

THE EFFECTS OF MESSAGE STRUCTURE  
IN VERBAL INSTRUCTIONS TO  
KINDERGARTEN CHILDREN

by

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## Abstract

Teachers' instructions to young children produce varying performance, but little is known about which kinds of instructions are most effective. Gehlbach (1975) found that a common error made by children in decoding teachers' instructions was to make indiscriminate, or generalized responses when a selective or limited response was indicated in the instruction (e.g., children often traced all rather than a specified portion of a geometric figure).

Extending that research, the present experiment investigated sequential and logical features of brief messages (one or two sentences) which may influence the selectivity of childrens' decoding of instructions and their subsequent responses to the task. The major hypotheses tested were: 1) that a message containing some form of cautionary component (e.g., "only" or "just") would be decoded more successfully than a message containing only a positive statement of the discrimination needed to complete a task successfully; and 2) that a message containing an explicit negative would be decoded more successfully than either one containing only a positive statement of the discrimination, or the positive statement plus a cautionary word .

Tasks involving the selective tracing of parts of overlapping or adjacent geometric figures were presented by audiotaped messages to 100 kindergarten children. Each message was recorded in four conditions which varied the sentence structure and lexical content only slightly: 1) a core statement of the task; 2) the core statement plus the cautionary word "just"; 3) the core statement followed by an explicit negative; and 4) the core statement preceded by the explicit negative. Children were randomly assigned to one of the four conditions. Criteria were established

to yield a total accuracy score which functioned as the dependent variable for analysis. With all tasks treated as items from a single test, the alpha coefficient of internal consistency was 0.85. In a two-way analysis of covariance (sex x condition) on accuracy, VMI emerged as a significant covariate ( $r = 0.46$ ,  $p = 0.001$ ). The analysis of the adjusted means for the four experimental conditions yielded an  $F_{3,91}$  of 2.66 ( $p = 0.052$ ). Tukey's test for all pairs of means showed that performance scores were significantly higher in both the core condition and the condition in which the explicit negative preceded than scores in the condition in which the explicit negative followed the core statement ( $p < .01$ ). No interaction effects were indicated in an analysis of aptitude treatment interaction, and no other significant contrasts were noted.

Experimental studies of micro-features (micro-variables) which influence the effectiveness of verbal instruction to young children are virtually non-existent. Perhaps the most significant finding of this study is that such variables do in fact exist and that the effects they produce are measurable. Further study may uncover other significant variables, yielding a "set of rules" which would have a direct bearing on teachers' verbal instructions and which would cut across individual differences in young children to produce more successful execution of instructions.

To Roger Gehlbach for his guidance,  
rigorous expectations, patience and good  
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## TABLE OF CONTENTS

	PAGE
LIST OF TABLES.....	viii
LIST OF FIGURES.....	ix
CHAPTER	
I INTRODUCTION.....	1
II RELATED RESEARCH.....	3
III METHOD.....	27
IV RESULTS.....	31
V DISCUSSION AND CONCLUSIONS.....	40
BIBLIOGRAPHY.....	45
APPENDIX	
A .....	47
B .....	58
C .....	61
D .....	64
E .....	66



## LIST OF TABLES

TABLE		PAGE
I	Means and Standard Deviations for Accuracy, Latency Visual-motor Integration and Age in Four Conditions.....	33
II	One-way Analysis for Variance on Accuracy Scores by Condition.....	33
III	Pearson Correlation for Age, Sex, Accuracy, Latency and VMI for All Groups.....	34
IV	Pearson Correlation for Age, Sex, Accuracy, Latency and VMI for Core Condition.....	34
V	Pearson Correlation for Age, Sex, Accuracy, Latency and VMI for Core+Caution Condition.....	35
VI	Pearson Correlation for Age, Sex, Accuracy, Latency and VMI for Core+Negative Condition.....	35
VII	Pearson Correlation for Age, Sex, Accuracy, Latency and VMI for Negative+Core Condition.....	36
VIII	Tukey's Test for All Pairs of Means.....	37
IX	Two-way Analysis of Covariance (Sex by Condition) on Accuracy with VMI Covaried.....	38
X	Two-way Analysis of Covariance (Sex by Condition) on Latency with VMI Covaried.....	38
XI	Mean and Range of Total Latency in Each of Four Conditions.....	39

## LIST OF FIGURES

FIGURE	PAGE
1. Model for Teacher-pupil Communication.....	4
2. Model for a Study of Verbal-instructional Communication.....	17
3a,b. Examples of Geometric Figures Presented in Tasks.....	28

## Chapter I

### Introduction

Teachers spend a great deal of time talking to children. The ultimate goal, of course, is that the teachers' verbal behavior, in conjunction with non-verbal experiences, will lead to the children's achievement of the goals of schooling more expeditiously than if these behaviors were omitted. Verbal communication can be successful only to the extent that the message is comprehended by the receiver--to the extent that there is congruence between the intent of the speaker (encoder) and the perception or comprehension of that intent on the part of the listener (decoder). While it is possible for the decoder to misinterpret an accurate message which precisely states the encoder's intent, it is not likely that the decoder will correctly interpret an inaccurate message. Therefore, the primary responsibility for accurate communication lies with the encoder.

In the case of communication between teachers and young children, the responsibility is particularly acute. A message which is accurate, and totally comprehensible to an adult, may be confusing to the young child whose language fluency is not yet fully developed (Chomsky, 1969). In spite of this potential problem, the literature of early childhood education had devoted very little attention to the teacher as an encoder. Out of forty-two early childhood education texts surveyed, only six were concerned in any way with teacher talk, except as a means to encourage

child talk. In five of these six texts, discussion was limited to a paragraph or two of descriptive phrases (e.g., "low", "calm", "quiet manner", "clear in giving directions", or "pleasant yet firm"). One author (Tough, 1963) devoted an entire chapter to communication between the teacher and the young child. She emphasized the difference between their respective levels of fluency, and acknowledged the problem of decoding which could result. Unfortunately, she suggested few solutions, and those were general in nature (e.g., directions should be specific, rather than oblique). There remains unanswered the question of how to formulate a verbal message to ensure the greatest possible comprehension by the young child who is decoding.

In general terms, this study is concerned with variables which might influence the effectiveness of teachers' verbal instructions to young children. Specifically, it will test whether the young child's execution of a specified task can be significantly affected by small changes in verbal content (e.g., addition of a cautionary word such as "just" or "only") or in sequences of the various parts of an instruction.

## Chapter II

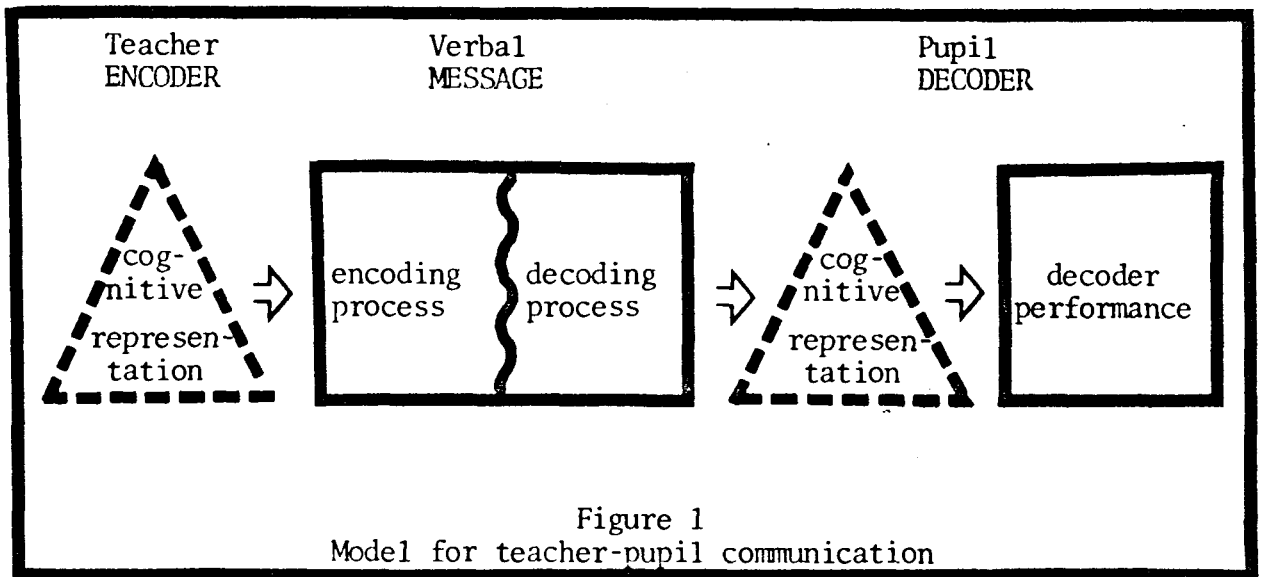
### Related Research

The literature review is presented in three sections. First, Shannon and Weaver's (1949) model of communication will be adapted to form a framework for a review of communication research as it relates to the special problems of the teacher of young children. The second section will concern the young child as a special kind of decoder, as evidenced by the research on language development, cognitive development, and personality development. The third section will review some of the general research on teaching effectiveness. With the exception of a few studies such as those pertaining to Headstart (Miller et al., 1969 cited in Travers, 1973) which evaluate overall programs in terms of socio-economic background and general long-term cognitive development, most teacher-effectiveness research has neglected early childhood concerns. However, some of the findings regarding teacher behavior with older children may be applicable to instructional effectiveness with young children as well. Such research will be examined to the extent that it is relevant (e.g., Hiller, 1969; Rosenshine, 1968).

#### Communication

Three major categories of communication are suggested by Westley and MacLean (1957): 1) an externalization of an immediate state, with no response required (e.g., "I am tired"); 2) the relaying of information (e.g., "this is a circle"); and 3) a mandate or instruction for specific

action (e.g., "trace the circle"). In the early years, a large proportion of teacher-child communication is in the second and third forms. An adaptation of Shannon and Weaver's (1949) model for communication (cited in Andersch, 1969) shown in Figure 1, represents the essential features of these processes.



In Figure 1, the dotted triangle indicating the encoder's cognitive representation of an instruction includes both the representation of an object, or symbol, and the representation of the action to be taken in regard to the object or symbol (i.e., the communicative intent). The decoder's cognitive representation in the model likewise includes both object and action.

The communication process, as represented in Figure 1, is sequential over time. The decoder's performance is a function of all prior processes. Success dependencies operate in the reverse of the process itself. That is, the performance of the decoder is a direct function of his own cognitive

response to the act, which in turn is a function of the accuracy of the decoding process, which is itself dependent upon the adequacy of the verbal representation, and so on. In order to be effective, the encoded message must be clearly organized and the content must be appropriate to prior learning or skills of the decoder. Two questions arise: 1) "Which differences between young children and adults would account for a difference in decoding behavior?" and 2) "What specific verbal components should teachers attend to in encoding messages to young children for maximum decoding success?"

In the existing literature regarding the teacher as an encoder, few findings are recorded in terms of the effectiveness of encoding as measured by its decoded consequences. For the most part, investigations have centered around observations, and measurement or frequency counts of various surface features such as length of utterances, number of questions, or kinds of questions. For example, male teachers emit longer utterances than female teachers (Hayes et al., 1971). and teachers of grade one pupils use more second-person and fewer third-person references than do teachers of grades six and eleven (Loflin et al., 1973, cited in Dunkin and Biddle, 1973). These descriptive findings are relevant to a study of the effectiveness of teachers' communication with young children only to the extent that they suggest possible variables which might be correlated or be manipulated in experimental designs.

Of the few variables which are considered in terms of decoder effects, most are concerned with learning and retention of information. Furthermore, communication literature has, for the most part, dealt with adults and older students, and with messages which are longer than those normally

employed with young children. It is possible, however, that some of the variables considered in effective teacher discourse may have relevance in a study of effective instructions. For example, verbal markers of importance (e.g., "remember this") while studied mainly as a method for improving learning and retention (e.g., Pinney, 1969) are frequently employed in conjunction with mandates (e.g., "now listen carefully") and as such may warrant further study.

Cautionary words such as "just" and "only" are commonly found as verbal markers in teachers' explanations and mandates to young children (Gehlbach, 1975). A cautionary word is especially interesting, in that it is a marker which implies a negative instruction, i.e., what not to do. For example, "trace just the part of the circle which..." implies that the listener should not trace all of the circle.

