differences between Level 1 and Level 2 (C_{diff_3} = .201, $p < .05$) and between Level 2 and Level 3 (C_{diff_2} = .191, $p < .05$). Level 3 arrays, considered by this experimenter to be the most complex since they required the encoding of three features for effective communication, were, in fact, easier to encode than Level 2 arrays.

As can be seen in Table 1, the hypothesis that formal versus informal instructions would interact significantly with age was not confirmed (F = 1.54, $p < .10$).

Table 1 presents confirmation of the prediction that stimulus complexity and formal versus informal condition would interact so that the informal condition would have a more facilitative effect on the encoding of relatively simple as opposed to complex stimulus arrays (F = 8.02, $p < .01$). Figure 1 depicts the configuration of cell means for this interaction. It shows that the favorable effects of informal as compared with formal instructions is greater at the lowest level of complexity (Level 1) than at the two higher levels (Levels 2 and 3).

It was predicted that age and stimulus complexity would interact so that the effect of age on encoding would be more apparent as the arrays became more complex. Table 1 shows that the interaction was significant (F = 7.77, $p < .01$). Figure 2 indicates that at the lowest level of complexity, Level 1, the three age groups' scores did not differ substantially, whereas at Levels 2 and 3 the differences in favor of the older groups increased progressively.

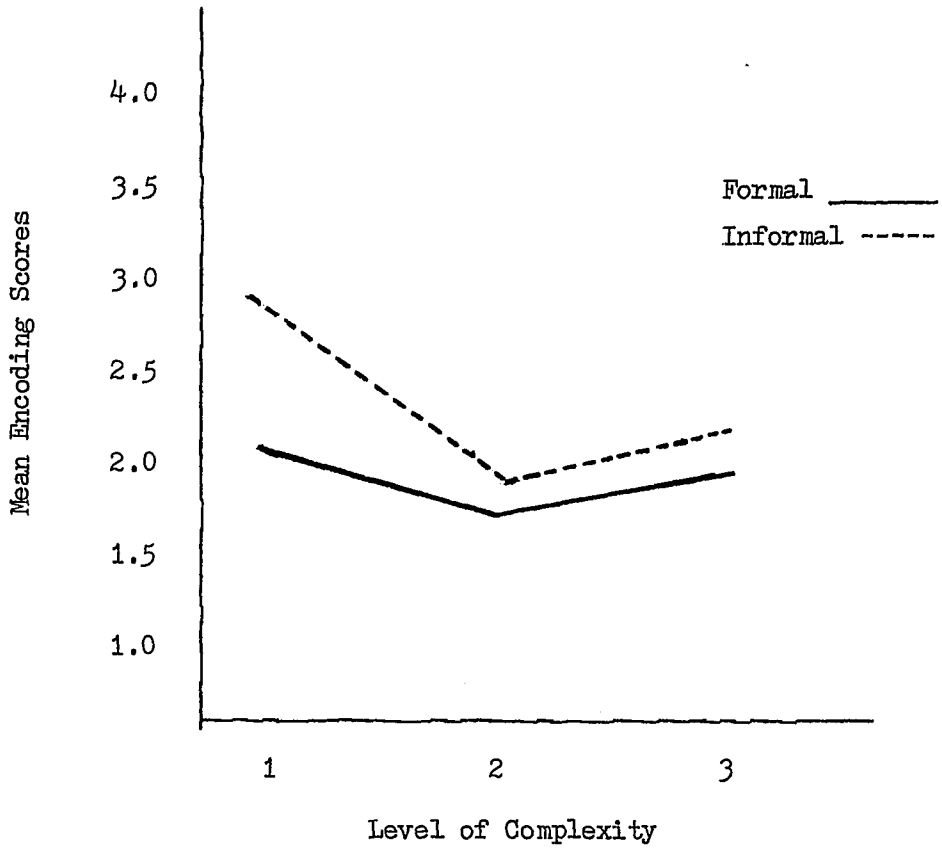

Figure 1. Encoding scores in formal and informal conditions for three levels of complexity.

