A Study of Precausal Thinking in Non-Retarded and Mildly Mentally Retarded Children

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A STUDY OF PRECAUSAL THINKING IN NON-RETARDED
AND MILDLY MENTALLY RETARDED
CHILDREN

by

Sandra Sue Gagie

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment
of the
Degree of Doctor of Education

Western Michigan University
Kalamazoo, Michigan
December 1978
DEDICATION

To Joe, my husband, and our six children,
Laura, Tim, Jeff, Marta, Sara, and Greg in deep appreciation for the tremendous support and patience that made the completion of this work possible.
ACKNOWLEDGMENTS

The personal satisfaction to be derived from the completion of this dissertation must be shared with many people who provided invaluable assistance, encouragement and understanding. They include my Doctoral Advisory Committee, Dr. R. Burke, Dr. D. Sellin, my major advisor, and Dr. A Hannaford who also acted as my advisor; Dr. J. Eisenbach and Dr. M. Wirtz for their confidence in my capabilities; Professors Icabone, Harris, Nicolaou and Patterson who acted as judges for the data; my husband and our six children who experienced both the highs and lows of my personal enthusiasm for the study but always continued to encourage me; to my parents who believed in higher education, even for women.

Sandra Sue Gagie
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CHAPTER I
THE PROBLEM

Statement of the Problem

It is taken for granted by parents and teachers that children are capable of objective causal thinking. This study tests that assumption. Studies with normal children by Piaget (1930, 1972) and Laurendeau and Pinard (1962) reveal that children do not, in fact, employ objective causal thinking until about the age of 12. Up to that time their causal thinking is subjective and egocentric; Piaget termed this behavior precausal thinking.

One focus of this study was to determine the developmental levels of precausal thinking in both normal and mentally retarded children. A second intended outcome of this study was to obtain an understanding of the administration, scoring, length and difficulty of the Laurendeau and Pinard procedure which was used to study this problem. A third outcome was to gain basic information about the use of this procedure with mildly retarded youngsters as well as non-retarded ones.

The specific problem addressed in this study was: Is there a difference in the developmental levels of non-retarded and mildly retarded children on questions pertaining to physical causal thinking?
Need for the Study

In a 1977 report to the National Institute of Education, the National Research Council of Sciences identified examples of fundamental research that are or will be relevant to the conduct of education (Kiesler & Turner 1977). The first example of fundamental research needing attention was "understanding cognitive development." Two methods cited for gaining this understanding were 1) child development studies based on the work of Jean Piaget, and 2) the use of new tests and diagnostic systems to explore how children think and perceive their world. One such system would be the technique used by Laurendeau and Pinard (1962).

Piaget has produced detailed research literature about the cognitive functioning of normal children, but he has not been as interested in differences between divergent ability levels (Robinson & Robinson 1965). Gallagher (1975) and Robinson and Robinson (1977) have pointed out the lack of research on the mentally retarded using Piagetian theory.

Finding similarities in the learning patterns of non-retarded and retarded children could facilitate proper placement in mainstreaming. Dunn (1968) and Lilly (1970) have advocated mainstreaming for the mentally retarded. A parallel to mainstreaming is the normalization principle for the mentally retarded espoused by Wolfensberger (1972). In trying to operationalize these two prin-
ciples, it would help educators to know if mentally retarded children pass through the same invariant sequence of developmental stages as normal children.

Additional need for this study is derived from the emergence of legislation involving the preschool handicapped population. Public Law 94-142 (1975) mandates child find programs and appropriate curriculum development for all handicapped children including the mentally retarded. One important component of the law is the Individualized Educational Program (IEP) that teachers must prepare for each child. A careful assessment of the child must be made in order to prepare an appropriate IEP. Teachers must understand developmental stages in order to present material in the proper sequence when assessing a child's abilities. Understanding the stages or levels of development could provide an understanding of the prerequisites necessary for teaching a task.

Public Act 198 passed in Michigan in 1971 mandates educational services for the handicapped from birth through age 25. In order to achieve appropriate programming it would seem necessary to understand the development of children, especially their causal thinking. This can be achieved in terms of the meanings that children have established through their own experiences. One aspect of understanding would be a comparison of causal thinking of non-retarded and mentally retarded persons.
Definitions

Since certain terms have special meaning in the context of this study, a particular vocabulary is necessary. Below are the operational definitions of these terms.