Clark (1974) measured the time intervals from the moment a subject saw a card with a picture of a star and a cross and a statement (e.g., "The star is not above the cross.") to the moment he pushed a "true" or "false" button. Clark compared the time it takes to verify an affirmative sentence with the time it takes to verify a negative one, and concluded that the negative is more difficult to process. He reasoned that a negative instruction leaves more alternatives open. When one is told what not to do, there are still many choices left for what one should do. If Clark's conclusion is correct, the message, 'do not trace all of the circle', is an explicit negative which may, by virtue of difficult processing, confuse a young child. On the other hand, if used in conjunction with a positive instruction, it might serve as a verbal marker, or warning, and thus limit an otherwise over-generalized response to a specific instruction. In the



curriculum of most kindergartens, emphasis is placed on completion of tasks, and recognition and production of whole geometric figures. Therefore, special consideration is needed to determine the effects of such variables as cautionary words, or explicit negatives on instructions which have specific limitations.

The literature on communication also considers prosodic variables. These variables do not relate to the content of messages, but rather to their aural characteristics. They describe qualities of "clarity" and "pleasantness" of speech in terms of pitch, harshness, volume, and speed. To date, the only conclusions drawn are that moderation and variation are preferable to extremes and monotony (Anderesch, 1969; Brooks, 1971). As in most of the other communication research, studies have been primarily concerned with older children, and with messages which are longer in duration than a simple instruction or mandate.

One notable exception is the study by Gehlbach (1975) in which no correlation was found between the number of words per second in instructions encoded by teachers, and the success of task completion by decoders of kindergarten age. In the Gehlbach study, messages were produced by sixty different teachers. It is possible that in an experiment in which a single message was used and only the speed of the message was manipulated, different results might be produced. In the same manner, variables such as cautionary words or explicit negatives should be examined experimentally, to determine which of these variables within the teachers' encoded instruction would predictably affect decoding success. In the case of a young child, the significant variables might be quite different from those variables which affect adult-decoder success.

## The Young Child as a Special Case

Language development. Studies of language development in the last three decades have investigated the nature of the code, the development process, and the effects of socio-economic and cultural variables on this development. Observations of size of vocabulary, length of sentences, and frequency of word usage have led to the development of a number of theories. In most of these studies, the emphasis has been on the production of language, or encoding skills of the young child, rather than on the decoding skills. For example, Braine (1971) studied pivotal grammar in two-word sentences of the very young child, and Bloom (1970) categorized the acquisition of the negative in terms of disappearance, non-existence, non-occurrence, rejection, and denial. Glucksburg, Krauss and Higgins (1975) investigated referential grammar, stating that "proper exclusion as well as inclusion increases with age, but factors controlling improved performance remain unknown" (p. 336). Bloom (1975) cites Labov (1970) and others who have concentrated on the effects of socio-economic level and culture on language development, but again with the emphasis on production of language, rather than on comprehension.

Chomsky's (1969) work is a notable exception. She explored the child's command of syntactic structures by means of comprehension tests involving selected constructions of a relatively complex nature. She concluded: "The children's observed failure to correctly interpret a number of constructions is indicative of several areas in which their underlying syntactic knowledge falls short of the adults" (p. 2). Chomsky (1969) presented an example of this discrepancy in syntactic

knowledge in an experiment in which a blind-folded doll was shown to 40 children from kindergarten to grade four. Each child was asked, "Is the doll easy to see?" Resultant answers, and subsequent questioning revealed that unlike the older children who gave correct responses, many kindergarten children interpreted the message to mean, "Can the doll see easily?" rather than "Can it easily be seen by someone else?".

Whether we consider size of vocabulary, acquisition of the negative, or development of a knowledge of syntax, there is evidence of a disparity between the language fluency of the young child and the adult. Because of this disparity, instructions which might be quite adequate for an adult or older child may be inappropriate for a child of kindergarten age. Clearly, vocabulary level is a factor, but even within the limits of a vocabulary which is totally familiar to the decoder, the syntactic structure can vary greatly, and result in a discrepancy between what is intended and what is comprehended. Thus, the teacher of young children has the responsibility to adapt his instructions so that they will be appropriate, and accurately comprehended. To make such adaptations, the teacher needs more information than is presently available regarding the effects of specific lexical and syntactical changes in verbal instruction to young children.

Cognitive development. Teachers seem to have at least an intuitive notion of the cognitive development of a child. However, they are not always aware of the specific limitations imposed by given levels of development. The difference in cognitive development between an adult and a young child is not simply a quantitative measure of acquired bits and pieces of

information over a span of time. The difference appears to be more a matter of the relationship of these bits and pieces to each other, and to the world at large. Smith (1975) itemized three basic aspects or characteristics of cognitive structure: 1) a system of categories; 2) sets of rules for allocating objects or events to particular categories; and 3) a network of interrelations among the categories. Comprehension, or as Smith (1975) defined it, "making sense of the world," is the relating of new experience to existing cognitive structure. There appears to be a consensus in the literature that there is a difference between the cognitive structures of the child and those of the adult. However, no such consensus exists in the explanations for, or even the descriptions of, this difference.

The Yale Clinic of Child Development (Gesell and Ilg, 1949), while limiting its reports to behavioural observation, stressed maturation as the prime factor in a profile of the young child which is clearly different from that of an adult. No explanations were put forward, but as a result of observations of fifty or more children, age norms were established for such variables as height, weight, motor characteristics and emotional expression. For example, according to these norms, a three-year old child can copy a straight line or a circle, but the ability to copy a square does not occur until age four. By age five a child can copy a circle, a square, and a triangle, and is beginning to be able to form some letters of the alphabet.

Perhaps the most often quoted and widely discussed theory of the development of cognitive structure is that of Jean Piaget. His theory suggests that the young child is quite different from the adult in several

ways -- in his methods of approaching reality, in his views of the world, and in his usage of language. Piaget views the process of child development as passing through a specific and invariable sequence of stages from sensorimotor, through preoperational, to concrete operations, and finally to formal operations. The child's processing of information at each stage is governed by what Piaget terms schemata--the sum total of which constitutes the child's cognitive structure at any given stage. This cognitive structure serves as a kind of filter for information perceived, and as a program for behaviour during intellectual operations such as the operation of putting things together, placing them in categories, and forming hierarchies of classes (e.g., Ausubel and Sullivan, 1970).

According to Piaget, the young child centres his attention on limited amounts of available information, depending on the stage at which he is functioning. For verbal instructions to be effective, it is important that the cognitive assumptions made by the instructions (e.g., level of abstraction or relationships among concepts) be appropriate to the cognitive structure which the child brings to the task. An often quoted example is the four- or five-year old child who perceives a change in the volume of water when it is transferred to a taller and narrower container. Unlike an older child, who is able to consider two dimensions, the younger child attends to only one, and therefore equates "taller" with "more" (Ginsberg and Oppen, 1969). Smith (1975) supports this view with the argument that we "see" what the brain tells us to see. Our perceptions are coloured by what we know. For example,

"...children in the early grades of school may not have mastered the special nature of passive sentences and therefore will not predict them. They will interpret, 'Tommy was hit by his sister,' as 'Tommy hit his sister', not because they have analyzed the sentence incorrectly, but because they accept its surface structure as a sufficiently close match to the kind of sentence they would be likely to produce" (p. 93).

Gibson (1969) holds the view that schematic concepts and their strategic use follow, rather than precede, perception. She sees a progression from discrimination, through recognition, to production. These three processes in perceptual development form a kind of cognitive hierarchy. The cognitive process begins with an abstraction of salient features and differentiation of simple patterns and objects from background stimulations (perception), and culminates in the form of representations, with the resultant ability to label and produce copy. For example, once a child has perceived the salient features of a circle, he can discriminate, or recognize its difference from a square. When labels (verbal language) have been attached to the salient features, such as "round," "straight," or "corner," these labels can facilitate perceptual learning. A teacher is in the position of first introducing the label (e.g., "round"). Later, the teacher may use this label to call the child's attention to the salient feature of "roundness" in another context where, for example, the new shape is only an approximation of a circle, or a sphere. A new form also can be learned by cataloguing it with a familiar label into the existing schema, and then noting a departure from the exact label, such as a "squashed circle." This approximation can then have the new label, "oval," attached.

Perceptual learning is a continuum of increased ability to abstract distinctive features and invariant relationships. The ability to attend selectively grows with age. Gibson (1969) reports a previous experiment

(Gibson et al., 1962) in which children four- to nine-years old were asked to choose exact copies of a sample from an array of graphic forms, some of which differed only slightly from the original. In line-to-curve transformations (e.g., one line of the form was curved rather than straight) the percentage of errors dropped from thirty-seven percent for four-year olds, to seven percent for eight-year olds. Gibson (1967) also cites a study by Maccoby and Konrad (1966) in which subjects were presented with two messages concurrently, through a loud speaker or microphones. When children listened to a man's voice and a woman's voice speaking at the same time, with instructions to report what only one of the voices was saying, the number of correct reports increased with age.

If Gibson's theory regarding the importance of attention to salient features is accepted, one might hypothesize that errors could be decreased by first having the subject listen to the voices separately, and then pointing out, or calling attention to the salient features (e.g., "See how some lines are curves and others are straight," or "Notice that the man's voice is low and the woman's voice is high.").

Olson (1970) supports Gibson's theory that the basic cognitive process is a perceptual one, but modifies this theory by stating that "... it is the performatory acts in various media that confront the individual with the alternatives from which he then selects further information" (p. 201). In a five-year study of the acquisition of the diagonal, Olson (1970) cited numerous experiments which provide evidence that the cognitive development of the young child is indeed different from that of the older child, or an adult. For example, the percentage of children (N=118) who were able to copy a diagonal checkerboard by pressing diagonal

bulbs on a bulb board, increased from 28.57 at age three, through 37.74 and 77.78 for ages four and five respectively, to 100 percent at age six.

In summary, while researchers may differ in their approaches to the problem, in their theories as to cause, and even in their definitions of the referent words (e.g., perception, comprehension, or cognition) there appears to be agreement that the cognitive development of a young child is not the same as that of an adult. The young child perceives and makes sense of his world in quite a different way. The questions which still need to be answered are: 1) "What information does the young child need?" and 2) "What kind of organization of the information is necessary for the child to understand the learning task?" More specifically, in the case of verbal instructions, we must ask, "What information must the message contain that is different from the information needed by an adult?"

✓ Personality traits. A third dimension which should be considered in the development of the young child is that of personality. Kagan (1965) categorized children as impulsive or reflective by examining error scores and latency scores on his Matching Familiar Figure Test. Latency was the measurement, in seconds, from the end of instruction to the first response, on each item of the test. For any given group of children, those who scored above the mean on errors, and whose latency measures were below the mean were labelled "impulsive." The opposite group, with errors below the mean and higher latency measures, were labelled "reflective."

The scores of the other two groups (low error/low latency and high error/high latency) were apparently considered to be a function of mental



ability and no personality labels were attached. A number of studies have used these dimensions of personality to explain success or failure on other tests (e.g., Katz, 1971; Plomin and Buss, 1973; Ward, 1968).

Many attempts have been made to modify "impulsivity" with an eye to improving success levels (e.g., Briggs and Weinberg, 1973; Debus, 1970; Yasida and Hagens 1968; Heider, 1971, cited in Zelniker et al., 1972). Of the various modification methods used, only specific training or instruction in search strategies has proven effective in reducing impulsive children's error scores (e.g., Heider, 1971; Meichenbaum and Goodman, 1971; Zelniker et al., 1972). While the tendency towards reflection or impulsivity remains relatively stable, in general children tend to become more reflective with age. Katz (1971) explains this in terms of an underlying change in cognitive processing which occurs during the early years, "reflecting a change in the tendency of children to go beyond perceptually dominant stimuli, and to reflect over, analyze, and use alternate dimensions" (p. 746).

This view correlates with Piaget's centration theory, as described earlier. For example, it should require more reflection (increased latency) to consider more than one dimension, or alternative, to a verbal instruction. Gibson would also agree with this view, but with the emphasis on a change in perception from attending to a single salient feature, to attending to several features. In the case of an instruction to trace a specified part of a circle, the younger child might attend to "trace" and filter out the "part of" as being irrelevant. The resultant activity would then be a tracing of the whole figure, requiring less reflection than if he were also to attend to the instruction "part of."

