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AN ANALYSIS OF RESPONSES TO AMBIGUOUS QUESTIONS

The Ohio State University

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AN ANALYSIS OF RESPONSES
TO AMBIGUOUS QUESTIONS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy
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The Ohio State University

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1985

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CHAPTER I
INTRODUCTION

There is currently a good deal of research interest in the nature and development of children's comprehension monitoring of, and knowledge about, communication. That is, researchers want to learn more about how children know when, or whether, they understand something being communicated to them. Efforts are being made to learn more about their growing knowledge and abilities as active monitors and regulators of their own comprehension, especially when listening to spoken messages (Dickson, 1981).

Within this domain, one reason for the continuing interest of psycholinguists in the problem of ambiguity resolution (namely, the ability to clarify ambiguous communications) is the fact that ambiguity is virtually ubiquitous in language, so much so that one early researcher (Kaplan, 1955) called ambiguity "the common cold of the pathology of language." This ubiquity becomes especially apparent, as Garrett (1970) pointed out, when one considers the ambiguity at the level of phrases and clauses within both ambiguous and unambiguous sentences. Furthermore, it can reasonably be argued that even nominally unambiguous language often becomes functionally ambiguous, under natural conditions, due to the loss of lower-level information as a result of noise in speech perception and visual information processing.
In this connection, much recent research has been focussed on the phenomena of developmental differences in children's responses to questions of ambiguous nature, and explanations for these phenomena. The current research is particularly interested in three co-variates of response changes with age: Phrasing of questions, degree of abstractness of questions, and order in which referents are mentioned within questions.

AGE TRENDS

In some preliminary research, Hughes and Grieve (1980) presented groups of 5- and 7-year-old children with four questions. These questions "were intended to be bizarre," in Hughes & Grieve's words, in the sense that they did not permit direct answers. An example of one question type posed was, "Is red heavier than yellow?" In this case, a category mistake was involved, in that the two referents "red" and "yellow" did not inherently differ with respect to the criterion of "heaviness." Thus this type of question was unanswerable pending clarification of its meaning, and a reasonable response on the Ss' part would have been to say "I don't know," and to request more information.

A second type of question presented to young subjects by Hughes and Grieve (1980) was of the form, "One day two flies were crawling up a wall. Which fly got to the top first?" For questions of this nature, Hughes and Grieve reasoned that subjects would see the requirement for provision of more information before they could provide an answer. For example, was one of the two flies older, or stronger, or faster, etc., than the other one?

The results of the study were reasonably clear, and piqued the curiosity of the current researcher. When presented with questions
intended to be unanswerable without either clarification of meaning or provision of further information, young children almost invariably provided responses. The nature of qualitative differences in replies between 5-and 7-year-old children was noteworthy as well. The younger children frequently responded by importing additional context to the situation--e.g., by responding in terms of a bucket of red paint being heavier than a bucket of yellow paint in their father's work room. Yet the older children were less likely to do this, tending instead to remain with characteristics of the elements referred to in the questions, or appealing to rules which might be expected to apply in the situation to which the question refers. The other notable difference between the two age groups was that while older children frequently qualified their responses in some way, indicating uncertainty, younger children never did so.

A subsequent study by Smith (1983), based upon questions of the type used by Hughes and Grieve (1980), and utilizing subjects in the 3rd and 9th grades, confirmed the findings of Hughes and Grieve relating to differences in response type as a function of age. Of primary interest among Smith's findings was the statistically-significant difference between subjects in the 3rd and 9th grades on the number of their responses which effectively rejected these ambiguous questions as being unanswerable. Still more intriguing was the finding that even at the 9th-grade level, only about 27% of subjects actually rejected the questions as unanswerable.

Neither Hughes and Grieve (1980) nor Smith (1983) extended the findings, either to subjects between 3rd and 9th grades, or older than
9th grade. Thus, one of the major questions under investigation in the current study was whether findings of differences in response as a function of age could be extended to subjects of 3 other ages, namely, 4th grade, 8th grade, and 12th grade, in addition to kindergartners.

PHRASING OF QUESTIONS

In terms of exciting a critical, questioning response, on the part of testees, to questions of ambiguous form, a major, potentially confounding variable is the way in which a question is phrased. In studies examining the linguistic structure of questions, Larsen and Flavell (1970) found that children's comprehension of the concept of compensation in relation to the conservation of liquids depended upon the way in which the question was worded. In their research, the question, "If I pour this water into here, how high would it come up to?", as related to two dissimilarly-shaped vials, brought forth more correct answers than a question of the sort, "If I put the same amount of water in here, how high would it come up to?" (Larsen & Flavell, 1970).

Goodnow (1973) also has demonstrated that differences between forms of question in post-judgment inquiries are related to the child's rationale for his judgment. In her studies of children who were able to conserve liquids, she found that the structure of the questions she posed to them, to elicit their way of knowing, influenced the reasons provided by the children (Goodnow, 1973).

Given a background of studies such as these, whose results indicate that phrasing of questions is a major distractor for both children and adults in their performance of Piagetian tasks, an important issue raised by the current research is, does the phrasing of an ambiguous question
affect subjects' ability to respond in questioning fashion? If so, in what ways? Put differently, is it easier for Ss to recognize the ambiguous nature of a question such as "Is red heavier than yellow?" when some other phrasing of the question is used? For example, the same referents and comparison term could be couched in questions such as "Which is heavier, red or yellow?" and "Why is red heavier than yellow?" Thus the current research sought to determine the effects of changes in question phrasing on Ss' responses.

**DEGREE OF ABSTRACTNESS**

Content analysis of the Hughes and Grieve (1980) questions led to the development of similar, but different, questions used for the current research. These questions are of the basic type, "Which is (comparison term), A or B?" where A and B are referents. Questions fall into three categories: (1) **Physical**, in which the comparison term is of a physical dimension (such as weight, thickness, or volume), and the referents are tangible entities (such as milk, cars and boats); (2) **Physiognomic**, in which the comparison word is an emotive dimension (e.g., happy, funny, or friendly), and referents are concrete, non-human objects (for example, chocolate, corn, and pans); and (3) **Abstract**, in which the comparison term is of a concrete dimension (e.g., loudness, thickness, or fatness), and referents are abstract entities (for instance, outside vs. inside, below vs. above).

The first two categories of question (physical and physiognomic) are included primarily for two reasons. First, the physical category contains questions of the type used by Hughes and Grieve (1980) and thus permits replication of research which has employed questions of this type
in the past. Second, the current researcher is greatly interested in testing the distinction, as discussed in Chapter II, which Werner (1978) drew between physical and physiognomic types of perception.

The third category, that of abstract questions (e.g., "Which is louder, outside or inside?") was included primarily as an age-wise expansion of previous research which has included items of this type (Hughes & Grieve, 1980; Smith, 1983).

**ORDER IN WHICH REFERENTS ARE MENTIONED**

Adkins and Ballif (1972) noted, in their study of children's responses to ambiguous questions, that many Ss gave answers simply by naming the last referent mentioned by the experimenter. For example, if a child were asked, "Which is happier, a cat or a dog?", he or she would tend to respond by saying "dog" more frequently than "cat," simply as a function of the referent "dog" being mentioned last by the experimenter. The current study controlled for the order in which referents are mentioned; counterbalancing, for example, the question phrased as "Which is bigger, milk or water?" with one phrased, "Which is bigger, water or milk?"

In sum, then, the primary goal of the current study was to examine age changes in responses to questions of ambiguous type, particularly with respect to three areas: (1) Phrasing of questions; (2) degree of abstractness imposed within questions; and (3) the order in which referents are mentioned within questions. Additionally, the current research conducted a qualitative analysis of the types of response children gave to ambiguous questions.
These research questions relate to a number of different theories and investigations dealing with children's communication and understanding, particularly as relates to spoken, or verbal, communication. We now turn to a review and analysis of this literature.
CHAPTER II
LITERATURE REVIEW

There is a wide variety of theoretical explanations for various phenomena of cognitive and verbal development being studied. The first portion of this chapter will deal with theories and related studies which apply specifically to developmental changes which affect children's comprehension monitoring and knowledge about communication; particularly verbal communication.

Following the laying of this age-differences theoretical groundwork, the rest of Chapter II will review specific studies which are relevant, in some way, to at least one of the three major categorical co- variates of response changes with age; namely, phrasing of questions, degree of abstractness of questions, and order in which referents are mentioned within questions. The chapter will conclude with an overview of studies which relate most closely to the present study, or which present historical reasons for the importance of the current work.

THEORETICAL BACKGROUND/STUDIES ON AGE CHANGES

Grice (1975) formulated a set of conventions which guide and constrain a listener's inferences to a speaker's intent in using an utterance, and called them the rules of conversation. These rules are that utterances are contingent on an immediate discourse context, are relevant to the topic of the discourse, and are informative in that the
The contingency of an utterance refers to the fact that the members of "adjacency pairs" (Sacks, Schegloff, & Jefferson, 1974) share a common topic of utterance. For example, an appropriate answer to a question must address the general topic of the question. If a speaker addresses a different topic, the speaker has failed to directly answer the question. In this case, the speaker has violated the rule of contingency. For instance, a woman may be asked, "How old are you?" If the woman addresses a different topic with her next utterance, like "It's time for lunch," her utterance is noncontingent with the question and she has failed directly to answer the question (Ackerman, 1981). If the woman has done so deliberately, she has employed a conversational strategem (Weiser, 1974) to avoid answering the question. One of her purposes in using this strategem to not answer the question is to convey to the listener that she does not wish to answer the question. That is, by using an utterance in deliberate violation of the contingency rule of conversation, the woman has conversationally implicated her reluctance to answer a question.

The relevance of an utterance refers to the fact that an utterance must address the discourse topic in a manner that is to the point of the conversation. A deliberate violation of this rule is a signal that the speaker is implicating some unstated attitude or belief about the topic of the utterance. For example, when asked about the skill of a dentist, a speaker may say, "He has a nice waiting room" (Ackerman, 1981). This utterance addresses the general discourse topic, but does not address the
point of the question. There is little apparent relationship between a
good waiting room and a dentist’s skill. The fact that the speaker
deliberately chose to make the utterance contingent on the topic of
conversation and yet irrelevant to the point of the question is a signal
that the speaker intends to convey some unstated attitude about the
topic.

The informativeness of an utterance refers to the fact that a
speaker will not comment on a fact that is obviously true or false if the
speaker is being cooperative in the conversation (Grice, 1975). This is
because the speaker is obligated to make an utterance informative. For
example, a speaker will not normally ask, "Are you eating again?", or
say, "I see you are eating again," when it is obvious a listener is in
the midst of a snack. These utterances are totally redundant with the
information in the context of utterance. By deliberately violating this
rule of informativeness, the speaker is again conveying some unstated
attitude or belief about the event in the context.

Research Regarding Rules of Conversation

A study by Ackerman (1981), which contained two parts, was conducted
in order to determine the extent to which young children use the rules of
conversation to evaluate the use of an utterance. In particular, the
focus of the study was on children's discrimination between utterances
that violate or conform to these rules, and the children's understanding
of the speaker's intent in the case of a violation. The children's
understanding of the above three conversational rules, then, was
investigated.
In Experiment 1 of Ackerman's (1981) study, kindergarten and first- and second-grade children were asked to make simple discriminations among utterances that did or did not violate these rules of conversational sequencing. All the utterances used in this study were legal utterances, in that they could be used appropriately by adult speakers in the contexts in which they occurred. The children were asked to assign the utterances to one of two speakers. The speakers were described as being a "smart aleck" and "saucy" or as being "honest" and "always telling the truth." The extent to which the children made appropriate assignments of the utterances to the speakers was the measure of the children's sensitivity to the rules. In addition, to examine children's interpretations of the speaker's intent in using the utterances, following each discrimination the children were asked a question about the speaker's intent. In Experiment 2, first- and third-grade children were asked to explain the use of the utterances by the speakers. In this manner, the children's inference to the speaker's intent in deliberately violating a conversational rule could be examined more closely.

Ackerman notes that an understanding of the rules of conversational sequencing (cf. Grice, 1975) is an important component of a child's ability to comprehend utterances. This understanding, in Ackerman's thinking, involves two component aspects. First, children must be sensitive to the differences between the deliberate use by a speaker of rule violating and conforming utterances. That is, children must be sensitive to the conventions governing utterance use. These conventions will cue the child to the need to infer the speaker's intent when utterances are used to convey some implicated meaning. In many cases, a
listener can become aware that a speaker has some nonliteral intent in using an utterance only by recognizing that the utterance violates the conventional standards of sequencing. Second, children must make the correct inference to the speaker's intent or motivation in using a rule-violating utterance (Ackerman, 1981).

The results of Ackerman's (1981) study showed that 6- and 7-year-old children, and some 5-year-olds, indeed can discriminate between rule-violating and conforming utterances. Thus, Ackerman concluded, these children are sensitive to the "need" to infer the speaker's intent in deliberately using a rule-violating utterance. However, it was found that these children did not consistently generate the correct inferences about the speaker's intent in using these utterances. Children begin to do this when they are about 8 or 9 years of age. Thus, Ackerman reasoned, the natural history of children's ability to use the rules of conversational sequencing to evaluate the use of an utterance begins with an initial ability by 5- and 6-year-olds to distinguish between the commonplace and exceptional legal uses of utterances and ends with the sophisticated ability of 9-year-olds to generate explanations of the deliberate use of rule-violating utterances.

However, Ackerman found, even though 6-year-olds do not generate correct explanations for these utterances, they can recognize and accept these explanations when they are provided. He hypothesized that this recognition of a correct inference for a rule violation is probably an important step on the road to generating these inferences spontaneously. Through this kind of recognition, after events following a rule-violating utterance have established the correct interpretation of the utterance,
young children can learn the associations between particular kinds of rule violations and how a speaker's intent is usually interpreted (Ackerman, 1981).

In conclusion, Ackerman (1981) remarked: "The relationship between metalinguistic evaluations of rule violations, and spontaneous responses to utterances is unknown at this point. However, one reasonable hypothesis is that the metalinguistic component becomes more important in interpreting utterances when listeners encounter strangers or novel situations or utterances."

If Ackerman's hypothesis is to be adopted as a point of debarkation, then there appear to be several closely-related difficulties or shortcomings which metalinguistically-immature children are apt to experience, when functioning in the listener role.

First, young children often have trouble evaluating the quality of messages, that is, judging whether messages are adequate for their communicative purpose (Robinson, 1981; Robinson & Robinson, 1977). In some cases, the cause of children's inaccurate evaluation may be an inability to carry out the requisite comparison activity (Flavell et al., 1981). That is, they simply may not be able to compare the message with all the potential referents present to determine whether it describes only one (an insufficiently specific, ambiguous, and thus inadequate, message). The more frequent and fundamental problem, however, appears to be a lack of awareness that such comparative activity is needed for adequate message evaluation (Robinson, 1981; Whitehurst & Sohensburg, 1981). Young children seem to lack a clear idea of what properties a good referential communication message should possess: "The young child
does not know that to communicate referentially is to describe differences" (Whitehurst & Sonnenschein, 1981, p. 139, italics in original work), and "does not know that the message should refer uniquely to whatever the speaker has in mind" (Robinson, 1981, p. 172).

Second, incredible though it may appear, young children may not even recognize that the quality of the message affects communicative success (Patterson & Kister, 1981). E. J. and W. P. Robinson have conducted a series of interesting studies demonstrating that young children are prone to blame the listener rather than the speaker and her message for an unsuccessful communicative outcome, even when the listener is manifestly not at fault (Robinson, 1981; Robinson & Robinson, 1977). For instance, the Robinsons showed, if a speaker's ambiguous message leads a listener to misidentify a referent, young children are likely to say that the listener is to blame—not even mentioning the message! Their reasoning may simply be that since it is the listener rather than the speaker who actually produces a given outcome, he is the one who must be to blame if that outcome is inadequate. The speaker and her message are thus "distal" rather than "proximal" causes of the outcome and for that reason may be harder to identify as such (Robinson, 1981).

Consistent with this focus on communicative outcomes rather than communications and communicative processes is the finding that some young children are more likely to judge an ambiguous message as adequate if the listener correctly identifies a referent (by chance) than if she does not (Robinson & Robinson, 1977). For young children, then, it appears that listeners and their responses to messages are much more salient and available for evaluation than speakers and their messages.
Ambiguity in Communication

According to Piaget (1926), preoperational children are ineffective, or "egocentric," communicators because they are not cognizant of perspectives other than their own. Consequently, they communicate with others as if everyone shared their own intuitively-derived point of view. That lack of perspective coordination is related to ineffective verbal encoding in communication has been confirmed by Flavell (1968) and Rubin (1972).

In addition to studies of the coordination of speaker-listener perspectives in communicative encoding, Piaget studied how children function as listeners, or decoders (Bearison & Levey, 1977, italics in original work). Children were told stories and then asked to retell them to other children. Piaget (1926) reported that preoperational children failed to recognize numerous referential ambiguities in their speakers' messages. For example, it was quite common for the child speakers to use pronouns without ever indicating their referents, and it was just as common for the child listeners to find idiosyncratic meanings in the messages by supplying their own referents based on their intuitive experience. Piaget concluded that the inability to coordinate speaker-listener perspectives results in egocentric encoding as well as egocentric decoding. In regard to the latter, he noted, "If children fail to understand one another, it is because they think they do understand one another" (p. 116).