**Educable mentally impaired** (mentally retarded) means a person identified by an educational placement and planning committee, based upon a comprehensive evaluation by a school psychologist, certified consulting psychologist, or certified psychologist, and other pertinent information as having all the following behavioral characteristics:

a) development at a rate approximately 2 or 3 standard deviations below the mean as determined through intellectual assessment,

b) scores approximately within the lowest 6 percentiles on a standardized test in reading and arithmetic,

c) lack of development primarily in the cognitive domain,

d) unsatisfactory academic performance not found to be based on his social, economic, and cultural background.

*(Guidelines for Special Education Programs and Services in Michigan, 1974)*

**Normal children** are children able to function in a regular classroom setting 100% of the school day with no ancillary services.

**Questionnaire** is the questionnaire developed in 1962 by

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Laurendeau and Pinard on physical causal thinking.

Developmental levels refers to a sequence of levels of development in causal thinking as derived from the questionnaire by Laurendeau and Pinard (1962).

Hypotheses

The following hypotheses have been formulated to address this study. The four hypotheses concerned with the chronological age match have been grouped together as have the four hypotheses concerned with the mental age match. The rationale for the hypotheses follows each grouping.

HYPOTHESIS I: Mentally retarded children will respond at lower developmental levels than the non-retarded children of the same chronological age to questions on the concept of dream.

HYPOTHESIS II: Mentally retarded children will respond at lower developmental levels than the non-retarded children of the same chronological age to questions on the concept of life.

HYPOTHESIS III: Mentally retarded children will respond at lower developmental levels than the non-retarded children of the same chronological age to questions on the concept of the movement of clouds.
HYPOTHESIS IV: Mentally retarded children will respond at lower developmental levels than the non-retarded children of the same chronological age to questions on the concept of the origin of night.

Rationale: Several studies support differences in developmental levels between retarded and non-retarded children of the same chronological age. Zigler (1969) has explained differences in development between non-retarded and retarded by stating that the rate of learning differs with IQ. He would expect the familially retarded (those who do not have organicity) to make slower progress through the cognitive stages of development than the non-retarded. If the environment were held constant there would still be differences in cognitive development due to differences in genetic composition. Inhelder (1968) and Stephens (1971) studied reasoning in the mentally retarded. They found that the more severe the retardation the lower the developmental levels attained by the retarded. Hood (1962) studied the development of number concepts in non-retarded and retarded children; the retarded of the same chronological age were found to be at lower developmental levels than the non-retarded.

HYPOTHESIS V: Mentally retarded children and non-retarded children matched on mental age will respond at the same developmental
levels to questions on the concept of dreams.

HYPOTHESIS VI: Mentally retarded children and non-retarded children matched on mental age will respond at the same developmental levels to questions on the concept of life.

HYPOTHESIS VII: Mentally retarded children and non-retarded children of the same mental age will respond at the same developmental levels to questions on the concept of the movement of clouds.

HYPOTHESIS VIII: Mentally retarded children and non-retarded children of the same mental age will respond at the same developmental levels to questions on the concept of the origin of night.

Rationale: Several studies have compared retarded and non-retarded children using a mental age match. Ellis (1963) pointed out that for the retarded it is necessary to take into account some index of equivalence rather than chronological age. In this case the MA was used as that index. Rossi (1963) and Osborne (1960) found that non-retarded and retarded matched on mental age did equally well on learning word clusters. McManis (1970) compared
the two groups on seriation and conservation tasks; the two groups did equally well. Moore and Stephens (1974) investigated the moral conduct of retarded and non-retarded matched on mental age; the groups were equivalent. The study pointed out that moral conduct is developmental and with increased CA and MA conduct improves.

Organization of the Dissertation

This chapter has been concerned with certain preliminaries including statement of the problem, need for the study, definition of terms, and hypotheses.