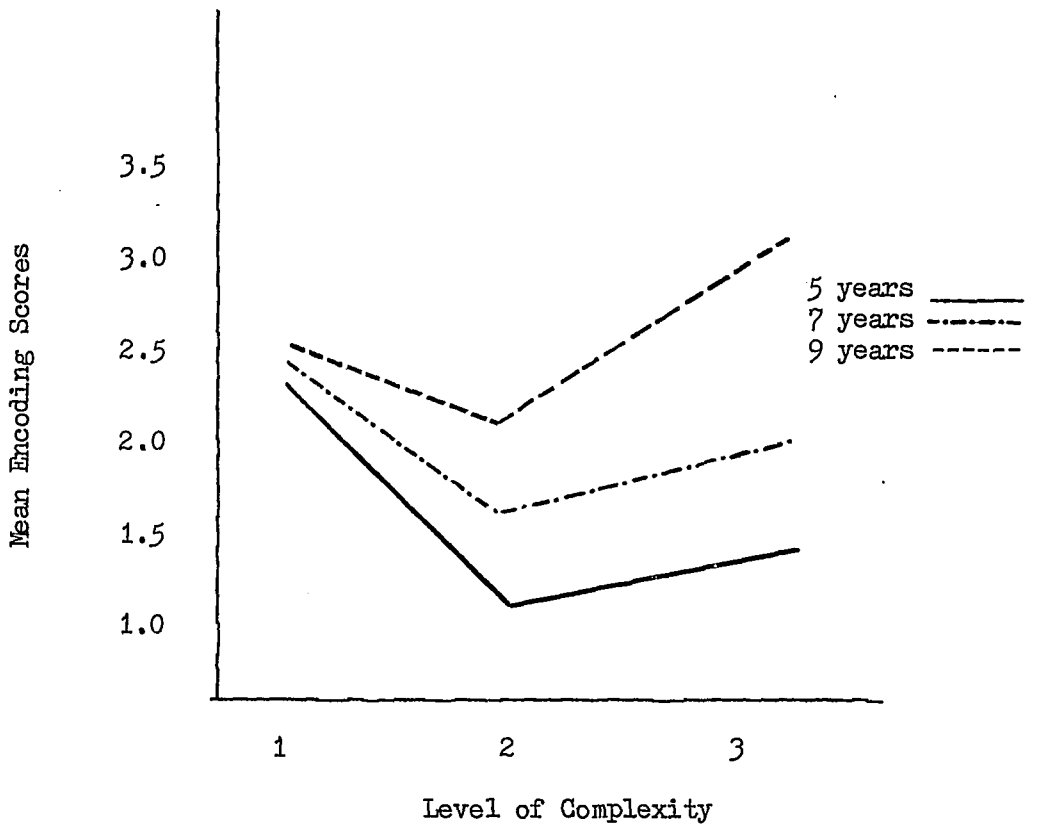

Figure 2. Encoding scores of three age groups for three levels of complexity.

Analysis of Other Dependent Variables

In addition to testing the predictions cited above, one objective of this study was to determine what effect, if any, certain specific factors had on referential communication. The results of the 3 x 3 x 2 repeated measures analyses of variance on these specific contributing factors yielded some additional information about referential communication as a process.

TABLE 2

ANALYSIS OF VARIANCE OF THE NUMBER OF FEATURES ENCODED

Source	df	Sum of Squares	Mean Square	F-Ratio
Between subjects	71			
Age (A)	2	230.9537	115.4769	17.7691**
Formal-Informal (B)	2	33.4491	33.4491	5.1470*
A x B	2	59.2314	29.6157	4.5571
Error between groups	132	428.9169	6.4987	
Within subjects				
Complexity (C)	2	17.3981	8.6990	5.7128**
A x C	4	31.4908	7.8727	5.1701**
B x C	2	49.3427	24.6713	16.2021**
A x B x C	4	2.7684	0.6921	
Error within subjects	132	200.9998	1.5227	

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

Table 2 shows that in terms of the number of features encoded there were significant main effects for the formal-informal condition ($F = 5.15$, $p < .01$). Regarding the main effect for condition, subjects encoded more features in the formal ($M = 5.54$) as compared to the informal condition ($M = 4.75$). This particular finding was opppo-site to the predicted result. Regarding age, subjects encoded more

features with increasing age ($\underline{F}$ = 17.77), so that for the youngest subjects $\underline{M}$ = 3.83, for the middle group $\underline{M}$ = 5.24, and for the oldest group $\underline{M}$ = 6.36. The Newman-Keuls comparison points out that the only significant difference was between the nine-year-olds and the five-year-olds ($\underline{C}_{diff}$ = 1.55, $\underline{p} < .05$). There was also a main effect for stimulus complexity ($\underline{F}$ = 5.71). A smaller number of features was encoded on moderately complex (Level 2) arrays ($\underline{M}$ = 4.81) than on either the complex (Level 3) arrays ($\underline{M}$ = 5.5) or the simple (Level 1) arrays ($\underline{M}$ = 5.12). The Newman-Keuls comparison showed that the difference between Level 3 and Level 2 scores was significant ($\underline{C}_{diff}$ = .423, $\underline{p} < .05$), but not the difference between Level 2 and Level 1.

In addition to the main effects, Table 2 shows that there were three significant interaction effects on the number of features encoded. The age and condition interaction ($\underline{F}$ = 4.56, $\underline{p} < .05$) is illustrated in Figure 3. It can be seen that the youngest subjects encoded more features in the informal condition than in the formal condition, whereas the two older groups of subjects encoded fewer features in the informal condition than in the formal condition.

Table 2 also shows that complexity interacts significantly with age ($\underline{F}$ = 5.17, $\underline{p} < .01$) on the number of features encoded. The nature of this interaction is revealed in Figure 4. The youngest subjects encoded slightly more features at Level 1 than at Level 2 and Level 3. Similarly, the seven-year-old subjects encoded about the same number of features across the three stimulus complexity levels. In contrast, the nine-year-old subjects encoded increasing numbers of features with increasing complexity.