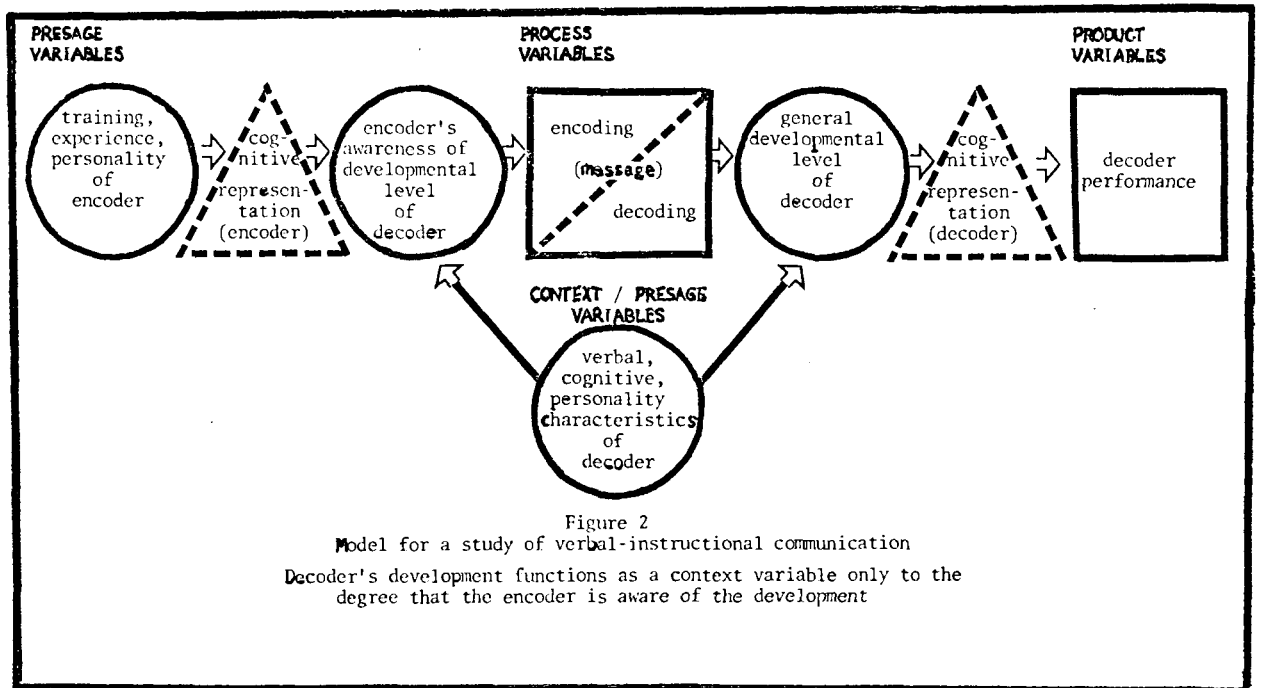
Cronbach (1975) emphasized the importance of personality traits, and personal styles or beliefs in his work on aptitude-treatment interactions. Although the studies cited were conducted with older students, the suggestion that the success of a particular teaching method may vary according to the personality of the individual could have significance for a study of instructional effectiveness with young children, as well.

Whether the change in a child's personality occurs by gradual development or by means of specific training (e.g., training towards reflectivity as proposed by Zelniker et al., 1972), it will be a long-term process. To improve communication and decoder success on a short term basis requires modification of the teacher-encoder's instructional speech. To construct a message, or instruction, which can be successfully decoded by a young child, we need to consider not only language and cognitive development, but possibly personality traits, as well. If a young child is less reflective than an older child or adult, the effectiveness of a verbal instruction to him might be increased by verbal cues which call attention to features not normally attended to, thus leading the child toward more reflection on, or consideration of, alternative behaviors.

Teacher-effectiveness research. An important decision which has to be determined in any research is which variables are to be examined. Dunkin and Biddle (1974) have proposed a model for the study of teaching effectiveness which delineates four major types of variables in the teaching-learning process: 1) presage variables (the teachers' formative experiences, training, and characteristics); 2) context variables (pupil characteristics and environmental variables); 3) process variables (classroom behavior for

both teachers and pupils); and 4) product variables (immediate pupil growth and long-term pupil effects).

Presage variables and context variables. Dunkin and Biddle (1974) classify decoder characteristics as context variables. This classification reflects their concern with teacher behavior as a result of teacher-pupil interaction, and it does not lend itself to detailed analysis of the effectiveness of verbal instruction. In order to analyze the communication process as distinct from general classroom behavior, it is necessary to separate encoding from decoding. Figure 2 indicates this separation in a model which adds the Dunkin and Biddle classification to the communication model illustrated earlier in Figure 1.



The model in Figure 2 also distinguishes between the inevitable impact of decoder characteristics on the decoder's cognitive representation and

decoder performance, and the possible but not inevitable impact of decoder characteristics upon encoding technique. The impact on the decoder's cognitive representations functions as a presage variable; the possible impact on encoding functions as a context variable. Whether the context variable affects encoding depends upon the encoder's degree of awareness of the decoder's presage variables. A dotted line is used in the model to indicate that the degree of encoder awareness determines the extent to which pupil presage variables become a factor in the encoding process.

Process variables and product variables. The empirical linking of teacher behaviour (process variables) and pupil outcomes (product variables) were noted earlier as the distinguishing feature of research on teaching effectiveness. Teacher behaviour is roughly divided into methods or strategies, and skills or techniques.

Strategies are methods of operating in the classroom which can be used in various subject areas, and by various teachers. Effectiveness depends on the techniques and skills employed within the method, and on their appropriateness for the group of pupils. For example, the lecture method may be more appropriate than the discussion method for a group of fifty students, but the success of the lecture may also depend on the strategies or techniques employed (e.g., organization, timing, humour, etc.), and the appropriateness of the material to the age and experience of the audience.

Functionally, the lecture bears some relationship to teachers' instructions to young children. In both situations the teacher, as an encoder, delivers a message, or series of messages, to the pupil. The

pupil, in turn decodes the message to the extent that he is able to process the information.

In a review and discussion of the research on the lecture method, McLeish (1976) cites a number of studies which categorize and tabulate the various aspects of this method. Some of the studies are merely descriptive, while others attempt to measure the product, or outcome, in terms of student achievement. Still others evaluate the method in terms of student appeal. Studies differ in their conclusions regarding comparison of the traditional lecture method with other methods such as programmed instruction (Pikas, 1969; Himmel, 1972), and McLeish makes no definitive statement regarding the conclusions. Research on the lecture has also dealt with the relating of information in fairly long sequences of teacher discourse. In these respects, it has little bearing on teachers' instructions to young children. However, an examination of some of the techniques, or variables within the lecture method, might provide valuable insight.

Unfortunately, even within the lecture method, or any other method such as discussion, tutoring, or programmed instruction, most of the variables examined in research on teaching effectiveness deal with broad or general concepts--with macro-variables such as undifferentiated, or only generalized, categories of "teacher talk." For example, Dunkin and Biddle (1974) cite a study by Adams and Biddle (1970) in which it is reported that grade eleven teachers are "emitters" in about sixty percent of all verbal moves. When teacher discourse is categorized in terms of its relationship to Bloom's (1956) taxonomy of objectives (cited in Gage and Berliner, 1975), the purpose appears to be to attach a label

(e.g., "concerned with knowledge" or "promotes analysis") describing what the message does, rather than how it does it.

In the investigations of micro-variables within the lecture, subjects have been from upper-elementary to university levels, with verbal fluencies approaching or equal to those of an adult.

Rosenshine (1968) examined micro-variables to distinguish between effective and ineffective lectures. In two fifteen-minute lessons on Yugoslavia and Thailand, presented to grade twelve pupils by 43 teachers, Rosenshine found that effective lectures contained more explaining links, that is, "prepositions and conjunctions which indicate the cause, result, means or purpose of an event or idea" (p. 8).

Using the same video tapes and transcripts, and the same original sample as Rosenshine (1968), Hiller (1969) found a significant negative correlation between vagueness in a lecture, and retention of material. In Gehlbach's (1975) study, with 120 kindergarten children, this correlation was not borne out ( $r = -.05$ ). This is not to say that vagueness is not a significant variable. It simply suggests that a measurement of vagueness may not be appropriate if there is a mismatch in levels of fluency between the encoder and decoder. Examining the effectiveness of instructions to young children in terms of variables, such as organization or vagueness, is comparable to examining these same variables as criteria of effectiveness in a lecture delivered in French to an English-speaking audience, where decoding problems control the variance in decoder performance, to such an extent that variance attributable to encoding is obscured.

The use of advance organizers is another strategy which could possibly have importance in a study of instructional effectiveness (Ausubel, 1960; Barnes and Clawson, 1975). Ausubel described an advance organizer as a statement of concepts at a higher level of abstraction, generality and inclusiveness than the learning task itself. Barnes and Clawson (1975) reported that Ausubel (1968) compared a 500-word written advanced organizer with an historical passage of the same length, using 120 college seniors as subjects. The difference between means of the experimental and control groups was almost significant at the .01 level in favour of the group using the advance organizer. Ausubel (1960) suggested that advance organizers serve as a warm-up, creating a disposition to learn verbal materials. Three important aspects of the research on advance organizers are: 1) the units of analysis have been large (e.g., a 500-word expository passage); 2) for the most part, the medium of presentation has been in writing; and 3) studies on advance organizers to date have been concerned with older children and adults. At the kindergarten level, with reading skills not yet established, a written message is inappropriate. The few studies which have used an oral advance organizer have been inconclusive (Feller, 1973; Lucas, 1972, as cited in Barnes and Clawson, 1975). While the idea of advance organizers has credibility, the research does not directly provide information which is relevant to verbal instructions to young children. Large units of analysis in which a multiplicity of smaller variables (micro-variables) could be functioning to cloud results, and a written presentation to a child who has not yet mastered reading, are inappropriate.

An orienting statement, while not identical to an advance organizer as described by Ausubel (1960), has some similarities which might bear investigation. The idea of providing advance orienting information for the listener makes common instructional sense, and the use of orienting statements is a common practice for teachers of young children (Gehlbach, 1975). Within Piagetian theory, an orienting statement would call forth a schema appropriate to the information contained in an instruction so that chances of processing would be optimal.

Gibson (1969) might predict that an orienting statement would call the decoder's attention to distinctive features of the information following (e.g. "Trace the part of the circle which ..."). The addition of an explicit negative, rather than simply being a verbal marker of importance (Pinney, 1969, cited in Gage and Berliner, 1975), may serve as an orienting statement (e.g., "Do not trace all of the circle. Trace the part of the circle that ..."). For this reason, the explicit negative warrants further investigation in a study of verbal instructions to young children.

To date, much of the research on teaching effectiveness has been correlational, producing results which, even when highly significant in statistical terms, form a questionable base for instructional design. However, significant correlations may be a starting point for experimental manipulation of variables which could produce information which would have a direct bearing on the effectiveness of teachers' instructions to young children.

Gage (1963) proposed a study of micro-variables as a route of investigation for selection for specific, measurable criteria for teacher



effectiveness. In response to Gage's proposal, Gehlbach (1975) investigated verbal correlates of instructional effectiveness with kindergarten children.

In Gehlbach's study, sixty teachers were asked to generate taped messages to verbally direct 120 kindergarten children in the completion of eight visual-motor tasks. The messages were examined for micro-features (e.g., individual words and sentence structure) which were likely to affect the selectivity of children's decoding of the instruction and response to the task, and whose frequencies would correlate with decoder success. A common error made by the children in decoding the teachers' instructions was to make an indiscriminate, or generalized response when a selective or limited response was indicated in the instruction. For example, children would trace all rather than a specified portion of a geometric figure. In a post hoc analysis of the data, "the principal difference between successful and unsuccessful teacher-encoders seemed to reside in their relative abilities to communicate to the decoder, with adequate instructional power, the points at which the generalizable response was to be started and stopped, or at least applied with caution" (Gehlbach, 1975, p. 27). Two important variables which emerged were cautionary words (e.g., "only" and "just") and explicit negatives (e.g., "Do not trace all ..."). In two of the tasks, correlations of the occurrence of cautionary words in an instruction with the decoder's performance success were 0.33 and 0.35 (N = 60). Likewise, correlations for use of an explicit negative and decoder success were 0.26 and 0.36 (N = 60).