Chapter II reviews related literature. Chapter III presents the subjects, instrumentation, procedures used to gather data, and procedures to analyze the data. The results of the study are presented in Chapter IV where each hypothesis is discussed in detail. Conclusions and other outcomes of the study are discussed in Chapter V as well as implications for Piagetian theory, implications for the mentally retarded, implications for educators, and implications for future research.
CHAPTER II

REVIEW OF THE RELATED LITERATURE

Introduction

Tuckman (1972) has stated "the purpose of the literature review is to expand upon the context and background of the study, to help further define the problem, and to provide an empirical basis for the subsequent development of hypotheses" (p. 289). This study focuses on the development of causal thinking in normal and mildly retarded children. In order to more clearly define the problem and support it, this chapter will be divided into four sections. These are: Piagetian Theory and Studies; Piagetian Studies Involving Causal Thinking; Piagetian Studies with the Mentally Retarded; and Summary and Implications.

Piagetian Theory and Studies

"To date in the field of developmental psychology, there exists a no more significant theory both for the understanding of the thought processes and for application to classroom teaching than that of Jean Piaget" (Gorman, 1972, p. 108).

The formulation of Piaget's theory of development was brought about by his early interest in the biological sciences, an interest in epistemology, and in large part by the observation of his own three
children from the moment of their births. Development in the Piagetian sense refers to the qualitative and quantitative transformations which occur through time. This concept is applied to an individual as he/she grows and as he/she changes from birth to maturity (Gallagher 1975).

In order to discover the methods of thinking used by children of various ages, Piaget uses a clinical questioning method. A problem or question is presented to the child and the child's responses determine the direction of subsequent questioning. Piaget's method of observation is quite different from that of traditional mental testing though both are systematic and both are concerned with mental development (Phillips 1969). The Questionnaires used in this study have their roots in Piagetian theory and incorporate his method. Pinard and Laurendeau attempted to combine the advantages of Piaget's method through thoroughness and flexibility of questioning with those of traditional psychometric methods by standardizing the questions (Phillips 1969).

Piaget's method of inquiry led him to the conclusion that human beings evolve through an orderly progression of developmental stages that eventually lead to mature intelligence. He describes intelligence, in terms adapted from biology, as a form of interaction between one's cognitive structures and one's environment. The interaction of these two is termed adaptation.
Adaptation is accompanied and enhanced by the learner's feeling of disequilibrium because of confusion, interest, curiosity, or unresolved questions. As the learner strives to restore balance, resolve confusion, follow up interests and curiosity, learning occurs and equilibrium is restored for the moment. Learning is a continuing process of equilibrium and progresses throughout life (Cain 1976).

Adaptation and equilibration are brought about by two complementary processes termed assimilation and accommodation. Assimilation and accommodation occur simultaneously. During assimilation an individual absorbs novel situations or objects into pre-existing schemes or structures of the mind. Accommodation takes place when the individual modifies his/her structures or schemes in the mind according to pressures of the external world to correspond with situations of objects in reality. For example, Ginsburg (1969) states:

- One assimilates an environmental event into a structure and one accommodates a structure to meet the demands of the environment. Eventually the organism tends toward equilibrium. He aims toward a balance between his mental structures and requirements of his world (p. 59).

The steps of cognitive development are mediated by the structure of each individual's central nervous system and by one's experience in the world of reality.
In studying various components of external reality, Piaget and his colleagues have tried to gain an understanding of the progressive adaptation of the child to his world (Pinard 1959). Pinard states:

Piaget and his collaborators have successively studied the various components of external reality: space and time, the analysis of which leads to that of speed and movement; the external object, which opens the way for the study of number and quantity, that is to say for the physical qualities of the object such as quantity of matter, weight, and volume; causality, which implies the study of simple physical causation, probability, and chance. Using extremely ingenious techniques, Piaget has shown that the child's mastery of these different notions is the result of a long elaboration involving the childhood period. For each one of the notions studied, the development is reflected in a series of successive levels or stages (p. 4).

Stage dependent theories maintain that for the child to arrive at stage B in his/her development he/she must first have reached and passed through stage A. The order is fixed; stage B cannot be arrived at until stage A has been mastered (Flavell, 1970, 1971). Gallagher (1975) cites Bijou (1968), Gagne (1968), and Wohlwill (1973) as proponents of invariant order of development; the rate and quality of change in a child's development depend on the particular
kinds of experience a child encounters. Laurendeau and Pinard (1962) set out to verify the invariant sequence of development using a different sociological milieu and to add more stability or support for such stages. Tanner and Inhelder (1960) purport the fact that people who assume a fixed order of development also accept a position that the age at which the stages appear and the lengths of the stages will vary as a function of heredity, potential, and experience.