Asher (1976) studied the development of children's decoding ability using standardized stimuli in a task derived from an information-processing interpretation of communicative competence. According to this
view, children are poor communicators, not because they are egocentric, but because they fail to "compare the relationship of potential messages to the referent and the nonreferent" (Asher & Oden, 1976, p. 132). Subjects were shown a set of one-word clues (e.g., "waves") for a series of word pairs (e.g., ocean-river) and were asked to evaluate the quality of each clue in terms of its usefulness in distinguishing between the referent (underlined word) and nonreferent member of the word pairs. Half of the clues were unambiguous, in that they were associated with the referent but not with the nonreferent, while the other half were ambiguous in that they were equally associated with the referent and nonreferent.

Asher (1976, Experiment 2) found that second graders, in comparison to fourth and sixth graders, were very poor in evaluating the quality of either ambiguous or unambiguous clues, and he attributed their poor performance to a tendency always to compare the associative strengths of the clue word to the referent word but never to the nonreferent word. However, Bearison and Levey (1977) note, this interpretation would account for differential performance between grades in the ambiguous condition but not in the unambiguous condition. Assuming that the second graders failed to consider the nonreferent and compared only the clue and referent, they would have judged all clues as being good ones because both ambiguous and nonambiguous clues were associated with the referent, and, consequently, they would have had high scores in the unambiguous condition and low scores in the ambiguous condition. However, that the second graders scored significantly worse than fourth and sixth graders in the unambiguous as well as in the ambiguous conditions indicates that
something more than simply a failure to consider the nonreferent was operating in their appraisal of the quality of clue words. Furthermore, Asher's task eliminated most of the contextual features that commonly define communicative contexts. Messages consisted of single words lacking a syntactic context from which to infer meaning and were printed and read by subjects rather than spoken and heard. In essence, children were asked to perform a referential word game with an imaginary speaker rather than instrumentally respond to verbal messages communicated within a listener-speaker dyad (Asher, 1976).

The study conducted by Bearison and Levey (1977) was designed to assess children's ability to decode ambiguous and unambiguous messages using standardized stimuli and more-naturalistic communicative task situations than in the Asher study. In ambiguous messages, questions were posed using nouns or pronouns without indicating which of two possible referents was intended by the speaker.

Subjects (90 children from kindergarten, second grade and fourth grade) were read 12 different message stems, followed in each case by a question pertaining to the contents of the stem. For half of the messages, the meaning of the questions was unambiguous, while for the other half the questions contained pronouns without specified referents. An example of an adequate message was, "Jane got a bicycle for Christmas and Mary got a new coat. What did Jane get for Christmas, a bicycle or a new coat?" In the ambiguous condition, the question was, "What did she get for Christmas, a bicycle or a new coat?" Each stem was matched to an adequate or an inadequate question on alternate administrations between subjects.
The subjects were told that the experimenter was trying out some questions that she would be asking other children and that they could help her by listening to the questions and judging whether they were "good" or "bad" questions. If a subject thought that a question was a good one, he was to answer it; if it was not a good one, he was to say so and, if possible, explain what was wrong with it. Subjects were given a sample of a good and a bad question. On the sample items, subjects were told if their responses were correct and were given the correct response, if incorrect. For the remainder of the questions, no feedback was given.

Measures of the subjects' ability to distinguish adequate and inadequate messages were based upon their appraisals of the quality of the questions and their response latencies. An accurate appraisal in the unambiguous condition consisted of giving the correct answer to the question and, in the ambiguous condition, of not answering the question and offering some recognition, in the form of an explanation, of its ambiguity.

The findings of Bearison and Levey's (1977) study indicated the course of development of children's ability to decode verbal messages. Children's ability to distinguish between unambiguous and ambiguous referential communication increased with age. Younger children found subjective meaning in sentences when the meaning was objectively ambiguous by selecting referents that were intentionally left unspecified. Older children, on the other hand, had little difficulty in distinguishing between ambiguous and unambiguous messages. Also, all subjects had shorter response latencies (defined as the time between the
end of the experimenter's asking of a question and the beginning of the subject's response) for the unambiguous compared with the ambiguous messages. There was further evidence here, then, for the a priori hypothesis that older subjects in the present study would perform better on ambiguous-question tasks than younger subjects.

The findings from Bearison and Levey (1977) seem to be in accord with those reported by Dittman (1972), who studied the frequency of listener responses, such as head nods and vocalizations including "uh-huh," "yee," and "I see." The development of this type of communicative skill showed an orderly progression among children in the first, third, and fifth grades.

**Processing of Information**

An interesting investigation was conducted by Markman (1977). It raised the question of how people become aware of their own comprehension failure, and argued that a partial answer to this question can be derived from recent demonstrations that comprehension involves constructive processing. People might detect certain types of problem in their comprehension as a result of information obtained while engaged in constructive processing. To the extent that children are failing to engage in such processing, they would not have this source of information and consequently would be misled into thinking that they comprehend material that they in fact do not understand. These hypotheses were tested in two studies in which first through third graders were presented with instructions made obviously incomprehensible by the deletion of information needed for understanding of how to perform the task.
In her first study, in order to avoid problems in assessing individual differences in comprehension, Markman designed experimental materials so as to be incomprehensible to all subjects. Given the certainty that children could not fully understand the material, the question of interest was whether the children realized that they had not understood. In addition, the tasks were designed to be relatively simple, in that the distortion of the material was made very obvious from an adult perspective. Children were presented with instructions on how to perform a task, and crucial information necessary for executing the task was deleted.

The measure of whether the children realized that they had not understood how to perform the task was whether or not they asked a question or requested more information. Of course, failure to ask a question can be due to a variety of factors other than the one of interest. In anticipation of this problem, several precautions were taken. First, the children's participation was enlisted by asking them to serve as consultants to someone who was writing instructions for children. They were told that their advice on the clarity and completeness of the instructions was needed. Thus the children could attribute their failure to comprehend to problems inherent in the material rather than to their own shortcomings. Second, one of the instructions concerned how to perform a magic trick. Magic was selected not just for its motivational advantage, but also because a very salient aspect of magic is its incomprehensibility. The enjoyment of magic derives from the fact that it is not understood. Thus, magic instructions were expected to maximize the children's realization that
they had not understood the instructions and to minimize their reluctance to admit that they had not understood.

Results of Markman’s (1977) first study indicated rather clearly that older children realize that the information is incomplete before younger children do. Considerably more probing was necessary before the first graders would ask a question. However, a more-powerful conclusion was capable of being drawn when the qualitative nature of the data was taken into account; namely, it appeared that “first graders must be induced to repeat an instruction or even to execute it before they realize anything is wrong” (Markman, 1977).

Qualitative differences found by Markman (1977) lent support to the hypothesis that young children are processing the material at a relatively-superficial level. The findings suggest that the youngest children in this study were failing to execute the instructions mentally and consequently they did not notice the problems. In contrast, when the children attempted to perform the instructions, they literally confronted the problems and then became aware of their failure to understand. Similar results to these were expected for the present study.

In Markman’s (1977) second study, the hypothesis was tested that possibly a demonstration of a task by the experimenter might serve a function similar to the child’s own attempts to follow the instructions. Thus, children’s performance when the tasks were presented verbally was compared with that when the verbal instructions were accompanied by a demonstration.

For the same two basic conditions (Magic Trick and Game) as in Study One, children were randomly assigned to one of the two conditions,
"demonstrate" or "verbal," with the restriction that the two groups be equated for grade and sex. Children in both groups received a magic trick and a game task in counterbalanced order. The only difference in the procedure for the groups was in whether or not the tasks were demonstrated for the child. The verbalizations of the experimenter were identical for both groups. Details of the procedure are as follows:

In the "demonstrate" condition, the subject was informed that he or she would see the trick and then be told how to do it. The trick was then performed just as in the previous study. While performing the trick, the experimenter described what she was doing. This description was identical to that given in the verbal condition described below.

In the verbal condition, the subject was informed he or she would be told what the trick looked like and then how to do it. The description of the trick was: "I have an empty cup and a penny and a piece of paper. I take the plate and put it on top of the empty cup. Then I wrap the penny in the paper and put it on the top of the plate. Then, I push until the penny goes right through the plate into the cup. But the penny does not break the plate and there is no hole in the plate at all."

After the trick was demonstrated and described or only described, the instructions on how to perform the trick were given. The instructions for both groups were a slightly-expanded version of those used in Study One: "When you wrap the penny, you only pretend to wrap it. It really falls into your lap like this. Then you take the paper and put it on top of the plate and push until the penny falls into the cup." Following the instructions, the probes were given as in Study One.
In the demonstrate condition of the Game part of the experiment, children were told that they would first see what the game looked like, and then be told how to play. While describing what she was doing, the experimenter held up the cards, dealt them, and put them in a pile. She then said, "The game looks like this." She lifted the top card from each pile, looked at them without letting the child see, and placed both cards face down beside either the child or herself. She continued this procedure for four turns.

In the verbal condition, children were told they would hear what the game looked like and then how to play it. The initial description of the game was the following: "We play with these cards. Each card has a letter on it. We each get one card at a time until all the cards are used up. We each put our cards in a pile. We both have the same number of cards in our pile."

After the demonstration or description, the instructions on how to play were given. These instructions were identical with those in Study One. The probing procedure was identical with that used in the previous study.

It became apparent through the course of these two studies that first graders gave very little indication of being aware that their comprehension of instructions was faulty. Their failure to ask for more information existed in situations in which information was quite blatantly absent and despite several probes designed to elicit such questions without embarrassment to the child.

As noted by Markman (1977), "Clearly the tasks of the present study are limited, but they were designed to be exceptionally simple. The
distortions of material were obvious; they were omissions of material rather than, for example, ambiguity, vagueness, or inconsistency; and they concerned instructions on how to do something, so that the criteria for evaluation with respect to the goal are relatively straightforward."

In addition, children explicitly were instructed to check the material for its comprehensibility, an instruction designed to help overcome production deficiencies (Flavell, 1970). For these reasons, it was striking to Markman (1977) that first graders generally performed so poorly. For these same reasons, one should not be overimpressed by the good performance of third graders, Markman warns. On these very simple tasks, they performed well, but it certainly is possible that their performance would deteriorate as the task demands increased.

Though it is fairly clear that the young children in this study had difficulty in realizing that the instructions were inadequate, it is considerably less clear what factors are responsible for their poor performance. Markman's (1977) hypothesis is that it is due to a relative absence of constructive processing. The children appeared to be processing material at a relatively-superficial level, not really attempting to execute the instructions mentally or determine the relationship between the instructions and goal. As a consequence, they were left unaware of the inadequacy of the instructions.

Two aspects of the data suggested that this interpretation of the children's performance is a reasonable one. Both relate to the argument that, if the child's lack of awareness was due to his or her failure to execute the appropriate mental processing, by removing the necessity for such processing one should be able to facilitate performance. The
findings of the second study, that children may be more likely to notice problems in the instructions when the task has been demonstrated, can be fitted into this framework. The actual demonstration of the task can serve as a partial substitute for mental processes. The child does not have to infer mentally the results of applying each transformation, since he has previously seen some of them enacted.

The second line of evidence is that in both of the studies it was common to find the young children having to enact the instructions before realizing that they were incomplete. When children attempt to perform an instruction, they are forced into processing it more thoroughly. Again, they actually see the results of the transformations and literally confront the problems with the instructions rather than having to infer them. The fact that children are much more likely to notice problems in the instructions when they are forced to process them thoroughly suggests that their initial failure to notice the problems was due to superficial processing.

In 1979, Markman conducted a follow-up investigation based upon her 1977 research. Three studies were conducted with children in third, fifth, and sixth grades. In Study One, children were read essays, some with explicit inconsistencies, others with implicit inconsistencies. For example, in the explicit condition, the children were read an essay about fish which said: "Fish must have light in order to see. There is absolutely no light at the bottom of the ocean ... Some fish that live at the bottom of the ocean can see the color of their food; that is how they know what to eat." In the implicit condition, the essay read: "There is absolutely no light at the bottom of the ocean. Some fish that
live at the bottom of the ocean know their food by its color. They will only eat red fungus." Results showed that most of the students failed to notice even the explicit inconsistencies.

In Study Two, the children were again read essays with either explicit or implicit inconsistencies. In this study they were either required to repeat every two sentences after they were read, or required to repeat the entire essay after it was read. Again, children in this study indicated that they understood the incomprehensible material, not noticing the inconsistencies.

In Study Three, another condition was added in which the children were instructed that there was a problem in the essay—something tricky—and were asked to find it. The sixth graders, when informed of the existence of a problem, were capable of detecting the inconsistency. The majority of third graders still failed to discover the inconsistencies; however, they did approach the problem slightly differently by asking different questions and making more critical comments.

Markman (1979) concluded from this study that processing requirements for detecting ambiguities are complex. "The children must listen to, encode, and store the meanings; for two sentences to be seen as inconsistent, the sentences must be activated together in working memory and must also be compared to notice that they are incompatible."

In conclusion, Markman (1979) argued that the results of her studies indicate that children have a greater capacity to detect ambiguities than their performance may have revealed.
Inadequate Messages

A related study was conducted by Lempers and Elrod (1983), in which they constructed sentences of several different types, so as to be inadequate for communicative purposes for various reasons. In this study, young children served as listeners in five types of conditions. They were brought into a room individually, and were told by the experimenter, "We are going to play a game with these cards [points to her own and the child's set of cards]. You sit at this end of the table [points] and I will sit at that end [points]. We each have our own set of cards, but we will not be able to see each other's cards because of this screen between us [points]. Your cards and my cards have the same pictures on them [shows the child], but each of my cards has a black arrow under one of the two pictures on it. You have to point out on your card which picture I mean."

The experimenter and the child played the game with a pair of training cards. She would say: "There is a black arrow under one of the pictures on my card. I am going to tell you about the picture the arrow is under. After I tell you, you point to that picture on your card. The black arrow is under the big, blue box. Now show me on your card which picture I am talking about." All children used in the study passed this training phase, and continued on with the conditions.

Of the five conditions, four contained an inadequate message and one an adequate message. Four different types of communicative inadequacy were produced. "Message-dependent inadequacy" involved giving an ambiguous message; for example, in the case of a big red flower and a
little red flower on the card, the message would be "The arrow is under the red flower." "Situation-dependent inadequacy" is exemplified by the case in which the message was "The arrow is pointing to the big red flower" when the child's card would depict flowers that were neither red nor big. "Listener-dependent inadequacy" was brought about by the use of the labels "cadmium carmine," "trapezoid," and "hypothenuse," which were proven to be incomprehensible to the children by a pretest. "Speaker-dependent inadequacy" refers to those messages in which the experimenter, through coughing, actually leaves out the terms specifying the intended referent. In the "adequate" condition, a complete and unique description was given of the object to which the arrow was pointing.

After presenting an inadequate message, the experimenter observed the child's reaction. In case of no reaction, she would try again, wait for a moment, then, if the child still did not react, proceed as follows: "What is wrong? Did I tell you clearly which one? What should I have said?" In case the child pointed to one picture on his or her card, the experimenter would say: "Oh, I meant this one" [point]; then she would proceed with the following questions: "What went wrong? Did I tell you clearly which one? What should I have said?"

Lempers and Elrod (1983) used a 3-level scoring system to classify subjects' responses. Level 0 responses included all instances of no response at all, all incomprehensible responses, all "I don't know" reactions, all repetitions of what the speaker said, all cases in which the children described one of the objects on their card, and all guesses. A Level 1 response was scored when the subject gave an answer which indicated an awareness of the existence of a problem, while a Level 2
response score meant that the subject indicated awareness of the nature of the problem.

Results of the study suggested that the most difficult messages for subjects to appraise were those that contained unfamiliar vocabulary. In their discussion of these results, Lempers and Elrod (1983) noted that listening to an incomprehensible message poses several problems for a child. Does the message refer to anything at all? Is one of the objects in the referential field described, or is some other object, not depicted on the card, as in the situation-dependent form of inadequacy? If reference is made, which object among the alternatives is intended, or is more than one described, as with ambiguous messages? Indeed, Lempers and Elrod maintain that the use of unfamiliar vocabulary seems to increase the difficulty of ascertaining whether the two functional components of a referential message are present.

Results also indicated that children performed better with ambiguous messages than with speaker-interrupted messages. To Lempers and Elrod, these results were surprising, but the current researcher is not quite so taken aback. Several researchers (Cosgrove & Patterson, 1977; Hughes & Grieve, 1980; Ironsmith & Whitehurst, 1978; Kwock, 1984) have approached the situation of the child-adult interaction from different perspectives and have concluded that for various reasons, children seldom question adult questioners. An excellent summation of reasons for this is given by Hughes and Grieve (1980), who note that children are novices at their language, and have, through a multiplicity of interactions with adults, learned that adults are relative experts and are almost always right in their usage of the native tongue. Thus, it is the child's duty, in the
thinking of Hughes and Grieve, not to determine whether an adult's utterances make sense, but to determine what that sense is. Further support for this notion comes from Sonnenschein and Whitehurst (1980), who found that first graders evaluated uninformative peer speakers differently than equally-uninformative adult speakers, rating the adult performance as adequate and the peer performance as inadequate. Thus, the subjects in Lempers and Elrod's (1983) study, despite the message-interrupting behavior of the researcher, might still have evaluated her performance as adequate.

An alternative account for the lack of better listener performance in the speaker-dependent inadequate condition is suggested by results of studies by Cosgrove and Patterson (1977) and Ironsmith and Whitehurst (1978). Children in those studies made few requests for clarification when listening to ambiguous messages, even though some of them were able to specify the problem with the message. Thus, subjects in the Lempers and Elrod (1983) study may have realized the nature of the problem without knowing how to go about solving it.