Gehlbach's (1975) study represents the first two stages of Rosenshine and Furst's (1973) three-stage paradigm for research on teaching effective-

ness. Rosenshine and Furst propose that research on teaching effectiveness should begin with direct observation of what actually occurs in the classroom, in terms of teacher behaviour as described by strategies and techniques. Following this, correlational studies should investigate possible relationships between these occurrences and pupil outcomes. Since correlation does not imply a casual relationship, correlations which suggest a strong relationship should be subjected to experimental designs in which the pupil outcome is a dependent variable, and the strategy or technique is manipulated as the independent variable. Given the appropriateness of the Gehlbach (1975) study, the present research is built directly upon it, and moves from the correlational to the experimental phase.

This study, like the Gehlbach study, differs from the balance of the existing research in several ways: 1) it attends specifically to concerns that are unique with young children whose language development is not complete--to features of verbal instructions which would not produce demonstrably different performance in the average adult (e.g., use of a cautionary word such as "just" or "only"); 2) it deals with mandates for use of skills already learned (e.g., tracing a circle); 3) it utilizes taped messages of verbal instruction, insuring exact duplication of content, vocabulary, sentence structure, and prosodic variables such as pitch or speed. It also searches for micro-variables in verbal instruction which result in effective decoding that is not highly variable across children.

A concern in the design of the present study which was not attended to in the Gehlbach study is the possibility of aptitude-treatment

interactions. Pupil characteristics such as visual-motor integration and impulsivity may influence or obscure experimental results on tracing or drawing tasks. An examination of the literature on impulsivity and reflection sheds little light on problems of designing the most efficient instructional messages for pre-school children (Kagan, 1968; Katz, 1971. etc). This is partly due to the lack of impulsivity-reflectivity research with children in this age group, and also due to the fact that impulsivity and reflectivity are, by definition, characteristics of only about two-thirds of the population (Kagan, 1965). If characteristics such as impulsivity or reflectivity do produce differences in performance, a measure of latency (time elapsed between end of instruction and beginning of performance of task) would provide additional information regarding the relative merits of different types of messages across children. Likewise, in the performance of tasks such as the tracing of geometric figures, visual-motor integration could affect the performance of individuals (Beery, 1967). Therefore, measures of this variable might also clarify the relative merits of messages which differ in content or sequence of elements.

Based on Gehlbach's correlational study, this experiment tested the use of cautionary words and explicit negatives in oral instructions (mandates) to kindergarten children. Latency of response and visual-motor integration were measured to generate possible covariates. The negative value of vagueness, as discussed earlier, was not supported by Gehlbach (1975). Therefore, it has not been included as a variable in this study. The following hypotheses were tested: 1) based on Gehlbach's findings, a message containing some form of cautionary instruction (e.g., an implicit

negative such as "just") would be decoded more successfully than a message containing only a positive statement of the discrimination needed to successfully complete a task; 2) according to Gibson's (1969) theory of perception and Pinney's (1969) study of verbal markers, a message containing an explicit negative would be decoded more successfully than either one containing only a positive statement of the discrimination, or the positive statement plus a cautionary word. To test for possible effects of sequence, the explicit negative was presented either before, or after, the positive statement; and 3) visual-motor integration would correlate significantly with success as measured by task scores (Beery and Buktenika, 1967). However, when VMI was employed as a covariate the hypothesized differences in messages would remain significant, considering the general similarity for language development and cognitive development.

## Chapter III

### Method

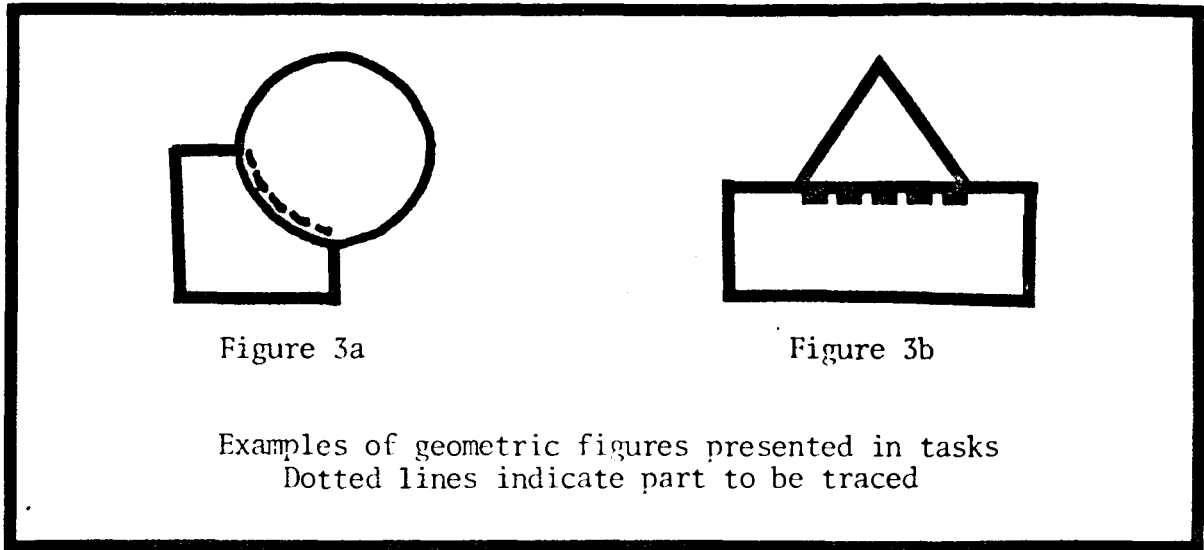
#### Subjects

Forty-eight boys and fifty-two girls from twelve kindergarten classes participated in the study. Their ages ranged from 65 to 76 months, and all children were from English-speaking homes in Burnaby, British Columbia, Canada.

#### Materials

Instructional tasks. To measure the dependent variable of decoder success, ten tasks involving the tracing of selected parts of overlapping or adjacent geometric figures were developed with corresponding audio-taped messages. For example, on a paper showing an overlapping circle and square, one task was to trace the part of the circle which covered the square, as shown in Figure 3a. The geometric shapes used were the circle, the square, the rectangle and the triangle. These shapes are recognized by virtually all children by the end of the kindergarten year, although the triangle and the rectangle are sometimes confused at this age. Both the general recognition and the occasional confusion were demonstrated in the warm-up tasks, as noted in Procedures in the following section. Tasks were designed so that those which contained both the triangle and the rectangle required the child to trace the one segment common to both shapes, thus eliminating errors due only to a reversal in

recognition. An example is shown in Figure 3b. All the tasks are reproduced in Appendix A.



Messages for the ten tasks were recorded in each of four conditions:

- Condition A. Simple core instruction. A positive statement of the task to be completed. (Example: "Trace the part of the circle that covers the square.")
- Condition B. The core instruction (A) with the implicit negative "just" included. (Example: "Trace just the part of the circle that covers the square.")
- Condition C. The core instruction (A) followed by an explicitly negative statement. (Example: "Trace the part of the circle that covers the square. Do not trace all of the circle.")
- Condition D. The reverse of Condition C, with the explicit negative preceding the core. (Example: "Do not trace all of the circle. Trace the part of the circle that covers the square.")

Complete transcripts of the messages are given in Appendix B.

Test of Visual-motor Integration. The age two to eight section of Beery and Buktenika's (1967) Developmental Test of Visual-Motor Integration (VMI) was administered to measure the visual-motor integration level for each child and to generate a covariate for an analysis of variance. In validity research on the test, the correlation between VMI and chronological age was .89 for the two- to fifteen-year age range. Correlations were higher with mental age than with chronological age. Beery and Buktenika (1967) described the progression in visual motor integration from an ability to discriminate forms, through an ability to trace and then to copy, culminating in an ability to produce the forms without a sample. By this analysis, therefore, reproduction of geometric forms, as required by the VMI test, presupposes an ability to trace a geometric figure, and was considered an appropriate measure.

### Procedure

Each child was tested individually, in a separate room near or adjacent to the classroom, and was introduced to the experimental setting by means of informal conversation. The Developmental Test of Visual-Motor Integration was administered according to the instruction manual, and age and sex were recorded. A set of simple warm-up tasks familiarized the child with the taperecorded instructions and verified his knowledge of shapes involved in the experimental tasks. A reproduction of the warm-up task sheet and a transcript of accompanying instructions are included in Appendix C. Only two children were totally unfamiliar with these shapes.

These two subjects were dropped from the sample and subsequently replaced, leaving a total sample of one hundred subjects, as noted above.<sup>1</sup>

Children were randomly assigned to one of the four instructional conditions. The ten tasks were presented in randomized orders for condition A, and these orders were replicated in each of the other conditions. Instructions for each task, in each condition, were recorded on separate cassettes, which facilitated presentation in the specified order. Cassettes were numbered by task and color-coded by condition. The subject's identity number was recorded on the back of each task sheet.

All tests were administered by the experimenter. Task sheets were presented one at a time, and preliminary instructions were the same for each subject. The transcript for instructions is provided in Appendix D. No indication was given as to the correctness of a response.

### Scoring

Latency, recorded to the nearest tenth of a second, was measured from the end of a recorded message until the child began to trace.

VMI tests were scored according to the test manual, and raw scores were used for analysis. Performance on the tracing tasks was scored blindly. Criteria were established for each task to yield a possible accuracy score of 0 (no attention to required discrimination), 1 (partial success) or 2 (perfect task completion). Total scores were also computed for each subject.

<sup>1</sup>A few children, who clearly recognized the circle and triangle, but who appeared to be unsure in discrimination between the square and the rectangle, were retained in the sample. As noted in the Materials section above, this particular problem in discrimination did not affect the accuracy scores.



## Chapter IV

### Results

With the ten tasks treated as items from a single test, the alpha coefficient of internal consistency was .81 for the pooled sample. Correlations of individual test items with the total test ranged from .58 to .73, with the exception of task 8, for which the correlation with the total test was only .12. It seemed apparent that task 8 was either ambiguous, or measuring something considerably different from the other tasks. When task 8 was removed from the scale, the coefficient alpha for the remaining nine tasks treated as a single scale was .85. In all subsequent analyses, task 8 was excluded in forming the total scale score for tracing tasks. Item statistics for the ten tasks are given in Appendix E.

An accuracy score was computed for all subjects as the total of all nine individual task scores. The latency scores were computed similarly as the total over all nine tasks. The VMI score was the total number of drawings correct on the Age Two to Eight section of the Beery and Buktenika test. Means and standard deviations for accuracy scores, latency scores, visual-motor integration scores and age are shown in Table I for each of the four conditions: 1) Core; 2) Core+Caution; 3) Core+Negative (Core+Neg); and 4) Negative+ Core (Neg+Core). The distribution of boys and girls was 12 and 13 respectively, in all four conditions.

To test the general hypothesis that the experimental changes in message content or sequence might affect accuracy scores, a one-way analysis of variance on accuracy scores by condition was calculated (Table II), and yielded a significant  $F_{3,96}$  of 3.05 ( $p = .03$ ).

TABLE I  
Means and Standard Deviations for Accuracy,  
Latency, Visual-motor Integration  
and Age in Four Conditions

		Total	Core	Conditions		Neg+ Core
				Core + Caution	Core+ Neg	
Accuracy (Maximum= 18)	M	9.49	10.68	9.40	6.80	11.08
	S.D.	5.69	6.24	5.95	5.20	4.54
Latency (in seconds)	M	200.82	217.56	193.16	140.60	251.96
	S.D.	109.85	105.52	64.42	101.71	131.50
VMI (Maximum= 15)	M	10.27	10.52	10.56	9.80	10.20
	S.D.	1.96	2.04	1.47	2.27	1.97
Age (in months)	M	70.45	69.60	71.72	69.76	70.72
	S.D.	3.92	4.80	3.27	3.53	3.75

Accuracy and latency means are derived from totals of nine task scores for each subject.

TABLE II  
One-way Analysis of Variance on Accuracy Scores  
by Condition (Core, Core+Caution,  
Core+Neg, and Neg+Core)

Source	d.f.	SS	M.S.	F	p
Between Groups	3	279.70	93.23	3.05	.03
Within Groups	96	2933.28	30.55		
Total	99	3212.99			

As shown in Tables III through VII, correlations between total task accuracy scores and the variables of age, sex and latency were generally low. There was a significant correlation of .46 ( $p = .01$ ) between accuracy and VMI in the total sample. When the four conditions were examined separately, significant correlations for task scores and VMI ranged from .40 ( $p = .02$ ) to .57 ( $p = .002$ ). The only other significant correlations were between VMI and sex, in the Core condition (.41,  $p = .02$ ), and between VMI and latency in the Core+Neg condition (-.42,  $p = .01$ ).