Piaget's theory posits an invariant sequence of total intellectual development divided into four major periods. According to Gorman (1972), these periods and estimated ages for each are:

1. sensorimotor stage
   birth to 2 years
2. preoperational stage
   2 years to 7 years
3. concrete operations
   7 years to 11 years
4. formal operational stage
   11 years and above

Much subsequent work has been done to support Piaget's stage theory of development. Inhelder (1968), Woodward (1963), Laurendeau and Pinard (1962), Uzgiris and Hunt (1975), and Corman and Escalona (1969) have all sought to support Piaget's theory.

Sigel (1975) derived three important principles from Piaget's work. They are important because they are applicable to practice and give guidelines for the practitioner to follow. These are:

1. The child is not a miniature adult.
2. Conflict enhances development of concepts.
3. There seems to be some order in spite of individual
differences in the direction concept attainment takes.

Even though all adults have at one time been children, it often
seems difficult for adults to be able to grasp the perspective of chil-
dren (Robinson & Robinson, 1977). Piaget's stage dependent theory
should lead adults to a much better understanding of children's actions
and words, and more precise curriculum planning.

It should be acknowledged that not all studies have agreed with
Piaget's findings. Some of those are Brainerd (1974), Deutsche (1937),
Estes (1956), Mogar (1960), and Sears (1958). It is not understood
yet whether such results have been due to defects in methodology
such as the age of the subjects, procedures used, or the fact that the
stages do not exist. Current opinion seems to suggest that more work
in the area using more refinements in the methodology is needed.

Piagetian Theory Involving Causal Thinking

Causal thinking is one of the attributes of mature intellect.
It involves cause and effect thinking, the relation between regularly
correlated events or phenomena as implied by "why" questions.
Wallon (1974) has identified that the "why" questions of children relate
to "celestial bodies, of clouds, of origins." This study addresses
these questions of correlated events.

Gallagher (1975) points out that how children view the physical
world is important for understanding their actions and responses in
everyday life situations as well as for curriculum design. A study of causal thinking magnifies the value of such knowledge. For example, objective causal thinking requires that explanations based on pure psychological factors and those relating to pure physical causality must be integrated (Laurendeau & Pinard, 1962). Piaget (1930, 1972) called this precausal thinking. He also identified about 17 successive categories or stages of physical causality. The first nine stages represent precausal reasoning and are characterized by nonnaturalistic explanations based on magic, animism, and supernaturalism. The final eight stages are much more objective and are the beginning of objective causal thinking.

For this study five of the stages characterized by concepts that Piaget referred to as "adherences" will be studied. These are conceptions of nature founded upon fragments of internal experience which are grounded to the external world (Laurendeau & Pinard 1962).

Below are the concepts with an explanation and an example of each as identified by Laurendeau and Pinard (1962) from Piaget's work of 1930.

**Phenomenism** is the most primitive form of thought used by a child to represent reality. It is the linking together of two events in a causal connection simply because they are contiguous either in time or space.

Example: A plane may be able to fly because it is blue in
color. In its purest form a child may believe that objects have the power to connect with each other themselves. The shadow of an object may be explained by the darkness of the night coming to hide under an object.

**Finalism** is the conception that reality is a world organized around well-determined plans and most always centered around human activity.

**Example:** Each object has a function which by itself explains its existence. A ship floats in order to carry people from one country to another. Large mountains are for adults and small ones are for children.

**Artificialism** is an extension of finalism. All things originate from the action of the maker. Either God or men are held responsible for the existence of all objects whether natural or artificial. The thought now is changed from "made for men" to "made by men."

**Example:** Lakes are for boats to sail on becomes to the child, men have dug lakes and rivers in order to move about from one place to the next.

**Animism** explains the child's concept of nature. Life and consciousness are given to surrounding objects.

**Example:** A mountain is alive; a bicycle is alive; fire is alive.

**Dynamism** is very closely related to animism. The child not only attributes life to objects but gives them the strength and energy

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to choose their own destiny.