Ironsmith and Whitehurst (1978) conducted a study, using kindergartners and second, fourth, and sixth graders, which dealt with referential communication tasks. The study had two purposes. First, the researchers wished to test the hypothesis that the maturity of listening skills of young children has been overestimated due to a focus on informative messages. For example, Ironsmith and Whitehurst felt that difficulties experienced by young children in responding to the messages of other children by Glucksberg and Krauss (1967) were likely due to the ambiguous, non-informative quality of many of the communications of young
speakers. Thus, Ironsmith and Whitehurst reasoned, it may be that listening skills follow a timetable similar to that for speaking skills, if the ability to respond appropriately to ambiguous messages rather than merely to informative messages is examined.

Second, Ironsmith and Whitehurst (1978) sought to collect systematic developmental data on the kinds of feedback children give to a speaker once they have detected that the speaker has given a poor message; not by employing children as both speakers and listeners in the experimental dyad, but rather, by using adult experimenters as speakers, to go along with child listeners.

During the study, children were asked to choose 1 of a set of 4 pictures on the basis of the speaker's message. Messages were either informative, providing enough information for subjects to choose the correct referent, or ambiguous, describing 2 of the 4 referents. Children were instructed to ask questions if they needed more information. If a child asked a question or made a response such as, "I don't know," the experimenter then gave a two-attribute, informative clue and recorded the child's response.

The response deemed most appropriate to an informative message was choosing the correct referent. The most-appropriate response to an ambiguous message was to ask a question. A question was defined as any verbalization indicating the child's inability to solve the problem. In this regard, kindergartners responded identically to both message types, choosing 1 of the 4 pictures. General requests for more information were prevalent among second graders, while specific requests for information about the attributes distinguishing between the potential referents were
often made by fourth and sixth graders. These results were all in the direction expected by Ironsmith and Whitehurst (1978). Surprisingly, though, significant sex differences revealed that girls were more likely than boys to provide feedback on ambiguous trials.

The main result was consistent with findings of previous research (Alvy, 1968; Glucksberg et al., 1966): Listener accuracy in responding to informative messages was high in all age groups; however, the ability to deal with ambiguous messages was quite poor in young children. Even when instructed to ask a question on ambiguous trials, sixth graders responded appropriately on just over half the trials, and kindergartners and second graders lagged far behind. As with many speaker skills (Flavell et al., 1968; 1975), listener competence does not appear to be mature up to the beginning of adolescence.

In their discussion, Ironsmith and Whitehurst (1978) remarked: "A consideration of the developmental differences in the type of feedback given to ambiguous messages by child listeners may provide some suggestions as to what subskills are necessary for adequate listener performance." They then noted a trend which the present researcher finds conforms well to a Wernerian perspective; that younger children, especially second graders, asked mostly general questions. The frequency of general questions remained stable with age. The frequency of specific questions, however, increased with age, surpassing the frequency of general questions among older Ss.

Ironsmith and Whitehurst (1978) conclude their study with the observation that two subskills would seem to be relevant in accounting for the development of listener abilities. First, the listener is
required to compare the information in the message received to each member of the array. Children may fail to engage in this comparison process and, instead, impulsively choose the first message-to-picture match they find, looking no further.

Second, even though children may be capable of comparing the message to the stimulus array, detecting ambiguity, and formulating a question, they may not see the desirability of giving the speaker feedback about the adequacy of a message. Perhaps, Ironsmith and Whitehurst argue, children lack the social experience in which they witness adults providing feedback about the adequacy of another person's communication. Also, based on past experience, they may expect adults to give adequate messages and be reluctant to give negative feedback in the face of a poor message. The present researcher agrees especially with this final point, and sees it as being in line with previously-noted observations by Hughes and Grieve (1980), Kwock (1984), and others on the same topic.

Tasks Involving Two or More Equally Possible Items or Events

Beal and Flavell (1982) wondered whether children fail to identify ambiguous messages as such because they forget their initial uncertainty or pay insufficient attention to it. These authors attempted to increase children's attention to ambiguities in instructions about how to place colored blocks, to see whether this led to more correct judgments of the quality of ambiguous instructions. In their experiment, Beal and Flavell asked kindergartners to carry out instructions such as "Take the red block and put it on the tray," some of which were ambiguous and some unambiguous. Children in one condition, the "Alternative Building" condition, made one interpretation of ambiguous instructions and were
then asked, "See if you can think of any way to make your building
different this time, but still follow the instructions." That is,
children were asked to make a second, different interpretation with their
first effort still in view.

Children were then asked about their first effort, "Do you think
your building looks exactly like Sheri's (the imaginary instructor) or do
you think it might look different than hers does?" They were also asked
whether they thought the instructions did a good job of telling them how
to make a building like Sherri's. Compared with children who had made
only one interpretation of ambiguous instructions, children in the
"Alternative Building" condition were more likely to judge that their
first effort might not be exactly like Sheri's. There was, however, no
effect on judgments about quality of instructions, with most children
judging that the instructions did a good job. The authors interpreted
these data as showing that "Children . . . who received mnemonic support
in the form of having two different buildings present during the inquiry
period, did appear to recognize the ambiguities in the instructions . . .
. However, they did not utilize this recognition of the ambiguities in
evaluating the instructions" (p. 47).

In other words, Beal and Flavell (1982) argued that children may be
aware of ambiguities in instructions without necessarily locating the
instructions as the source of the ambiguity. However, Robinson and
Robinson (1983) note that other interpretations of their data can be
made. Children in the Alternative Building condition may have assumed
that they had been asked to make a second building because their first
effort was wrong. Whether or not they assumed this, children may have
thought that their second effort was the correct one. That is, as Robinson and Robinson (1983) note, "... we do not know whether children who judged that their first building might be wrong, understood that either their first or their second efforts could be correct: We do not know whether they recognized the ambiguity in the instructions."

Singer and Flavell (1981) carried out a related study in which kindergartners and second graders evaluated the communicative clarity of brief oral instructions under varying conditions. As background for their study, they noted that the preponderance of recent studies in the areas of communication and metacognitive development, which have focused on children's comprehension monitoring skills, suggests that younger children are less likely than older ones to detect and be puzzled by ambiguous reference and other types of communicative inadequacies in the messages they receive (e.g., Asher, 1979; Baker & Brown, 1980; Dickson, 1981). What is more, they also seem less knowledgeable about the meaning and implications of those message problems they do show signs of detecting (Bearison & Levey, 1977; Ironsmith & Whitehurst, 1978; Patterson, Cosgrove, & O'Brien, 1980).

For example, Singer and Flavell (1981) note that kindergartners may show clear expressions of puzzlement and response uncertainty when given a referentially ambiguous instruction, such as "Put the red block on the tray," where their task is to select a block identical to the (nonvisible) speaker's, and there are two different-shaped red blocks present between which to choose. However, then they are likely to select one red block or the other and go on to say, when questioned, that the selected block looks exactly like the speaker's and that the speaker did
a good job of telling them how to choose one exactly like hers.

In the Singer and Flavell (1981) study, the researchers attempted to find out how well young children do understand this implication when the message ambiguity is made completely explicit. Kindergartners and second graders watched a puppet respond to a series of simple instructions, such as "Pick up the round one." On some trials (unambiguous), the instruction was unambiguous; the puppet said that the speaker meant the single round object present and then proceeded to pick that object. On other trials (no closure), the instruction was referentially ambiguous; the puppet explicitly called attention to this fact by saying that the speaker could mean this one or that one, and that he could not pick one because he did not know which one she meant. On still other trials (closure), the instruction was equally ambiguous and the puppet again pointed out the ambiguity by saying that the speaker could mean this one or that one. However, the puppet then confidently said he thought she meant this one (an arbitrarily-chosen round one), and went on to select that object. At the end of each trial, the subjects rated how clear the speaker (emphasized) had been in telling which object she was thinking of.

Singer and Flavell expected that the second graders would clearly understand the fact that ambiguity implies inadequacy, regardless of what the listener does, and therefore would rate both the closure and the no-closure ambiguous instructions as unclear, and about equally so. In contrast, they expected that the kindergartners would have a less-adequate understanding of this implication, and that their ratings might, therefore, be more influenced by the listener's response; in particular,
they might rate the closure instructions as clearer than the equally-ambiguous no-closure ones.

Analysis of the results revealed that, as expected, the older subjects' ratings of the speaker's communicative clarity were not influenced by the listener's response to the speaker's instructions, whereas the younger subjects' ratings definitely were. That is, the second graders rated instructions that had been shown to be referentially ambiguous as unclear, and equally so regardless of the listener's behavior. In contrast, the kindergartners rated them as more clear when the listener confidently "followed" them than when the listener refused to try to follow them. The authors note that this finding is consistent with Robinson and Robinson's (1977a, 1977b) observations that some young children's judgments of the adequacy of ambiguous messages are affected by whether the listener happens by chance to select the correct referent. However, Singer and Flavell (1981) note, kindergartners' ratings also appear to have been influenced by the intrinsic quality of the instructions, as well as by the listener's response to carry them out.

The researchers conclude that "This study appears to show that younger children are less clearly and consistently aware than older ones that referentially ambiguous messages are intrinsically unclear and unsatisfactory messages when the communicator's task is to specify a unique referent" (p. 1215). However, they felt that the finding of greatest initial interest is "... not which specific task factors can and cannot swamp the child's nascent and fragile understanding, but rather that the understanding is so fragile" (p. 1215).
The interesting finding of Singer and Flavell’s (1981) study, then, from their perspective, was that young children’s knowledge about communication seems to have a striking limitation. Namely, even when they have seen that a message is referentially ambiguous, they will sometimes still claim that it is communicatively clear.

THEORETICAL BACKGROUND/OTHER STUDIES AND THEORIES

The majority of studies reviewed above has dealt almost exclusively with the analysis, in one form or another, of how young children (fourth grade or younger) respond to ambiguous questions of various types and in varying situations. Yet, given that the current research deals as much with older subjects as it does with those younger, it is useful to consider the few studies that exist, which utilize older children or adolescents as subjects in ambiguous-question research. In addition to doing precisely that, this section will consider the viewpoints of several other researchers, the testing of whose theories involves the use of older children or adolescents as subjects.

One Meaning Hypothesis

Foss, Bever, and Silver (1968) hypothesize that a "process" takes place when adolescent or adult listeners notice that an ambiguous sentence is ambiguous. Namely, they interpret the sentence in more than one way, and can state this fact. However, the authors note, in normal discourse people do not usually perceive more than one meaning of the sentences they hear—even though many everyday sentences are in fact ambiguous. These two observations are relevant for a model of sentence comprehension since they pose a problem about the number of grammatical analyses that are ordinarily imposed on sentences.
There is a number of alternative models of this process (MacKay, 1966). (1) Listeners fully analyze all the possible syntactic structures and semantic interpretations and then choose among them by some procedure (e.g., by utilizing the preceding or later sentence context); (2) Listeners hold the unanalyzed string in abeyance, not assigning any structure or meaning to it until further information permits a single interpretation; and (3) Listeners immediately compute only one structure and meaning and maintain it unless further input necessitates a change or recomputation of the sentence structure and meaning.

Primarily in order to test MacKay's (1966) models against their own, Foss, Bever, and Silver (1968) studied 40 undergraduate subjects who verified whether or not pictures shown at the end of a sentence represented the meaning of the sentence. There were 12 ambiguous sentences, equally divided among the three basic ambiguity types: lexical, surface structure, and deep structure ambiguities. A lexical ambiguity occurs when a single word can have more than one meaning within the sentence while the grammatical structure remains unchanged (e.g., the word "pipe" in "The man is holding a pipe."). A surface structure ambiguity occurs when one string of words can be grouped together in two meaningful ways (e.g., "The boy is looking up the street," can be either (The boy) (is looking) (up the street) or (The boy) (is) (looking up) (the street)]. Such groups are usually indicated by intonation which can, therefore, disambiguate a surface structure ambiguity. Intonation cannot disambiguate the other two types. A deep structure ambiguity occurs when, roughly, the words and phrases of the sentence can enter into more than one set of grammatical relations. The grouping of the
words can remain the same [e.g., in "The elephant is ready to lift," the phrase "the elephant" can either be the logical subject (soon the elephant will have lifted something) or the logical object (someone has just readied the elephant to lift it someplace)] (Foss, Bever, & Silver, 1968).

The main results of their study are summarized as follows: (1) Errors in verification occurred significantly more often when an unexpected picture was presented after an ambiguous sentence than when an expected picture was presented; (2) There was a difference in verification time (whether right or wrong) for expected versus unexpected alternatives of an ambiguous sentence. The verification time for the latter minus its control was longer than the verification time for the former minus its control; and (3) The expected meaning of an ambiguous sentence had no slower verification time than an unambiguous sentence. Thus, ambiguity per se did not seem, to the researchers, to interfere with understanding the meaning of a sentence.

The authors concluded that their results support a model of normal sentence comprehension which states that subjects typically assign only one immediate interpretation to an ambiguous sentence. Only if that interpretation is found to be incorrect does a subject reinterpret the sentence.

Cairns (1971) formed a study designed to test this "one-meaning hypothesis," within the realm of both structurally and lexically ambiguous sentences. This investigation called into question the generality of the hypothesis. It employed ambiguous sentences of both of the above types, each highly biased toward one meaning, in a judgment
task which required subjects to judge the compatibility of individual members of sentence pairs. The pairs of principal interest were those containing an ambiguous first sentence (S1), and a second sentence (S2) compatible with only the unexpected (improbable) meaning of S1. The subjects were required to judge whether the two sentences "went together" and judgment latency (time between presentation of S2 and the subject's response) was taken as the dependent measure.

The rationale for the technique was that if only the more probable meaning had been computed for S1, then for the sentences to be judged as compatible, S1 would have to be reprocessed and the less probable meaning computed. If, on the other hand, two meanings resulted from the initial processing of the ambiguous S1, no reprocessing should be necessary.

The data revealed a reprocessing effect (increased judgment latency) only for the lexical ambiguities. It was concluded that the "Language Comprehension Device" (LCD) is capable of computing and retaining two meanings for biased, structurally-ambiguous sentences, but only one for biased, lexically-ambiguous ones. It was suggested by Cairns (1971) that lexical decisions are made by the LCD immediately after receipt of an ambiguous lexical item.

A follow-up study by Cairns (1973) paired biased and unbiased ambiguous sentences with either an "expected" or an "unexpected" second sentence. Then, 80 subjects in Cairns' (1973) study were to judge compatibility. The results supported the conclusion that only one meaning was derived for both types of ambiguities during initial comprehension processing. An analysis of the interactions obtaining between the independent variables supported a model which identifies
stages crucial for the initial processing and also for the reprocessing of ambiguous sentences.

Semantic Constraints

Oden (1978) posited that the degree of sensibleness of sentences is determined by "semantic constraints" which may be more or less satisfied. Intuitively, a semantic constraint, according to Oden (1978) is a relationship between two parts of a proposition such that the meaning of one part constrains what the other part may be; or, in other words, it is a limitation on the ways in which particular semantic elements may be sensibly related. A somewhat more formal definition, as Oden states it, but one which specifically allows for constraints to be more or less satisfied, is: "A semantic constraint is a function that is associated with a particular semantic relationship and that defines, for each combination of semantic elements that may enter into the relationship, the degree of sensibleness of the resulting semantic structure." It may be noted that this definition requires that sensibleness be considered a continuous variable, whereas it has traditionally been thought of as taking only two values: Sense and nonsense (Oden, 1978).

Thus, continuous semantic constraints had been studied previously by Oden and Anderson (1974), who examined how the effects of multiple constraints within a sentence are combined to determine the total sensibleness of that sentence. Oden and Anderson asked subjects to judge the likelihood of events described by agent-verb-recipient propositions, for which the compatibility between the agent and the verb, and between the recipient and the verb, were manipulated independently. The results of this prior study supported the hypothesis that, in general, people use
continuous semantic constraints to determine the degree of sensibleness of sentences as they hear them.

The Oden (1978) experiments sought to extend the study of continuous semantic constraints through the use of ambiguous sentences. In these experiments, subjects judged which interpretation of an ambiguous sentence they would be likely to obtain as the meaning of the sentence, and how much more likely it seemed than the alternative interpretation. For example, subjects read the sentence, "The girl saw the boy with the binoculars," and chose which of two possible interpretations made the most sense to them. In this case, one possible interpretation is that the girl looked through a set of binoculars and saw a boy some distance away. The alternative interpretation is perhaps that a girl saw a boy standing some distance away, holding a pair of binoculars. But if the word "boy" in the above sample sentence is changed to "dog," then the associated semantic constraint is also changed, and it appears less likely that the object has the binoculars in its possession.

Thus, the first experiment used this technique of changing words in sentences that were surface-structurally ambiguous in order to vary factorially the degree to which the hypothesized semantic constraints of each interpretation were satisfied. It was assumed that subjects would prefer the interpretation which was most sensible and that, in fact, the degree of preference for that interpretation would be a direct function of the relative sensibleness of the two interpretations. To Oden, the task seemed ideally suited to the study of semantic constraints, since it allowed the semantic constraints of one interpretation to be "pitted" against those of the other interpretation.
In Experiment 2, every ambiguous sentence was preceded by a context sentence that was used to manipulate the critical semantic constraints. As an illustration, consider the previously-mentioned example: "The girl looked for the boy with the binoculars." One semantic constraint on the use of binoculars as an optical instrument concerns the distance from the observer to the object: It is more sensible to use binoculars to look for distant objects. This distance is not specified in the sentence above, but could be mentioned in a preceding context sentence. Similarly, among the characteristics of the boy that affect the sensibleness of his having binoculars are his age and the activity in which he is involved, both of which may also be given in the context sentence. An example of one stimulus of this type is: "A girl was looking out of her window toward the park across the street where there was a bunch of 3-year-olds playing tag. She was looking for a boy with a pair of binoculars." Notice that it is now relatively easy to vary both the proximity and the age of the children over a wide range. Oden (1978) reasoned that this should produce large effects.