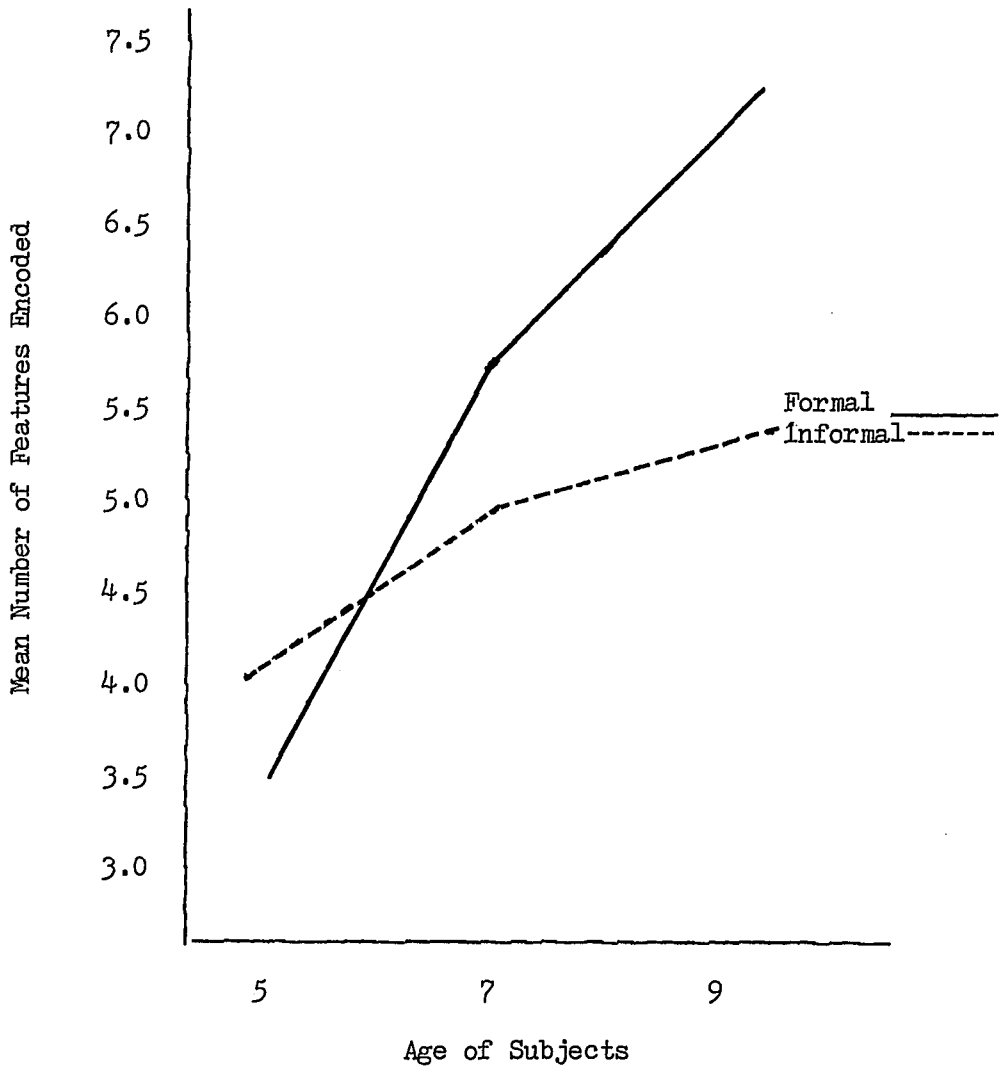

Figure 3. Number of features encoded by three age groups in formal and informal conditions.