Example: Clouds are conscious of their displacements and may choose their own course and execute their movements without any assistance.

Several early studies cited by Laurendeau and Pinard (1962) support the existence of precausal thinking with evidence of realism, animism, and artificialism. Russell and Dennis (1939); Russell (1940); and Dennis (1942) observed the stages in normal children. Lerner (1958) observed animism and its disappearance by around 9 or 10. Bruce (1941) obtained the same results with a group made up of Negro and white children; he observed the four stages of animism. Havighurst and Neugarten (1955) studied American Indian children and observed animism as did Klingensmith (1953). Grigsby (1932) studied preschoolers and was able to discern 17 types of causality, 9 of those being precausal.

Laurendeau and Pinard (1962), Gallagher (1976) and Berzonsky (1970) have all exhibited studies which did not support the existence of precausal thinking. Johnson and Josey (1931), Isaacs (1930), Mead (1932), and Jahoda (1958) all failed to find the definite existence of precausal thinking.

More recent studies have also dealt with forms of causal thinking. Harding and Jones (1972) attempted to determine whether student perception of an interviewer would change the response the
child would make to the question, "What makes the clouds move?"

Four hundred-fifty children were randomly assigned to one of three interview groups, a nonreligious group where questions were asked by a person in regular street clothes, a religious group where questions were asked by a man dressed as a clergyman, and a telephone group. There were no significant differences in responses on this question of physical causality.

Kuhn (1974) studied the development of children's comprehension of the unidirectional relation which exists between a cause and effect. Sixty-eight children in kindergarten through grade two were sampled. Almost all the younger children chose a relationship randomly without thought to cause and effect. The older children in the group seemed to have acquired a competence for unidirectional relationships as they did not choose randomly.

Berger, Prentice, Hollenber, Korstvedt, and Sperry (1969) studied the development of causal thinking in children of average intelligence with severe psychogenic learning inhibitions. Three tests of physical causality devised by Piaget were used to study their development. One of the measures, the origin of night, is the same as the one used in the present study. They found that the children with learning inhibitions were at lower developmental levels than the control group with whom they had been matched on age, intelligence, and social class. At the second testing 18 months later, and after
psychotherapy with parents and children and special classroom placement, the differences had disappeared. It was suggested that one of the interventions was probably responsible for the change. More research is needed to determine that fact.

Nass (1956), using similar methods to the Berger group, studied causal thinking in emotionally disturbed children. He also found that they were at significantly lower developmental levels than the normal group even though both were doing average school work.

Dennis (1942) concluded that precausal concepts are autogenous and universal, since they are observed among children who had never been trained to use them. They are also observed in children of different cultures and from different regions and countries.

Piagetian Studies with the Mentally Retarded

The phenomena of mental retardation poses many questions of critical importance concerning the individuality of mental development (Kessler, 1970). Although Piaget was relatively uninterested in individual differences and mental retardation, his ideas have achieved interest among special educators in the field of mental retardation (Robinson & Robinson, 1965). The diagnostic tools and techniques that Piaget and Inhelder (1958) developed allow the experimenter to gain insights into the cognitive processes and thinking of such children. It is realistic to use the Piagetian stage theory to study the thinking processes of the mentally retarded.
With the advent of the Individualized Educational Program (IEP), it is necessary to be much more precise in assessing developmental and achievement levels of mentally retarded children before prescribing for them. Harding and Jones (1972) have suggested that the work of Piaget has provided teachers with valuable information in order to be diagnosticians. The teacher should be able to prescribe for individual children using a variety of learning experiences at the child's developmental level.

Nondiscriminatory testing has become an issue, since Public Law 94-142 (1975) mandates it. Mercer's (1975) research provides evidence that much traditional psychometric testing is discriminatory with certain populations. The use of developmental data using Piagetian theory is a possible way to avoid discrimination in testing.

Several studies reinforce the use of Piagetian assessment techniques for diagnostic purposes with the mentally retarded.

