

ORGANIZER INFLUENCE ON CHILDREN'S RESPONSES TO
QUESTIONS OF PHYSICAL CAUSALITY

A Dissertation
Presented to
the Faculty of the College of Education
University of Houston

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

by
James Harding
August 1970

545353

DEDICATION

To my mother, Mrs. Susie Harding, and to my aunt, Mrs. Louise Dunlap, whose encouragement and expectations were always a source of inspiration.

ACKNOWLEDGMENTS

The writer wishes to express his appreciation for the cooperation of the many people whose contributions made this study possible.

Grateful appreciation is expressed to the citizens and school board of the Dickinson Independent School District, Mr. A. J. Labay, Mr. Ed Wilhelm, Mrs. Helen Schleuter, Mrs. Jimmye Martin, Mrs. Louise Martin, and all of the primary and elementary school teachers and principals who tolerated the investigator and interrogator during this study and for their individual and collective contributions were very essential.

Special thanks go to Mr. Don Aldridge of the General Telephone Company for his assistance in developing the special communications device used in this study.

To Dr. Howard L. Jones, the chairman of the author's research committee, the writer wishes to express his sincere appreciation for not only the time, energy, and advice that was given in planning and conducting this dissertation, but also for the patient counsel and guidance rendered throughout a period of crisis.

Special gratitude is expressed to Dr. Jacob Blankenship, Dr. Joseph Carbonari, Dr. Loye Hollis, and Dr. Leo Mahoney, members of the research committee, for their encouragement, advice, and constructive criticism during the study.

This study was in progress when an extreme crisis appeared in the life of the investigator. Many heartfelt thanks go to the doctors and staff at Saint Joseph Hospital, who labored untiringly to help save the life of his daughter, Gieselle.

And finally the author wishes to express his kindest appreciation to his wife, Blanche, and their three children, James, Tracey, and Gieselle for their understanding and patience were the most important factors contributing to the successful completion of this study.

ORGANIZER INFLUENCE ON CHILDREN'S RESPONSES TO
QUESTIONS OF PHYSICAL CAUSALITY

An Abstract of a Dissertation
Presented to
the Faculty of the College of Education
University of Houston

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

by
James Harding
August 1970

Harding, James. "Organizer Influence on Children's Responses to Questions of Physical Causality." Unpublished Doctor's dissertation, University of Houston, August, 1970.

Committee Chairman: Dr. Howard L. Jones

ABSTRACT

The purpose of this investigation was to study the effect of a child's perception of an interrogator upon the child's spontaneous responses to Piagetian questions of causality.

Specifically, the study attempted to answer the question:

Are there significant differences in children's responses to Piaget questions dealing with physical causality, when children are interviewed by interrogators whom they perceive to occupy different roles in society.

In his book, The Child's Conception of Physical Causality, Piaget describes children's reaction to the question "What makes clouds move?" Five stages of explanations are noted: (1) magical, the clouds move when we move, or cars, or animals move, average age for this stage is 5; (2) God or large men make clouds move, average age 6; (3) the clouds move by themselves; the sun, rain, or moon cause the movement; or the wind from the snow, trees, or God cause the movement, average age 7; (4) the wind moves the clouds, but the wind,

in turn, comes from the clouds, average age 8; and (5) the wind moves the clouds and the wind does not come from the clouds, trees, or God, average age 9.

Four hundred and sixty-three children ages five to ten were randomly selected and interviewed on a one-to-one basis to determine their explanation of why clouds move. Prior to interviewing, children were randomly placed into one of three groups: a religious, nonreligious, or telephone category. The interviews were:

1. Religious--where the interrogator wore a black suit, black shoes, and a clerical collar and introduced himself as reverend.

2. Nonreligious--where the interrogator wore a business suit and introduced himself as mister.

3. Telephone--where only the student and a telephone were present in the room. The interrogator was in a distant room.

The investigator and a judge analyzed the responses and categorized them according to Piaget (1966).

Using Kruskal-Wallis One Way Analysis of Variance by Ranks, no significant differences were found among the groups. Analysis of the data indicated that the stages did not differ significantly from the results found by Piaget.

TABLE OF CONTENTS

	Page
LIST OF TABLES	xi
 Chapter	
1. BACKGROUND OF THE STUDY	1
STATEMENT OF THE PROBLEM	3
NEED FOR THE STUDY	4
LIMITATIONS OF THE STUDY	5
Limitation of the Sample	5
Limitation of the Questioning Procedure . .	6
DEFINITIONS OF TERMS	7
2. SUMMARY OF RELATED RESEARCH AND SELECTED LITERATURE	9
INTRODUCTION	9
CONCEPTS OF PHYSICAL CAUSALITY IN HUMANS . . .	10
THE SUBJECT'S PERCEPTION OF A TEACHER OR INTERROGATOR	17
SUMMARY	22
3. THE INVESTIGATION	24
INTRODUCTION	24
THE SAMPLE	26
PROCEDURE	26
CATEGORIZATION OF RESPONSES	29
STATISTICAL TREATMENT	30
4. RESULTS	35

Chapter	Page
5. SUMMARY, CONCLUSIONS, AND DISCUSSION	52
INTRODUCTION	52
PURPOSE OF THE STUDY	52
THE STUDY	53
DISCUSSION	55
SUMMARY	59
BIBLIOGRAPHY	61
VITA	68

LIST OF TABLES

Table	Page
1. Vertical Rankings of Responses According to Piaget Stages	32
2. Horizontal Rankings of Responses According to Age Categories	34
3. Distribution of Responses in Seven Categories of Explanation of Cloud Movement	36
4. Distribution of Students Responses to Causality Questions to Person Dressed in a Business Suit and Calling Himself Mister . . .	41
5. Distribution of Students Responses to Causality Questions to Person Dressed as a Minister and Calling Himself Reverend	42
6. Distribution of Students Responses to Causality Questions to Telephone Interview Where Interviewer Not Identified	43
7. Ranks of Student Responses by Ages to Causality Questions as Described by Piaget Stages	44
8. Analysis of Responses by Age	46
9. Ranks of Student Responses to Causality Questions According to Piaget Stages	48
10. Analysis of Responses by Piagetian Stages . . .	50

CHAPTER 1

BACKGROUND OF THE STUDY

The findings of epistemologist Jean Piaget have had a profound impact on American education. While Piaget is among the first to note that he is not a curriculum nor an instruction specialist, throughout the literature of curriculum development, instruction, and learning are found references to the results of Piaget's investigations with children of all age levels.

Certainly, one positive reaction of educators to the work of Piaget has been the acceptance that children go through certain stages in cognitive growth. This acceptance allows educators to view the student as he is--an active growing organism who reacts to external stimuli, and, in addition, an organism who reacts differently at different stages of development.

The student's development of concepts of physical causality has received a great deal of attention from American psychologists. Thompson (1963) states that scientific interest in concepts of physical causality probably stems from two sources: (1) increased interest in physical causation in a scientific era, and (2) the theory of conceptual growth proposed by Piaget. On the basis of children's responses to oral questioning in the presence of an interrogator, Piaget

(1966) concluded that the following stages are representative of children's development of concepts of physical causality: (1) pure autism where thought is of images and motor schemes characterized by magic and participation (up to three years of age); (2) egocentrism (up to seven or eight years), characterized by animism and artificialism; and (3) reciprocity and relativity (beyond seven and eight years), characterized by mechanical causation, logical deduction, and spatial explanation (pp. 302-03).

According to Piaget (1929), physical causality does not exist before seven or eight years of age. Before that time the conceptions are finalistic, phenomenistic, magical, animistic, moral, and artificialistic. This postulation of discrete stages of conceptual growth and of definite age periods has been most provocative, and has stimulated much research.

Science educators are especially interested in the work of Piaget. The end product of any instructional sequence is the development of conceptual learnings, principles, processes, or skills which aid the child in independent future learning. In attempting to create learning situations for children, teachers of science attempt to provide materials for learning which are complimentary to the child's characteristics at different stages of development. In this way, instructional materials might include a manipulative concrete apparatus for a concrete operational child or learning

activities in logical manipulations for the older formal operational child.

An examination of the many investigations related to Piaget's hypotheses reveals that Piaget's research findings have not gone uncontested. Huang (1943), one of Piaget's principal critics, concluded that it is impossible to believe that preschool children's thinking is composed of all mysticism and animism, and no physicalism. Oakes (1947) questioned kindergarten, second, fourth, and sixth-grade children and nonscience college teachers on explanations of natural phenomena. This analysis revealed that children's explanations differ only in degree from those offered by adults.