Thus, in one experiment, the semantic constraints were manipulated by varying critical words within the ambiguous sentence; in the other, a preceding context sentence was used. The results of both experiments supported the hypotheses that the judged likelihood was a direct function of the relative sensibleness of the interpretations, that semantic constraints determined the degree of sensibleness of each interpretation, and that these semantic constraints are continuous restrictions which are independent of each other and stable from sentence to sentence in which they occur (Oden, 1978; italics in original work).
Beaver, Garrett, and Hurtig (1973), discussing their "concurrent, mutually-contingent processes" model, state that when an ambiguity is encountered during language comprehension, all possible meanings are processed until the end of the clause is reached, at which point one of the interpretations is chosen to be the meaning of the sentence. That interpretation will then be analyzed through the rest of the sentence unless it turns out to be incompatible with a later part of the sentence. Beaver et al. (1973) do not explain how this choice is made but, given the results of the present experiments, a natural hypothesis would be that the relative sensibleness of the interpretations is used in making this choice (Oden, 1978). The Oden (1978) experiments did not address this hypothesis directly, since the judgmental task differs in significant ways from natural language comprehension, particularly in that Oden's tasks allowed subjects unlimited time and made them fully aware, in advance, of the ambiguity. However, the results of Oden and Ekberg's (1981) experiment indicate that the relative sensibleness of interpretations as specified by semantic constraints does actually determine which interpretation is obtained during normal comprehension in a paraphrasing task. Thus, it is reasonable to begin to develop language-processing models that use the continuous sensibleness information provided by semantic constraints (Oden, 1978).

RESEARCH ON PHRASING OF QUESTIONS

As the current research manipulates the way in which questions of ambiguous nature are phrased, it is important to scrutinize both the theoretical underpinnings and subsequent experimental results of studies conducted previously, which are tangent to this area. These theories,
experiments, and observations originate within several different domains of inquiry, and converge on the question of "How does the phrasing of questions influence subsequent responses on the part of subjects?"

Before commencing with the review of literature in this area, the current researcher notes with interest that research conducted in so many areas, and concerned with such a great variety of questions, indeed focuses upon this area of psycholinguistics.

Leading Questions

A theoretical analysis of the structure of social interaction led Swann, Giuliano, and Wegner (1982) to postulate two distinct processes through which leading questions may mislead people. A leading question can be defined as one which assumes prior knowledge of some fact or event, on the part of both the questioner and the recipient of the question. For example, consider the following classical leading question: "Have you stopped beating your wife yet?" In this question, there is an assumption on the part of the questioner that the recipient of the question has been beating his wife.

The researchers reasoned that when a questioner asks a leading question of a respondent, observers may use their knowledge of conversational rules to infer that the questioner had an evidentiary basis for the question. Hence, observers will treat the question as conjectural evidence for the view of the respondent implied by the question. In addition, observers who listen to respondents answer leading questions may be misled by the answers because, in an effort to cooperate with the questioner, respondents may supply behavioral evidence that misrepresents their actual personalities. To test these hypotheses,
Swann et al. conducted two experiments in which observers listened to tape-recorded interviews.

Experiment 1 examined the hypothesis that observers who listened to an interviewer ask a respondent a series of leading questions would infer that the respondent possessed the characteristics implied by the leading questions. In half of the interactions, the interviewer probed for evidence of extroverted behavior only. In the other interactions, the interviewer probed for evidence of introverted behavior only.

Observers listened to these interactions under one of three conditions. Some observers had access to conjectural evidence only: The interviewer's questions. Other observers listened to behavioral evidence only: The respondent's answers. Still other observers had access to both types of evidence (questions and answers). Finally, one group of observers made inferences about respondents without hearing the interactions at all. This last condition served as a control group.

The major dependent measure within all four conditions was observer impressions of the extroversion-introversion of respondents. In addition, the researchers asked two questions regarding the influence of the leading questions. The first question asked participants to estimate the extent to which respondents' answers were a function of their personal attributes or the questions they were asked. The second question asked them to estimate the extent to which interviewer's questions seemed biased or leading.

Experiment 2 sought to elucidate the interference processes underlying observers' use of conjectural and behavioral evidence by manipulating observers' beliefs about the origins of the questions that
an interviewer asked of a respondent. Swann et al. (1982) led some observers to believe that the interviewer and respondent had no previous contact and that questions the interviewer asked were chosen at random from a fishbowl (fishbowl-origin condition). Other observers, like those in Experiment 1, were told nothing of the previous relationship between the interviewer and respondent, nor were they told how the questions were selected (unspecified-origin condition). All observers then listened to a tape-recorded interview in which the interviewer probed for either introverted or extroverted qualities. Observers had access to either the questions only, the answers only, or both. They then rated the respondent and answered two questions concerning how the interviewer selected her questions.

The researchers' data clearly confirmed their major prediction: When steps were taken to block the tendency of observers to assume automatically that the conjectures in leading questions are based on evidence, they made no inferences about the targets of such conjectures on hearing the leading questions alone. At the same time, when observers witnessed the answers that such leading questions evoked from respondents, they made full use of this information in forming impressions about the respondents.

Importantly, in their discussion, Swann et al. (1982) note that these data speak to the implicit assumptions that people make when they hear interviewers (and perhaps people in general) ask leading questions of others. Specifically, the authors note, "It appears that most people infer that individuals do not simply ask such questions 'out of the blue'; instead, they assume that leading questions are grounded in
Crocker (1982) conducted an experiment in order to test the hypothesis that the phrasing of a question about the relationship between two events can influence what information subjects feel they need to answer the question. A total of 60 introductory-psychology students participated in the experiment, in groups of 5. They were told that the experiment concerned the information people feel they need to solve problems. Subjects were presented with a description of a covariation problem and asked to indicate what information they would need to solve the problem.

There were two versions of the experimental materials. One version concerned the relationship between practicing the day before a tennis match and the outcome of that match. The second version concerned the relationship between seeding clouds with a new chemical and the occurrence of rainfall. The two versions were identical in structure. The stimulus materials were illustrated with the tennis problem, which read, "Imagine that you play competitive tennis, and you have a tennis match every week. You begin to wonder how your workout schedule affects your performance in your matches." One of three covariation questions followed. Two of the questions explicitly mentioned only one of the relevant instances. That is, subjects read, "You want to find out if there is a relationship or connection between working out the day before a match and winning that match" (win), or, "You want to find out if there is a relationship or connection between working out the day before a match and losing that match" (lose). The third question explicitly stressed no particular type of instance (unbiased). It read, "You want
to find out if there is a relationship or connection between whether or not you work out the day before a match and whether you win or lose the match."

Subjects were instructed to indicate only that information that is necessary to solve the problem, or their answer would be considered wrong: "In other words, indicate what information is necessary and sufficient to make an accurate judgment." These instructions were followed by a list describing the four types of instances that are logically relevant to the judgment. The alternative types of instances from which subjects chose were: (a) The number of times you work out the day before a match and win the match; (b) the number of times you work out the day before and lose the match; (c) the number of times you don't work out the day before and win the match; and (d) the number of times you don't work out the day before the match and lose the match.

This experiment indicated the importance of question phrasing when subjects estimate the degree of relationship between two events. In it, subjects asked to estimate the relationship between working out the day before a tennis match and winning the match sought different information than subjects asked about working out the day before a match and losing the match (Crocker, 1982). These findings are consistent with the results of the Wason and Johnson-Laird (1972) study that when testing a proposition, people preferentially search for instances that could confirm, rather than disconfirm, the proposition.

Crocker (1982) goes on to note that subjects asked the unbiased question sought more information to answer the question than subjects asked either of the biased questions. She puts forth two possible
explanations for this finding: First, when people are not explicitly provided with a hypothesis, they may seek out more information than when they do have one, perhaps in an attempt to develop a hypothesis. Second, subjects may be trying to figure out exactly what the experimenter wants them to do, and they may assume that any instance the experimenter mentions in the question he or she must want them to use.

Estimation Research

Another example of how the wording of a question can affect a person's answer to it has been reported by Harris (1973). His subjects were told that "the experiment was a study in the accuracy of guessing measurements, and that they should make as intelligent a numerical guess as possible to each question" (p. 399). They were then asked either of two questions, such as, "How tall was the basketball player?", or, "How short was the basketball player?" Presumably, the former form of the question presupposes nothing about the height of the player, whereas the latter form involves a presupposition that the player is short. On the average, subjects guessed about 79 and 69 in. (190 and 175 cm), respectively. Similar results appeared with other pairs of questions. For example, "How long was the movie?" led to an average estimate of 130 minutes, whereas, "How short was the movie?" led to 100 minutes. Thus, even though it was not the central concern of Harris' study, his work clearly demonstrates that the wording of a question may affect the answer.

Research Regarding Memory

Two examples from the published literature also indicate that the wording of a question put to a person about a recently-witnessed event
can affect a person's answer to that question (Loftus, 1975). In one study (Loftus, 1974; Loftus & Zanni, 1975), 100 students viewed a short film segment depicting a multiple-car accident. Immediately afterward, they filled out a 220-item questionnaire which contained six critical questions. Three of these asked about items that had appeared in the film whereas the other three asked about items not present in the film. For half of the subjects, all the critical questions began with the words, "Did you see a . . . " as in, "Did you see a broken headlight?" For the remaining half, the critical questions began with the words, "Did you see the . . . " as in, "Did you see the broken headlight?"

Thus, the questions differed only in the form of the article, the or a. One uses "the" when one assumes the object referred to exists and may be familiar to the listener. An investigator who asks, "Did you see the broken headlight?" essentially is saying, "There was a broken headlight. Did you happen to see it?" His or her assumption may influence a witness' report. By contrast, the article "a" does not necessarily convey the implication of existence.

The results showed that witnesses who were asked "the" questions were more likely to report having seen something, whether or not it had really appeared in the film, than those who were asked "a" questions. Even this very subtle change in wording influences a witness' report (Loftus, 1975).

In another study (Loftus & Palmer, 1974), subjects saw films of automobile accidents and then answered questions about the accidents. The wording of a question was shown to affect a numerical estimate. In particular, the question, "About how fast were the cars going when they
smashed into each other?" consistently elicited a higher estimate of speed than when "smashed" was replaced by "collided," "bumped," "contacted," or "hit." In addition, the study found that for each of the above-mentioned verbs, in order, the estimates of speed decreased in the same order.

In a similarly-conducted study by Loftus (1975), 490 subjects, in four experiments, saw films of complex, fast-moving events, such as automobile accidents or classroom disruptions. The purpose of these experiments was to investigate how the wording of questions asked immediately after an event may influence responses to questions asked considerably later. It was shown that when the initial question contains either true presuppositions (e.g., it postulates the existence of an object that did exist in the scene) or false presuppositions (e.g., it postulates the existence of an object that did not exist in the scene), the likelihood is increased that subjects will later report having seen the presupposed object. The results of Loftus' study thus suggested that questions asked immediately after an event can introduce new—not necessarily correct—information, which is then added to the memorial representation of the event, thereby causing its reconstruction or alteration. In addition, the study showed, the wording of a presupposition into a question about an event, asked immediately after that event has taken place, can influence the answer to a subsequent question concerning the presupposition itself, asked a very short time later, in the direction of conforming with the supplied information.

There are at least two possible explanations of this effect, according to Loftus (1975). The first is that when a subject answers the
initial question, he or she somehow reviews, or strengthens, or in some sense makes more available certain memory representations corresponding to the event in question. Later, when asked a subsequent question about that same event, he or she responds on the basis of the strengthened memorial representation.

A second possibility is called the "construction hypothesis" by Loftus. In answering a given initial question, the subject may "visualize" or "reconstruct" in his or her mind that portion of the incident needed to answer the question. So, if he or she accepts the presupposition, he or she introduces that same portion of the incident into his or her visualization, whether or not it was in his or her original memory. When interrogated later about the existence of that part of an incident, subjects may "see" what they themselves have constructed.

In summary, studies have found that memory can be altered by leading questions which presuppose information inconsistent with originally-presented memory materials. And, as becomes evident upon review of the research on the effect of misleading questions generally, such questions can exert a powerful influence upon the ways in which listeners will respond.

The next area under scrutiny in the current work is that of degree of abstractness, versus physiognomization, as contained in questions used in the current study, and as theorized by Werner and his associates.

DEGREE OF ABSTRACTNESS VERSUS PHYSIOGNOMIZATION

Werner (1978) notes that the typical civilized person perceives the objects of the environment in a manner which he calls objective
technical. That is, things are determined by properties that result from
objective conceptual relationships and from technical requirements. The
color perceptions of red, yellow, green, and blue are objective optical
perceptions when observed as characteristics of the objects in a
technical context. There is another world—also a world of objects—but
these objects have no prosaic objective properties. Instead, they have
"faces," or physiognomies. Werner calls this world physiognomic because
every civilized adult perceives human faces physiognomically.
Physiognomic perception involves the suffusing of percepts with an
emotional, affective, or expressive quality (Schlesinger, 1979). For
example, one cannot totally define a face by objective characteristics
such as a crooked nose, a facial angle of \( x \) degrees, blue eyes, white
skin, etc. Those are physical or geometric properties.
Physiognomically, a face is either grumpy or cheerful, energetic or
tired, lascivious or pure.

Werner continues, saying, "These qualities are not feelings but,
rather, are perceptions. They are nothing derivative, but are the most
primitive perceptions of all. The most primordial objects of awareness
(for children and primitive peoples) are not thinglike but facelike"
(1978, p. 149). He feels it is erroneous to believe that the
physiognomic qualities which humans attribute to nonhuman things are
transferred from [the perception of] human faces. The physiognomic
perception of human faces is only a meager remnant of an original mode of
perception by which naive peoples look at objects.

There are, then, according to Werner (1978), two ways of perceiving:
First, an original physiognomic one and, second, an advanced one which is
conceptual-objective-technical. Thus, colors can be perceived as objectively ordered within the spectral series, but the colors can also be viewed physiognomically. Then, for example, red is not the optical spectral quality but is something else, "... an appearance with characteristics such as living, burning, strength-laden, energetic" (p. 150).

It is interesting to note that Werner uses principles and techniques of microgenesis (as opposed to ontogenesis or phylogenesis) in verifying the more-primitive nature of physiognomic perception. He states that "... the physiognomic aspect of a word can be shown to be more primary than its conceptual meaning because when a word is presented tachistoscopically, the physiognomic aspect becomes perceptible to the subject earlier than does the meaning of the word itself ..." (1978, p. 151).

Differences Between Physiognomic and Objective Qualities

Werner notes that one can identify a series of characteristic differences between physiognomic and objective qualities. First, the objective quality is conceptual. "Blue" is a designation for a group of colors. Each blue is readily perceived as an objective quality by every individual. By contrast, the physiognomic quality is an individual and unique one and is dependent upon individual experience. The word "blue" or "red" is perceived as a specific, individual blue or red. And, in the same way, the nature of the particular physiognomic quality will depend upon the individual. Depending on the inclination of the subject, color words are experienced more or less physiognomically (Werner, 1978).
Second, objective qualities are fixed and adynamic; yet the most essential characteristic of physiognomic perception is the dynamic. The world of things, as physics teaches, eliminates the quality of strength. In the physiognomic world, however, the dynamic is perceived directly. Blue is not the adynamic color of the spectrum; rather, it is "... unendingly outspreading, far-expanding, radiating outward toward the depths" (Werner, 1978, p. 151).

Third, according to Werner, the category of physiognomic qualities is different from the category of material qualities. For example, red and green are objectively-contrasting colors, while blue and green are objectively related. The opposite is true in the physiognomic world. There, red and green are related to one another through their strength, their vivacity, and their cheerfulness, and for that reason are distinguished from blue. The objective color contrast—red/green—is paralleled by the physiognomic color contrast—red/blue.

Fourth, the material qualities are tied to a specific sensory modality—the visual, the auditory, etc. But physiognomic qualities arise well before any differentiation of specific sensory domains, according to Werner (1978). They arise, as Werner claims can be ascertained experimentally, as a total perception. Thus for every physiognomic color, the root is a specific organization of the total body, a specific body attitude. This difference between the material world and the physiognomic world can, according to Werner, be demonstrated in speech, not only with color words, but also in words referring to materials, such as "wood" or "wool."

Schlesinger (1979) notes that "Physiognomic sensitivity has been
referred to as the tendency of a perceiver to suffuse percepts with an emotional, affective, or expressive quality" (p. 107). Wallach and Kogan (1965) state that "To respond to the physiognomic properties of things and events involves an act of metaphor, an act of simile, or an act of signification. . . . A gap is being bridged between two distinct kinds of psychological entities—visual experience on the one hand, feeling states on the other" (pp. 143-145). However, not all perceptions are physiognomic, as pointed out by Werner and Kaplan (1963), who distinguish two types of perceptual processes resulting from properties of the visually-perceived environment.

A "geometric-technical" perception results from stimulus properties that convey information such as form, arrangement, height, width, configuration, etc. "Physiognomic perception," on the other hand, results from properties that convey information about the affective or emotional quality of the stimulus.

Gombrich (1960) notes that as early as 1783 the "expressive" qualities of lines and shapes aroused interest. Authors and poets, for example, have described stormy skies as "angry and menacing" or blue, sunny skies as "smiling." Other early interest centered on the idea of uncovering a person's inner feelings and character from his outward appearance, particularly from his facial features and body movements. But regarding the present, Wallach and Kogan (1965) state that "More generally, the term has come to convey the notion of learning about inner feeling, and affect states, from perceivable externals" (p. 143).