One of the first studies using Piagetian theory with the mentally retarded was done by Woodward (1959) in England. She studied a group of severely and profoundly retarded individuals using Piaget's sensorimotor stage. No subject had been able to reach the lower limit of the Stanford-Binet Intelligence Scale, Form L. Her study suggested that lower functioning mentally retarded individuals do pass through the sensorimotor stage of development. They possess the characteristics of infants of normal intelligence, and exhibit the

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behaviors seen in normal infants. For the retardates the behaviors are regarded as bizarre because of the size and age of the individual. Actually the behaviors are characteristic of the stage in which the retardate is functioning. By understanding these observations and using an ordinal scale of development such as the one developed by Uzgiris and Hunt (1975), a teacher should be able to pinpoint the behavior of the person well enough to write objectives. These objectives would dictate the subsequent experiences that would be appropriate for his/her developmental level.

Inhelder (1968) has studied reasoning in the mentally retarded. She proposes that retarded individuals are slower in development than non-retarded ones but that they do follow the same invariant sequence. Using the stage sequence Inhelder (1968) is able to classify retarded adults. She hypothesizes that the mildly retarded adult would be able to progress through Piaget's stage of concrete operations but no farther; the moderately retarded would be able to reach the preoperational intuitive period; the severely and profoundly retarded will be fixated at the sensorimotor stage. Fixation according to Inhelder means that the individual remains in that stage with no more progress and perhaps even decelerates. She also found individuals remaining in a state of transition between two stages for longer periods than normals. Reaching equilibrium under these conditions then seems more difficult for the retarded; social and emotional factors can
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interfere with the process. This combination of circumstances could make it difficult for a retarded person to reach his/her potential.

Kahn (1976) studied the relationship between moral maturity, cognitive reasoning, MA and CA with three groups of children. These were moderately retarded, mildly retarded, and non-retarded children matched on MA. Piagetian tasks were used to find differences in the three groups. Moderately retarded were found to be at lower developmental levels of cognitive reasoning and moral maturity than MA matched mildly retarded and non-retarded individuals. Kahn recommended that in order to determine an educational program and prognosis for moderately retarded more than just MA and/or IQ are needed. Other cognitive, social, and moral assessments must be made in order for proper programming to be determined.

The importance of developmental data was also noted by Steele (1975). After a longitudinal study involving 13 to 16-year-old educable mentally retarded students, 68% showed no gain in developmental level on Piagetian test items. Steele concluded that materials for curriculum should be on the level of the student and that developmental data provide more relevant information for education than IQ scores.

Stephens, along with several colleagues (Stephens, McLaughlin, Hunt, Mahaney, Kohlberg, Moore, and Aronfreed, 1974) has done extensive longitudinal research with the retarded on the development
of reasoning, moral conduct, and moral judgment. The subjects were 75 non-retarded and 75 mildly retarded between the ages of 6 and 18 years who were evaluated every two years. The retarded showed slower progress than their normal counterparts, but it would seem fixation did not occur in the older children as one might have expected from Inhelder's work (1968). A slowing down period in the adolescent period was noted with more change appearing in the late teens. Stephens and McLaughlin (1974) found deficits in the retarded that could not seem to be accounted for by MA or CA. They state:

Significant differences which are not accounted for by CA or MA do exist between the operational thought of non-retarded and retarded persons. These differences appear to involve the categorization, flexibility, and reversibility required in tasks involving conservation and classification (p. 126).

Klien and Safford (1977) point out the "tremendous variability in cognitive MR task performance within IQ categories" (p. 213), and they suggest that "research should attempt to identify specific aspects of concept learning and the cognitive processes involved" (p. 213). Studies on causal thinking such as the current one should help to fill that need.

Summary and Implications

Given a review of the citations listed in this study several
implications can be drawn. These are:

1. Piagetian theory is viewed as being applicable to the mentally retarded.

2. There is precedent for using Piagetian theory with the mentally retarded.

3. There is precedent for using CA and MA contrast samples.

4. There is justification in comparing the retarded against non-retarded children.

5. Precausal thinking is another dimension for understanding the mentally retarded.
CHAPTER III
METHODS AND PROCEDURES

Subjects

The sample used in this study was comprised of 72 children between the chronological ages of 3 1/2 years to 10 1/2 years. Three groups of children were selected in order to study precausal thinking in non-retarded and mildly mentally retarded children.