Isaacs (1930), Hazlitt (1930), Deutsche (1943), Cohen (1966), and Flavell (1963) are some of the investigators in whose studies evidence appears to refute Piaget's findings. But while the influence of discrete variables on the development of causal thinking in children has been investigated, the variable of the child's perception of the interrogator, which is the focal point of this study, has not been explored.

STATEMENT OF THE PROBLEM

The purpose of this investigation was to study the effect of a child's perception of an interrogator upon the child's spontaneous responses to specific Piagetian tasks.

Specifically, the study will attempt to answer the following question:

Are there significant differences in student's responses to Piaget questions dealing with physical causality, when students are interviewed by interrogators whom they perceive to occupy different roles in society.

NEED FOR THE STUDY

Any person who has interviewed individual students knows of the behaviors of students not wishing to be interviewed. However, an interrogator's smile or the reminding of past pleasurable student experiences can bring about a change in the student who may no longer perceive an enemy. Teachers of children of all ages know of the profound influence that pleasant nonverbal cues such as smiling can have on children's responses (Bandura and McDonald, 1963). On the other hand, a simple questioning look might force the child to change a response if the child infers that he has erred in the sight of the teacher.

These smiles or frowns of teachers are a form of organizer for the student. From their perception of a teacher's mode, dress, comments, etc. students might organize or have organized for them their reaction, or answers, to teacher questions. In fact, expected teacher outcomes might be noted by students observing appropriate teacher organizers. The use of

an organizer in this investigation differs somewhat from the definition of Ausubel (1963) in that Ausubel, in describing instructional organizers, has defined them as:

. . . appropriately relevant and inclusive introductory material presented in advance of an actual learning task at a higher level of abstraction, generality, and inclusiveness than the material itself (p. 263).

In the classroom or an interview, an organizer might be considered as a cue or clue for a student's response that the student receives from a teacher or interrogator.

Given, then, that the teacher may be able to change the student's responses or even help some students to form responses, the question is raised in this study, how do children's responses differ if the questions are asked by a person whom the child perceives as an alien to his normal school-life society? Similarly, do children's responses differ if the student is asked through the use of a machine?

LIMITATIONS OF THE STUDY

Elements which limit the scope and findings reported in this study include the limitations of the sample, and the limitation of the questioning procedure.

Limitation of the Sample

The study is based on a research design using a sample of 463 students during the fall and spring of 1969-1970.

Because the study was not designed to investigate the relationship of students' intelligence, standardized test scores, or other demographic data to their responses to Piagetian tasks, no attempt was made to select students on the basis of IQ, sex, grade, or other such variables.

All students came from one of three public schools in the same school district or two private kindergartens. The reliability of results of this study and those found with other students in similar studies should be noted.

Limitation of the Questioning Procedure

The "Clinical Method," as used by Piaget (1929) and modified by others, will be the limiting basis of the questioning procedure in this study. Each interview is considered as an experiment, where the interrogator is seeking to determine the validity of thought processes about, for example, cloud movement phenomena. Piaget (1966) says:

We must analyze all ideas relating to (cloud) movement as fundamentally as possible, and we must also do so as objectively as possible, that is to say, without being influenced by our own adult logic . . . The act of questioning children requires patience above anything else (pp. 60-61).

Therefore it is paramount that the interrogator is certain that the children's typical responses are really what the student means to say, and not push the student into an advance idea.

An attempt to analyze the quality and nature of the childrens' explanations were limited roughly to five general types as used by Inbody (1963):

1. Explanations which were fairly complete, generally correct, causal in nature, and with a minimum of verbalization.
2. Explanations which were plausible, causal in nature, but with incorrect causative factors given.
3. Explanations which were generally correct, but appeared to be largely verbalistic because of the lack of additional explanation or justification.
4. Explanations which were generally incorrect, involving no causation, animistic or referring to God or Jesus.
5. Responses which provided no explanation (p. 276).

DEFINITIONS OF TERMS

Organizer. In this study, mode of presence of the interrogator who questions the subjects.

Interrogator. The person conducting the interviews in all three experimental categories used in this study.

Investigator. The person doing the investigation but not the interviewing.

Religious interview. An interview where a person wore black suit, black shoes, and clerical attire.

Nonreligious interview. An interview where a person wore a business suit.

Telephone interview. An interview done by telephone, where no one was present but the subject and the telephone.

CHAPTER 2

SUMMARY OF RELATED RESEARCH AND SELECTED LITERATURE

INTRODUCTION

Causality certainly is one concept of great interest to science educators. For a student to understand the nature of science, it is necessary for him to understand the cause-effect relationship. Piaget in his research has described the intellectual growth of children in the development of concepts of length (1960), conservation of mass (1952), number (1952), physical causality (1966), language and thought of the child (1926), the psychology of intelligence (1950), the construction of reality in the child (1954), the child's conception of space (1956), as well as other studies. The impact of Piaget's research is seen in many areas of curriculum development.

For example, Science Curriculum Improvement Study (SCIS), Science A Process Approach (SAPA), Minnesota Mathematics and Science Teaching Project (MinneMAST), and the Elementary Science Study (ESS), have developed teaching materials which reflect the influence of the research of Piaget and others.

Since the publication of Piaget's work, many experiments and investigations have attempted and are attempting to

corroborate his conclusions. The studies to date present conflicting evidence in their support or refutation of Piaget's theory concerning causal thinking. Thompson (1941), Grisby (1932), Nagy (1948), Dennis (1940), and Sarvis (1939) are among the investigators whose studies claim to substantiate all or part of Piaget's conclusions, while the works of Isaacs (1930), Hazlitt (1930), Deutsche (1943), Oakes (1947), and Huang (1943) present evidence which appears to refute Piaget's findings.

CONCEPTS OF PHYSICAL CAUSAL- ITY IN HUMANS

Thompson (1963) states that scientific interest in concepts of physical causality probably stems from two sources: (1) our interest in physical causation in a scientific era, and (2) the theory of conceptual growth proposed by Piaget.

As far back as the writings of Tiedemann (1787), the tendency of children to attribute "life" to inanimate objects has been studied. However, detailed investigations of concept formation in children probably started to receive its greatest examination with Piaget in his study of causal explanation of physical phenomena.

On the basis of children's responses to oral questioning in the presence of an interrogator, Piaget (1966) concluded that the following three stages are representative of children's

concepts of physical causality: (1) pure autism up to three years of age, characterized by magic and participation; (2) egocentrism up to seven or eight years, characterized by animism and artificialism; and (3) reciprocity and relativity beyond seven or eight years, characterized by mechanical causation, logical deduction, and spatial explanation (pp. 302-03). According to Piaget, physical causality, as such, does not exist before seven or eight years of age; before that time the conceptions of children are finalistic, phenomenistic, magical, animistic, moral, and artificialistic. This postulation of discrete stages of conceptual growth and the definite age periods has been most provocative, and has stimulated much research.

In a study by Lacy and Dallenbach (1939), young children were asked the following questions: "What is the cause of sleep? How do these things happen: a blister, bleeding, a smile, smoke, or melting?" (p. 105). An "after --- this --- therefore --- because --- of --- this explanation" was found to appear suddenly by the end of the eighth or ninth year. After eight or nine "correct" answers (common-sense answers were accepted) were given quickly and confidently by children. The investigators reasoned that the narrow age range within which the cause-effect relationship was developed is an argument for an ability that is primarily dependent on maturation.

Danziger and Sharp (1958) also found that when children between five and eight years were asked to explain the growth of animals, sun, wind, and rain, their responses tended to fall into four different types involving an increasing complexity of factors and interactions among factors. However, they did find that the type of causality offered was somewhat related to the kind of growth or movement they were asked to explain.

Dennis (1942) applied some of Piaget's causality questions to his own daughter at various age levels and obtained evidence in substantial agreement with Piaget's findings. He concluded that his daughter's development was "entirely in agreement" with the sequential stages described by Piaget's hypothesis of causality. Dennis and Russell (1940) also found substantial support for Piaget's hypothesis of causality in their investigation of Zuni children. Their conclusions reflect that the "conceptions of the Zuni child seem not to differ from those of Piaget's French-speaking and American subjects" (p. 186).

Nass (1956) investigated the effect of personality, experience, and the form of wording of the questions asked upon Piaget's types of causal thinking. The effect of personality was investigated by contrasting the responses of normal and withdrawn eight to ten year old children, matched as to school attendance, age, sex, and intelligence test scores.

The hypothesis was advanced that withdrawn children would function at a less mature level than normal children. This hypothesis was verified in that the withdrawn children displayed significantly more nonnaturalistic responses to a series of questions similar to those used by Piaget.

Muuss (1959) demonstrated that high causally-oriented subjects have more tolerance toward ambiguous stimuli on a perceptual test consisting of a sequence of unfinished pictures. His subjects tended to guess later, make fewer guesses, and expressed less certainty when asked to guess what the final picture was going to be. The study emphasized that when the causally-oriented child makes a guess, he is more inclined to do so in terms of probability and is aware of the tentative, hypothetical nature of his response.