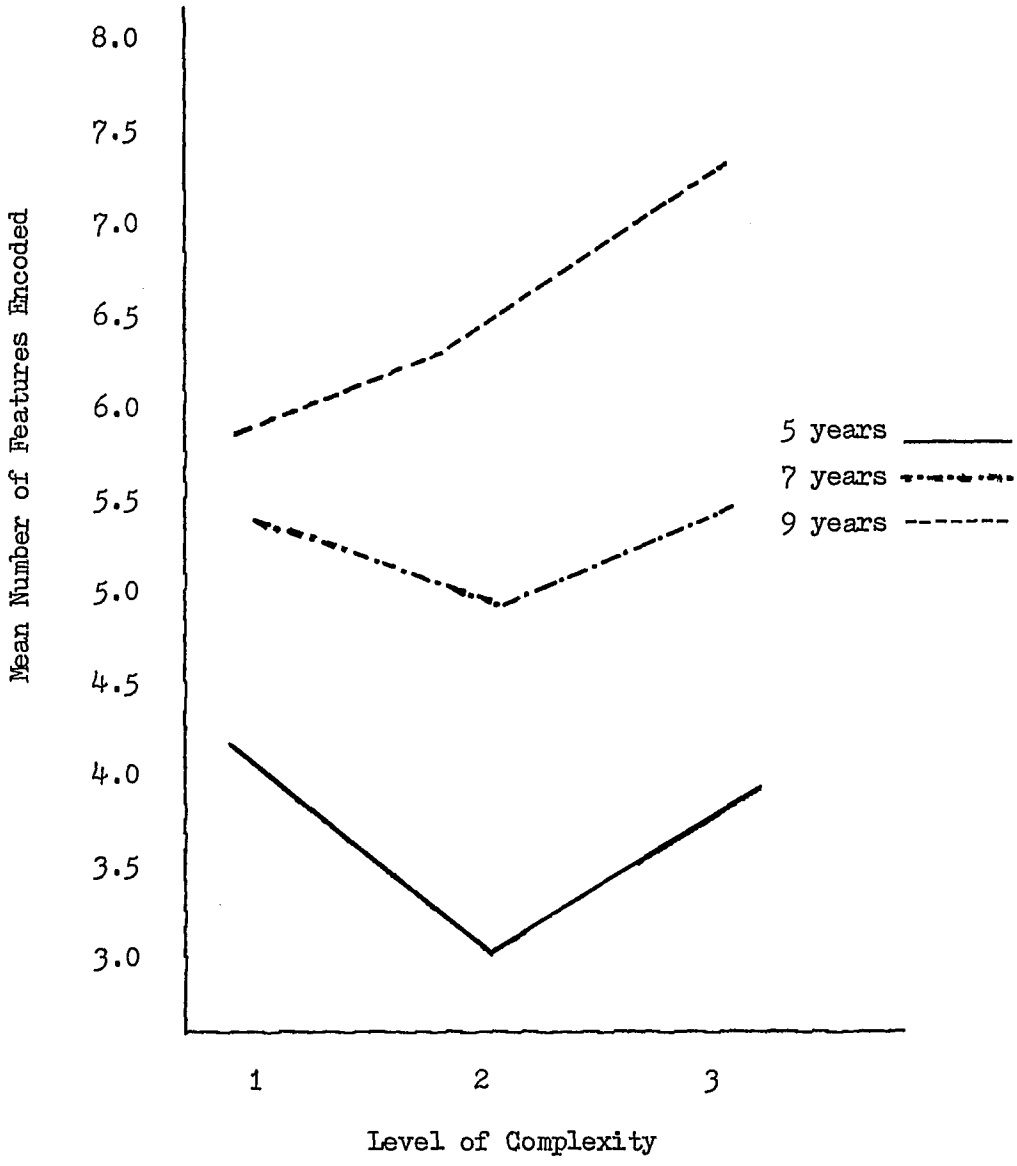

Figure 4. Number of features encoded by three age groups at three levels of complexity.

Finally, Table 2 shows a significant interaction between formal informal condition and complexity ($F = 16.20$, $p < .01$). In Figure 5 it can be seen that at low complexity (Level 1), more features were encoded in the formal condition than in the informal condition, whereas at the more complex levels the number of features encoded in the formal and informal conditions was about the same.

TABLE 3

ANALYSIS OF VARIANCE OF REDUNDANT ENCODINGS

Source	df	Sum of Squares	Mean Square	F-Ratio
Between subjects	71			
Age (A)	2	4.7778	2.3889	1.8351
Formal-Informal (B)	1	0.0046	0.0046	0.0036
A x B	2	0.9259	0.4630	0.3556
Error between subjects	66	85.9167	1.3018	
Within subjects				
Complexity (C)	2	11.5833	5.7017	9.8434**
A x C	4	0.2222	0.0556	0.0944
B x C	2	2.0093	1.0046	1.7074
A x B x C	4	2.5185	0.6296	1.0701
Error within subjects	132	77.6666	0.5884	

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

Table 3 presents a summary of the analysis of variance of the number of redundant features encoded. There is a significant main effect for stimulus complexity ($F = 9.84$, $p < .01$) reflecting the fact that there were more redundant encodings at Level 2 ($M = 1.44$) than there were at Level 1 ($M = .903$) or at Level 3 ($M = 1.03$). The Newman-Keuls comparison reveals that there were significant differences between the means for Level 2 and Level 1 ($C_{diff} = .263$, $p < .05$) and

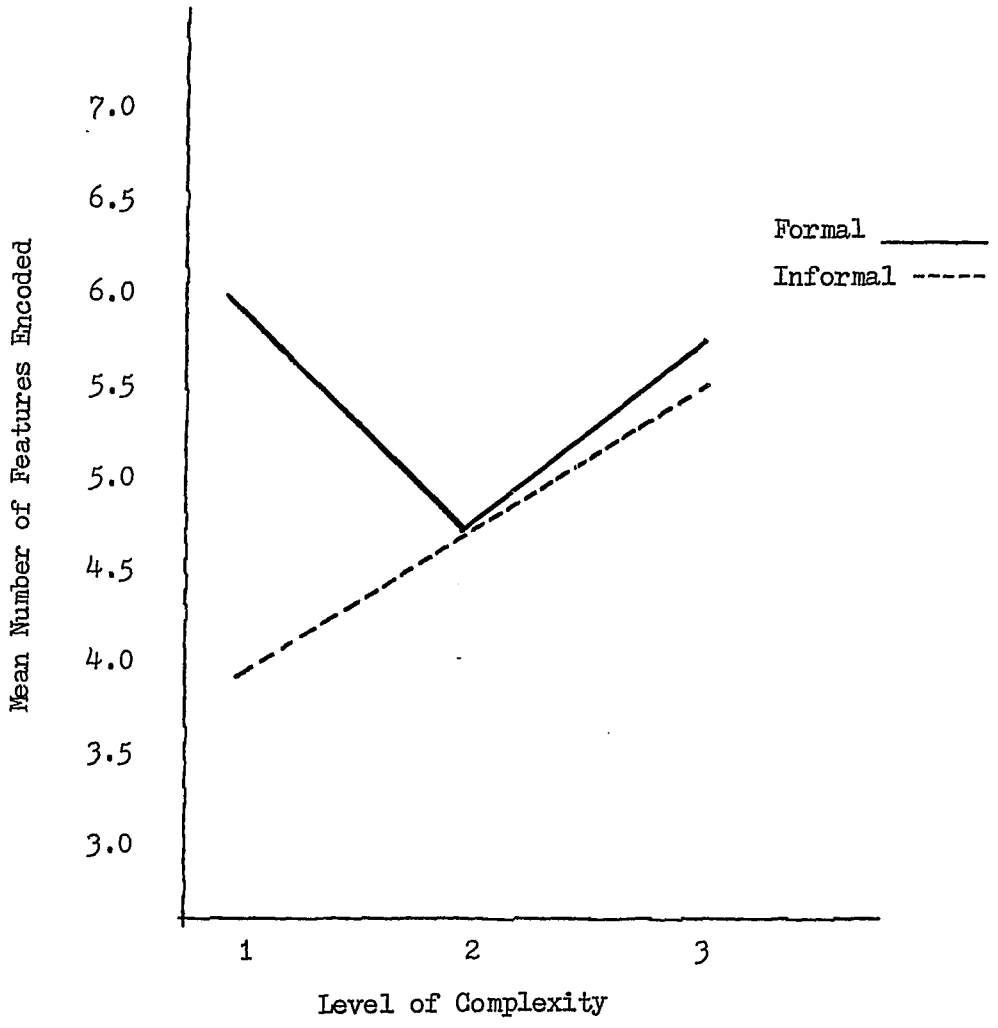

Figure 5. Number of features encoded in formal and informal condition for three levels of complexity.

also between the means for Level 3 and Level 2 (C_{diff} = .249, $p < .05$). There were no other significant main effects or interactions for the number of redundant features encoded.