The subjects in Group I were 24 mildly mentally retarded children as defined by the Michigan Guidelines (see definitions). Their chronological ages ranged from 6 1/2 years to 10 1/2 years. Their mental ages were between 4 and 6 1/2 years. There were 10 males and 14 females in Group I.

The subjects in Group II were 24 non-retarded children between the chronological ages of 6 1/2 years and 10 1/2 years. Each child in Group II was matched with a child in Group I on chronological age. Each match was within one month of the birthdate of each child in Group I. There were 15 males and 9 females in Group II.

The subjects in Group III were 24 non-retarded children between the chronological ages of 3 and 6 1/2 years. Each child in Group III was matched with a child of the same mental age in Group I.
Twelve subjects in Group III were males and 12 were females.

Instrumentation

Precausal Thinking

The experimental questionnaires developed by Laurendeau and Pinard (1962) were administered to each subject. The questionnaires are reproduced in Appendix A. These questionnaires serve as the measure of precausal thinking. They were described by Laurendeau and Pinard as a systematic replication of Piaget's main experiments on precausal thinking.

These four questionnaires were chosen because they are purely verbal and examine four areas of children's precausal thinking. These areas and the concept they are related to are:

<table>
<thead>
<tr>
<th>Area</th>
<th>Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>The concept of dream</td>
<td>Realism</td>
</tr>
<tr>
<td>The concept of life</td>
<td>Animism, dynamism</td>
</tr>
<tr>
<td>The concept of night</td>
<td>Artificialism, finalism</td>
</tr>
<tr>
<td>The concept of clouds</td>
<td>Explanation of natural motions-dynamism</td>
</tr>
</tbody>
</table>

Laurendeau and Pinard (1962) consistently verified the existence of a hierarchy of stages of precausal thinking when they developed the questionnaires. They used three judges to validate the classification by stages. The results support the validity of this classifi-
cation used in the study when the questionnaires were developed. Tetrachoric correlations yielded coefficients between .59 and .78, indicating a relationship among the "evolution" of the concepts examined. Correlations between chronological age and the questionnaires ranged from .86 for the explanation of dream to .74 for the concept of life. The youngest children thought in terms of precausality, the older in terms of causality.

The Peabody Picture Vocabulary Test (PPVT) developed by Dunn (1965) was administered to Group III. It has emerged as a measure of mental age for research purposes as it yields a mental age score as an estimate of mental age (Williams, 1977). It has been noted that it is a quick intelligence test for screening learning difficulties, for purposes of assessing intellectual capacity, and for educational placement (Colarusso, McLeskey & Gill, 1977).

Reliability coefficients ranged from .77 for youngsters 2 1/2 years of age to .84 for 18-year-olds (Dunn, 1958). Norris, Hotel and Brooks (1958, p.18) found differences in scores on the two test forms (A and B) to be so small as to leave little doubt as to their equivalence.

The test has content and construct validity according to the author (Dunn, 1965). Congruent validity was established by correlating the PPVT and the Stanford Binet. Correlation coefficients ranged from .82 to .86. Concurrent validity correlations were .50 with
other measures of scholastic achievement (Dunn, 1965).

Design

The design for this study was patterned after a report by Goulet (1968). Goulet demonstrated the efficiency of employing two normal samples with one mildly mentally retarded sample. With this design, two dimensions, that of chronological age and that of mental age, can be studied simultaneously. The design includes two matched samples of non-retarded children, one equated on MA and one equated on CA for each group of retarded. It has the advantage of yielding more information to the investigator concerned with identifying the nature of differences in retardates.

Procedures

Data Gathering

All children in Group I were in classes for the educable mentally impaired (retarded) which comply with the Michigan School Guidelines. Due to school policy, test data were not available for those children. According to Michigan law, each child placed in such classes must fall within 2 to 3 standard deviations below the mean as determined through intellectual assessment. The mean scores which fall between 2 and 3 standard deviations below the mean on the WISC (62.5) was used for estimating mental ages. Precedence for
this is found in a study by Stephens (1971) in which she used a range
for estimating mental age. Using the standard formula for MA,
\[ MA = \frac{IQ \times CA}{100} \]  (Kirk & Johnson, 1951, p. 42) the estimated mean IQ
was used along with the chronological age of the child in the formula.
The formula is based on the Stanford Binet concept of MA for children.
By substituting the IQ score and the chronological age of the child in
the formula, a mental age estimate resulted.