Muuss (1960) studied the relationship between "causal" orientation, anxiety, and insecurity in elementary school children. By using the Social Causal Test and the Physical Causal Test, he was able to determine that even though there are small but significant relationships between intelligence and the criterion variables, the obtained differences between the high causal and low causal groups on the criterion variables could not be explained on the basis of differences in intelligence. Muuss found that the experimental classes designed to develop a causal understanding of the dynamics of human behavior contributed significantly more high causally-oriented students,

while regular control classes contributed more low causally-oriented students.

Muuss (1961) also studied social causality with emphasis on the subjects' understanding of the multiple causes of behavior, the effects of behavior, and the importance of thinking in probability terms when considering both cause and effect. The main question in his study was whether subjects who participated in a learning program primarily designed to develop a more thorough understanding of social causality and human motivation, also developed a more thorough understanding of the factors that operate the physical world and help to explain natural phenomena. It was found that measures of physical causality, have a higher correlation with IQ than measures of social causality, and that there was a tendency for experimental subjects to obtain lower correlations between the measure of causality and IQ than is the case for control subjects.

Muuss (1960) investigated the mental health effects of a one and two year causal learning program on sixth grade subjects using ten tests. He found that in six out of ten tests, significant differences were found between two-year experimental subjects and control subjects. Significant differences were also found between the one-year and the two-year experimental subjects in five out of ten tests.

Yuckenberg (1962) studied the six and seven year olds' concepts of the sun, moon, day and night, and gravity to find

a basis upon which further development of the understanding of these concepts occurred. Her results demonstrated that the children's readiness to learn about space was brought about by outside influences. It was also demonstrated that the sample children showed a great deal of interest in the sun, moon, and the earth. Evidence was present that they had experienced opportunities to gain information about the objects that can be seen in the sky.

Haupt (1950) reported a study of concepts of the moon as obtained from first-grade children in free discussion. His study revealed that there is a need for further study of the roles of imagination in various levels of children's thinking. Apparently imagination is of great importance in children's formulation of hypotheses.

The data concerning animism in children comes from such diverse groups as Swiss, American, Indian, French, British, and Australian. These investigations indicate that children who believe objects to be living frequently attribute to them various forms of consciousness. Piaget (1929) proposed that in civilized man animistic thinking disappears at about the age of twelve or shortly thereafter. Adults, he claimed, believe that only plants and animals are living. But it does not appear that Piaget has questioned adults on this point, nor, until recently, have other investigators directed their inquiries to adult subjects.

Dennis (1953) used the group method to question sixty-seven graduate students on such objects as an unlighted match, the same match lighted, an electric clock on the wall, the sun, the wind, a pier, gasoline, and the ocean. He found that many of the causality answers were equivalent to those recorded for children, except that some of the adult answers reflect larger vocabulary. The data clearly demonstrated that animism is not limited to children.

A study by Ojemann, et al. (1955) demonstrated rather conclusively that if pupils are provided with a causally-oriented teacher who uses causally-oriented learning material, a significant causal change occurs in the pupils' behavior. Stiles (1950) has shown that a causal learning program produced a decrease in punitiveness in ten-year-olds as measured by their way of handling peer problems. Levitt (1955) found support for the hypothesis that: "In children of elementary school age, an awareness of the dynamic, complex, variable nature of human maturation is negatively related to rigid, moralistic punitiveness" (p. 494). He concluded that causality and punitiveness appear to be significantly related.

Levitt and Lyle (1955), investigating whether or not causality increases frustration tolerance, found that low-causally oriented subjects give significantly more extra punitive responses and significantly fewer intropunitive responses on the Children's Form of the Picture Frustration Test. They

found that the low-causally-oriented subjects were more frequently egodefensive in their responses and showed less need-persistence, thus indicating that a causal orientation contributes to increased frustration tolerance.

THE SUBJECT'S PERCEPTION OF A TEACHER OR INTERROGATOR

Feelings about the self are established early in life and are modified by subsequent experiences. Ausubel (1954) and Jourard and Remy (1955) are among the investigators who have reported results to support the theoretical contention that among the significant people believed to affect the child's feelings about himself are first, his parents, and later, his teachers.

Schludermann and Schludermann (1969) examined the perceptual regularities and universalities in the interperson perception of Hutterite children in Manitoba. The aim of the investigation was: how basic and universal are the trends observed in social role differentiation and perception in a contrasting cultural milieu; to determine the nature and number of the basic dimensions underlying the perception of people; and to determine how the variables of age and sex influence the children's ability to perceive different social roles.

Since it is the basic tenets of Hutterite society to abolish all visible signs of status symbols usually associated

with rank, role, and position in society, it was concluded that no clear-cut indication of a stable evaluative potency activity (EPA) was demonstrated. The assumption of a few basic dimensions underlying Hutterite children's perceptions of social roles became doubtful.

Schuldermann and Schuldermann (1969) also repeated their study using Hutterite adolescents. They found that only one common factor accounted for one-third of the total variance. The principal factor matrix of the adolescents was almost as undifferentiated as that of the children. The assumption of a basic dimensions underlying adolescents' perception, as well as the assumption of increased cognitive differentiation in social role perception of adolescents were not supported.

According to Gibson and Pick (1963), the facial patterns for the perception of emotion have been studied in many experiments, but the ocular patterns for the perception of the act of looking at something have been neglected. In their study of the "Perception of Another Person's Looking Behavior," various styles of looking were taken under consideration. However, only the variable of the temporary line of gaze was studied. The results suggest that we have good discrimination for the line of gaze of another person, at least with respect to whether or not we are being looked at. The ability to read eyes seems to be as good as the ability to read fine print on an acuity chart.

Cline (1954) investigated the perception aroused by a pair of schematic faces in three quarters profile whose eyes were drawn as to appear to be looking at each other. He systematically varied the expressive features of the two drawings and noted the social situations perceived in accordance with these combinations. However, he did not vary the apparent lines of gaze.

Wardell (1960), assuming that being looked at is a potent social stimulus, studied the effect on the behavior of a child or adult who stared at her most of the time, part of the time, or none of the time. Her results showed that although the children were preoccupied most of the time (in a test situation), they proved to be very conscious of whether they were, or were not, being observed, and for what proportion of the time.

Fields (1950) studied facial expression and its relation to personal adjustment as an initial process in the perception and recognition of emotional states. The results from this study showed that every individual was able to discriminate accurately at least seven of the twenty expressions presented. Sex differences in the ability to discriminate facial expressions were not significant. There was positive correlation between discrimination and social adjustment, but not high enough to warrant individual prediction. No correlation

was shown to exist between discrimination of facial expression and emotional adjustment.

It has been hypothesized that children often respond to what adults expect of them, especially in a testing situation. Although the examiner may assume that an answer given by a subject is based upon some cognitive knowledge about the problem under consideration when the student interacts with the subject, the subject's own attitudes, attributes, and expectations may prove to be significant determiners of the subject's responses (Rosenthal, 1966). Larrabee and Kleinsassar (1967) had examiners administer the Weschler Intelligence Scale for Children to six graders of average intelligence. Each child was tested by two different examiners at different times, one administering the even-numbered items and the other administering the odd-numbered items. When the examiner was told to expect superior performance, a total IQ gain of 7.5 points was recorded over the administering when an examiner was told to expect inferior performance.

According to social learning theory, the sequence of developmental change is considered to be primarily a function of reinforcement contingencies and other learning variables (Bandura and McDonald, 1963). These variables could be altered by the manipulation of selected cues to emphasize any particular bias.

A series of studies dealing with teacher-pupil relations have sought to determine how children see and feel about their teachers, Gage, Leavill, and Stone (1955); how teachers see and feel about their pupils, Cook (1955); and how teachers think their pupils see themselves, Perkins (1958).

Davidson and Lang (1960) investigated the relation between children's perception of their teachers' feelings toward them and the variables of perception, academic achievement, and classroom behavior. The major finding was that: The children's perception of their teachers' feelings toward them correlated positively and significantly with self-perception. The child with the more favorable self-image was the one who more likely than not perceived his teacher's feelings toward him more positively. Perhaps, the more positive the children's perception of their teacher's feelings, the better academic achievement and the more desirable the classroom behavior.

Some investigators of pupil-teacher relationships have used pupils' ratings of teachers' classroom behaviors. The ratings never conceptualized along personality dimensions related to the authoritarian versus the nonauthoritarian personality pattern, Amidon and Flanders (1961). The intent of these studies has been to show that authoritarian related teacher behavior elicits pupil anxiety which results in lowered pupil achievement.