Thus out of these facts of perception, there arose a problem area germane to psychological inquiry. Werner and Kaplan (1963) refer to the
empirical studies in this domain as employing two main techniques—"the production and comprehension methods." In the production approach, emotional states are described to the subjects with the request that they draw (i.e., produce) an appropriate linear representation of that state. The comprehension or matching study requires the subjects to match the appropriate emotional states—from a number of possibilities—to presented visual configurations. Adult subjects have been used in most studies, and, in general, have demonstrated "... a goodly degree of consensus in the way in which they connect feeling states with linear representations" (Schlesinger, 1979, p. 109).

The high level of consensus displayed by adults in the manner in which they make physiognomic inferences has not been found in children. In fact, two developmental studies (Honkavaara, 1961; Nathan & Hass, 1970) report very low levels of physiognomic sensitivity in children aged approximately 4 years. In both of these studies, however, tasks were employed that required some degree of verbal sophistication. Honkavaara (1961) required subjects to describe photographs of persons, or to judge whether a given photo depicted a face that was, for example, "more miserable than happy." Nathan and Hass (1970) used items such as "The word is (fragrant); show me which line looks (fragrant)." It is clear that differences in available vocabulary must be considered one possibility in accounting for poor performance by the younger-aged groups. In a study using children approximately 10 years of age, Wallach and Kogan (1965) found a ceiling effect to occur on many of their tasks, in that the children in their study showed a level of performance equal to that of adults. Thus, the results of prior research suggest that
physiognomic sensitivity takes a developmental course: Very limited in young children, increasing steadily to approximately 10 years, with a high consensus displayed at that time and into and throughout adulthood.

Before reviewing two studies from which the current work is largely derived, there is one final area whose importance in this particular domain of psycholinguistics merits attention; namely, the order in which referents are mentioned within questions presented to subjects.

ORDER IN WHICH REFERENTS ARE MENTIONED WITHIN QUESTIONS

After the administration of an objective-projective test of motivation to achieve in school, for children ages 3 1/2 to 8 or 9 years, Adkins and Ballif (1972) found, in their results, factors which, "... although suggestive of substantive interpretations, seemed to be influenced by the positions of the answers and/or primacy versus recency; i.e., whether the keyed answer was presented first or last." Thus, in subsequent testing, some factors were "loaded for items with answers predominantly in the right-hand position, which were presented last, and some for items with answers predominantly in the left-hand position, which were presented first."

And, in a study by Bearison and Levey (1977), which was reviewed in greater detail earlier in this chapter, the choice of referents on two of the 12 items of the decoding task permitted further inquiry regarding the question of egocentrism in children's decoding. Specifically, in two of the message stems, first-person referents were paired with second-person referents. For example, one of the items was, "My birthday is in March and yours is in .... When is the birthday, in March or ...?" If in the ambiguous condition children made errors on these items, it was
expected that they would err in the direction of interpreting the meaning of the questions by choosing the second-person referent because that was the one that specifically referred to themselves. However, among 34 subjects who made errors on these items, the errors were not significantly more often in the direction consistent with an egocentric orientation. Instead, they tended to choose the last referent mentioned in the sentence stem.

STUDIES RELATING CLOSELY TO THE PRESENT RESEARCH

Two pieces of research are of particular importance for the current study: Hughes and Grieve (1980) and Smith (1983).

First, Hughes and Grieve (1980) presented groups of 5- and 7-year-old children each with four questions. These questions were as follows: (1) "Is milk bigger than water?"; (2) "Is red heavier than yellow?"; (3) "One day there were two flies crawling up a wall. Which fly got to the top first?"; and (4) "One day there were two people standing at a bus stop. When the bus came along, who got on first?".

These questions were intended by Hughes & Grieve to be "bizarre," in the sense that they did not permit direct answers. This was so for different reasons. Questions (1) and (2) were intended to involve "category mistakes," and a reasonable response might have been to say: "I don't know what you mean," and request further clarification. The meaning of questions (3) and (4), on the other hand, is perfectly clear, but a reasonable response might have been to say: "I don't know," and request more information.

Hughes and Grieve's (1980) curiosity in this area had been piqued by informal observations which suggested that children do tend to provide
answers to bizarre questions, and to justify their responses in various ways. Hughes and Grieve reasoned that it would be difficult for a researcher to be sure that a question intended to be bizarre would be received as such, but still wondered at children's propensity to respond deadpan to bizarre questions. Thus, they questioned children with these four questions, each intended to be bizarre in the sense that as they stand they cannot be answered directly. Questions (1) and (2) require clarification of their meaning, and questions (3) and (4) require the provision of additional information before they can be answered.

Children were tested individually by the same experimenter. Adult and child sat at a table on which lay some papers, including a sheet on which the adult noted the child's responses, but there were no toys or pictures to be seen. The adult experimenter simply said: "Listen, is milk bigger than water?", or whatever. The questions were always presented in the following order: (1), (3), (2), (4). If the child failed to give a response, or said "Don't know," the question was repeated once. If the child gave a response without justifying it (e.g., "Is red heavier than yellow?" "Yes."), he or she was asked, "Why?"

The results of the study were reasonably clear. When presented with questions intended to be bizarre—questions which cannot be answered directly, without clarification of meaning or provision of further information—young children almost invariably provided replies. Younger five-year-old children frequently did so by importing additional context to the situation—i.e., by responding in terms of where the liquids originate, for example, or what happens when they are poured into containers. But older seven-year-old children were less likely to do
this, tending instead to remain with characteristics of the elements referred to in the questions, or appealing to rules which might be expected to apply in the situation to which the question refers. The other major difference between the groups was that while the older children frequently qualified their responses in some way, indicating uncertainty, the younger children never did so.

A study conducted by Smith (1983) was intended, in part, to be a follow-up to the Hughes and Grieve (1980) study just noted. The study had two main goals: (1) To determine the nature of age changes in response to questions that were bizarre in the same sense as those in the Hughes and Grieve (1980) study, and more specifically, to see whether children show an increased tendency with age to seek clarification on such questions; and (2) to determine whether the tendency to seek clarification could be enhanced by prior experience with a different type of nonsensical question, a type that previous research (Rasnake, 1983) had shown leads to more-adequate responses to ambiguous questions.

During the Smith study, 128 3rd and 9th graders were tested on bizarre questions of the sort: "One day two flies were crawling up a wall. Which one reached the top first?" and "Is red heavier than yellow?" to determine whether there are age differences in responses to bizarre questions, and in particular, whether children will increasingly ask for clarification and more information with age. To enhance questioning, the test items, of the type noted above, were preceded by another form of nonsensical question, which earlier research had shown, leads to more adequate responses (Rasnake, 1983). These items were of the sort: Picture--carrot; Question: "Why is this a boy?" In various
conditions the presentation of the two types of question was counterbalanced.

Results suggested three main conclusions: (1) As hypothesized, there was an increase with age in properly questioning the question in the form of either rejecting the question as being meaningless (e.g., "It makes no sense") or asking for more information. But even the 9th graders showed few proper responses (only 27% of 9th graders responded properly, and only 12% of 3rd graders did so); (2) Qualitative analyses showed a decline in more primitive forms of response, and an increase in more abstract forms of response, with age. Thus there were declines in tautological responses (repeating a part of the question in the answer, such as answering, "the one that got there first" in response to the question, "Which reached the top first?"—70% of 3rd graders vs. 47% of 9th graders) and acquiescing responses (81% of 3rd graders vs. 52% of 9th graders). However, there was an increase in "logical" responses with age (9% 3rd graders vs. 44% 9th graders). Such responses added meaningful information (e.g., "The stronger fly reached the top first."), and constituted the importation of context, by the subject, to the question.

The results were explained from a Wernerian perspective, emphasizing an increasing ability to differentiate oneself from environmental cues with age, and an increasing tendency to be more reflective and to structure the environment on the basis of logic. But there were still many 9th graders performing poorly, and the children were generally resistant to cues designed to enhance questioning.
SUMMARY/HYPOTHESES

The results of the studies reviewed above, and the theoretical postulations which pertain to them, therefore, suggest 3 primary conclusions: (1) Children as a group have difficulty in properly analyzing and interpreting ambiguous messages; (2) The ability to identify correctly an ambiguous communication as such generally improves with age; and (3) It is apparently possible to divide an ambiguous question into component parts which are more, or less, responsible for contributions to the overall ambiguity of the message (e.g., the way a question is phrased, the subject matter of the question, stimulus materials present with the question, etc.).

Based upon the above-noted research, and on the studies cited whose results generally substantiate "constructive" ties to increasing competence at ambiguous-message-identification tasks with increasing age, it seemed likely that the present study would yield 3 main effects (i.e., independent variables whose manipulation would affect the answers given by Ss to questions of ambiguous nature). These variables are: (1) Age, with an expected increase in the number of "question questioning" responses with increasing age; (2) Phrasing of the question, with those questions beginning with "Why is . . ." being the most difficult to respond properly to (particularly in view of the results of researchers such as Swann et al., 1982; Loftus, 1975); and (3) The degree of abstractness or content of geometric-technicality vs. physiognomization present in the question (especially when Werner's theory on the topic is taken into consideration), with ambiguous questions of physiognomic nature being the easiest to answer, based upon their primordial nature
relative to questions containing geometric-technical or abstract referents or comparison terms. It is noted in passing that the current study sought to control for whether subjects would tend to answer an appropriately-worded question by giving the last referent mentioned in the sentence stem (e.g.: "Which is bigger, A or B?" "B."); but did not expect any significant effects to emerge in this area.

The current work also was designed to extend the work of numerous of those researchers mentioned above, whose experimentation dealt largely with younger-age children (fourth grade and younger). Thus, the current study employed eighth and twelfth graders as subjects.

Finally, the current study sought to examine the qualitative differences in responses children gave as a function of age, and to search for differences in response due to any of the factors mentioned previously in this section.
CHAPTER III

METHOD

SUBJECTS

Ninety-six schoolchildren from a suburban Columbus, middle-class school district participated in the present study. There were 24 kindergartners (mean age 5.99 yr.), 24 fourth graders (mean age 9.95 yr.), 24 eighth graders (mean age 13.97 yr.), and 24 twelfth graders (mean age 17.82 yr.) —12 males and 12 females in each grade. All subjects were selected at random from classes. Subjects were tested individually by one of four different experimenters, comprised of two males and two females. All received 9 questions devised for the current study first, then were administered the Quick Test (Ammons & Ammons, 1962). The Quick Test, a brief instrument designed to assess general verbal ability, was used in order to permit subsequent analysis of relationships, between answers given to questions devised for the current study, and verbal acumen. All answers to questions from the current work were recorded on prepared score sheets, while answers to the Quick Test were written on score sheets designed for use with the Quick Test. Items were administered by two male young adults and two female young adults, randomly assigned within sex of Ss, but balanced for sex of Ss.
PROCEDURES AND MATERIALS

The primary goal of the current study was to examine age changes in responses to questions of ambiguous type, particularly with respect to three areas: (1) Phrasing of questions; (2) Degree of abstractness imposed within questions; and (3) The order in which referents are mentioned within questions. Additionally, the current study involved a qualitative analysis of the types of response which children gave to ambiguous questions.

Within this study, there were nine "base questions;" three each of physical, physiognomic, and abstract type, as discussed in Chapter II (see section entitled "Degree of Abstractness vs. Physiognomization"). An example of each follows: "Which is bigger, milk or water?" (physical); "Which is happier, chocolate or vanilla?" (physiognomic); and "Which is louder, inside or outside?" (abstract). For each base question, there were six questions, including the actual base question. These six were composed of three different ways of asking the base question and, for each of these three ways, a reversal of the order in which referents within questions were mentioned. Thus, for the first example of the base question, "Which is bigger, milk or water?", the other two ways of phrasing the question were "Is milk bigger than water?" and "Why is milk bigger than water?". As can be seen, the three ways in which questions were phrased are different, in that the first type (the base question) implies the exclusive interpretation of the term "or" (Kwock, 1984; Rasnake, 1983); the second implicitly allows for the possibility that the two referents do not differ on the criterion used; and the third assumes that the first-mentioned referent somehow possesses
"more" of the criterion than the second-mentioned.

Referents then were reversed in order, pursuant to findings of studies such as those by Adkins and Ballif (1972) and Bearison and Levey (1977) that many Ss in their study gave answers simply by naming the last referent mentioned by the experimenter, or by saying "yes," regardless of the order in which referents were mentioned. That is to say, the current study was designed, through reversal of order in which referents are mentioned, to control for Ss' succumbing to an acquiescence-response set.

A complete listing of all 9 base questions follows, along with notation as to which type of question (i.e., physical, physiognomic, or abstract) it is:

1. Which is bigger, milk or water? (physical)
2. Which is happier, chocolate or vanilla? (physiognomic)
3. Which is louder, outside or inside? (abstract)
4. Which is heavier, a circle or a square? (physical)
5. Which is funnier, corn or peas? (physiognomic)
6. Which is thicker, below or above? (abstract)
7. Which is warmer, a boat or a car? (physical)
8. Which is friendlier, pots or pans? (physiognomic)
9. Which is fatter, before or after? (abstract)

Assume that the six questions pertaining to the first "physical" question, namely, "Which is bigger, milk or water?" are ordered 1 through 6; the next six questions, pertaining to the first physiognomic question, "Which is happier, chocolate or vanilla?" are numbered 7 - 12, and so on. Then a matrix employing these coded numbers appears as Appendix A, in order to allow for assignment of individual questions to Question Sets.
By employing mathematical theory as a tool to use in assuring that each Question Set included one question for each of the various question types, methods of phrasing, and orders for mentioning referents, groups of 3 "domain questions," congruent to N, N+1, and N+2 (mod 6) were selected for each Question Set, with N ranging from 0 to 5, inclusive. Specifically, the "physical" representative for each set was congruent to N; the "physiognomic" representative congruent to N+1, and the "abstract" representative congruent to N+2. To complete the Question Sets, each of which contained 9 questions, each domain question served as one of three questions in its domain, with the other two coming from its major diagonal in the matrix (see Appendix A). Questions comprising a major diagonal for a given domain question can be defined as those whose numbers represented the next two numbers congruent to that of the domain question, mod 19. Thus, for example, Domain Question 1 would have, as its other 2 questions, questions #20 and #39. The mod-19-congruency format was designed precisely to permit overlapping of each base question with other similar, but not identical, questions. Thus, it in effect imposed a stratified-random-sampling technique on the entire body of questions used. This technique eliminated a problem which could have been encountered by pure random selection of questions, whereby, for instance, a subject could have been asked, "Which is happier, chocolate or vanilla?", respond, and then be asked as the next question, "Is chocolate happier than vanilla?".

Each subject was administered the Ammons & Ammons Quick Test (1962) --a brief verbal-ability test--following the administration of one of the six Question Sets (nine questions to a set). Within each Question Set,
the order in which questions were presented was randomized. See Appendix B for a complete listing of questions contained in each Question Set.

Finally, the match of individual Ss with Question Sets was at random, within constraints that each of the six Question Sets had to be administered twice per grade per sex.
CHAPTER IV

RESULTS

The current research was primarily concerned with examining age differences in responses to questions of ambiguous type, particularly with respect to three areas: (1) Phrasing of questions; (2) degree of abstractness imposed within questions; and (3) the order in which referents are mentioned within questions. Additionally, the current research conducted a qualitative analysis of the types of response which children gave to ambiguous questions.

Before proceeding further, two points relevant to the scoring system in general merit mention. First, if a subject responded by answering "no" or "neither" to any question, he or she was asked, "What did you mean?" by the experimenter, following completion of all 9 test questions. This was asked in order to find the motivation underlying such responses, as they could conceivably have been either a nonquestioning response type, or a rejecting response type, depending upon motivation. Secondly, for purposes of scoring, if a subject made more than one response to a given question, his or her best response was taken into consideration for purposes of analysis.

PHRASING OF QUESTIONS

Due to the nature of data gathered, a Chi-Square analysis procedure, or Fisher's Exact Test, was used throughout this research. The only
determinant of which test was used was the size of cells in the 2 X 2 contingency tables prepared for each analysis.

As noted in Chapter III, questions were phrased in three different ways. For example, the question, "Which is happier, chocolate or vanilla?" was asked in two other broad ways: "Why is chocolate happier than vanilla?" and "Is chocolate happier than vanilla?"

Initially, analyses were conducted with respect to age differences on the criterion of "attempts to answer questions." That is, the current investigator was interested in whether or not there would be age differences, within question type ("Which Is" type vs. "Why Is" vs. "Is"), on the sheer ability of Ss to attempt an answer at questions. This is an important criterion, because the extent to which one can overcome an ambiguous question, and at least attempt a response to it, is a fair measure of how much he or she is able to put distance between him or her self and the question.

ATTEMPTS TO ANSWER: "WHICH IS" TYPE QUESTIONS

For questions of "Which Is" type (example: "Which is heavier, a circle or a square?")", "attempts to answer questions" were classified as the following: importing context (IC), changing words used in the question (CH), and mentioning either of the referents used in the question. Non-attempts for the same type questions (i.e., "Which Is" type questions) were: non-responding (NR), saying "don't know" (D), and rejecting the question (*).

On the basis of the above classification, an analysis was conducted using the Chi Square procedure. Table 1 gives the values for all attempts vs. non-attempts for these "Which Is" type questions at each of
the four grades:

Table 1: Ss Attempting vs. Not Attempting "Which Is" Type Questions

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Ss Attempting</th>
<th>Total Number of Ss Not Attempting</th>
</tr>
</thead>
<tbody>
<tr>
<td>K:</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>4:</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>8:</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td>12:</td>
<td>24</td>
<td>0</td>
</tr>
</tbody>
</table>

As can be seen, 83.3% of kindergartners attempted responses, 87.5% of fourth graders did so, 70.8% of 8th graders did so, and 100.0% of 12th graders made attempts. Chi Square analyses revealed only one main effect: Significantly more 12th graders than 8th graders made attempts at "Which Is" type questions ($X^2 = 6.02; p < .02$).