Table 4 presents a summary of the analysis of variance for the number of contrastive features encoded. The analysis of variance was done after the Arcsin transformation was carried out on the raw scores. This transformation was necessary since the number of contrastive features increased with the complexity of the stimulus.

TABLE 4

ANALYSIS OF VARIANCE OF CONTRASTIVE ENCODINGS

Source	df	Sum of Squares	Mean Square	F-Ratio
Between subjects	71			
Age (A)	2	79.7572	16.0934	25.5976**
Formal-Informal (B)	1	32.1868	0.0002	0.0004
A x B	2	6.0755	3.0377	4.8317*
Error between subjects	66	41.4947	0.6287	
Within subjects				
Complexity (C)	2	6.4101	3.2050	11.9724**
A x C	4	8.3098	2.0774	7.7603**
B x C	2	1.5224	0.7612	2.8434
A x B x C	4	0.5128	0.1282	0.4789
Error within subjects	132	35.3367	0.2677	

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

Table 4 shows that in terms of the number of contrastive features encoded there was a significant main effect for age (F = 25.60, $p < .01$). The number of contrastive features encoded increased with increasing age such that the youngest subjects produced the smallest number of contrastive features (M = 1.11); the middle age group, an

intermediate level of such features ($\underline{M}$ = 1.715); and the oldest group, the largest number ($\underline{M}$ = 2.13). The Newman-Keuls comparison shows that there were significant differences between the means for the nine-year-olds and the five-year-olds (C_{diff} = .482, $p < .05$) and between the seven-year-olds and the five-year-olds (C_{diff} = .458, $p < .05$). Table 4 also shows a main effect for stimulus complexity ($\underline{F}$ = 11.93, $p < .01$). As stimulus complexity increases, the number of contrastive features also increases, so that for Level 1, $\underline{M}$ = 1.47; for Level 2, $\underline{M}$ = 1.66; and for Level 3, $\underline{M}$ = 1.90. The Newman-Keuls comparison shows that in terms of contrastive features encoded there are significant differences between the means for adjacent levels of stimulus complexity (C_{diffs} = .169 and .178, $ps < .05$).

In addition to these main effects, Table 4 reveals two significant interactions. There is a significant interaction between age and condition ($\underline{F}$ = 4.83, $p < .05$) that reflects the fact that the five-year-olds encoded more contrastive features in the informal condition than in the formal condition ($\underline{M}$ = 1.42 and $\underline{M}$ = .948, respectively); and both the seven- and the nine-year-old subjects encoded more contrastive features in the formal condition than in the informal condition. (See Figure 6.)

The age by complexity interaction in Table 4 ($\underline{F}$ = 7.76, $p < .01$) is depicted in Figure 7. Five-year-olds encoded more contrastive features at the lowest level of complexity than at the middle level or the highest level. The older subjects, on the other hand, encoded more contrastive features as stimulus complexity increased with the effect being stronger for nine-year-olds than for seven-year-olds.

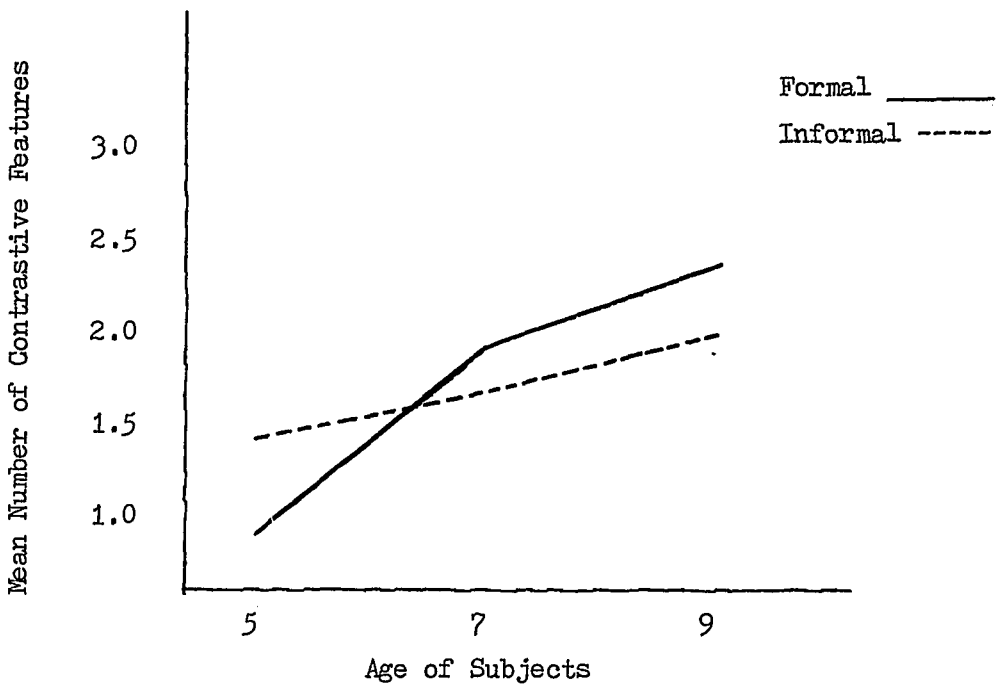

Figure 6. Number of contrastive encodings in formal and informal condition for three age groups.