In a study by Goldberg (1965) to determine whether attitudes toward authority and school work are associated with differential perception of teachers' behavior and school performance, the findings tend to support the conclusion that pupils differentiated in their attitudes do perceive differently, and that this differential in perception influences the consequent amount of school work performed. However, there is a need for more such studies of the student-teacher interaction.

With valid results not only may we gain insight into the question of what qualities make for an effective teacher but also an understanding of how the child's perception of his teacher, irrespective of its accuracy relates to his self-concept, school achievement, and classroom behavior.

SUMMARY

The development of causality in students has received impetus from the investigation of Piaget. Piaget and others have noted that students go through stages of development and that their answers to causality questions at these different stages may vary.

Investigations of the effect of teachers' or interrogators' influence on a student's responses have generated ambivalent results. Studies have not been reported which

investigate the effect of subjects' perceptual differences of an interrogator while answering causality question.

CHAPTER 4

THE INVESTIGATION

INTRODUCTION

The purpose of this investigation was to study the effect of different interrogators on childrens' spontaneous responses to a certain Piagetian task.

In his book, The Child's Conception of Physical Causality (1966), Piaget describes childrens' reactions to the question "What makes clouds move?" Five stages of explanations are noted:

1. Magical (The clouds move when we move, or cars, or animals move), Average age 5;
2. God or large men make clouds move, Average age 6;
3. The clouds move by themselves; the sun, rain, moon cause the movement; or the wind from the snow, trees, or God cause the movement, Average age 7;
4. The wind moves the clouds, but the wind, in turn, comes from the clouds, Average age 8;
5. The wind moves the clouds and the wind does not come from the clouds, trees or God, Average age 9 (p. 61).

It should be noted that in this sequence, the child first (stages 1-3) confuses physical and moral causes of cloud movement. Even when the child notes that the wind causes cloud movement, he might be confusing moral and physical causes by noting that the wind comes from some sources such as trees

or from God. As Piaget (1966) noted:

Such physical causes as are occasionally taken into account are the constraint exercised by one body upon another, like that of a police force (as when the Sun or God makes the clouds move along) . . . or non-essential adjuvants which are then simply added to the force of the cloud itself as it "flies" along.

But from the fourth stage onward . . . a new element appears in the explanation of movement; it is the idea of physical determinism. Henceforward, the movement of clouds, whatever their private force or will, is explained solely by the action of a body external to them, namely the wind. The wind has thus become an indispensable physical cause that is independent of them (p. 69).

In a society in which morality has been equated with the work of the clergy, the question has been raised, does a child's answer to the cause of cloud movement depend on to whom he speaks? Would a child answer differently the question "What makes clouds move?" to a minister or to a person whom he perceives as a minister? Also, how does a child respond to an interview through media such as a telephone while not knowing who is on the other end of the line?

If such variances are found in childrens' responses to cloud movement questions, then childrens' answers to questions asked by interviewers perceived as religious leaders should differ significantly from students' answers to the same question asked by nonreligious figures. Similarly, there should be differences between childrens' responses to telephone interviews and childrens' responses to interviews with non-clergy.

THE SAMPLE

A sample of 463 boys and girls used to obtain data for this study was selected from three elementary schools in a Texas gulf coast school district and from two kindergartens. The sample of children ranged in age from 5 to 9 years. No attempt was made to obtain a sample that would reflect sex, IQ, grade level differences, or other demographic data since the study was concerned with the question of developmental stages and not physical, social, or intelligence variables.

The study was conducted in a growing, diversified gulf coast Texas community of approximately 15,000 population. Residents work in nearby oil and chemical plants, NASA's Manned Spacecraft Center and its allied industries, and in many other locations extending from Galveston to Houston and beyond.

The school population generally reflects a range of cultural and economic backgrounds. All pupils in the elementary schools study science for 125 to 150 minutes per week, depending on the level or intermediate grade organization in a particular school.

PROCEDURE

Three types of interviews were used to gather data. In actuality, these three types of interviews were done by an interrogator appearing in two different costumes and via the telephone. The sample students were randomly assigned to one

of the three interview groups.

1. A religious group (R). Children were questioned by the interrogator who dressed in a black suit and clerical collar and called himself reverend.

2. A nonreligious group (NR). Children were introduced to the interrogator dressed in a business suit who called himself mister.

3. A telephone group (T). Students were not introduced to the interrogator and were interviewed by telephone.

Because the children sampled were personally known by the investigator and, as such, were thought not to be able to perceive an acquaintance dressed in clerical attire as a minister, the investigator did not question the children. The interrogator in this study was foreign to the students, and one who was skilled in Piaget questioning from past research, and was experienced in working with student groups and individual from 5 to 10 years of age.

Each child was brought to a room (by the investigator), where the interrogator was stated. The investigator controlled the shuttle process during all interviews. Only the child and the telephone were present in the room during the telephone interviews.

In the interviews, determination was first made of the child's knowledges that clouds, do, indeed, exist and that they move. This sequence was followed by the question "What

makes clouds move?" and a notation from the child on his perception of the causality of cloud movement. Generally, maximum flexibility was allowed for children responses and the interrogator's justification questions which followed. If "wind" was the child's response, the child was asked how the wind makes the clouds move and where the wind comes from to help distinguish between the third, fourth, and fifth Piagetian stages. Note was also made of whether the student thought clouds could move without wind and whether clouds can generate wind.

Guiding principles stressed by Inbody (1963) were used in the interviews.

1. To help reduce anxiety, each interview began with a casual conversation about subjects of interest and concern to the child.
2. Questions were worded carefully to avoid influencing the child's responses by giving him anticipated clues to the anticipated answers.
3. The interrogator attempted to be casually permissive to avoid communicating any anxiety of his own about the child's responses, yet not to appear disinterested.
4. The interrogator made every effort to convey to the child a genuine liking and acceptance while maintaining a sense of neutrality and objectivity.
5. Interrogations were conducted in areas which were quiet as possible and free from distractions.
6. The interrogator attempted to adopt his behavior to the subject and the situation according to his evaluation of motivations and defenses that might be influencing the child's responses (p. 272).

Every effort was made to insure freedom of each child to reveal his own thoughts, rather than repeating, parrot-like, a response that he suspected the interrogator wanted.

CATEGORIZATION OF RESPONSES

Four hundred sixty-three students, selected from the lower elementary grades and kindergarten, were individually interviewed to determine their explanations of cloud movement by using Piaget causality questions. All responses were tape recorded and subsequently analyzed by the investigator and the interrogator. For a response to be considered significant, the response had to contain elements of:

1. Animistic or anthropomorphic views, where the cloud movement explained was ascribed as alive and conscious, or where the explanations were in terms of a Deity.
2. Mechanistic, at a level of logical cause-effect relationship.
3. A logical scheme of abstract interpretations where explanations were mechanical with a theoretical principle involved.

STATISTICAL TREATMENT

The hypotheses tested in the study in the null form are:

HYPOTHESIS: H_{01} There are no significant differences at .05 level of significance in children's responses to Piaget causality questions when children are interviewed by different interrogators.

HYPOTHESIS: H_{02} There are no significant differences at the .05 level of significance in the ages of children sharing similar responses to Piaget causality questions when interviewed by different interrogators.

Similarly, these three research sub-hypotheses should be noted:

HYPOTHESIS: H_1 There will be significant differences at the .05 level of confidence in responses of children who had nonclergy interviews and those who had clergy interviews.

Nonclergy vs. Clergy

HYPOTHESIS: H_2 There will be significant differences at .05 level of confidence in responses of children who had nonclergy interviews and those who had telephone interviews.

Nonclergy vs. Telephone

HYPOTHESIS: H_3 There will be significant differences at .05 level of confidence between the responses of children who had clergy interviews and those who had telephone interviews.

Clergy vs. Telephone

To test the hypotheses, the Kruskal-Wallis One Way Analysis of Variance by Ranks was used. To meet the criteria of the test, the three independent groups (religious, nonreligious, and telephone), were drawn from the same population. In the computation of the Kruskal-Wallis test, each of the category observations were replaced by ranks.

By using the three different categories a distribution was established for the three major groups for all 18 subgroups.

The formula used in computing the H value of the Kruskal-Wallis test is:

$$H = \frac{12}{N(N-1)} \sum_{j=1}^k \frac{R_j^2}{N_j} - 3(N+1)$$

Where: k = number of samples

N_j = number of cases in jth sample

$N = \sum N_j$, the number of cases in all samples combined

R_j = sum of ranks in jth sample (column)

$\sum_{j=1}^k$ = directs on to sum over the k sample (columns)

is distributed approximately as Chi-square with $df = k-1$, for sample sizes n_j s sufficiently large.