A similar analysis to that carried out for "Which Is" questions was conducted for "Why Is" type questions (example: "Why is a car warmer than a boat?"). For "Why Is" questions, "attempts to answer" included the following: Importation of context or imputing information (IC). "Non-attempts" at answering the question included: Non-responding (NR), saying "don't know" (D), asking whether supposed to answer the question (Q), saying that S didn't understand the question (U), and rejecting the question (*). Based upon this classificatory system, then, a Chi Square analysis was performed. Table 2 presents values for all attempts vs. non-attempts for these "Why Is" type questions, for each of the four grade levels:
Table 2: Attempts vs. Non-Attempts for "Why Is" Type Questions

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Ss Attempting</th>
<th>Total Number of Ss Not Attempting</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>8</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>12</td>
<td>13</td>
<td>11</td>
</tr>
</tbody>
</table>

Thus, 12.5% of kindergartners attempted to respond, 33.3% of fourth graders did so, 45.8% of 8th graders attempted responses, and 54.2% of 12th graders did so. Chi Square analyses showed that more 8th graders than kindergartners made attempts ($X^2 = 4.94, p < .05$), and significantly more 12th graders than kindergartners attempted responses ($X^2 = 7.59, p < .01$).

 Attempts to Answer: "Is" Type Questions

For questions of "Is" type (example: "Is inside louder than outside?")," attempts to answer questions" were classified as the following: Giving a "yes" response (+), giving a "no" response (-), and importing context or imputing information (IC). "Non-attempts" for the same type questions (i.e., "Is" type questions) included not responding (NR), saying "don't know" (D), rejecting the question (#), asking a question about whether it was intended that the S answer the question (Q), and commenting on the unusual nature of the question (C).

With the above classification system in mind, an analysis was conducted, using Chi Square. Table 3 shows values for all attempts vs. non-attempts for these "Is" type questions at each of the four grade levels surveyed:
Table 3: Attempts vs. Non-Attempts for "Is" Type Questions

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Ss Attempting</th>
<th>Total Number of Ss Not Attempting</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>19</td>
<td>5</td>
</tr>
</tbody>
</table>

As illustrated by Table 3, 54.2% of kindergartners attempted responses to questions of "Is" type, 75.0% of fourth graders did likewise, 58.3% of eighth graders did so, and 79.2% of twelfth graders did so. The Chi Square simple-differences analysis of the largest difference, namely, between twelfth graders and kindergartners, proved to be non-significant. Therefore, analysis in this area was terminated.

The nature of the data gathered did not permit a direct comparison between the three types of question ("Which Is" vs. "Why Is" vs. "Is"), regarding the relative number of Ss attempting to answer each. However, it is interesting to note that whereas the percentages are overall roughly equivalent for the "Which Is" and "Is" type questions, the percentages of Ss attempting to answer "Why Is" type questions are quite a bit lower. This phenomenon, although not directly testable in the current context, gives rise to a question as to whether perhaps "Why Is" type questions are indeed the most difficult for which Ss must attempt responses.
DEGREE OF ABSTRACTNESS IMPOSED WITHIN QUESTIONS

As mentioned in Chapter III, and as introduced in Chapter I, questions were imbued with 3 different levels of abstractness. They derive both from Wernerian theory and a logical extension of that theory, and include: (1) Physical types of question, in which the comparison term is of a physical dimension (such as weight, thickness, or volume), and the referents are tangible entities (such as milk, cars, and boats) (example: "Which is bigger, milk or water?"); (2) Physiognomic types of question, in which the comparison word is an emotive dimension (e.g., happy, funny, or friendly), and referents are concrete objects (for example, chocolate, corn, and pans) (for example: "Which is funnier, corn or peas?"); and (3) Abstract, in which the comparison term is of a concrete dimension (e.g., loudness, thickness, or fatness), and referents are abstract entities (for instance, outside vs. inside, or below vs. above) (example: "Which is thicker, above or below?").

Thus, collapsing across question type (be it "Which Is," "Why Is," or "Is" type), analyses were conducted in order to find out how much of a burden, relative to the other two levels, did each level of abstractness place upon Ss in the various grades. Analyses were conducted to find how many Ss tried to answer questions containing varying degrees of abstractness, versus how many did not. The same criteria for responses to be scored as "attempting to answer the question" applied as before.

Table 4 presents the total numbers of responses attempted for each level of abstractness imposed, and for each grade level:
Table 4

<table>
<thead>
<tr>
<th></th>
<th>Physical</th>
<th>Physiognomic</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>11</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>4:</td>
<td>20</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>8:</td>
<td>14</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>12:</td>
<td>15</td>
<td>21</td>
<td>16</td>
</tr>
</tbody>
</table>

Results obtained via Chi Square analyses revealed several significant bits of information. First, more 4th graders than kindergartners attempted to answer the questions, for questions of physical degree (\(X^2 = 5.83; p < .02\)). Second, significantly more 8th graders than kindergartners attempted to answer physiognomic questions (\(X^2 = 4.20; p < .05\)). Third, more 12th graders than kindergartners were attempted to answer questions of physiognomic variety (\(X^2 = 9.11; p < .01\)). Fourth, significantly more 12th graders than 4th graders attempted to answer questions of physiognomic degree (\(X^2 = 7.59; p < .01\)). Finally, there were no response differences between Ss at any grade levels tested, with respect to questions of abstract degree.

In chart form, a summary of the above results appears below as Figure 1:
Finally, the review of results of primary analyses examines effects due to the order in which referents were mentioned within questions. ORDER IN WHICH REFERENTS WERE MENTIONED

Adkins and Ballif (1972) noted, in their study of children's responses to ambiguous questions, that many Ss gave answers simply by naming the last referent mentioned by the experimenter. For example, if a child were asked, "Which is happier, a cat or a dog?", he or she would tend to respond by saying "dog" more frequently than "cat," simply as a function of the referent "dog" being mentioned last by the experimenter.

This type of response is connected to another, similar type of response which is variously known as "yea saying" or "succumbing to an acquiescence-response set." In responses of this sort, Ss tend to go along with their perception of the experimenter's proposition, usually by saying "yes," when asked a question which could be answered either "yes" or "no." The results of the Mason and Johnson-Laird (1972) study discussed earlier are consistent with this picture inasmuch as they found that when testing a proposition, people preferentially search for instances which could confirm, rather than disconfirm, the proposition.

The current study sought, through mixing completely the order in
which referents are presented within questions, to control for these effects (going along with the last-mentioned referent and succumbing to an acquiescence-response set). For example, for every time that the question was asked, "Why are pans friendlier than pots?", it was also asked, "Why are pots friendlier than pans?".

In order fully to assess the impact of word order, several analyses were conducted. First, "Which Is" questions were examined for evidence of a tendency of Ss to go with the last-mentioned referent (or the first-mentioned one). Analysis of all 9 possible "Which Is" type questions (example: "Which is happier, chocolate or vanilla?") turned up but one significant result: There was an interaction between the order in which "milk" and "water" were asked in the question, "Which is bigger, milk or water?", and Ss' responses. That is, there was a tendency to go with the last referent mentioned (Fisher's Exact Test $p < .05$). All other interactions between word order and the responses of Ss proved to be non-significant.

Second, "Is" type questions were analyzed, with the intent of looking for a tendency to say "yes" when asked an ambiguous question. Thus, the total number of "yes" responses to each question of "Is" type (example: "Is inside louder than outside?") was compared with the aggregate number of "no" responses for that same question.

This analysis was conducted for each of the 9 possible "Is" type questions. Findings were that for 2 questions, there was an apparent acquiescence-response set in play. First, whether the question regarding "vanilla" and "chocolate" was phrased, "Is vanilla happier than chocolate?" or "Is chocolate happier than vanilla?", 22 of the 32 Ss who
received this question said "yes" in response. This number is significant at p < .05 via a binomial-probability test.

Second, whether the question regarding "inside" and "outside" was phrased, "Is inside louder than outside?" or "Is outside louder than inside?", 22 of the Ss receiving this question said "yes" in response. Similarly to the results immediately above, this value is significant at p < .05. Thus both of the significant results were in the direction expected from an acquiescence-response-set perspective. None of the other 7 "Is" type questions presented any significant results.

AGE DIFFERENCES IN RESPONSE TYPE

Having reviewed findings regarding phrasing of questions, the amount of abstractness imposed within questions, and the order in which referents were mentioned, we now turn to an examination of other interesting findings. Broadly, these findings deal with how various response types differ as a function of age.

There was a rich variety of different types of response observed among the various age groups tested. The classification and analysis of these responses was conducted, based in part upon similar groupings from previous research (e.g., Hughes & Grieve, 1980; Markman, 1977; Smith, 1983). However, a part of this analysis is also exploratory, and, particularly with respect to the classification, or grouping, of responses, which occurs later in this chapter, the qualitative delineations drawn between responses of different types are, in a sense, arbitrary.

Presented first are the analyses of three response types which were studied separately. They are: (1) Rejecting the question; (2) "Don't
know" responses; and (3) non-responses.

REJECTING THE QUESTION

It is important to consider first one crucial answer type: That of rejecting the question. As this entire study is concerned with age differences in response to questions of ambiguous type, no response is more of focal concern than the actual act of rejecting ambiguous questions as being unanswerable.

Rejecting responses were counted as such if, through them, Ss actually rejected the question as being ambiguous or unanswerable as it stood. (Example: "Why is above thicker than below?" "You cannot have above being 'thicker' than below. They do not differ that way. You cannot answer this question.")

The values below, given as Table 5, represent the number of Ss at each grade level who gave at least one rejecting (*) response.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Giving 1 or More (*) Responses</th>
<th>Not Giving 1 or More (*) Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>K:</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>4:</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>8:</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>12:</td>
<td>9</td>
<td>15</td>
</tr>
</tbody>
</table>

As can be seen, both columns of numbers are identical for 8th graders and 12th graders. Also, note that only 8.3% of kindergartners rejected ambiguous questions at any point, while only 20.8% of 4th
graders did, and 37.5% of both 8th and 12th graders did so. In fact, analysis revealed that both 8th and 12th graders gave significantly more rejecting (*) responses than kindergartners ($X^2 = 4.25; p < .05$).

Analysis of the second-largest difference (between Ss at grades 4 and 8/12) revealed no significant differences.

"DON'T KNOW" RESPONSES (COMBINING "WHICH IS" AND "WHY IS" TYPE QUESTIONS)

The number of "Don't know" responses was analyzed. Table 6 shows the numbers for Ss who gave responses of "Don't know" type, vs. those who did not, at each grade level:

<table>
<thead>
<tr>
<th></th>
<th>&quot;Don't Know&quot; Responses</th>
<th>All Other Response Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>K:</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>4:</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>8:</td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>12:</td>
<td>0</td>
<td>24</td>
</tr>
</tbody>
</table>

As can be seen, there is a steady decrease in the number of "Don't know" responses with increasing age, as percentages range from 50.0% for kindergartners, to 0.0% for twelfth graders.

Three analyses yielded significant results: (1) The number of "Don't know" responses, combining across questions of both "Which Is" and "Why Is" type, was significantly lower at grade 12 than at the kindergarten level ($X^2 = 13.44; p < .01$); (2) The number of 12th graders giving "Don't know" responses, combining across these same two types of
question, was significantly lower than at 4th grade ($X^2 = 4.76; p < .05$).

Third, more kindergartners than eighth graders gave "Don't know" responses ($X^2 = 6.21, p < .02$).

**NUMBER OF NON-RESPONSES**

A response is classified as a "non response" if the S is asked a question and fails to make any sort of response at all. Note that an analysis of this type is different from that conducted and reported previously, under "Attempts to Respond," because whereas several types of response, including some actual verbal utterances, were included in the analysis of "Attempts to Respond," only the singular response of "no response" was being inspected here.

Table 7, below, gives numbers of Ss from each grade; those giving non-responses in the left-hand column, and those giving responses in the right-hand column.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Non-Responses</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>23</td>
</tr>
</tbody>
</table>

As can be seen, in no case were there very many non-responses. In fact, no analyses proved to be significant.
ANALYSIS OF RESPONSES GROUPED INTO LEVELS

Responses were grouped into 5 qualitatively-different levels, beginning with Level 1, which was the most-primitive type of response, and continuing through to Level 5, which was the most-mature type of response. These classifications represent an attempt by the current investigator to order hierarchically responses which were seen as qualitatively distinct. All "levels" discussed below are of the current researcher's own construction but were created in the interest of ascertaining whether or not Ss would tend, with increasing age, to respond to ambiguous-type questions at higher levels.

The lowest level, Level 1, contained all "non-responses." That is, for any subject who failed to give a response of any type, his or her response was given a "no response" rating, and categorized in Level 1. This was seen as the most-primitive type of response because in it, subjects appeared to be completely overcome by the ambiguous nature of the question. It was decided that any response at all would be more mature than no response.

The next-lowest level, Level 2, included all responses in which one of the two referents mentioned was given as an answer (example: "Which is bigger, milk or water?" "Water."), or a question was answered either "yes" or "no" (example: "Is chocolate happier than vanilla?" "Yes."), or a response of "don't know" was given to a question, or finally a tautological response was given (example: "Why is a circle heavier than a square?" "Because it is."). It was felt that in each of these instances, while Ss did give a response to the question, they did little else of substance. In none of these answers was there any hint of
suspicion that the question might be ambiguous or in some sense unanswerable. But this type of response was seen as being more advanced than no response at all, because it indicated that the subject was not so completely overwhelmed by the question that he could not even formulate a response.

Level 3 included all responses in which subjects either commented on the unusual nature of the question (example: "This is a different sort of question."), or said that they didn't understand what the question meant. It was at this level that subjects visibly recognized, for the first time, the ambiguous nature of questions. This one change in response separates subjects at this level from those responding at Level 2, for at Level 2, subjects gave no indication that they were aware of the ambiguous nature of the question presented.

Level 4 responses were categorized as all those in which subjects questioned whether they were supposed to answer, changed the question's original comparison term in their answer (example: "Why is milk bigger than water?" "It's thicker."), or logically imported context of their own invention into the question (example: "Why is a car warmer than a boat?" "Because cars have heaters and boats don't."). Responses at this level, then, were viewed as being more advanced than those of Level 3 because at this level, subjects were putting some distance between themselves and the question, or trying to mold the question, through their answer, so that it was then unambiguous. Contrast answers of this type with those of the Level 3 variety, in which subjects merely commented on the ambiguous nature of the question, without somehow manipulating it to strip it of seeming ambiguity.
Finally, responses were classified at Level 5 if through them subjects actually rejected the question as being ambiguous or unanswerable as it stood (example: "Which is happier, chocolate or vanilla?" "Neither is happier than the other. You can't answer this. This question makes no sense."). This response type was deemed the best possible, since in fact the only truly correct response to give, in the face of an ambiguous question, is one which rejects it out of hand or asks for more information.

Thus, to recap, Figure 2 presents levels of response, and responses contained within each of those levels, respectively.

Level 1: no response (abbreviated NR)
Level 2: first referent (1), second referent (2), yes (+), no (-), don't know (D), tautological response (T)
Level 3: comment on nature of question (C), admit to not understanding (U)
Level 4: changing the comparison term used originally in the question (CH), questioning whether supposed to answer (Q), logically importing context or imputing information (IC)
Level 5: rejecting the question as being unanswerable (*)

Figure 2
Response Types Contained Within Each Level
Level One Responses: "Non-Response"

The analysis of Level One responses was presented earlier in this chapter. See the section entitled "Number of Non Responses."

Level Two Responses

Age-wise analysis of Level Two responses (including mentioning either of the referents presented, saying "yes" or "no," saying "don't know," and giving some sort of tautological response) revealed no significant differences. However, note that an age-wise analysis of the number of "Don't know" responses, reported separately in a previous section of this chapter, indicated that significantly more responses of kindergartners, fourth graders, and eighth graders, were of the "Don't know" variety than of twelfth graders.

Level Three Responses ("Why Is" Type Only)

For questions of the "Why Is" type (example: "Why is corn funnier than peas?") an interesting age-wise comparison was made on the criterion of "Number of Level-Three Responses." Included in this comparison, as noted above, were responses which either commented on the unusual nature of the question (C), or which allowed that the subject did not understand the question (U). Table 8 shows values for all four grade levels; the left-hand column tallies all Level Three responses together, while the right-hand column gives the number of all other types of response.
Table 8

<table>
<thead>
<tr>
<th>Level Three Responses</th>
<th>Not Level Three Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>K: 1</td>
<td>23</td>
</tr>
<tr>
<td>4: 0</td>
<td>24</td>
</tr>
<tr>
<td>B: 1</td>
<td>23</td>
</tr>
<tr>
<td>12: 0</td>
<td>24</td>
</tr>
</tbody>
</table>

Analysis of differences between grade levels yielded no significant results, so analysis for this section was terminated.

Number of Level Four (Logical) Responses

Consider the phenomenon of responses which are logical. In this regard, the major question is whether children tend to increase the amount of logic, arguably a relatively-high-order response type, as they grow older. In the above-presented scoring system, responses classifiable as being of logical type are at Level 4, and include changing the comparison term used originally in the question (CH), questioning whether supposed to answer the question (Q), and logically imparting context or imputing information (IC). At this level of response, Ss still answer the question, rather than reject it. But responses at this level were the second-best possible, as a group. [Please note that for purposes of the current analysis, responses classified as "rejecting the question" (*) were deleted, since an analysis of age changes on this specific type of response was conducted separately and was presented previously in this chapter].
Table 9, below, presents all totals for responses of logical type (broken down by question type) and of non-logical type (broken down by question type, and excluding (#) responses):

<table>
<thead>
<tr>
<th></th>
<th>Ss With Logical Responses</th>
<th>Ss With Non-Logical Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Which Is</td>
<td>Why Is</td>
</tr>
<tr>
<td>K:</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>4:</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>8:</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>12:</td>
<td>2</td>
<td>20</td>
</tr>
</tbody>
</table>

First, for "Which Is" type questions (example: "Which is friendlier, pots or pans?")), the largest difference (namely, between kindergarten and fourth, eighth, and twelfth grades) was tested, and found to be not significant.