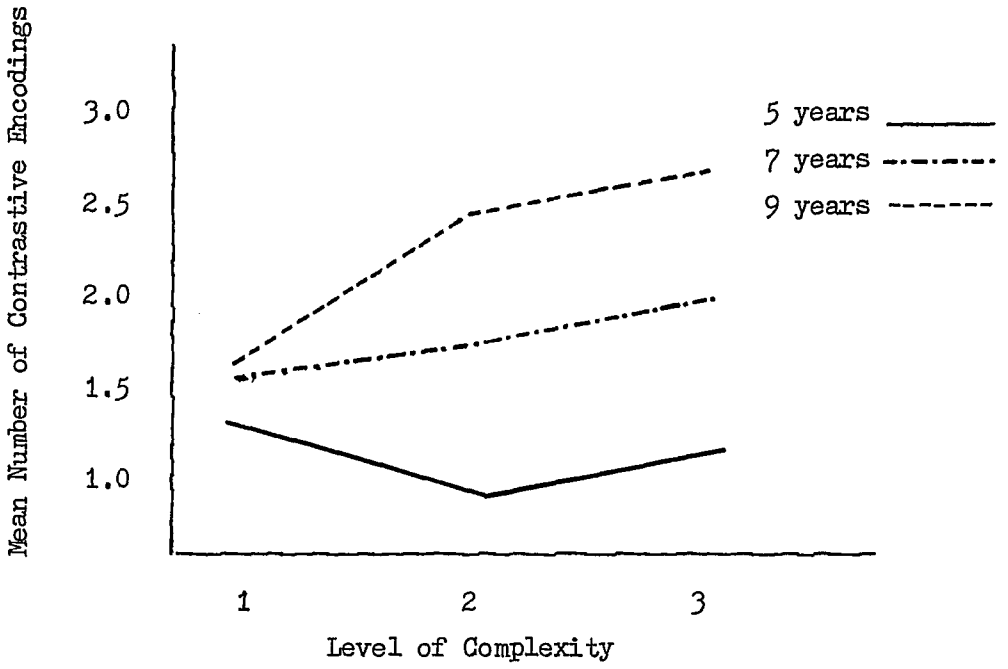

Figure 7. Number of contrastive encodings for three age groups at three levels of complexity.

In terms of the final contributing factor in referential communication, adjective ordering, no significant main effects or interactions were found (see Table 5).

TABLE 5

ANALYSIS OF VARIANCE OF ADJECTIVE ORDERING

Source	df	Sum of Squares	Mean Square	F-Ratio
Between subjects	71			
Age (A)	2	28.5093	14.2546	2.1934
Formal-Informal (B)	1	2.4491	2.4491	0.3769
A x B	2	16.0093	8.0046	1.2317
Error between subjects	66	428.9166	6.4987	
Within subjects				
Complexity (C)	2	11.6759	5.8380	2.6882
A x C	4	8.1574	2.1094	0.9391
B x C	2	3.7870	1.8935	0.8719
A x B x C	4	7.0463	1.7616	0.8111
Error within subjects	132	286.6667	2.1717	

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

CHAPTER IV

DISCUSSION

The results of this present study provide descriptive information on how children of different ages handle an encoding task in specific situations. But beyond the descriptive level, these results also reveal patterns of encoding behavior that shed additional light on group differences in performance. Further, when these encoding patterns are viewed from the pragmatic perspective they explain the relationship between the situational variables explored in this study and referential communication. The task in this discussion, then, is: 1) to describe the similarities and differences between these results, our predictions, and previous findings; 2) to identify the resulting patterns of encoding behavior; and then 3) to attempt to explain the meaning of these patterns from the pragmatic perspective. To aid in this task, Table 6 has been devised. This table is a frequency count of the number of criterial features encoded by the children in the study.

Consistent with previous findings and the predictions made in this present study, the results indicate that encoding is facilitated by relatively simple stimulus arrays, an informal context, and increasing age. In addition, this general picture of the encoding process is supported by specific encoding activities (i.e., the number of features encoded) that are also consistent with this general profile.

There are, however, several instances where these present results are inconsistent with earlier results and also with the predictions

made in Chapter II. For example, the results of this study appear to be inconsistent with earlier findings that 1) children encoded fewer features with increasing stimulus complexity (Ford and Olson, 1975); 2) verbal output increased in a relatively informal setting (Labov, 1970; Cazden, 1970); 3) redundancy increased with age (Whitehurst, 1976); 4) age is unrelated to the ability to encode contrastive features (Ford and Olson, 1975; Whitehurst, 1976); and finally, that 5) contrastive encodings decrease as stimulus complexity increases (Ford and Olson, 1975; Whitehurst, 1976).