To test H_{01} the analysis of variance was made within and among stages or as categorized by the investigator and interrogator into one of the stages described by Piaget. (See Table 1.)

Table 1
Vertical Rankings of Responses According
to Piaget Stages

Age	Category	Piaget Stages				
		1	2	3	4	5
5	Religious Nonreligious Telephone	↑	↑	↑	↑	↑
6	Religious Nonreligious Telephone					
7	Religious Nonreligious Telephone					
8	Religious Nonreligious Telephone	Rankings From 1 to N	Rankings From 1 to N	Rankings From 1 to N	Rankings From 1 to N	Rankings From 1 to N
9	Religious Nonreligious Telephone					
10	Religious Nonreligious Telephone	↓	↓	↓	↓	↓

WHERE Religious = ranks for clerical interviews
Nonreligious = ranks for nonreligious interviews
Telephone = ranks for telephone interviews

To test H_{02} hypothesis, the Kruskal-Wallis One Way Analysis of Variance by Ranks was also used, by testing the variances among the age distribution. (See Table 2.)

In testing the two null hypotheses and inferring from them to the three sub-hypotheses, Tables 1 and 2 illustrates the overall format. Each of the six age groups were divided into a religious, nonreligious, and telephone category.

Table 2
Horizontal Rankings of Responses According
to Age Categories

Piaget Stages	Age Categories					
	5	6	7	8	9	10
1	Religious	Nonreligious	Telephone	Rankings From 1 to N		
2	Religious	Nonreligious	Telephone	Rankings From 1 to N		
3	Religious	Nonreligious	Telephone	Rankings From 1 to N		
4	Religious	Nonreligious	Telephone	Rankings From 1 to N		
5	Religious	Nonreligious	Telephone	Rankings From 1 to N		

WHERE Religious = ranks for clerical interviews
 Nonreligious = ranks for nonreligious interviews
 Telephone = ranks for telephone interviews

CHAPTER 4

RESULTS

Four hundred and sixty-three children ages 5 to 10 were selected and interviewed on a one-to-one basis to determine their explanation of why clouds move. Prior to interviewing, children were randomly placed into one of three groups: a religious, a nonreligious, and a telephone category. The interviews were:

1. Religious. Where the interrogator wore a black suit, black shoes, and a clerical collar and introduced himself as reverend.

2. Nonreligious. Where the interrogator wore a business suit and introduced himself as mister.

3. Telephone. Where only the student and a telephone was present in the interview room, whereas the interrogator was in a distant room.

All of the students' responses were tape recorded. The investigator and interrogator analyzed the responses and categorized them into stages as described by Piaget (1966).

Table 3 shows the distribution of all responses as categorized by the interrogator and the investigator.

All but three children offered explanations of some sort. These three children had never seen a tape recorder or telephone and were hesitant to speak or had extreme withdrawn

Table 3

Distribution of Responses in Seven Categories of
Explanation of Cloud Movement

Interview Type	Causal or Logical Explanation	Claimed Never Saw Clouds	Clouds Do Not Move	No Reason for Movement	No Answer	Language	Other Scientific Explanations	Total
Religious	102	4	5	5		3	11	130
Non-religious	118	1	4	13	2	1	20	159
Telephone	118	6	3	21	14	3	19	184
Total	338	11	12	39	16	7	40	463

tendencies. About 73 percent of the children gave explanations that were causal or had a logical scheme, about 2.37 percent claimed they never saw clouds, another 2.5 percent said clouds did not move, and 8.43 percent gave no reason for movement. Some 3.45 percent were eliminated because of a language problem for they seemingly could not understand the interrogator or the interrogator did not understand them, another 8.63 percent gave other scientific answers.

Classification of childrens' responses were made by the investigator and the interrogator into one of the five stages described by Piaget (1966). See page 24 of this study. Students giving responses other than causal or logical were not used in the results of this study. The investigator and the interrogator spent forty hours prior to the investigation of the sampled children, interviewing, taping, and classifying childrens' responses and perfecting the technique. While no reliability estimate is offered in terms of a numerical score, it should be noted, however, that of the children interviewed in the sample, only nineteen responses could not be agreed upon to fit one of Piaget's categories or a category that was unique.

To aid the reader in understanding the classification of responses, the following sample interviews and their categories follow. The first response will be that of the Piaget child and the second response will be from the children used in

this study.

STAGE 1

Sala, 8 years

You have already seen the clouds move along? What makes them move? -- When we move along, they move along too. -- Can you make them move? -- Everybody can when they walk. -- When I walk and you are still, do they move? -- Yes--And at night, when everyone is asleep, do they move? -- Yes -- But you tell me that they move when somebody walks. -- They always move. The cats when they walk, and then the dogs, they make the clouds move along. (Piaget, 1966, p. 62)

Dana, 7 years

What makes clouds move? -- They move by their feet. If they (the clouds) had no feet, would they move? -- Yes -- How would they do that? -- When you move they would move. -- Can you explain that? -- Well, when the goats and cows and things walk the clouds walk too.

STAGE 2

Pen, 8 years

What makes the clouds move along? -- God does. "But on the other hand, they are alive." -- Why? "Because they move." (Piaget, 1966, p. 64)

Marty, 7 years

What makes the clouds move? -- It's the string that sometimes pull the clouds. Who pulls the string? -- The man who sells the balloons on the corner. -- How does he do that? -- He puts the air in the balloon and tie it with the string. -- How does that make the clouds move? -- Well, God blows the clouds also.

NOTE: Here the combination of large or powerful men or God moving the clouds.

STAGE 3

Grim, 5 years

Why do they (clouds) move along? -- It's the moon that makes them move. -- "Do they know that they are moving? -- Yes -- Do they know that the moon makes them move? -- Yes -- And does the moon know it? -- Yes. (Piaget, 1966, p. 65)

Kelvin, 8 years

What makes the clouds move? -- The sun makes the clouds move. How? -- You see when the sun is shining and the clouds get hot they move. -- Well, if the sun did not shine to make the clouds hot, would they move then? -- Yes -- How does this happen? -- When the clouds get black and it rains.

Jimmy, 7 years

What makes the clouds move? -- Where does the wind come from? -- God makes the wind -- How does the wind move clouds? -- The wind pushes the clouds. -- Are the clouds alive? -- I think so. -- How can you tell? -- When we move the clouds move.

Although not noted by Piaget, both the investigator and the interrogator agreed that the wind for this child (Jimmy) is a moral wind, i.e., God wants to do it, and as such suggests a third stage.

STAGE 4Aud, 9 years

Tell us about the wind! -- It comes from the sky. -- How is it made in the sky? -- Don't know. -- What do you think? -- It might come from the clouds. -- How is that? -- Because, when the clouds move along, it makes air (wind). When they are not moving, there is not much of it. -- Why do the clouds move along? -- Because it's the air which they make that makes them move along. -- How is that? -- Because it pushes them. -- Why? -- Don't know. (Piaget, 1966, p. 70)

Cathy, 9 years

What makes the clouds move? -- The wind. -- Where does the wind come from? -- The sky. -- How does the wind move the clouds? If there was no wind, would the clouds move? -- No. -- Can wind come from clouds? -- Yes. -- Can clouds make wind? -- Yes.

STAGE 5Gut, 9 years

Why do clouds move more or less quickly? -- Because of the wind. -- They move along by the wind. -- Where does

the wind come from? -- From the sky. -- And how is the wind made? -- Don't know. -- And can the clouds make a wind? -- No. -- Can they make a wind by moving? -- No. -- And when there is no wind, can they move along alone? -- No. (Piaget, 1966, p. 72)

Glen, 8 years

What makes the clouds move? -- The wind. --
Where does the wind come from? -- From the sky. --
How does the wind do that? -- Don't know. -- Can clouds make wind? -- No. -- Can wind come from clouds? -- No. -- If there was no wind could the clouds move? -- No.

The distribution of student responses according to religious, nonreligious, and telephone are reflected in Table 4; Table 5, page 42; and Table 6, page 43.

Data in Tables 4, 5, and 6 were used to test:

Hypothesis H_{01} : There are no significant differences at .05 level of significance in childrens responses to Piaget causality questions when children are interviewed by different interrogators.

This hypothesis was tested using the Kruskal-Wallis One Way Analysis of Variance by Ranks. At each age level, rankings of 1 to 5 (according to the Piagetian stages) were made for subjects' responses. (See Table 7, page 44.) Comparisons were made among the scores to identify the probability (p) that the groups (R, NR, and T) were indeed from the same population. Results are noted in Table 8, page 46.