TABLE III

Pearson Correlations for Age, Sex, Accuracy,  
Latency and VMI for All Groups (N=100)

	Age	Sex	Accuracy	Latency	VMI
Age	--				
Sex	-.03	--			
Accuracy	.00	-.03	--		
Latency	.05	-.04	.13	--	
VMI	.22	.13	.46*	-.02	--

\* $p = .01$

TABLE IV

Pearson Correlations for Age, Sex, Accuracy,  
Latency and VMI in Core Condition (N=25)

	Age	Sex	Accuracy	Latency	VMI
Age	--				
Sex	.07	--			
Accuracy	.01	.16	--		
Latency	.06	.18	.11	--	
VMI	.23	.40*	.57**	.14	--

\*  $p = .05$

\*\* $p = .01$

TABLE V

Pearson Correlations for Age, Sex, Accuracy,  
Latency and VMI in Core+Caution Conditon (N=25)

	Age	Sex	Accuracy	Latency	VMI
Age	--				
Sex	-.12	--			
Accuracy	-.14	-.30	--		
Latency	-.13	-.01	.05	--	
VMI	.22	-.04	.40*	.04	--

\*p < .05

TABLE IV

Pearson Correlations for Age, Sex, Accuracy,  
Latency and VMI in Core+Neg Condition (N=25)

	Age	Sex	Accuracy	Latency	VMI
Age	--				
Sex	-.07	--			
Accuracy	.16	-.10	--		
Latency	.13	-.26	.15	--	
VMI	.14	-.05	.44*	-.42*	--

\*p < .05

TABLE VII

Pearson Correlations for Age, Sex, Accuracy,  
Latency and VMI in Neg+Core Condition (N=25)

	Age	Sex	Accuracy	Latency	VMI
Age	--				
Sex	-.04	--			
Accuracy	-.09	.14	--		
Latency	.03	-.03	-.18	--	
VMI	.30	.23	.40*	.07	--

\*p .05

As a result of the significant correlations of VMI with accuracy in all conditions, and with latency and sex in some conditions, these variables were examined further. Two-way analyses of covariance (sex x condition) were conducted on both the latency and accuracy scores, with age and VMI entered as covariates. The analyses yielded a non-significant main effect for sex both on accuracy ( $F_{1,91} = 1.07$ ;  $p = 0.31$ ) and on latency ( $F_{1,91} = 0.04$ ;  $p = 1.00$ ). Age emerged as a non-significant covariate in both analyses ( $r = .00$ ,  $p = 1.00$ ) and was not considered further. VMI emerged as a significant covariate only in the analysis of accuracy scores ( $r = 0.46$ ,  $p = 0.00$ ).

Group means for accuracy scores were adjusted for covariation with VMI scores, and are shown in Table IX along with standard errors. For a more powerful test, a one-way analysis of covariance for condition on accuracy means with VMI as the covariate (BMD; Dixon, 1973), showed a statistically significant omnibus  $F_{3,95}$  statistic of 2.75 ( $p < .05$ ). The summary analysis is shown in Table X.

TABLE IX  
Group Means and Adjusted Group Means  
for Accuracy in Four Conditions

	N	Mean	Adjusted Mean	S.E.
Core	25	10.68	10.36	0.993
Core+Caution	25	9.40	9.03	0.994
Core+Neg	25	6.80	7.40	0.999
Neg+Core	25	11.08	11.17	0.991

TABLE X  
One-way Analysis of Covariance for Condition  
on Adjusted Accuracy Means

Source of Variance	DF	Sum of Sq.	Mean Sq.	F
Equality of Adjusted Cell Means	3	202.69	67.56	2.75*
Zero Slope	1	599.33	599.33	24.39
Error	95	2333.94	24.57	
Equality of Slopes	3	47.64	15.88	0.64
Error	92	2286.30	24.85	

$p < .05$

A test for homogeneity of regression was not statistically significant ( $F = 1.00$ ). This signals the absence of aptitude-treatment interactions.

A post hoc t-test on adjusted means, using orthogonal contrasts, showed that the Core+Neg condition produced significantly lower accuracy relative to both the Core and the Neg+Core conditions ( $p < .05$ ). A t-test matrix for adjusted group means is shown in Table XI.

Given that neither sex nor VMI emerged as significant variables in the earlier analysis of covariance on the latency totals, a one-way analysis of variance was conducted, yielding an  $F_{3,96}$  of 5.11 ( $p = 0.00$ ). The summary analysis is shown in Table XII. Over one third of the task responses in the Core+Neg condition were 0.0 seconds, due to the fact that many children in this condition began the response immediately after the core part of the message, or at least before the end of the complete message. A comparison of the means and ranges of latency in the four conditions is found in Table XIII.

Table XI  
t-test Matrix for Adjusted Group Accuracy Means

	Core	Core+Caution	Core+Neg	Neg+Core
Core	--			
Core+Caution	.95	--		
Core+Neg	2.10*	1.15	--	
Neg+Core	-0.58	-1.52	-2.69*	--

\*  $p < .05$

Table XII  
One-way Analysis of Variance on Latency  
Totals in Four Conditions

Source	DF	Sum of Squares	Mean Square	F	p
Between Groups	3	164513.00	54837.66	5.11	0.00
Within Groups	96	1030206.00	10731.31		
Total	99	1194719.00			

TABLE XIII

Mean and Range of Total Latency in Each of Four Conditions  
Reported in Tenths of Seconds (N=100, n=25)

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Condition	Mean	Minimum	Maximum
Core	217.56	51.	527.
Core+Caution	193.16	110.	400.
Core+Neg	140.60	0.	374.
Neg+Core	251.96	98.	654.

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## Chapter V

### Discussion and Conclusions

The most important result emerging from this study was that two conditions, Core and Neg+Core, produced better decoder success than the Core+Neg condition. This relationship still existed when adjustments were made for VMI scores, which correlated significantly with task accuracy scores. Contrary to expectation, the addition of a cautionary word, "just", did not produce higher scores than the core instruction alone. This result was particularly surprising, considering the fact that in the Gehlbach study, the correlations of cautionary words and total scores were .33 and .35 (N = 60). Unlike this study, messages in the Gehlbach study were generated by 60 teacher-subjects and varied on a number of dimensions (e.g., length, content, and repetition). The introduction of the additional variables without controls may account for the discrepancy in the results of the two studies. It is further possible that in replication of the present study with a larger sample, the addition of a cautionary word would emerge as a stronger variable. On the other hand, the difference between the results also suggests a note of caution regarding prescriptive statements which are based on the results of correlational studies alone, and emphasizes the need for experimental tests.

In retrospect, it is not surprising that the core instruction followed by an explicit negative yielded the poorest results. In this condition seventeen subjects started to trace seventy-four of the tasks immediately after the core statement. Of these, some completed the task with no apparent attention to the explicit negative. Others started, stopped, then started again, with varying degrees of success. Still others started, and then stopped at whatever point they happened to have reached when they heard the

explicit negative. Frowns, raised eyebrows, and glances toward the examiner indicated a degree of confusion not evidenced in the other conditions.

Although latency did not correlate significantly with any other variables, in the Core+Neg condition the correlation between latency and VMI was  $-.42$  ( $p < .05$ ). As described earlier, many subjects began the task immediately after the core message, yielding a latency measure of zero seconds. Beery and Buktenika (1967) found a high correlation between VMI and mental age. It is conceivable that subjects who scored high on VMI had enough information from the Core part of the message to be able to start, but were then confused by the interference of the explicit negative, thus depressing the accuracy scores in spite of the correlation between VMI and accuracy. In a subsequent study, it might be advisable to record either a negative latency (i.e., the time elapsed between the onset of activity and the end of instruction) or a more precise measure of the start, stop, start sequence. Without these measurements, there is no clear picture of what actually occurred in the Core+Neg condition.

Clark (1974) theorized that an explicit negative is more difficult to process than a positive (Core) instruction, which might explain the low accuracy scores in the Core+Neg condition. However, it does not explain the significant improvement in decoder accuracy when the explicit negative precedes, rather than follows the core statement. It is possible that the difficulty in processing the negative results in no action, until the positive statement clarifies the instruction.

Another possible explanation is that the explicit negative preceding the core instruction serves as a "verbal marker of importance" (Pinney, 1969). If this is the case, the words "not...all" in the explicit negative, in fact, call attention to the words "part of" in the core message, making the limiting feature of the core message more salient. In the case of the Core+Neg condition, where the core message has already been processed, and perhaps even acted upon, it is possibly too late for the explicit negative to serve as a warning, or director of attention.

From yet another point of view, Gibson's (1969) theory of attention to salient features would suggest that subjects attended first to a single verb and noun (e.g., "trace...circle"). When this was effectively countermanded by the other salient features (e.g., "not trace..." or "...Not...all") the mandates were effectively incompatible. This would explain the significantly lower accuracy scores in the Core+Neg condition as compared to the Core condition.

Although Clark, Pinney and Gibson provide us with theories for why both the Core and the Neg+Core conditions produce significantly better accuracy scores than the Core+Neg condition, we are still faced with the question of why there is no significant difference between the Core and the Neg+Core conditions. We can only conclude that while an explicit negative preceding a core message may help some children, in terms perhaps, of marking salient features, it at least does not confuse them, as would appear to be the case when the explicit negative occurs after the core message.

Visual-motor integration was the only demographic considered in the investigation of aptitude-treatment interaction, since there was virtually no correlation between accuracy scores and other trait variables. Results indicate that there was no interaction. It is possible, of course, that a replication of the study or an increase in sample size would yield inconsistent results. Furthermore, as Cronbach suggests (1975) a higher order interaction, using VMI plus one or more other variables, could account for more of the variance than presently indicated. Thus, conclusions drawn from the aptitude-treatment interaction data in this study must be considered with sample size and number of variables in mind. Nevertheless, results of the study suggest further investigation of micro-variables in teachers' instructions to young children as a promising source of substantive information for teacher training in verbal explanations and directions for tasks.

There is little doubt that the average adult or older child could successfully perform any one of the tasks presented in this study in any one of the four conditions. However, the significant main effects for the four conditions of differently encoded instructions, as evidenced by the analysis in this study, suggest that for young children there is good reason for attention to seemingly small differences in messages. Difficulties in successful completion of tasks might well be a result of micro-variables in the teachers' instruction. Further investigation of such micro-variables could well yield a "set of rules" easily applied by the teacher, and result in instructions which cut across individual pupil differences to produce more successful completion of tasks.

## BIBLIOGRAPHY

- Andersch, E.G., Staats, L.C., and Bostrom, R.N. Communication in everyday use. New York: Holt, Rinehart & Winston, 1969.
- Ausubel, D.P. "The use of advanced organizers in the learning and retention of meaningful material." Journal of Educational Psychology, 1960, 51, 267-272.
- Barnes, B.R., and Clawson, E.U. "Do advance organizers facilitate learning? Recommendations for further research based on an analysis of 32 studies." Review of Educational Research, Fall, 1975, 45, No. 4, 637-660.
- Beery, K. Visual-motor integration. Monograph. Chicago: Follett Publishing Co., 1967.
- Beery, K., and Buktenika, N.A. Developmental Test of Visual-Motor Integration. Chicago: Follett Publishing Co., 1967.
- Bloom, L.M., Language development: Form and function in emerging grammars. Cambridge, Mass: MIT Press, 1970.
- Bloom, L.M., "Language development review." In Horowitz, F.D. (Ed.), Review of child development research, 4, Chicago: University of Chicago Press, 1975.
- Braine, M., "The acquisition of language in infant and child." In Reed, C. (Ed.), The learning of language, New York: Appleton-Century Crofts, 1971.
- Brooks, W.D., Speech communication. Dubuque, Iowa: Wm. C. Brown Co., 1971.
- Chomsky, C., The acquisition of syntax in children from 5 to 10. Research Monograph No. 57. Cambridge, Mass: MIT Press, 1969.
- Clark, H.H., "The power of positive speaking." Psychology Today, Sept., 1974, 102, 108-9, 111.
- Cronbach, L.J., "Beyond the two disciplines of scientific psychology." American Psychologist, 1975, Feb., 116-127.
- Dunkin, M.J. and Biddle, B.J., The study of teaching, New York: Holt, Rinehart & Winston, Inc., 1974.
- Gage, N.L., "Paradigms for research on teaching." In N.L. Gage (Ed.), Handbook of research on teaching, Chicago: Rand McNally, 1963.