TABLE 6

NUMBER OF CRITERIAL FEATURES ENCODED

Number of Features Encoded	5-year-olds		7-year-olds		9-year-olds	
	Formal	Informal	Formal	Informal	Formal	Informal
One dimension						
0	8	1	6	4	8	1
1	14	23	18	20	16	23
Two dimensions						
0	9	7	3	4	2	3
1	12	14	13	13	8	7
2	1	3	8	7	14	14
Three dimensions						
0	3	3	2	1	0	0
1	13	8	3	5	1	0
2	6	10	12	10	3	5
3	0	3	7	8	20	19

From the pragmatic view, however, these present results are not necessarily inconsistent with the studies cited above, but are, instead, complementary. Since pragmatics contends that all language is contextually based, variations of all the relevant situational factors must

be explored in order to understand their full impact on communication. For example, this study complements the Ford and Olson (1975) finding that children encoded fewer features with increasing stimulus complexity, since Ford and Olson (1975) did not vary the formality of context. This present study revealed that the number of features encoded was dependent upon the relative formality of the setting (see Chapter III). Similarly, the finding that verbal output increased in a less formalized setting (Labov, 1970; Cazden, 1970) is complemented by these present findings that verbal output (number of features encoded) is also modified by age and the complexity of the stimulus.

The predicted linear relationship between encoding and the complexity of the arrays did not materialize. It was not Level 3 (most complex), but rather Level 2 (moderately complex), that was the most difficult to encode for the children in this study (see Table 6). This particular inconsistency stems from the fact that the stimuli used inadvertently created some unforeseen problems for the children. This is borne out by the fact that the Level 2 arrays led to the greatest number of redundant encodings (see Chapter III) across all three age levels.

This study also provides insight into the communication process by allowing us to analyse the patterns that emerge when we associate group differences in encoding with specific variations in the formality of context, stimulus complexity, and age. Table 6 reveals 1) a pattern of disruption in the encoding process, and 2) a pattern reflecting variations in the ability to recognize the demand characteristics of the task. But even more importantly, these patterns interacted with the children's ages.

In more concrete terms, Table 6 reveals that the formal context is disruptive when encoding the relatively easy stimuli as opposed to the more difficult arrays where formality seems to make for only minimal differences in performance. This pattern also helps to interpret Figure 1, which tells the same story graphically. But looking at Table 6, this general pattern of disruption must be qualified by the age factor. Although the formal context proved disruptive in encoding easy arrays, it should be noted that the five-year-old children experienced the most disruption on this level while the middle-aged children (seven years old) were least affected. Further, the disruption continued for the youngest children on the more complex two- and three-dimensional arrays, while both groups of older children were no longer affected by formality with more complicated arrays. Table 6 shows that there is no real difference between the numbers of seven- and nine-year-olds in the two settings who were able to encode the correct number of features. But Figure 3 explains that those children in the formal condition encoded more features than those in the informal. Further, Figure 6 reveals that the older children in the more formal setting encoded more contrastive features than those in the informal setting.

In addition to this pattern of disruption, Table 6 reveals another age-dependent pattern. Again, although the children performed similarly on the easy arrays, the youngest children were very distracted when more than one feature required encoding and were therefore less capable than the older children of meeting the demands of the more complex arrays. This is reflected in the fact that while the majority of the youngest children proved quite capable of encoding one attribute correctly on the easiest arrays, not as many could encode one attribute on the more com-

easiest arrays, not as many could encode one attribute on the more complicated arrays and only a minimal number could encode the appropriate number of attributes. Figure 4 illustrates that, indeed, the youngest children encoded more features on Level 1 than they were able to encode on either of the more comples levels. Further, Figure 7 reveals that the five-year-olds could encode contrastive features on Level 1 to an extent they could not duplicate on the harder arrays. It should also be noted that for the five-year-olds the informal context seemed slightly more conducive to understanding the demands of the tast than the formal context.

On the other hand, the older children seemed less handicapped by the increasing demands of the difficult arrays (although the seven-year-olds did not perform as well as the oldest children). In fact, the oldest children did best when asked to encode three dimensions simultaneously (see Figures 2, 4 and 7). As opposed to the youngest children, both groups of older subjects were effective regardless of the formality of the context. In fact, both groups of older children encoded more features and more contrastive features in the formal condition than in the informal (see Figures 5 and 6, respectively).

To summarize, these patterns of encoding reveal that younger children found a formal, school-like context disruptive and were distracted by the additional features required in the more complex arrays. In contrast, the older children seemed at ease in both a formal and an informal setting and were much less distracted by the addition of features to accommodate the complex arrays.

The pragmatic perspective on language development explains first that all language is learned within the confines of a setting that helps

to determine the language rules applicable in that situation. In this experiment different contexts were created by the interaction of complexity levels and variations in the formality of context. According to Bates (1975) this would require that the children in this study redefine each variation to figure out the language rules that apply. If the children were not familiar with a particular context and its language rules, then, pragmatics would explain that these children would not be effective communicators in that context. Looking at the patterns generated by the three age groups in this study, it seems that the youngest children were least effective in contexts that were formalized and where stimuli were more complex. The older children on the other hand, were less handicapped by this same context. Therefore, we can infer that group differences in this study stem from the children's knowledge of and familiarity with the contexts in which they were asked to communicate.

In summary then, the pragmatic perspective's impact on the methodological and conceptual ambiguities surrounding the relationship between the variables explored in this study and referential communication was to clarify their interrelatedness. But even more importantly, this study allowed us to determine what governed the patterns of responses obtained. As an application of the functional systems approach, this study has shown that this integrated methodological and conceptual perspective is a viable means of obtaining unambiguous results that can explain group differences in the ability to communicate effectively.