Analysis of the data do not permit the rejection of the null hypothesis at any age level. Since no significant

Table 4

Distribution of Students Responses to Causality
Questions to Person Dressed in a Business
Suit and Calling Himself Mister

Age	Piaget Stages				
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
5	6	4	4	4	1
6	2	8	4	2	6
7		2	6	4	14
8		2	7	5	7
9			4	8	7
10			4	6	6
Median Age	5	6	8	8	8
Average age for Piaget stage	5	6	7	8	9

Stage 1 = Magical

Stage 2 = Artificial and animistic

Stage 3 = Artificial and mechanistic

Stage 4 = Physical and moral

Stage 5 = Logical explanation or schema found

Note: Of the 132 children interviewed for this category, the compatibility of the median age and the average age of the Piaget child should be noted.

Table 5
Distribution of Students Responses to Causality
Questions to Person Dressed as a Minister
and Calling Himself Reverend

Age	Piaget Stages				
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
5	3	9	3	1	1
6	1	6	5	2	1
7		8	5	3	5
8			3	10	8
9		1	2	10	7
10			4	7	4
Median Age	5	6	7	8	9
Average age for Piaget stage	5	6	7	8	9

Stage 1 = Magical

Stage 2 = Artificial and animistic

Stage 3 = Artificial and mechanistic

Stage 4 = Physical and moral

Stage 5 = Logical explanation or schema found

Note: Of the 116 children interviewed for this category, the compatibility of the median age and the average age of the Piaget child should be noted.

Table 6
Distribution of Students Responses to Causality
Questions to Telephone Interview Where
Interviewer Not Identified

Age	Piaget Stages				
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
5	3	10	5	1	
6	2	7	4	5	3
7	1	3	4	6	7
8			4	11	4
9		1	4	8	5
10			4	9	7
Median Age	5-6	6	7	8	8
Average age for Piaget stage	5	6	7	8	9

Stage 1 = Magical

Stage 2 = Artificial and animistic

Stage 3 = Artificial and mechanistic

Stage 4 = Physical and moral

Stage 5 = Logical explanation or schema found

Note: Of the 114 children interviewed in this category, the compatibility of the median age and the average age of the Piaget child should be noted.

Table 7

Ranks of Student Responses by Ages to Causality Questions as Described by Piaget Stages

Age	Category	Age Classifications										Total
		Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		
		No.	Rank*	No.	Rank*	No.	Rank*	No.	Rank*	No.	Rank*	
5	Religious	3	6.5	9	12	3	6.5	1	3.5	1	1.5	17
	Nonreligious	6	6.5	4	12	4	6.5	4	3.5	1	1.5	19
	Telephone	3	6.5	10	12	5	6.5	1	3.5			19
Total		12		23		12		6		2		55
6	Religious	1	15	6	34	5	19	2	11	1	7.5	15
	Nonreligious	2	15	8	34	4	19	2	11	6	7.5	22
	Telephone	2	15	7	34	4	19	5	11	3	7.5	21
Total		5		21		13		9		10		57
7	Religious			8	51	5	33	3	22	5	23	21
	Nonreligious			2	51	6	33	4	22	9	23	21
	Telephone	1	18	3	51	4	33	6	22	7	23	21
Total		1		13		15		13		21		63
8	Religious					3	47.5	10	41.5	8	43	21
	Nonreligious			2	58.5	7	47.5	5	41.5	7	43	21
	Telephone					4	47.5	11	41.5	4	43	19
Total				2		14		26		19		61

Table 7 (continued)

Age	Category	Age Classifications										Total
		Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		
		No.	Rank*	No.	Rank*	No.	Rank*	No.	Rank*	No.	Rank*	
9	Religious					4	60.5	7	66	3	60	14
	Nonreligious					4	60.5	8	66	7	60	19
	Telephone			1	60	4	60.5	8	66	5	60	18
	Total			1		12		23		15		51
10	Religious					3	70.5	7	80.5	4	76	14
	Nonreligious					4	70.5	6	80.5	6	76	16
	Telephone					4	70.5	9	88.5	7	76	20
	Total					11		22		17		50
Grand Total		18		60		77		99		84		338

Rank = The rank from 1 to N of the ages of students giving responses categorized as the same Piaget stage where N = the total number of subjects having the same age.

*See pages 32-34 for Kruskal-Wallis ranking description.

Table 8
Analysis of Responses by Age

Age	H	Probability that Subgroups are from Same Population	.05 χ^2 Value df = (K-1)
5	.44	.90 > P > .80	5.99
6	.48	.80 > P > .70	5.99
7	.39	.90 > P > .80	5.99
8	2.25	.50 > P > .30	5.99
9	.88	.70 > P > .50	5.99
10	.39	.90 > P > .80	5.99

differences were found among the groups, between group differences would not be found.

Similarly:

Hypothesis H_{o2} : There are no significant differences at .05 level of significance in the ages of children sharing similar responses to Piaget causality questions when interviewed by different interrogators,

was tested using the Kruskal-Wallis One Way Analysis of Variance by Ranks. Comparison was made among the scores to identify the probability that the age distributions for each stage were similar for each of the interviewed groups. (See Table 9.)

Analysis of this data do not permit the rejection of the hypothesis at any stage. Apparently, no significant differences were found among the stages, then between stage differences would not be found. Results are noted in Table 10, page 50.

Failure to reject the two null hypotheses was tantamount to rejecting the three research hypotheses stated in Chapter 3:

Hypothesis H_1 : There will be significant differences in responses of children who had non-clergy interviews and those who had clergy interviews.

Hypothesis H_2 : There will be significant differences in responses of children who had non-clergy interviews and those who had telephone interviews.

Table 9

Ranks of Student Responses to Causality Questions According
to Piaget Stages

Age	Category	Age Classifications										Total
		Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		
		No.	Rank*	No.	Rank*	No.	Rank*	No.	Rank*	No.	Rank*	
5	Religious	3	6.5	9	24	3	41.5	1	50.5	1	54.5	17
	Nonreligious	6	6.5	4	24	4	41.5	4	50.5	1	54.5	19
	Telephone	3	6.5	10	24	5	41.5	1	50.5			19
	Total	12		23		12		6		2		55
6	Religious	1	3	6	16	5	33	2	44	1	53.5	15
	Nonreligious	2	3	8	16	4	33	2	44	6	53.5	22
	Telephone	2	3	7	16	4	33	5	44	3	53.5	21
	Total	5		21		13		9		10		57
7	Religious			8	8	5	22	3	36	5	53	21
	Nonreligious			2	8	6	22	4	36	9	53	21
	Telephone	1	1	3	8	4	22	6	36	7	53	21
	Total	1		13		15		13		21		63
8	Religious					3	9.5	10	29.5	8	52	21
	Nonreligious			2	1.5	7	9.5	5	29.5	7	52	21
	Telephone					4	9.5	11	29.5	4	52	19
	Total			2		14		26		19		61

Table 9 (continued)

Age	Category	Age Classifications										Total
		Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		
		No.	Rank*	No.	Rank*	No.	Rank*	No.	Rank*	No.	Rank*	
9	Religious					4	7.5	7	25	3	44	14
	Nonreligious					4	7.5	8	25	7	44	19
	Telephone			1	1	4	7.5	8	25	5	44	18
	Total			1		12		23		15		51
10	Religious					3	6.5	7	23.5	4	43	14
	Nonreligious					4	6.5	6	23.5	6	43	16
	Telephone					4	6.5	9	23.5	7	43	20
	Total					11		22		17		50
Grand Total		18		60		77		99		84		338

Rank = The rank from 1 to N of the stage distribution score where N = total number of subjects whose responses were placed in Piaget categories 1-5.

*See pages 32-34 for Kruskal-Wallis ranking description.

Table 10
Analysis of Responses by Piagetian Stages

Stage	H	Probability that Subgroups are from Same Population	.05 χ^2 Value df = (K-1)
1	.99	.70 > P > .50	5.99
2	1.30	.70 > P > .50	5.99
3	.26	.90 > P > .80	5.99
4	2.00	.50 > P > .30	5.99
5	1.87	.50 > P > .30	5.99

Hypothesis H₃: There will be significant differences between the responses of children who had clergy interviews and those who had telephone interviews.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND DISCUSSION

INTRODUCTION

The purpose of this chapter is to summarize the findings of the research and state conclusions.

PURPOSE OF THE STUDY

The purpose of this study was to determine the effect of organizer influence on children's responses to questions of physical causality.

In his book The Child's Conception of Physical Causality (1966) Piaget wrote that:

Five stages may be distinguished in the explanations which the child gives of the movement of clouds. The first stage is Magical: We make the clouds move by walking. The clouds obey us at a distance. The second stage is both artificialistic and animistic. The clouds move because God or men make them move. The third stage . . . the movement is conditioned by moral and physical causes. Artificialism has been transferred to objects. The fourth stage is mechanical, the wind pushes the clouds, but the wind has itself come out of the clouds. The fifth stage denotes a logical explanation (p. 61).