- Gage, N.L. and Berliner, D.C., Educational psychology. Chicago: Rand McNally, 1975.
- Gehlbach, R. Verbal correlates of instructional effectiveness with kindergarten children. Paper presented at annual meeting of AERA, Washington, D.C., April, 1975.
- Gesell, A. and Ilg F., The child from one to five. New York: Harper & Bros., 1949.
- Gibson, E.J., Principles of perceptual learning and development. New York: Appleton-Century Crofts, 1969.
- Ginsburg, H. and Oppen, S., Piaget's theory of intellectual development: an introduction. New Jersey: Prentice-Hall, 1969.
- Glucksberg, S., Krauss, R.M. and Higgins, E.T., Referential communication skills. In Horowitz, F.D. (Ed.), Review of Child Development Research, 4, Chicago: University of Chicago Press, 1975.
- Heider, E.R., "Information processing and the modification of an 'impulsive conceptual tempo'." Child Development, 42, 1971, 1276-81.
- Hiller, J.H., Fisher, G.A. and Kaess, W., "A computer investigation of verbal characteristics of effective classroom lecturing." American Educational Research Journal, 1969, 6, 661-675.
- Himmel, C.E., "College learning with and without formal classroom instruction: a comparison." Psychology in the Schools, 9, July, 1972, 272-277.
- Katz, J.M., "Reflection-impulsivity and color-form sorting." Child Development, 1971, 42, 745-754.
- Kagan, J., "Impulsive and reflective children: significance of conceptual tempo." In Krumboltz, J. (Ed.), Learning and the educational process, Chicago: Rand McNally and Co., 1965.
- McLeish, J. "The lecture method." In Gage, N.L. (Ed.), The psychology of teaching methods, Chicago: University of Chicago Press, 1976, 252-301.
- Meichenbaum, D. and Goodman, J., "Training impulsive children to talk to themselves: a means of developing self-control." Journal of Abnormal Psychology, 1971, 77, 115-126.
- Miller, L., et al. "Experimental variation of Headstart curricula: A comparison of current approaches." In Travers, R.M.W. (Ed.), Second handbook of research on teaching, Chicago: Rand McNally, 1973.
- Olson, D.R., Cognitive Development: The child's acquisition of diagonality. New York: Academic Press, 1970.

- Pikas, A., "Comparisons between traditional and programmed learning as functions of passive performance and active application and time till application." Cited in Gage, N.L., (Ed.), The psychology of teaching methods, Chicago: University Press, 1976.
- Pinney, R.H., "Presentational behaviors related to success in teaching." Unpublished doctoral dissertation, cited in Gage, N.L. and Berliner, D.C., Educational psychology, Chicago: Rand McNally, 1975.
- Plomin, R., and Buss, A., "Reflection-impulsivity and intelligence." Psychological Reports, 1973, 33, 726.
- Rosenshine, B. "Evaluation of classroom instruction." Review of Educational Research, 1970, 40, 279-300.
- Rosenshine, B., and Furst, N., "The use of direct observation to study teaching." In Travers, R.M. (Ed.), Second Handbook of Research on Teaching, Chicago: Rand McNally, 1973, 122-183.
- Smith, F., Comprehension and learning: a conceptual framework for teachers. New York: Holt, Rinehart & Winston, 1975.
- Tough, J. Listening to Children talking: a guide to the appraisal of children's use of language. London: Ward Lock Educational, in association with Drake Educational Associates, 1976.
- Ward, W.C., "Reflection-impulsivity in kindergarten children." Child Development, 1968, 39, 867-875.
- Westley, B. and MacLean, M., "A conceptual model for communications research." Journalism Quarterly, Winter, 1957, 36. Cited in Andersch, E.G., et al. Communication in everyday use, New York: Holt, Rinehart & Winston, 1969.
- Zelniker, T., Jeffrey, W.E., Ault, R. and Parsons, J., "Analysis and modification of search strategies of impulsive and reflective children on The Matching Familiar Figures Test." Child Development, 1972, 43, 321-335.

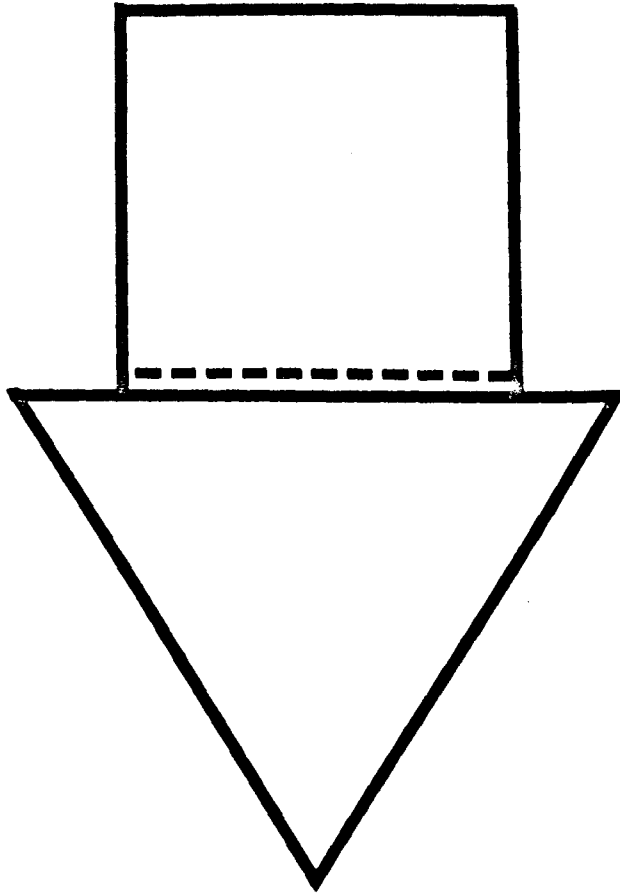
APPENDIX A  
REPRODUCTION OF TEN TRACING TASKS

Dotted line, not on original task sheet,  
indicates segment to be traced  
as specified by taped message.