CHAPTER V

SUMMARY AND CONCLUSIONS

The rationale for this particular study stemmed from the inconclusive results of studies of the effects of age, stimulus complexity, and the formality of the context on referential communication. Therefore one objective of this study was to explore the effects of these three variables on communication. Consequently children aged five, seven, and nine were asked to encode simple, moderately complex, and very complex stimulus arrays in either a formal or an informal context.

But further, since a critical review of the relevant literature showed that previous equivocal results were attributable to methodological and conceptual ambiguities, another objective was to explore the effects of the functional systems approach (Scribner and Cole, 1974) on these ambiguities. This approach requires a logically integrated, conceptual-methodological strategy and since the pragmatic perspective on language offered both a research strategy and a conceptual framework that were both situationally dependent, pragmatics was used as an explanatory framework.

More specifically, the functional systems strategy allowed us to:

1. explore the encoding process in a referential communication task by varying specific situational variables;
2. demonstrate that group differences in performance were patterned;

3. associate these patterns with specific differences in performance; and

4. gain insight into the relationship between situational variables and the communication process.

As predicted, the results of this study showed that the encoding process is a multiply determined, situationally dependent process. The data revealed significant main effects for age, formality of context, and stimulus complexity. But on another level, the resulting patterns of encoding behavior revealed that the children's knowledge of the language rules of a particular setting determined their relative success in communicating in the contexts created by manipulating the variables in this study. More specifically, the younger children were less successful in contexts that were formalized and where complex stimuli were involved. In contrast, both groups of older children, more at home in both the school-like and the informal settings, and with complex stimuli as well as easy arrays, were successful communicators in all the contexts explored.

This study has attempted to explore the advantages of the functional systems approach by using pragmatics, a perspective on language consistent with this general strategy. The relatively unambiguous findings suggest that continued exploration using this approach and/or the pragmatic perspective on language will shed additional light on referential communication as a cognitive, social, and linguistic process.

BIBLIOGRAPHY

Asher, R.S. The influence of sampling and comparison processes on the development of communication effectiveness. Paper given at meetings of American Psychological Association, September, 1972.

Asher, S.R. and Oden, S.L. Children's failure to communicate: An assessment of comparison and egocentrism explanations. Developmental Psychology, 1976, 12, No. 2, 132-139.

Bailey, S. An analysis of the trend toward objective thought and speech in children's communication. Unpublished master's thesis, Rutgers University, 1971.

Bates, E. (in) Morehead, D. and Morehead, A. (Eds.). Language deficiency in children: selected readings. University Park Press, 1976.

Cazden, C.B. The situation: A neglected source of social class differences in language use. Journal of Social Issues, 1970, 26, 35-60.

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

Cowan, P.A. The link between cognitive structure and social structure in two-child verbal interaction. Paper presented at meetings of the Society for Research in Child Development, 1967.

Edwards, A.L. Experimental design in psychological research. New York, Holt, Rhinehart and Winston, 1972.

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

Flavell, J.H., with Botkin, P.T., Fry, C.L., Wright, J.W., and Jarvis, P.E. The development of role-taking and communication skills in children. New York, John Wiley and Sons, 1968.

Ford, W., and Olson, D. The elaboration of the noun phrase in children's description of objects. Journal of Experimental Child Psychology, 1975, 19, 371-382.

Glucksberg, S. and Cohen, J.A. Speaker processes in referential communication: Message choice as a function of message adequacy. Proceedings of the 76th Annual Convention, American Psychological Association, 1968.

Glucksberg, S., Krauss, R.M. and Higgins, T. The development of referential communication skills. (in) Hetherington, E.M. (Ed.). Review of Child Development Research, 4, University of Chicago Press, 1975.

Glucksberg, S., Krauss, R.M. and Weisberg, R. Referential communication in nursery school children: Method and some preliminary findings. Journal of Experimental Child Psychology, 1966, 3, 333-342.

Kingsley, P. The relationship between egocentrism and children's communication. Paper read at meeting of the Society for Research in Child Development, 1971.

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

Labov, W. The logic of nonstandard English. (in) Williams, F. (Ed.). Language and poverty: Perspectives on a theme. Chicago, Markham Publishing Co., 1970.

Longhurst, T.M. and Turnure, J.E. Perceptual inadequacy and communicative ineffectiveness in interpersonal communication. Child Development, 1971, 42, 2084-2088.

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

Medin, D. and Cole, M. Comparative psychology and human cognition. (in) Estes, W.K. Handbook of learning and cognitive processes. vol. 1, New Jersey, Lawrence Erlbaum Associates, 1975.

Meissner, J. and Apthorp, H. Nonegocentrism and language mode-switching in black pre-school children, 1975, Unpublished manuscript.

Morris, C. Signs, language and behavior. Prentice Hall, Englewood, New Jersey, 1946.

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

Pietrinferno, G. The development of comparison processes in children's communication. Unpublished doctoral dissertation, Princeton University, 1973.

Rosenberg, S. and Cohen, B.D. Referential processes of speakers and listeners. Psychological Review, 1966, 73, 208-231.

Shatz, M. and Gelman, R. The development of communication skills: Modifications in the speech of young children as a function of the listener. Monographs of the Society for Research in Child Development, 1973, 38, #152.

Scribner, S. and Cole, M. Culture and thought. New York, John Wiley and Sons, 1974.

Werner, H. and Kaplan, B. Symbol Formation. New York, John Wiley and Sons, 1963.

Whitehurst, G.J. The development of communication: Changes with age and modelling. Child Development, 1976, 47, 473-482.