For "Why Is" type questions (example: "Why is above thicker than below?")), significant differences were found for the following: (1) More responses of 8th graders than kindergartners were of logical type ($\chi^2 = 4.36; p < .05$); and (2) More responses were logical at the 12th-grade level than at the kindergarten level ($\chi^2 = 5.83; p < .02$).

Third, for "Is" type questions (example: "Is before fatter than after?")), the largest difference, namely, between kindergarten and 4th grade, was tested and found to be not significant. This implies that
there were no significant differences between grade levels with respect
to the number of responses given, to "Is" type questions, which were of
logical type.

Level Five Responses: Rejecting the Question

Results of analysis of Level Five responses were reported previously
in this chapter. See the section entitled "Rejecting the Question."

One final set of analyses brings to a close the presentation of
results of comparisons from the current study. One group of post-hoc
comparisons was stimulated by the observation that Ss frequently, but not
always, tended to answer with a "preferred referent." For example, with
regard to the "Which Is" type question involving "milk" and "water," 14
more Ss answered "milk" than "water," and this difference deviates from
random expectancies at \( p < .05 \).

Post Hoc Comparisons

Thus, an exploratory comparison was conducted, within both "Which
Is" and "Is" type questions, on the preferences which Ss had, for one or
the other of the referents used in each of these questions. In other
words, this analysis sought to determine whether, for example, Ss
answered the "Which is bigger, milk or water?" question by responding
with "water" more often than "milk."

Tables 10 and 11, below, present first all nine referent pairs, then
the difference in number of responses favoring one referent over the
other, and finally the direction and significance of the observed
preference. Thus, as the first line of Table 10 shows, 14 more Ss said
"milk" than "water," and that difference was significant, via a binomial
test, at \( p < .05 \).
Table 10
Number of Responses Favoring One Referent Over Another: "Which Is" Q's

<table>
<thead>
<tr>
<th>Referent Pairs</th>
<th>Difference</th>
<th>Favoring</th>
<th>Sig.?</th>
</tr>
</thead>
<tbody>
<tr>
<td>milk/water</td>
<td>14</td>
<td>milk</td>
<td>Yes: .05</td>
</tr>
<tr>
<td>chocolate/vanilla</td>
<td>4</td>
<td>chocolate</td>
<td>No.</td>
</tr>
<tr>
<td>outside/inside</td>
<td>23</td>
<td>outside</td>
<td>Yes: .01</td>
</tr>
<tr>
<td>circle/square</td>
<td>19</td>
<td>square</td>
<td>Yes: .01</td>
</tr>
<tr>
<td>corn/peas</td>
<td>18</td>
<td>peas</td>
<td>Yes: .01</td>
</tr>
<tr>
<td>below/above</td>
<td>13</td>
<td>below</td>
<td>Yes: .05</td>
</tr>
<tr>
<td>boat/car</td>
<td>27</td>
<td>car</td>
<td>Yes: .01</td>
</tr>
<tr>
<td>pots/pans</td>
<td>5</td>
<td>pans</td>
<td>No.</td>
</tr>
<tr>
<td>before/after</td>
<td>8</td>
<td>after</td>
<td>No.</td>
</tr>
</tbody>
</table>

Table 11
Number of Responses Favoring One Referent Over Another: "Is" Questions

<table>
<thead>
<tr>
<th>Referent Pairs</th>
<th>Difference</th>
<th>Favoring</th>
<th>Sig.?</th>
</tr>
</thead>
<tbody>
<tr>
<td>milk/water</td>
<td>10</td>
<td>milk</td>
<td>No.</td>
</tr>
<tr>
<td>chocolate/vanilla</td>
<td>1</td>
<td>chocolate</td>
<td>No.</td>
</tr>
<tr>
<td>outside/inside</td>
<td>0</td>
<td>(neither)</td>
<td>No.</td>
</tr>
<tr>
<td>circle/square</td>
<td>15</td>
<td>square</td>
<td>Yes: .05</td>
</tr>
<tr>
<td>corn/peas</td>
<td>13</td>
<td>peas</td>
<td>Yes: .05</td>
</tr>
<tr>
<td>below/above</td>
<td>10</td>
<td>below</td>
<td>No.</td>
</tr>
<tr>
<td>boat/car</td>
<td>24</td>
<td>car</td>
<td>Yes: .01</td>
</tr>
<tr>
<td>pots/pans</td>
<td>2</td>
<td>pots</td>
<td>No.</td>
</tr>
<tr>
<td>before/after</td>
<td>8</td>
<td>before</td>
<td>No.</td>
</tr>
</tbody>
</table>
It is crucial at this juncture to note that for "Is" type questions, the answers given credit as belonging to "milk," for example, were all "yes" responses to "Is milk bigger than water?" plus all "no" responses to "Is water bigger than milk?". This makes an implicit assumption that when a S said "no" to the question "Is water bigger than milk?", he or she meant to say that milk was bigger than water. While this is not necessarily true from a logical standpoint, the assumption was made for two reasons: (1) That the majority of "no" responses, upon follow-up questioning, revealed precisely the sort of assumption that is being made here; and (2) as this is admittedly an exploratory analysis, it was felt that for such purposes it was permissible in order to try to quantify seemingly unwieldy data in this area.

The data presented in Tables 10 and 11, above, are regrouped and presented in slightly different form below (see Table 12); i.e., with respect to degree of abstractness imposed within questions. Note, for example, that as the referent pair of "milk/water" is of physical variety (see Chapter III for complete classification of all base questions), results pertaining to its analysis are under the left-hand column with those of all other physical-type questions. The rationale for grouping these results in the below manner is itself exploratory, and will be pursued further in Chapter V. For the moment, note that numbers presented in Table 12 represent significance levels for the analyses conducted and reported above, for all 9 questions, and for both "Which Is" and "Is" type. Also, note that "WI" stands for "Which Is" type questions, "IS" stands for "Is" type questions, and "n.s." stands for "not significant."
Table 12

Results Grouped by Degree of Abstraction Imposed

<table>
<thead>
<tr>
<th>Physical</th>
<th>Physiognomic</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>WI</td>
<td>IS</td>
<td>WI</td>
</tr>
<tr>
<td>milk .05</td>
<td>n.s.</td>
<td>chocolate n.s.</td>
</tr>
<tr>
<td>circle .01</td>
<td>.05</td>
<td>corn .01</td>
</tr>
<tr>
<td>boat .01</td>
<td>.01</td>
<td>pots n.s.</td>
</tr>
<tr>
<td>outside .01</td>
<td>n.s.</td>
<td>above .05</td>
</tr>
<tr>
<td>before n.s.</td>
<td>n.s.</td>
<td>before n.s.</td>
</tr>
</tbody>
</table>

Note from Table 12 (above) that, whereas only one of the Physical comparisons was non-significant, fully four comparisons for both the Physiognomic and Abstract varieties were non-significant. Thus, the greatest tendency of Ss to answer with a "preferred" referent, for whatever reason, was within questions of Physical nature, with only 1 non-significant difference in evidence.

OTHER EFFECTS (DUE TO SEX DIFFERENCES AND VERBAL ABILITY)

Throughout the entire data analysis, no sex differences were reported. That is, there were no significant effects obtained when examining male vs. female performance, collapsed across grades but staying within each of the 3 question types ("Which Is," "Why Is," and "Is") or collapsed across grades but within the three degrees of abstraction (physical vs. physiognomic vs. abstract). Thus, the sexes were not dissimilar on any evaluated criteria.

Finally, with respect to effects on responses to the current ambiguous questions, attributable to verbal ability, there were no apparent differences among Ss tested in the current study.
CHAPTER V
GENERAL DISCUSSION

The current investigation conducted analyses which were concerned primarily with examining age changes in responses to questions of ambiguous type. Of particular interest were three areas: (1) Phrasing of questions; (2) degree of abstractness imposed within questions; and (3) the order in which referents are mentioned within questions. Additionally, the current study conducted a qualitative analysis of the types of response which children gave to ambiguous questions. The results of these analyses, taken as a group, suggest that there are indeed developmental differences in both the types of response which children give to ambiguous questions, and their abilities to reject ambiguity as being either incomplete or without meaning. These findings in general support those of other studies cited in the review (Hughes & Grieve, 1980; Ackerman, 1981; Bearison & Levey, 1977; Asher, 1976).

Discussion relating to findings in the areas of interest noted above will follow in the same order as findings were presented in Chapter IV.

PHRASING OF QUESTIONS

The data analysis revealed that the way in which questions were posed to Ss in the current study did affect their responses in a variety of areas.
Attempts to Answer Questions

First, there were developmental changes in the capability of children to answer questions at all. All significant differences implied that younger-age children have more difficulty in responding to these questions than older children. For example, it was found variously that kindergartners perform worse than 8th graders, and that they perform poorly when compared with 12th graders. A possible explanation for this is that the younger children, as compared with the older age groups studied, lacked the social experience, as Ironsmith and Whitehurst (1978) would argue, in which they see adults questioning the adequacy of another’s communication. Thus, in absence of this experience, and confronted with these highly-unusual questions, they simply had no choice but to refrain from responding in any fashion.

The current study also found the greatest difficulty, in attempting to respond, coming with questions of "Why Is" type (example: "Why is a boat warmer than a car?"). That is, fewer responses, both overall and within age groups, were made to these "Why Is" type questions, vs. questions of "Which Is" and "Is" type. This finding ties in with a priori expectations that the "Which Is" type, by virtue of its offering a choice for response, would encourage Ss to respond without hesitation. And only slightly more obtrusive to Ss were predicted to be questions of "Is" type, since they allowed Ss a "way out," in that Ss could say "no" to any question of "Is" form. However, the "Why Is" type questions may have forced fewer overall attempts at answering because they more obviously presuppose false or incomplete assumptions. This line of reasoning receives support from Smith’s (1983) research, which indicated
that while Ss would reject incongruous questions (such as showing a picture of a dog, and asking, "Why is this a boy"), those same Ss would fail, as a group, to question or reject questions such as "Which is bigger, milk or water?"

**DEGREE OF ABSTRACTNESS IMPOSED WITHIN QUESTIONS**

As mentioned before, questions presented to Ss in the current study were imbued with 3 different levels of abstractness. These levels derive both from Wernerian theory and from a logical extension of that theory. Levels were: (1) **Physical** types of question, in which the comparison term is of a physical dimension (such as weight, thickness, or volume), and the referents are tangible entities (such as milk, cars, and boats) (example: "Which is bigger, milk or water"?); (2) **Physiognomic** types of question, in which the comparison word is an emotive dimension (e.g., happy, funny, or friendly), and referents are concrete objects (for example, chocolate, corn, and pans) (example: "Which is funnier, corn or peas?"); and (3) **Abstract**, in which the comparison term is of a concrete dimension (e.g., loudness, thickness, or fatness), and referents are abstract entities (for instance, outside vs. inside, or below vs. above) (example: "Which is thicker, above or below?").

Analyses were conducted in order to ascertain how much of a burden, relative to the other two levels, each level of abstractness was placing upon Ss in the various grades. The criteria employed in this connection were "attempts to answer the question." The same requisites for responses to be scored as "attempting to answer the question" applied as before.

As found with analysis by question type (i.e., "Which Is" vs. "Why
Is" vs. "Is" type questions), 12th graders were the least taken aback by the questions, overall. Furthermore, kindergartners were, as a group, the most hesitant to respond. That there were such well-defined differences between Ss with regard to attempts to answer physiognomic-type questions, and that all differences were in the direction of increasing attempts with increasing age, are right in line with expectations from the standpoint of Wernerian theory.

Recall that Werner (1978) theorizes two ways of perceiving: First, an original, more-primitive physiognomic one and, second, an advanced one which is conceptual-objective-technical. And, he states that "... the physiognomic aspect of a word can be shown to be more primary than its conceptual meaning because when a word is presented tachistoscopically, the physiognomic aspect becomes perceptible to the subject earlier than does the meaning of the word itself ... " (p. 151).

Thus, the observed positive relationship between age and attempts to answer questions of physiognomic type meshes well with Wernerian postulations. That is, it would be expected, given the relatively-primordial nature of physiognomic perception, that younger children would be the most baffled, or dazzled, by questions involving this type of "suffusion of percepts with an emotional, affective, or expressive quality" (Schlesinger, 1979, p. 107). Furthermore, with increasing age, the power of primal orders of perception to inhibit an understanding response should dissipate.

Still, other results of this section fail to confirm the legitimacy of the Wernerian position. First, there were no age differences regarding attempts to respond to questions of abstract type. Yet
Wernerian theory would seem to predict increasing communicative competence with questions of abstract nature, with increasing age. The fact that not even differences between the oldest and youngest Ss in the current study (namely, 12th graders and kindergartners) were significant is surprising in this light. Second, it does not stand to reason that the only significant difference for questions of physical degree was between fourth graders and kindergartners. Werner postulates an increasing competence, with increasing age, at general verbal communication. Thus, one would expect that if fourth graders were better than kindergartners at mustering responses to questions of physical type, then certainly eighth graders and twelfth graders would be as well. Again, results failed to confirm this inference as legitimate.

ORDER IN WHICH REFERENTS ARE MENTIONED

The current study sought, through mixing completely the order in which referents were presented within questions (e.g., asking both "Which is heavier, a circle or a square?" and "Which is heavier, a square or a circle?") to control for the effects of Ss' either going along with the last-mentioned referent or succumbing to an acquiescence-response set.

Analysis of results in this area yielded no consistent pattern, as only 3 questions out of 18 possible (9 questions each for "Is" and "Which Is" type questions), proved to contain an inherent response bias (see results, Chapter IV). However, it is unjustified, from a statistical standpoint, to dismiss these 3 biases as being random in origin. That is, one cannot say that it is probable that one sixth of all questions will yield a response bias purely by chance, since alpha for all results in this area was < .05, or roughly 1 case in 20 expectable by chance.
This observation, then, piqued the curiosity of the current researcher, and was the impetus for an exploratory, post-hoc-type analysis. Specifically, the observation was made that Ss frequently, albeit not always, tended to answer with a "preferred referent." For example, with regard to the "Which Is" type question involving "milk" and "water," 14 more Ss answered with "milk" than "water," regardless of the order in which the two referents were mentioned. This differs from expectations based upon chance at alpha < .05.

Thus, an exploratory comparison was conducted, within both "Which Is" and "Is" type questions, on the preferences which Ss had, for one or the other of the two referents used in each of these questions. In other words, this analysis sought to determine whether, for example, Ss answered the "Which is bigger, milk or water?" question by responding with "water" more often than "milk," regardless of relative juxtaposition of referents within the question.

It was found, by grouping questions in the physical, physiognomic, or abstract categories to which they belonged, that the following results pertained: (1) Within physical-type questions, all 3 possible "Which Is" questions contained significant referent preferences, as well as 2 of the 3 possible "Is" type questions; (2) within the physiognomic question type, only 1 of 3 possible "Which Is" questions displayed a preference, and similarly for 1 of 3 "Is" questions; and (3) within the abstract-type group of questions, 2 of the 3 possible "Which Is" questions proved to have significant preferences for one referent over another, but none of the 3 "Is" type questions did.
Thus, for whatever reason, Ss displayed a marked preference for one referent or another in 5 of 6 physical-type questions, but for only 2 of the 6 in each of physiognomic and abstract questions.

The explanation tendered by the current investigator centers again upon a Wernerian precept: That physical, tangible objects are easier to deal with and, in this relation, to form a marked preference for, than are abstract or intangible entities. Still, within a completely-analytical arena, there is no reason for preferences such as those chosen by Ss, such as "below being thicker than above." That is, there is no reason for such preferences unless some context from the Ss' experience is brought in to the question. For example, objectively speaking, peas are not "funnier" than corn, and yet Ss said they were, at p < .01.

REJECTING THE QUESTION

"Rejecting" responses were classified as top-level responses to ambiguous questions of the type presented in the current study (Level 5 responses). That is, it was felt that the most proper or most appropriate action to take, when given an ambiguous question, is to reject it as containing incomplete information or misapplied references of some nature. Analysis of results in this area revealed that significantly more 8th and 12th graders rejected the question than kindergartners. These results suggest that there are developmental differences in the ability of younger versus older children to question the question--i.e., to recognize an ambiguous message as being ambiguous, and to respond appropriately. This finding supports much of the literature cited in the review (Chapter II) in this area.
Perhaps, then, by using an idea first proposed by Robinson and Robinson (1977), one can posit that older children have come to "recognize that communication failure can be caused by inadequate messages" and thus have "begun to analyze the properties of the message [presented]."

Both Piaget and the social-learning school support Robinson and Robinson's position. By the time children reach 8th or 12th grade, two significant, relevant developmental changes nearly universally have occurred. First, children have reached adolescence, with the attending capacity, in Piaget's theory, for formal operations (including abstract-reasoning capabilities, particularly). By the time they reach formal operations, children have attained a nearly-adultlike capacity for using words as tools—symbols to represent abstract concepts.

Second, along the developmental road to achieving this level of verbal sophistication, they have been in enough situations calling for dialogue with adults to realize this nearly-equal capacity. It is reasonable, then, that they would be quicker to question an adult questioner, or to reject his or her questions as being meaningless, than would a younger subject who is still "learning the ropes" of verbal discourse.