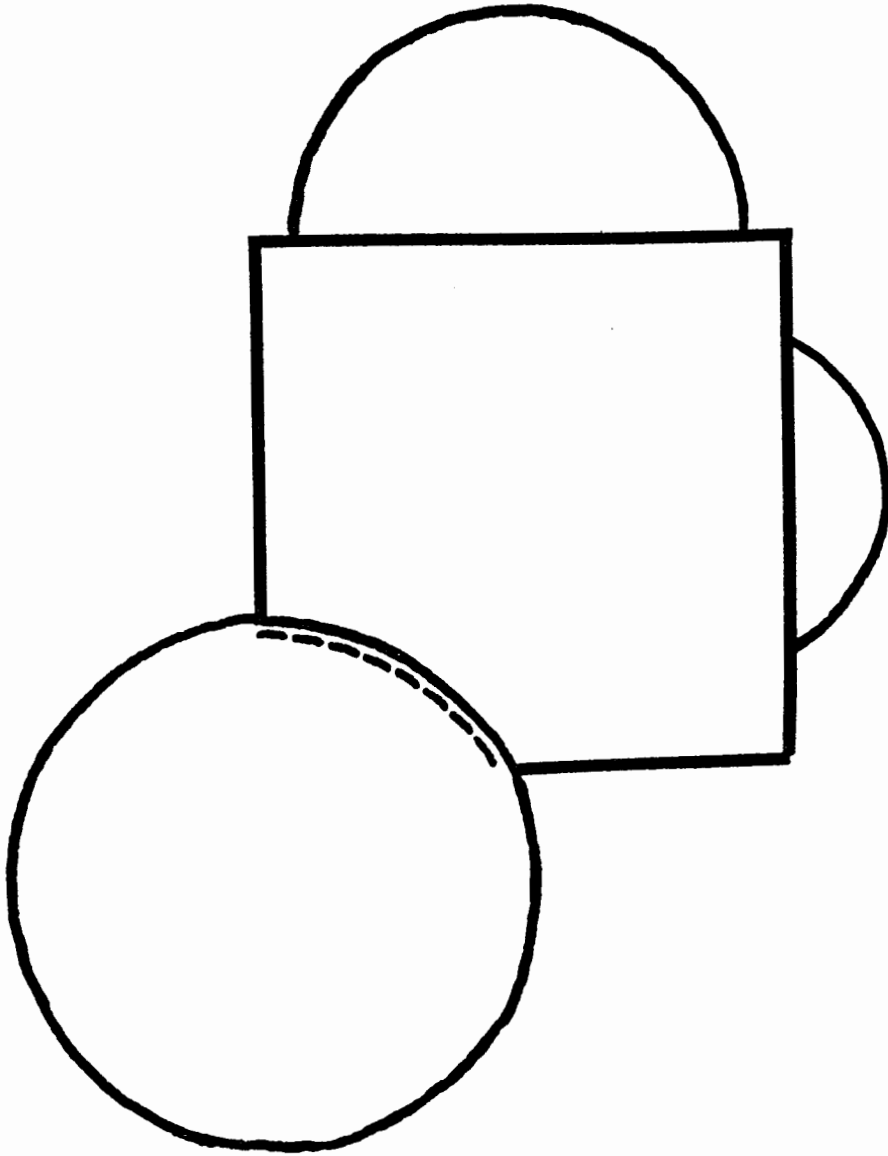


APPENDIX A

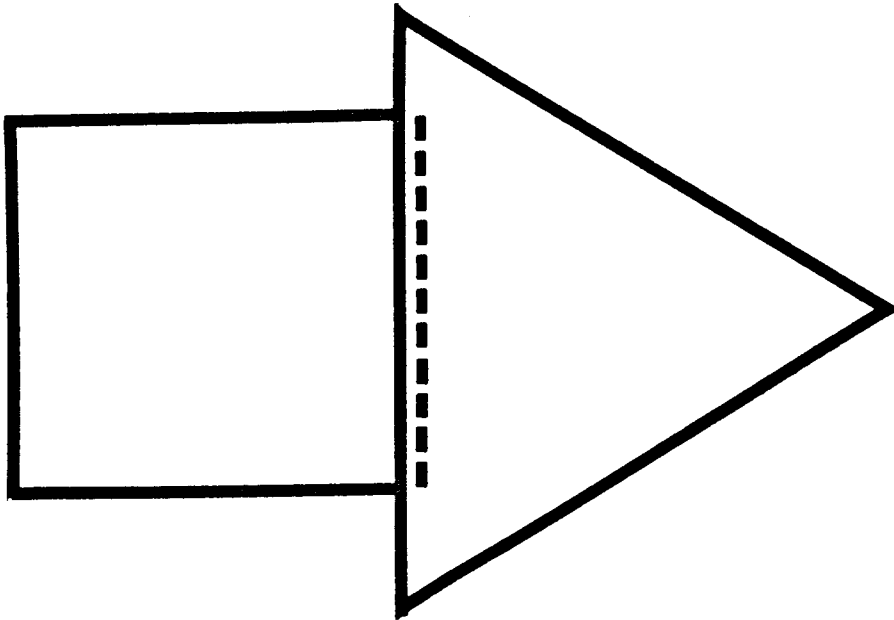
Task 1

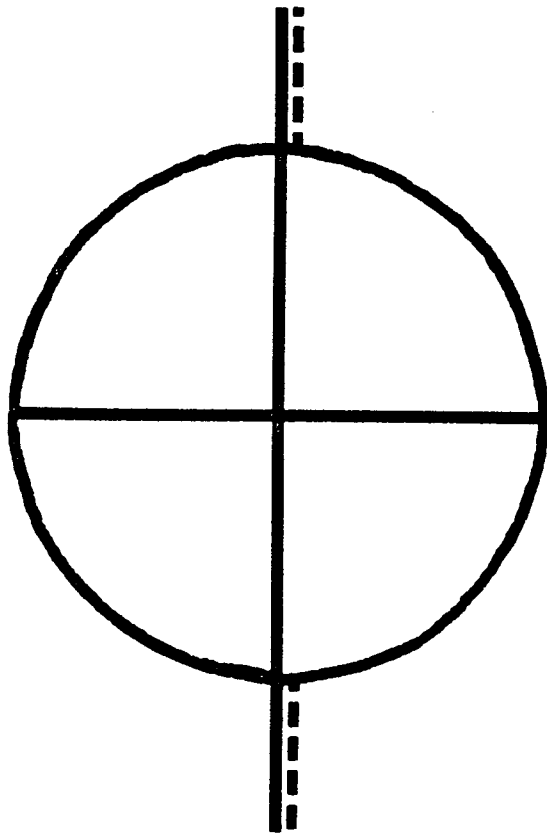


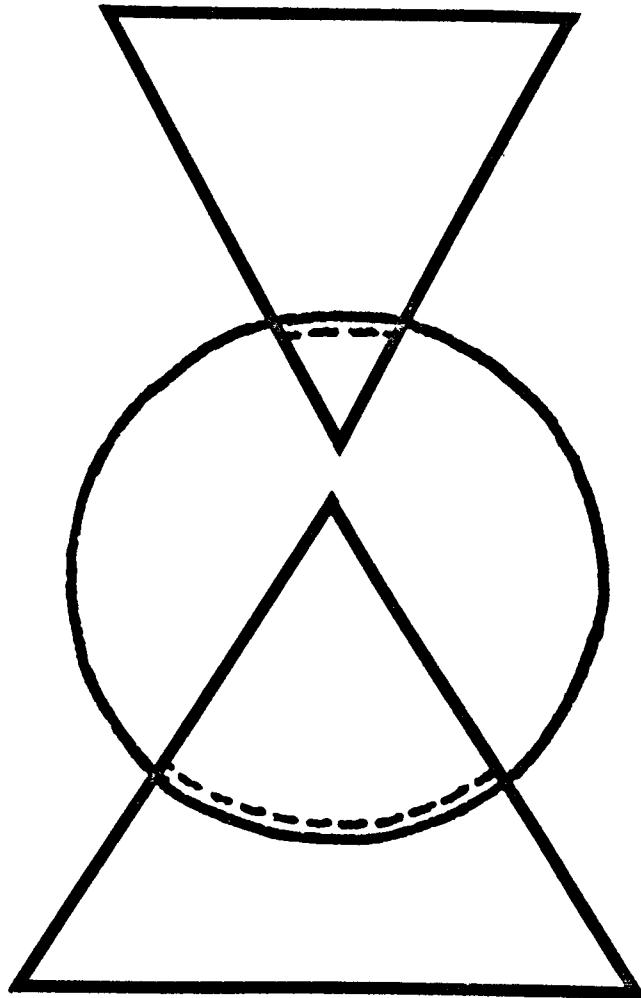
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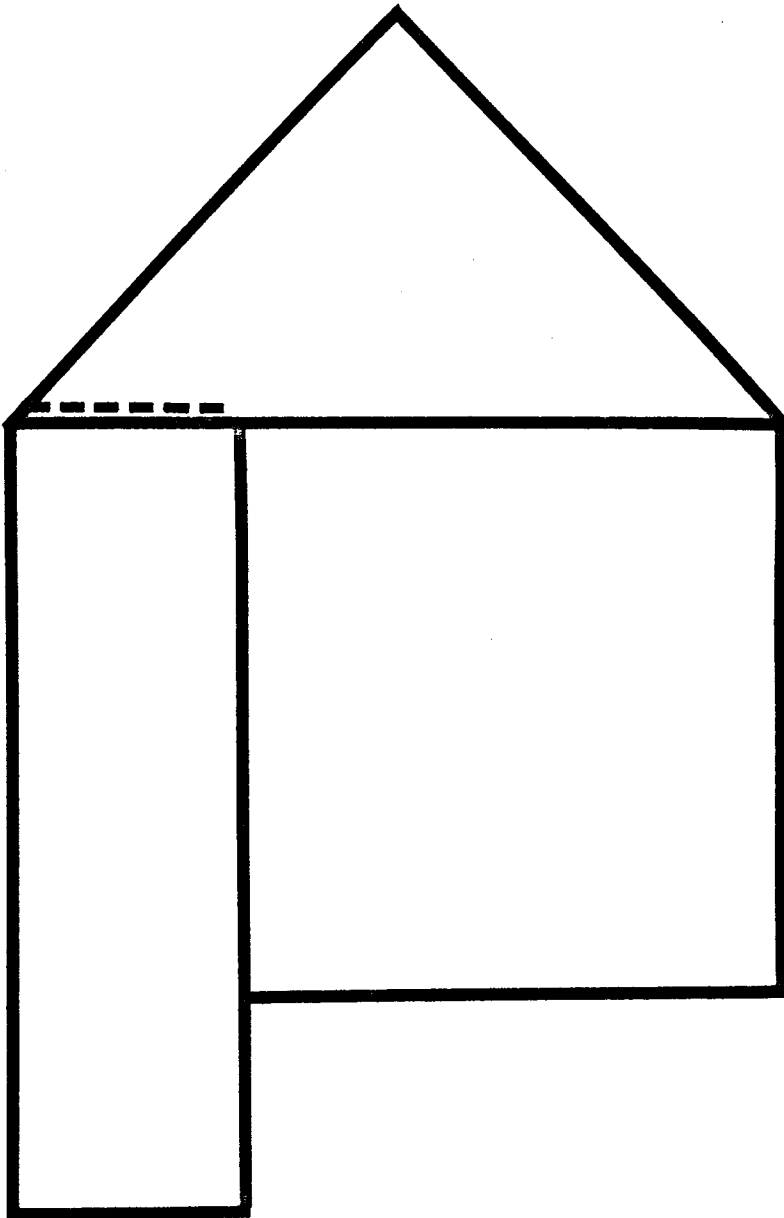