The question was raised in this study, do children's responses to Piaget's causality questions differ at specified age levels when children are interviewed by interrogators whom they perceive to occupy different roles in society? Likewise, are there differences in age distribution of children's

causality stages as described by Piaget when children were interviewed by different interrogators?

THE STUDY

Some 463 students were assigned to one of the three groups. Each child was placed in a religious, a nonreligious, or a telephone category.

1. A nonreligious group. Children were interviewed by the interrogator, dressed in a business suit and introduced as mister. This group did not receive the religious or telephone interview.

2. A religious group. Children were interviewed by the interrogator dressed as a minister and introduced as reverend. This group did not participate in the nonreligious or telephone interviews.

3. A telephone group. Children were interviewed by way of a telephone, and did not see the interrogator. This group did not participate in the nonreligious or religious interviews.

Each student interviewed was audio taped individually. Taping sessions lasted approximately three to five minutes each.

Classification of childrens' responses into the categories noted by Piaget (1966) were made by the investigator and the interrogator. Each rated the responses independently.

However, if the investigator and interrogator could not agree on the placement of a specific response, the response in question was not used in the results.

Specifically the study attempted to test two major null hypotheses.

Hypothesis H_{01} : There are no significant differences at .05 level of significance in childrens responses to Piaget causality questions when children are interviewed by different interrogators.

Hypothesis H_{02} : There are no significant differences at .05 level of significance in the ages of children sharing similar responses to Piaget causality questions when interviewed by different interrogators.

These two questions generated three research sub-hypotheses which completed the design of this study.

Hypothesis H_1 : There will be significant differences in responses of children who has non-clergy interviews and those who had clergy interviews.

Hypothesis H_2 : There will be significant differences in responses of children who had non-clergy interviews and those who had telephone interviews.

Hypothesis H_3 : There will be significant differences between the responses of children who had clergy interviews and those who had telephone interviews.

The Kruskal-Wallis One Way Analysis of Variance by Ranks was used to determine whether the K independent samples were from the same or different populations. The results are

given as individual responses in Tables 3, 4, and 5. Analysis of the data in the tables indicates that the stages did not differ significantly from the results found by Piaget and others.

DISCUSSION

Prior to studies of this kind it was easy for some to draw an unwarranted conclusion and to assume that religious settings or exposure to media somehow impedes the ability of some children to grasp scientific explanations. However, results of this study negates this idea.

Seemingly, it might be expected that when a child in a religious setting attributes causation to God, he may be responding to what is salient to him in that setting, or he may be responding to what he feels is expected of him, rather than using his cognitive processes. In some instances this may be true, however, the evidence of this study does not justify this conclusion.

Admittedly, the first impulse of the investigator after analysis of data was to determine whether the children in this study really accepted a stranger dressed in religious attire as a minister. There is no evidence that the acceptance was not made. Two cases should be cited here. One child returned to his classroom and announced that his minister was in the school and that his minister was happy with his answers to some questions. A second child questioned the noninterviewing

investigator two weeks after his interview by asking how "his friend," the reverend, was.

The question should be raised as to what the clerical collar meant to the children. It should be noted that the schools in which the interviewing was done exist in a moderately religious setting. There are more than ample churches for some 15,000 people in the area sampled and very few of the students are nonchurch-goers. However, the question is still raised as to whether a student would respond directly to his minister, priest, rabbi, or overseer. The interviewing in this study was done by an American white male. Would the responses reflect differences if an American Negro, Mexican-American, or other minority race member had done the interviews? Likewise, it should be pointed out that the sample studied was an integrated sample. Ethnic background was not a variable in this study. Would responses differ if only one ethnic group had been studied?

It is interesting only as an anecdote that the interrogator noted many times that children did not look at him when he wore the religious attire. Perhaps it is some indictment that youngsters are afraid to look a "minister" in the eye while asking or answering questions.

In view of contemporary concern for teaching disadvantaged or inner-city children who tend to have little interest in good school performance, these results may be helpful in

selecting teachers for these children, as well as studying and understanding something about their learning patterns. There is wide concern that the members of our society will in the future comprehend the general nature of science and technology more than most do today. This study has not provided positive evidence whether religious, nonreligious, or media (telephone) interviews or training, has an effect on scientific understanding. (Obviously they are not incompatible in all categories; some children gave purely scientific or logical explanations.)

The lack of significant differences in the telephone questioning gives some comfort for those who are worried about the responses of students to machines. Ironically, however, a greater number of children had to be eliminated from the telephone group than from any other group. For some reason, many children in the sample had not talked on the telephone prior to this study and many of these children either refused or could not respond to telephone questioning. If the child could answer on the telephone, the types of his responses were no different than those in other interviews. It is a "jolt," however, when a child refuses to answer any questions until he knows "how you got my telephone number" (age 7). One other child returned to his room after telephone interviewing with the announcement that he had just spoken to God. This child incidentally, did not give a Godlike response to the question.

One other finding should be mentioned. Several days of interviews went by before the interrogator was able to see that some older children (9-10) were claiming that the clouds do not move but they indeed had a rational reason for their answers. Closer questioning revealed that these children were convinced that the clouds do not move and that they appear to move only because the earth rotates. All of these children (some 40) when questioned as to whether the clouds would continue moving if the earth were to stop, answered "No." The very logical, to them, explanation seemed to come from their instruction in science. It was later found that several of their teachers had the very same idea about cloud movement. Perhaps it is an indictment of the system that we have erroneously "brainwashed some kids" into a sixth stage that goes beyond the findings of Piaget.

The implication for the theoretical position championed by Piaget over the years seems unambiguous. Seemingly, children's conceptual development, of physical causality as represented by their explanations, is not solely maturational phenomenon unaffected by training. If it were, it should have been unaffected by the religious interview.

Noteworthy at this junction is the fact that many children gave partly or wholly scientific responses and not just the animistic or anthropomorphic responses that some of Piaget's writings would predict for this age group.

A significant finding in this study is the role that imagination played in the childrens' responses to causal action for cloud movement. They attributed causal action to the "northwind," "southwind," "weather," "gravity," "fairies," "goats," and "Leprechauns." But, more noteworthy than the statements of these objects or forces are the contexts in which the actions are described. One example will serve to illustrate the characteristics of all: "The northwind is mean and blows the clouds away and the southwind is kind and blows them back at night." The characteristic of responses such as this is a remarkable display of imagination. Haupt (1950) says: "Imagination is of great importance in children's formulation of hypotheses" (p. 32).

It is recommended that a study of the roles of imagination in various levels and stages of childrens' thinking be investigated.

This study could be replicated to see if sex makes a difference.

Socioeconomic, religious, or ethnic background of both interrogator and subjects would also be an important study.

SUMMARY

Attempt was made in this study to determine whether childrens' perception of an interrogator would sway their responses to Piagetian tasks. Children were randomly placed

in one of three groups--students interviewed in a telephone conversation, students interviewed by a person garbed in religious attire and introducing himself as reverend, and a third "normal" Piagetian interview.

The lack of significant differences sheds more evidence on the validity of the findings of Piaget. It has been noted in the literature that little is known of the original Piagetian interviews. However, in this study, the same trends in student responses were found as those reported by Piaget. It is noteworthy that there were found no significant differences between the average ages of Piaget stages and the median ages of the stages found in this study.

BIBLIOGRAPHY

BIBLIOGRAPHY

- Amidon, E., and Flanders, N. A. "The Effects of Direct and Indirect Teacher Influence on Dependent-Prone Students Learning Geometry," Journal of Education Psychology, 52: 286-91, 1961.
- Anderson, Richard C. "Can First Graders Learn an Advanced Problem-Solving Skill?" Journal of Educational Psychology, 56:285, December, 1965.
- Anderson, Roland D. "Children's Ability to Formulate Mental Models to Explain Their Observations of Natural Phenomena," Dissertation Abstracts, 25:7:3994, January, 1965.
- Ausubel, David P. "The Transition from Concrete to Abstract Cognitive Functioning: Theoretical Issues and Implications for Education," Journal of Research in Science Teaching, 2:263:3, 1964.
- _____. "The Use of Advance Organizers in the Learning and Retention of Meaningful Verbal Material," Journal of Educational Psychology, 51:5:267-72, 1960.
- _____, and others. "Perceived Parent Attitudes as Determinants of Children's Ego Structure," Child Development, 25: 173-83, 1954.
- Bandura, A., and McDonald, J. J. "Influence of Social Reinforcement and the Models in Shaping Children's Moral Judgments," Journal of Personality and Social Psychology, 67: 275-81, 1963.
- Bruner, J. S. "Social Psychology and Perception," Readings in Social Psychology, eds. E. E. Maccoby, T. R. Newcomb, and E. L. Hartly. 3d. ed. New York: Henry Holt, 1958.
- Cline, M. G. "The Influence of Social Context on the Perception of Faces," Journal of Personality, 25:142-58, 1956.
- Cohen, S. "The Problem with Piaget's Child," Teachers College Record, 68:211-18, December, 1966.
- Cook, W. W. "Significant Factors in Teachers' Classroom Attitudes," Journal of Education, 7:274-79, 1956.
- Danziger, K., and Sharp, N. "The Development of Children's Explanations of Growth and Movement," Australian Journal of Psychology, 10:196-207, 1958.