NUMBER OF NON-RESPONSES

The current research found no significant differences between the 4 grade levels surveyed. However, in all four age groups, at least 1 subject did fail to respond. In this light, to the best knowledge of the current researcher, this study is alone in reporting any incidence of
non-responding. Part of the reason for this phenomenon may be due to the fact that few of the reviewed studies (see Chapter II) dealt with children as young as kindergarten, or as old as 12th grade. But the fact that at least one person at each grade level, including 12th grade, gave a non-response, is virtually without explanation.

"DON'T KNOW" RESPONSES (COMBINING "WHICH IS" AND "WHY IS" TYPE QUESTIONS)

Results of analyses in this area showed that 12th graders said "Don't know" in response to questions significantly less often than either kindergartners or 4th graders. Also, fewer 8th graders than kindergartners gave responses of this type. Findings in this direction were anticipated by the current researcher for two reasons. First, a "don't know" response was classified earlier as a lower-level (Level 2) response; it would thus be expected that there would be an age-wise decrease, at some point, in the number of "don't know" responses given. Second, and largely due to socialization factors inherent in most American public school systems, children eventually learn that a response of "Don't know" is not a preferred response, even when the child does not, in point of fact, know the answer. Thus, it is possible that even when 12th graders may have recognized that they did not know the answer to these questions, they may have attempted some response alternative to "don't know," due to some previous experience in the schools.

It seems that the second reason given accounts best for what appears to be a steady drop from kindergarten, to 4th grade, then 8th grade, and finally to 12th grade. In fact, reasoning from a perspective implied in the second reason, one would expect a smooth decrease from grade to grade.
NUMBER OF LEVEL-THREE RESPONSES ("WHY IS" TYPE ONLY)

Analysis of the number of Level Three responses (including commenting on the unusual nature of questions, or allowing that the S did not understand the question) yielded no significant agewise differences. This finding was not anticipated, on the basis of Wernerian theory. It states in general that as a child grows older, he or she begins to both impose more structure on the environment and to increase distance between the self and the environment. It stands to reason that one likely, pertinent offshoot of such activities would be that the older child either would comment on unusual questions (such as the current ambiguous items), or actually claim incomplete understanding of what is meant by questions. But in fact, this is not what happened at all.

NUMBER OF LOGICAL VS. NOT-LOGICAL RESPONSES

Regarding responses which were logical in nature, the major question asked in the current study was whether children tend to increase the amount of logic they employ in responding as they grow older. Results showed that significantly more 8th and 12th graders gave responses of the logical type for "Why Is" type questions than did kindergartners.

Note, first, in regard to these results, that the "Which Is" and "Is" types of question do not allow easily for importation of context or logical answers of any form. That is, the valence, or illocutionary pressure, brought to bear when an "Is" question is asked, dictates basically that it be answered either "yes" or "no" (example: "Is corn funnier than peas?" "No."). Similarly, the illocutionary force brought on by questions of "Which Is" type (example: "Which is thicker, above or below?") is such that the expected answer is one in which the respondent
chooses one of the proffered referents. Contrast expected answers to questions of both of these types against those expected by questions of "Why Is" type (example: "Why is inside louder than outside?"). It is with questions of this "Why Is" variety, finally, that one would expect some justification for the presented proposition, on the Ss' part, by means of explanation. And, when explanation is present the way in which arguments for the proposition are given will show developmental differences.

The results which showed Ss at both eighth and twelfth grades performed better than kindergartners comprise further support for the findings of previous studies (e.g., Hughes & Grieve, 1980; Smith, 1983) that older children do tend to impute more logic in their answers to questions of this sort than do younger children. Thus, the current study provides support for previously-observed age changes. However, insofar as there were no differences between 12th graders and 8th graders, or between 12th graders and 4th graders, the current work fails to delineate a fine-tuned agewise expansion of previous research. It was found that 12th graders do not respond with significantly-increased logic over that of 8th or 4th graders and this was contrary to results anticipated prior to the beginning of this study.

GENERAL CONCLUSIONS

In sum, the current research has found that children of all ages surveyed (kindergarten and fourth, eighth and twelfth grades) do tend to respond unquestioningly to questions of ambiguous type. Still, there are agewise differences in the quality of responses which typify their respective grades. The tendency for kindergartners, and to a lesser
extent, fourth graders, is either to be overwhelmed by the question, or to present a relatively-immature, primitive response. Conversely, eighth graders and twelfth graders tend not to be overcome by questions of ambiguous type, are more likely to reject them out of hand than are younger-age children, and tend to import logical context in providing their responses.

Results such as these fit well with theories put forth by Werner and Piaget; theories which typically predict increasing verbal competence, and increased mental distance from the situation imposed by ambiguous questions, or other referential forms of communication, with age.

Although frequently criticized as being too broad or vague to be of much use, Werner's general Orthogenetic Principle applies in this context. That is, as children grow and mature, they become more able to take an active role in cognition, because their increasing awareness of their own expanding cognitive capabilities allows them to do so. It follows logically, then, that children will develop the ability to monitor and evaluate their own cognitive awareness--i.e., to achieve greater realization of what it is that they understand and do not understand, regarding attempted communication.

Piaget's theory, as alluded to briefly earlier, has the most to contribute to explanation of the current results in its ideas regarding expanded cognitive (and verbal) capacities with the gradual appearance of formal-operational capabilities. It is at this stage of cognitive development that the child makes the transition from true childlike modes of cognition to nearly-adultlike methods. In this light, it is not at all surprising that most of the differences found in the current study
were between members of the older (8th and 12th grades) versus younger (kindergarten and fourth grade) age groups, rather than within these two age groups. For it is typically between fourth grade and eighth grade that the onset of formal-operational capabilities takes place, in Piagetian thinking.

With respect to the significance of the current research, and in conclusion, one may quote Hughes and Grieve's (1980) cogent point: "Psychologists and linguists—and all others who rely on questioning...children—can no longer treat the child as merely a passive recipient of questions and instructions, but must instead start to view the child as someone who is actively trying to make sense of the situation he is in—however bizarre it may seem."
Regarding future study in this area, there are three major points:

(1) It would be useful to take videotaped recordings of interactions between Ss and the experimenter. Observed at the time, but lost forever, are the precious facial expressions of children as they reacted to these ambiguous questions. It would be best to have the video camera surreptitiously placed, so that Ss would not be disturbed by its presence. It would, however, be necessary to inform all Ss in advance that they would be videotaped and that all recordings would be held in strictest confidence and used for research purposes only.

It is difficult to foresee what benefits would result from such efforts, but perhaps future research could find agewise differences with regard to facial expressions, even as the current research has found qualitative differences regarding verbal response type. In any event, it is likely that videotaping the subject-experimenter interaction would add a new dimension to future studies of this sort.

(2) There is a need for more work on the question of whether Werner's idea of physiognomic perception is testable by such means as the current study. No differences were found by this researcher, which were attributable to physical vs. physiognomic vs. abstract types of question, even though Werner's criteria for physiognomic perception were followed
closely. Perhaps results which would either lend support to, or
discredit, Wernerian thinking in this area, are unattainable by the
current methods of investigation. For this reason, it might behoove a
future researcher to examine physiognomic perception from a different
perspective than that attempted here.

(3) This study was itself, in ways, an agewise expansion on previous
research involving ambiguous questions of this type and differences were
noted. It would hence be interesting to expand this research to even
older age groups, to see whether or not young adults or even older
persons respond in the same fashion as the 12th graders surveyed in the
current study. Finally, although this would really be testing Ss from
the youngest ages possible, it would be interesting to try and test 2- or
3-year-olds to look for developmental trends in the other direction—
i.e., trends among children even younger than the kindergartners used in
the current study.
### APPENDIX A

**Table 13**

Matrix of Coded Numbers Used in Assignment of Questions to Question Sets

<table>
<thead>
<tr>
<th>Question Type</th>
<th>Base Questions 1 - 3</th>
<th>Base Questions 4 - 6</th>
<th>Base Questions 7 - 9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHYSICAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referents in</td>
<td>1 19 37</td>
<td>2 20 38</td>
<td>3 21 39</td>
</tr>
<tr>
<td>original order</td>
<td>4 22 40</td>
<td>5 23 41</td>
<td>6 24 42</td>
</tr>
<tr>
<td><strong>PHYSIOGNOMIC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referents in</td>
<td>7 25 43</td>
<td>8 26 44</td>
<td>9 27 45</td>
</tr>
<tr>
<td>original order</td>
<td>10 28 46</td>
<td>11 29 47</td>
<td>12 30 48</td>
</tr>
<tr>
<td><strong>ABSTRACT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referents in</td>
<td>13 31 49</td>
<td>14 32 50</td>
<td>15 33 51</td>
</tr>
<tr>
<td>original order</td>
<td>16 34 52</td>
<td>17 35 53</td>
<td>18 36 54</td>
</tr>
<tr>
<td>switched</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

1. Which is bigger, milk or water?
2. Why is milk bigger than water?
3. Is milk bigger than water?
4. Which is bigger, water or milk?
5. Why is water bigger than milk?
6. Is water bigger than milk?
7. Which is happier, chocolate or vanilla?
8. Why is chocolate happier than vanilla?
9. Is chocolate happier than vanilla?
10. Which is happier, vanilla or chocolate?
11. Why is vanilla happier than chocolate?
12. Is vanilla happier than chocolate?
13. Which is louder, inside or outside?
14. Why is inside louder than outside?
15. Is inside louder than outside?
16. Which is louder, outside or inside?
17. Why is outside louder than inside?
18. Is outside louder than inside?
19. Which is heavier, a circle or a square?
20. Why is a circle heavier than a square?
21. Is a circle heavier than a square?
22. Which is heavier, a square or a circle?
23. Why is a square heavier than a circle?
24. Is a square heavier than a circle?
APPENDIX B (continued)

25. Which is funnier, corn or peas?
26. Why is corn funnier than peas?
27. Is corn funnier than peas?
28. Which is funnier, peas or corn?
29. Why are peas funnier than corn?
30. Are peas funnier than corn?
31. Which is thicker, above or below?
32. Why is above thicker than below?
33. Is above thicker than below?
34. Which is thicker, below or above?
35. Why is below thicker than above?
36. Is below thicker than above?
37. Which is warmer, a boat or a car?
38. Why is a boat warmer than a car?
39. Is a boat warmer than a car?
40. Which is warmer, a car or a boat?
41. Why is a car warmer than a boat?
42. Is a car warmer than a boat?
43. Which is friendlier, pots or pans?
44. Why are pots friendlier than pans?
45. Are pots friendlier than pans?
46. Which is friendlier, pans or pots?
47. Why are pans friendlier than pots?
48. Are pans friendlier than pots?
49. Which is fatter, before or after?
50. Why is before fatter than after?
51. Is before fatter than after?
52. Which is fatter, after or before?
53. Why is after fatter than before?
54. Is after fatter than before?

Figure 3

Questions Corresponding to Numbers Given for Questions in Appendix A
APPENDIX C

Table 14

Significant Chi Square Analyses Performed, and Actual Data Used:

Number of 8th versus 12th graders attempting responses to "Which Is" Q's:

<table>
<thead>
<tr>
<th>Attempting</th>
<th>Not Attempting</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th</td>
<td>17</td>
</tr>
<tr>
<td>12th</td>
<td>24</td>
</tr>
</tbody>
</table>

\[ X^2 = 6.02; p < .02 \]

Number of 8th versus kindergartners attempting responses to "Why Is" Q's:

<table>
<thead>
<tr>
<th>Attempting</th>
<th>Not Attempting</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th</td>
<td>11</td>
</tr>
<tr>
<td>K</td>
<td>3</td>
</tr>
</tbody>
</table>

\[ X^2 = 4.94; p < .05 \]

Number of kindergartners vs. 12th attempting responses to "Why Is" Q's:

<table>
<thead>
<tr>
<th>Attempting</th>
<th>Not Attempting</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>3</td>
</tr>
<tr>
<td>12th</td>
<td>13</td>
</tr>
</tbody>
</table>

\[ X^2 = 7.59; p < .01 \]

Number of kindergartners vs. 4th attempting to answer Physiognomic Q's:

<table>
<thead>
<tr>
<th>Attempting</th>
<th>Not Attempting</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>11</td>
</tr>
<tr>
<td>4th</td>
<td>20</td>
</tr>
</tbody>
</table>

\[ X^2 = 5.83; p < .02 \]
APPENDIX C (continued)

Number of kindergartners vs. 8th attempting to answer Physiognomic Q's:

<table>
<thead>
<tr>
<th></th>
<th>attempting</th>
<th>not attempting</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>8th</td>
<td>18</td>
<td>6</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 4.20; \ p < .05 \]

Number of 12th vs. kindergartners attempting to answer Physiognomic Q's:

<table>
<thead>
<tr>
<th></th>
<th>attempting</th>
<th>not attempting</th>
</tr>
</thead>
<tbody>
<tr>
<td>12th</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>K</td>
<td>10</td>
<td>14</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 9.11; \ p < .01 \]

Number of 12th versus 4th attempting to respond to Physiognomic Q's:

<table>
<thead>
<tr>
<th></th>
<th>attempting</th>
<th>not attempting</th>
</tr>
</thead>
<tbody>
<tr>
<td>12th</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>4th</td>
<td>11</td>
<td>13</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 7.59; \ p < .01 \]

Number of responses Rejecting Questions, kindergartners vs. 8th and 12th:

<table>
<thead>
<tr>
<th></th>
<th>rejecting</th>
<th>not rejecting</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>8th and 12th</td>
<td>9</td>
<td>15</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 4.25; \ p < .05 \]
APPENDIX C (continued)

Number of 12th versus kindergartners giving "Don't know" responses:

<table>
<thead>
<tr>
<th></th>
<th>12th</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Don't know&quot;</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>not &quot;Don't know&quot;</td>
<td>24</td>
<td>12</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 13.44; \ p < .01 \]

Number of 12th versus 4th graders giving "Don't know" responses:

<table>
<thead>
<tr>
<th></th>
<th>12th</th>
<th>4th</th>
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</thead>
<tbody>
<tr>
<td>&quot;Don't know&quot;</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>not &quot;Don't know&quot;</td>
<td>24</td>
<td>18</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 4.76; \ p < .05 \]

Number of kindergartners vs. 8th graders giving "Don't know" responses:

<table>
<thead>
<tr>
<th></th>
<th>K</th>
<th>8th</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Don't know&quot;</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>not &quot;Don't know&quot;</td>
<td>12</td>
<td>21</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 6.21; \ p < .02 \]

Number of 8th vs. kindergartners giving Logical Responses ("Why Is" Q's):

<table>
<thead>
<tr>
<th></th>
<th>8th</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logical</td>
<td>19</td>
<td>11</td>
</tr>
<tr>
<td>not Logical</td>
<td>5</td>
<td>13</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 4.36; \ p < .05 \]
APPENDIX C (continued)

Number of 12th vs. kindergartners responding logically ("Why Is" Q's):

<table>
<thead>
<tr>
<th>Logical</th>
<th>not Logical</th>
</tr>
</thead>
<tbody>
<tr>
<td>12th</td>
<td>20</td>
</tr>
<tr>
<td>K</td>
<td>11</td>
</tr>
</tbody>
</table>

\[
\chi^2 = 5.83; \ p < .02
\]
BIBLIOGRAPHY


Ackerman, B. When is a question not answered—the understanding of young children of utterances violating or conforming to the rules of conversation. *Journal of Experimental Child Psychology*, 1981, 31, 487.


Asher, S. Children's ability to appraise their own and another person's communication performance. *Developmental Psychology*, 1976, 12, 24-32.


Beal, C. and Flavell, J. The effect of increasing the salience of message ambiguities on kindergartners' evaluations of communicative success and message adequacy. *Developmental Psychology*, in press.


Crocker, J. Biased questions in judgment of covariation studies. 

Dickson, W. An instructional device for teaching verbal skills through 
structured interactions between children in a communication game. 
Stanford, Calif.: Stanford University, 1974.

Dickson, W. (Ed.). Children's oral communication skills. New York: 

Dittman, A. Developmental factors in conversational behavior. Journal 
of Communication, 1972, 22, 404-423.

Edwards, A. Statistical Methods. Chicago: Holt, Rinehart and Winston, 

Flavell, J. The development of role-taking and communication skills in 

Flavell, J. Developmental studies of mediated memory. In H. W. Reese 
and L. P. Lipsitt (Eds.), Advances in child development and 

Flavell, J.; Botkin, P.; Fry, C.; Wright, J.; and Jarvis, P. The 
development of role-taking and communication skills in children. 
1975.)

Flavell, J.; Speer, J.; Green, F.; and August, D. The development of 
comprehension monitoring and knowledge about communication. 
Monographs of the Society for Research in Child Development, 1981, 46 
(5, Serial No. 192).

Foss, D. Some effects of ambiguity upon sentence comprehension. Journal 

Foss, D.; Bever, T.; and Silver, M. The comprehension and verification 
of ambiguous sentences. Perception and Psychophysics, 1968, 4, 304- 
306.

Garrett, M. Does ambiguity complicate the perception of sentences? In 
G. B. Flores d'Arcais and W. J. M. Levelt (Eds.), Advances in 

Gildea, P. and Glucksberg, S. On understanding metaphor: The role of 
context. Journal of Verbal Learning and Verbal Behavior, 1983, 22, 
577-590.

Glucksberg, S. and Krauss, R. What do people say after they have learned 
how to talk? Studies of the development of referential communica-


Rubin, K. Relationship between egocentric communication and popularity among the peers. Developmental Psychology, 1972, 7, 364.