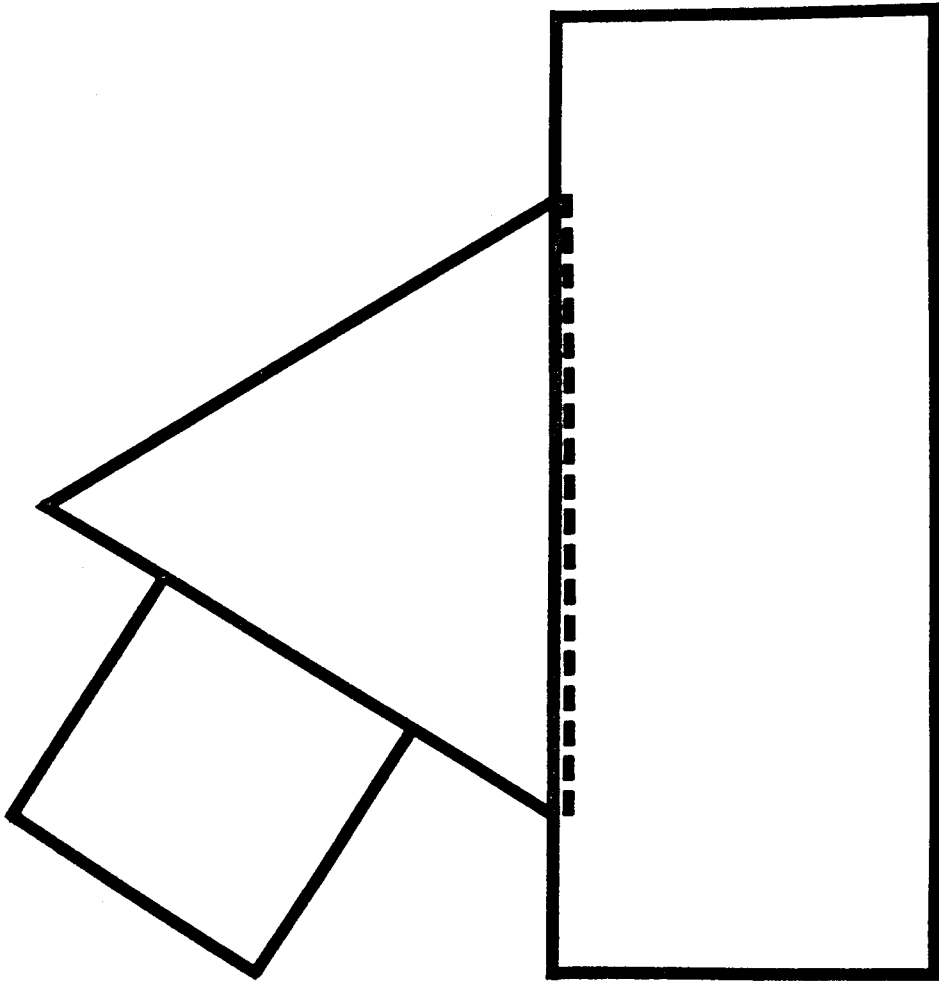
Task 3





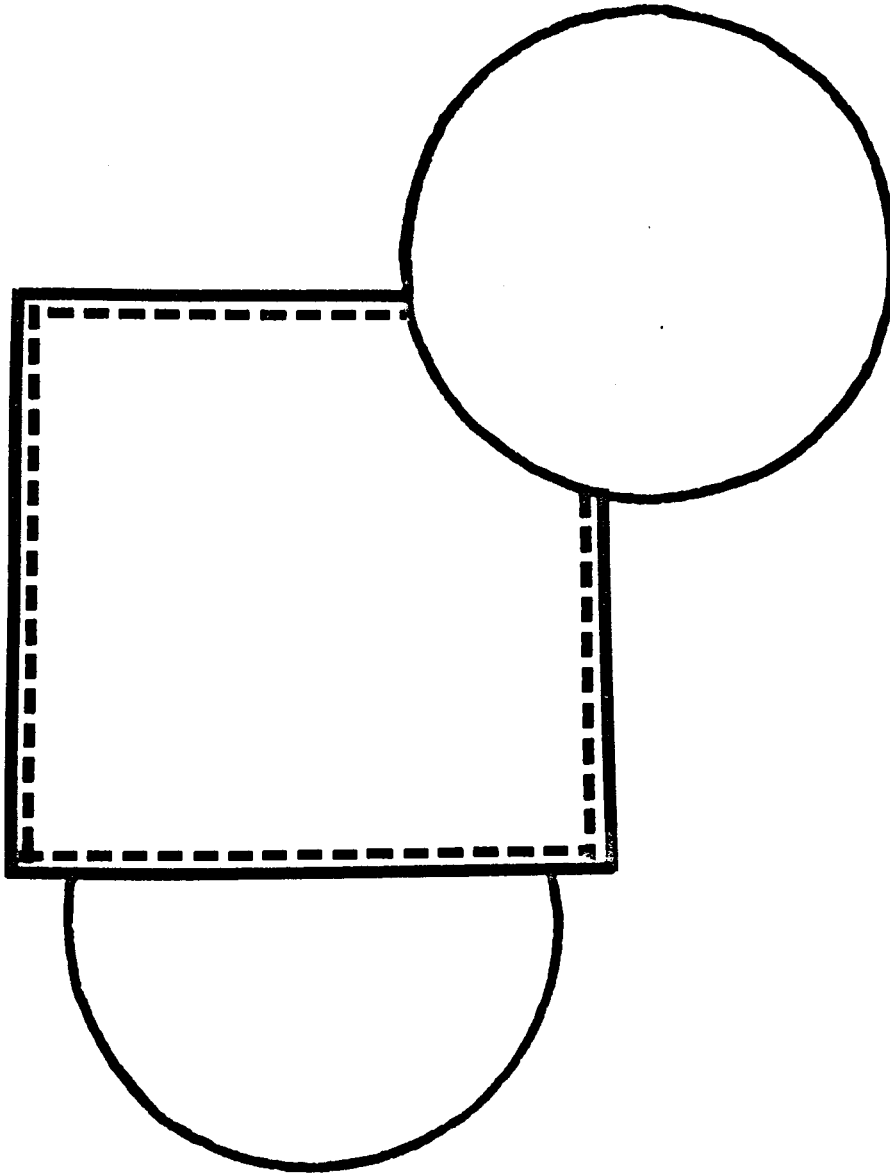






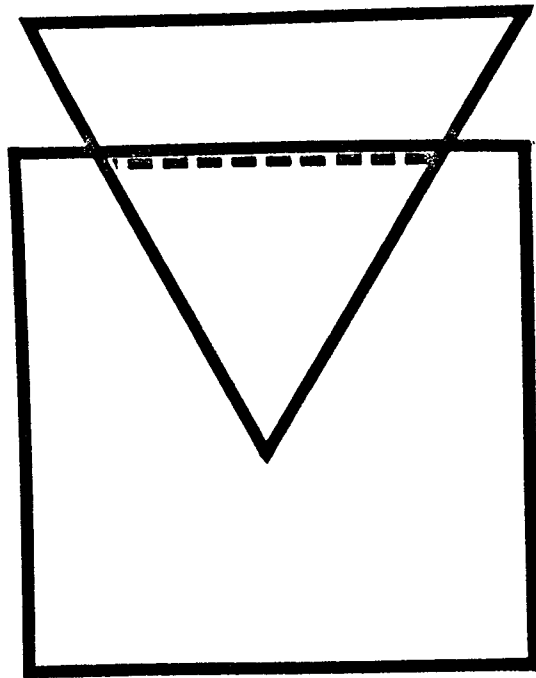
Task 8

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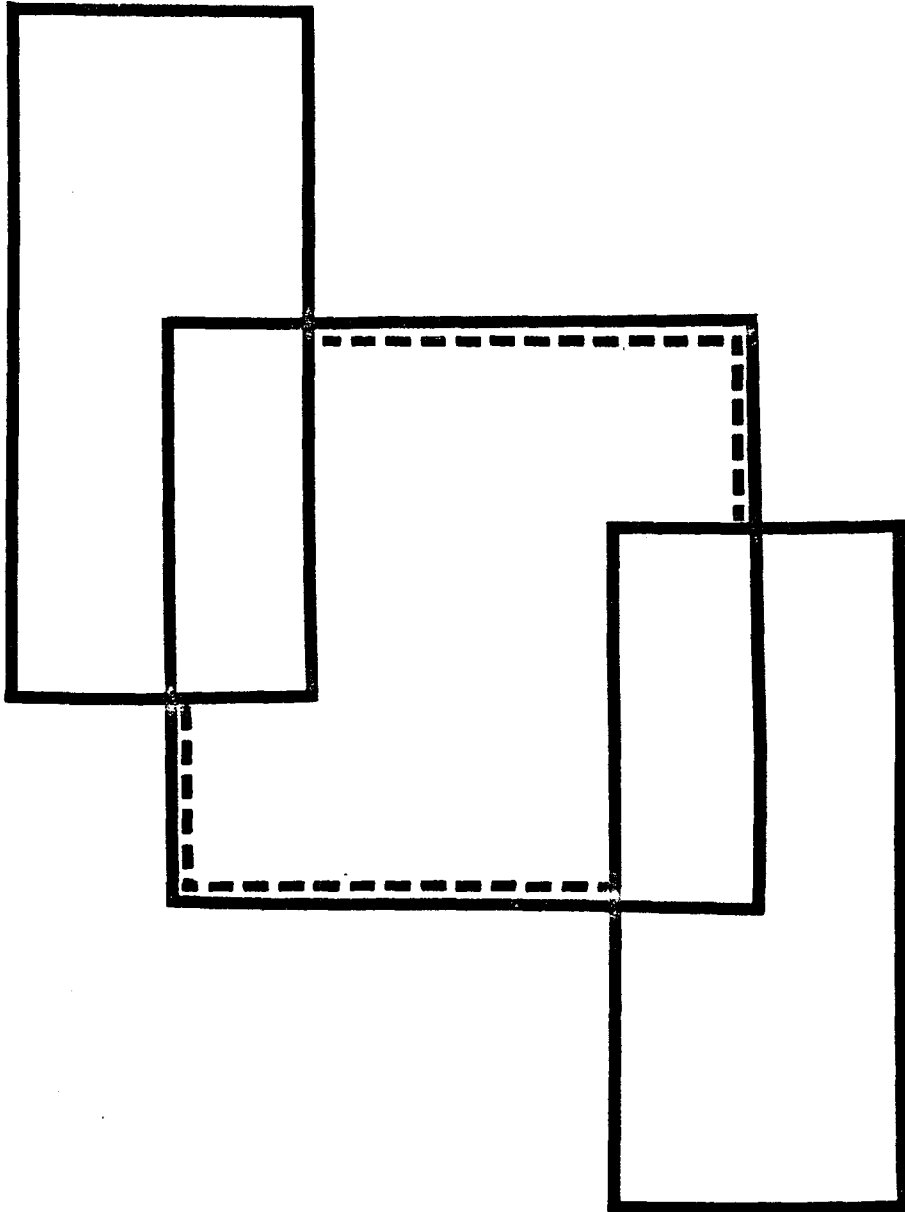




Task 9



Task 10



APPENDIX B  
TRANSCRIPTS OF TAPED INSTRUCTIONS  
FOR TRACING TASKS IN EACH OF  
FOUR CONDITIONS

APPENDIX B  
TRANSCRIPTS OF TAPED INSTRUCTIONS  
FOR TRACING TASKS IN EACH OF  
FOUR CONDITIONS

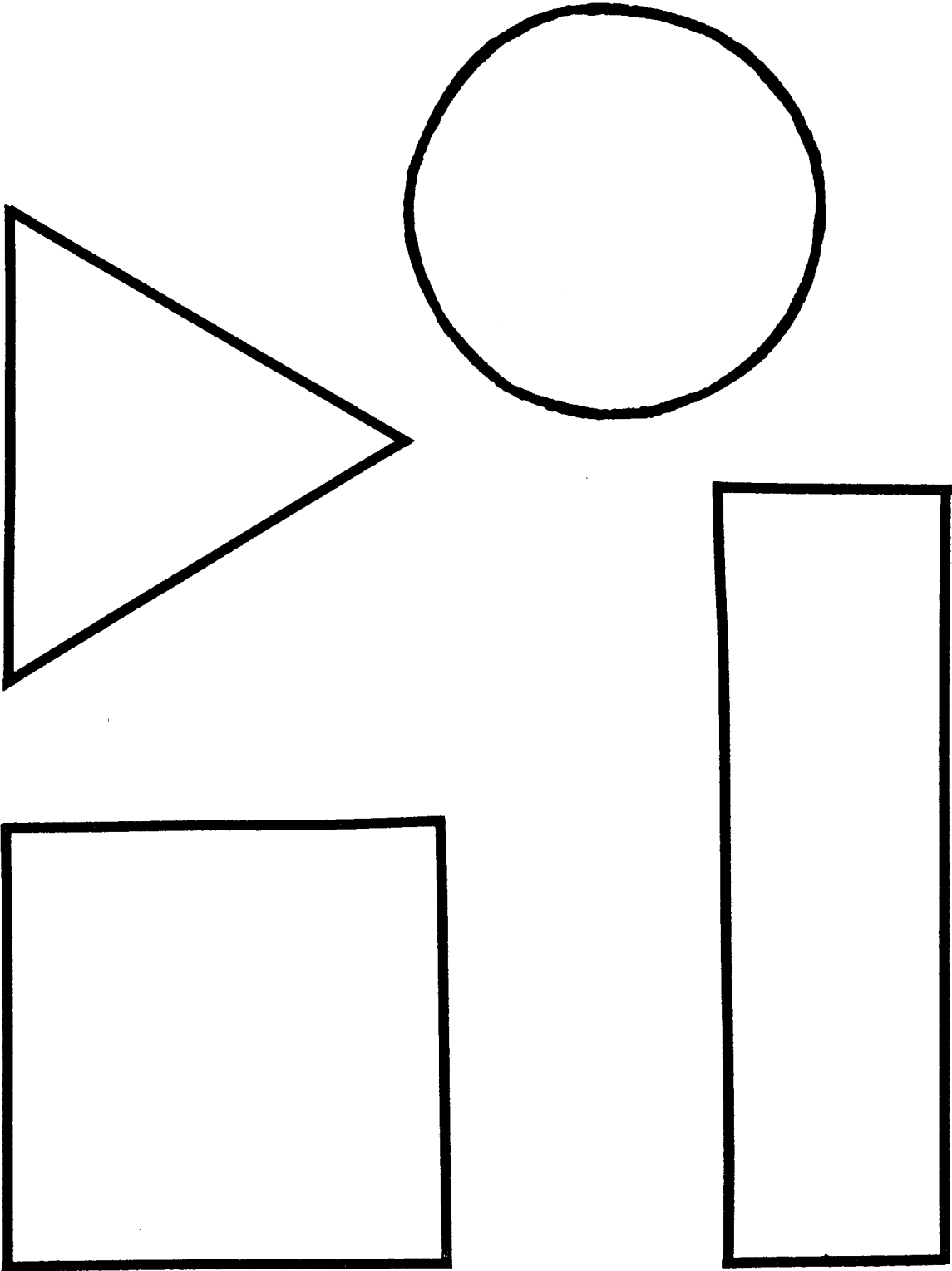
## TASK

1. a) "Trace the part of the square that touches the triangle."  
b) "Trace just the part of the square that touches the triangle."  
c) "Trace the part of the square that touches the triangle. Do not trace all of the square."  
d) "Do not trace all of the square. Trace the part of the square that touches the triangle."
2. a) "Trace the part of the circle that covers the square."  
b) "Trace just the part of the circle that covers the square."  
c) "Trace the part of the circle that covers the square. Do not trace all of the circle."  
d) "Do not trace all of the circle. Trace the part of the circle that covers the square."
3. a) "Trace the part of the triangle that touches the square."  
b) "Trace just the part of the triangle that touches the square."  
c) "Trace the part of the triangle that touches the square. Do not trace all of the triangle."  
d) "Do not trace all of the triangle. Trace the part of the triangle that touches the square."
4. a) "Trace the lines that are outside the circle."  
b) "Trace just the lines that are outside the circle."  
c) "Trace the lines that are outside the circle. Do not trace all of the lines."  
d) "Do not trace all of the lines. Trace the lines that are outside the circle."
5. a) "Trace the part of the circle that is inside the triangles."  
b) "Trace just the part of the circle that is inside the triangles."  
c) "Trace the part of the circle that is inside the triangles. Do not trace all of the circle."  
d) "Do not trace all of the circle. Trace the part of the circle that is inside the triangles."

6.
  - a) "Trace the part of the triangle that touches the rectangle."
  - b) "Trace just the part of the triangle that touches the rectangle."
  - c) "Trace the part of the triangle that touches the rectangle. Do not trace all of the triangle."
  - d) "Do not trace all of the triangle. Trace the part of the triangle that touches the rectangle."
7.
  - a) "Trace the part of the rectangle that touches the triangle."
  - b) "Trace just the part of the rectangle that touches the triangle."
  - c) "Trace the part of the rectangle that touches the triangle. Do not trace all of the rectangle."
  - d) "Do not trace all of the rectangle. Trace the part of the rectangle that touches the triangle."
8. (Omitted in final analysis)
  - a) "Trace the part of the square that is outside the circle."
  - b) "Trace just the part of the square that is outside the circle."
  - c) "Trace the part of the square that is outside the circle. Do not trace all of the square."
  - d) "Do not trace all of the square. Trace the part of the square that is outside the circle."
9.
  - a) "Trace the part of the square that is inside the triangle."
  - b) "Trace just the part of the square that is inside the triangle."
  - c) "Trace the part of the square that is inside the triangle. Do not trace all of the square."
  - d) "Do not trace all of the square. Trace the part of the square that is inside the triangle."
10.
  - a) "Trace the part of the square that is outside the rectangle."
  - b) "Trace just the part of the square that is outside the rectangle."
  - c) "Trace the part of the square that is outside the rectangle. Do not trace all of the square."
  - d) "Do not trace all of the square. Trace the part of the square that is outside the rectangle."

APPENDIX C  
REPRODUCTION OF WARM-UP TASK SHEET AND  
TRANSCRIPT OF TAPED INSTRUCTIONS

APPENDIX C  
WARM-UP TASK



APPENDIX C  
TRANSCRIPT OF TAPED INSTRUCTIONS  
FOR WARM-UP TASK

"Point to the circle."

"Point to the triangle."

"Point to the square."

"Point to the rectangle."

"Trace the triangle."

"Trace the rectangle."

"Trace the circle."

"Trace the square."



APPENDIX D  
INSTRUCTIONS TO SUBJECT PRIOR  
TO TAPED MESSAGES

## APPENDIX D

## INSTRUCTIONS PRIOR TO FIRST TASK

"Now the tape recorder will tell you to do some more things. Do just what it says. If you are not sure what it means, do what you think it said."

Note: If the subject asked a question about a task, the experimenter repeated, "Do what you think it said."  
No further comments were made before, or between tasks.

APPENDIX E  
ITEM STATISTICS FOR TEN TASK SCORES

## APPENDIX E

## Item Statistics for Ten Task Scores

Task	Mean	S.D.	Correlation w/total scale	Correlation w/modified total scale
1	0.96	0.97	.63	.66
2	0.95	0.98	.66	.66
3	0.98	0.86	.72	.73
4	1.17	0.93	.58	.57
5	1.30	0.92	.73	.73
6	1.05	0.96	.71	.74
7	1.04	0.95	.68	.70
8	0.69	0.82	.12	--
9	1.04	0.95	.70	.70
10	1.00	0.89	.60	.58
Alpha = .819				.849