- Davidson, Helen H., and Lang, Gerhard. "Children's Perception of Their Teacher's Feelings Toward Them Related to Self-Perception, School Achievement and Behavior," Journal of Experimental Education, 29:107-18, December, 1960.
- Dennis, W. "Animistic Thinking Among College Students," Scientific Monthly, 76:4:147-49, April, 1953.
- _____. "Animistic Thinking Among College and High School Students in the Near East," Journal of Educational Psychology, 48:193-98, 1957.
- _____. "Animistic Thinking Among College and University Students," Scientific Monthly, 76:247-50, April, 1953.
- _____. "Piaget's Questions Applied to a Child of Known Environment," Journal of Genetic Psychology, 60:307-20, 1942.
- _____. "Piaget's Questions Applied to Zuni and Navaho Children," Psychology Bulletin, 38:520, 1940.
- _____, and Russell, R. W. "Piaget's Questions Applied to Zuni Children," Child Development, 11:181-87, 1940.
- Deutsche, Jean M. "The Development of Children's Concepts of Causal Relations," Child Behavior and Development, eds. R. G. Barker, J. S. Kounin, and H. F. Wright. New York: McGraw-Hill Book Company, Inc., 1943.
- Fields, Sidney L. "Discrimination of Facial Expressions and Its Relation to Personal Adjustment," American Psychologist, 5:309, 1950.
- Flavell, J. H. The Developmental Psychology of Jean Piaget. Princeton, N.J.: D. Van Nostrand Company, 1963.
- Gage, N., Leavitt, G., and Stone, G. "Teachers' Understanding of Their Pupils and Pupils' Ratings of Their Teachers," Psychological Monographs, 69:31:406:1-37, 1966.
- Gibson, J. J., and Pick, A. D. "Perception of Another Person's Looking Behavior," The American Journal of Psychology, 76:386-94, 1963.
- Goldberg, J. B. "The Influence of Pupils' Attitudes on Their Perceptions of Teachers' Behaviors and on Their Consequent Performance of School Work," Dissertation Abstracts, 20:317, August, 1966.

- Grisby, Olive J. "An Experimental Study of the Development of Concepts of Relationships in Pre-School Children as Evidenced by Their Expressive Ability," Journal of Experimental Education, 1:144-62, 1932.
- Haupt, George W. "First Grade Concepts of the Moon," Science Education, 34:226, October, 1950.
- Hazlitt, Victoria. "Childrens' Thinking," British Journal of Psychology, 20:354-61, 1930.
- Huang, I. "Children's Conception of Physical Causality: A Critical Summary," Journal of Genetic Psychology, 63:71-121, 1943.
- Inbody, Donald. "Children's Understanding of Natural Phenomena," Science Education, 47:276, April, 1963.
- Isaacs, Susan. Intellectual Growth in Young Children. New York: Harcourt, Brace, 1930.
- Jones, F. N., and Arrington, M. G. "The Explanation of Physical Phenomena Given by White and Negro Children," Comparative Psychological Monograph, 18:5, 1945.
- Jourard, S. M., and Remy, R. M. "Perceived Parental Attitudes, the Self, and Security," Journal of Consulting Psychology, 19:364-66, 1955.
- Lacey, J. I., and Dallenbach, K. M. "Acquisition by Children of the Cause-Effect Relationship," American Journal of Psychology, 52:103-10, 1939.
- Larrabee, L. L., and Kleinsasser, L. D. "The Effects of Experimental Bias on WISC Performance." Unpublished paper. St. Louis: Psychological Associates, 1967.
- Levitt, E. E. "Punitiveness and 'Causality' in Grade School Children," The Journal of Educational Psychology, 46:494-98, December, 1955.
- _____, and Lyle, W. H. "Evidence for the Validity of Children's Form of the Picture-Frustration Study," Journal of Consulting Psychology, 19:381-86, 1955.
- Levitt, E. E., and Ojemann, R. H. "The Aims of Preventive Psychiatry and Causality as a Personality of Pattern," Journal of Psychology, 36:393-400, January, 1953.

- McAndrew, M. B. "An Experimental Investigation of Young Children's Ideas of Causality," Studies in Psychology and Psychiatry, 6:2, 1943.
- Menon, T. K. N. "Growth of Relativity of Ideas and Notions and Reasoning of Children," Indian Journal of Psychology, 11:86-91, 1944.
- Mogar, M. "Children's Causal Reasoning About Natural Phenomena," Child Development, 31:59-65, 1960.
- Muuss, R. E. "A Comparison of 'High Causally' and Low 'Low Causally' Oriented Sixth Grade Children on Personality Variables Indicative to Mental Health," Proceedings of the Iowa Academy of Science, 66:388-94, 1959.
- _____. "Mental Health Effects of a One and Two Year Causal Learning Program on Sixth Grade Subjects When IQ, Age, and Sex Are Controlled," American Psychologist, 15:435, 1960.
- _____. "The Relationship Between 'Causal' Orientation, Anxiety, and Insecurity in Elementary Children," Journal of Educational Psychology, 51:122-29, 1960.
- _____. "The Transfer Effect of a Learning Program in Social Causality or an Understanding of Physical Causality," Journal of Experimental Education, 29:231-47, 1961.
- Nagy, Maria. "The Child's Theories Concerning Death," Pedagogical Seminary and Genetic Psychology, 73, September, 1948.
- Nass, M. L. "The Effect of Three Variables on Children's Concepts of Physical Causality," Journal of Abnormal Social Psychology, 53:360-61, 1956.
- _____. "The Effects of Three Variables Upon Children's Concepts of Physical Causality," Journal of Abnormal Social Psychology, 53:191-96, 1956.
- Oakes, M. E. "Children's Explanations of Natural Phenomena," Teacher Colleges Contribution Education, 926, 1947.
- Ojemann, R. H., et al. "The Effects of a 'Causal' Teacher-Training Program and Certain Curricular Changes on Grade School Children," Journal of Experimental Education, 24:95-114; 243-46, 1955.
- Perkins, H. V. "Teachers' and Peers' Perceptions of Children's Self Concepts," Child Development, 29:203-20, 1958.

- Piaget, J. The Child's Conception of Number. London: Routledge & Kegan Paul, 1952.
- _____. The Child's Conception of Physical Causality. Totowa, N.J.: Littlefield, Adams & Co., 1960.
- _____. The Child's Conception of the World. New York: Harcourt, Brace, 1929.
- _____. The Construction of Reality in the Child. New York: Basic Books, 1954.
- _____. Judgment and Reasoning in the Child. New York: Harcourt, Brace, 1926.
- _____. The Psychology of Intelligence. London: Routledge & Kegan Paul, 1950.
- _____, and Inhelder, B. The Child's Conception of Space. London: Routledge & Kegan Paul, 1956.
- _____, and Szeminska, A. The Child's Conception of Geometry. New York: Basic Books, 1960.
- Rosenthal, R. Experimenter Effects in Behavior Research. New York: Appleton-Century-Crofts, Inc., 1966.
- Sarvis, B. C. "A Study of the Development Aspects of Child Thought by a Clinical Method," Psychological Bulletin, 36, 1939.
- Schludermann, S., and Schludermann, E. "Social Role Perceptions of Children in Hutterite Communal Society," The Journal of Psychology, 72:183-88, 1969.
- Siegel, S. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill Book Company, Inc., 1956.
- Stiles, F. S. "Developing an Understanding of Human Behavior at the Elementary Level," Journal of Educational Research, 43:516-24, 1950.
- Thompson, George G. Child Psychology. Boston: Houghton Mifflin, 1963.
- Thompson, Jane. "The Ability of Children of Different Grade Levels to Generalize on Sorting Tests," Journal of Psychology, 11:119-26, 1941.

Wardell, Elinor. "Childrens' Reaction to Being Watched During Success and Failure," Dissertation Abstracts, 21:12:4741, June, 1960.

Yuckenberg, Laura M. "Children's Understanding of Certain Concepts of Astronomy in the First Grade," Science Education, 46:149, March, 1962.