The children in Group II were chosen and questioned by a graduate class in Assessment Techniques in Special Education. They were
asked to find a child that matched a child in Group I on chronological
age. The chronological age of the child was to have been not more
than one month different than the child in Group I. All the graduate
students had had at least one class in assessment prior to the one in
which they were enrolled. The following directions were given to
the graduate students before they administered the questionnaires:

1. Administer the questionnaire to a member of the class
before it is administered to a child.

2. Listen to the tape recording of an administration of the
questionnaire. This was done in class with all students
present.

3. Tape record your administration of the questionnaire.

4. Record verbatim all responses by the child, then check
with what is heard on the tape.
5. Turn in the protocol and the tape recording to the instructor. The tape recording helped to ensure the fact that a child was used for the administration and that verbatim responses were recorded on the protocol.

The children in Group III were students in Mrs. Gagie's Nursery School or lived in the neighborhood adjacent to it. The PPVT was administered to each child individually. If their mental age matched the mental age of a child in Group I, they were placed in Group II as the mental age match for the child in Group I.

The experimental questionnaires were administered individually to each child in all three groups. All responses were recorded verbatim on protocols for later scoring and validation by judges.

Scoring

Each of the four concepts on the questionnaire were scored separately, but responses to each concept were scored as a comprehensive unit. A separate answer does not hold importance alone; it is important to the extent that it is likely "to indicate a verifiable trend toward a specific mode of reasoning" (Laurendeau & Pinard, 1962). All answers, whether right or wrong, were studied and interpreted. It has been pointed out by the test developers that the wrong answers are often more significant and present a better picture of the true level of the child's explanations (Laurendeau & Pinard, 1962).
than the right ones. Complete directions for scoring were taken from *Precausal Thinking in the Child* (Laurendeau & Pinard, 1962) and are presented in Appendix B.

It is necessary to be very thorough in the scoring procedures. The procedure is outlined in Appendix B along with examples of the stages. For example, with reference to clouds, one would carefully compare the responses recorded verbatim on the protocol with the responses in the scoring procedures in Appendix B. One must look qualitatively at the responses rather than quantitatively. Although the procedure is complicated, it offers a new means of assessment.

Reliability of Scoring Procedures

In order to verify the consistency in scoring procedures, a panel of four judges were asked to categorize a random sample of questionnaires. Each judge was given a random sample from the three groups of questionnaires. Using the scoring procedures outlined by Laurendeau and Pinard (1962), each judge was asked to carefully read the total responses to an individual questionnaire and then to categorize it by the method outlined. The judges were able to categorize each questionnaire by stages. The mean agreement was 53% for the total item-by-item categorization. Although the agreement was low, it was felt to be sufficient for the purpose of this study. It was the first attempt by these four judges at such a scoring procedure.
To establish rater reliability all questionnaires were scored twice by the writer with a 2 week interval between scorings. A percentage was calculated for the number of times there was agreement between the two scorings. These were as follows:

1. concept of dreams - 85% agreement between first and second scorings
2. concept of life - 97% agreement between first and second scorings
3. concept of night - 88% agreement between first and second scorings
4. concept of movement of clouds - 76% agreement between first and second scorings

Analysis of the Data

The Extension of the Median Test was used to analyze the data. Siegel (1956) called these tests "distribution free" since the techniques do not make numerous or stringent assumptions about parameters. Since the data that the questionnaires yielded were ordinal and the samples were independent, the Median Test was applicable for analyzing the data. According to Siegel (1956) if there are more than 40 subjects an Extension of the Median Test should be used. There were 48 subjects in this study so the Extension of the Median Test was used. This test determines whether
two independent groups are drawn from the same population with equal medians.

In using this test the null hypothesis states that the two groups are from populations with the same median; the alternative hypothesis states that the median of one population is different from that of the other or that the median of one population is higher than the median of the other.

Siegel points out one difficulty with computing the median test: several scores may fall at the combined median. If this happens he suggests two alternatives: 1) if the number of the combined groups is large, and if only a few cases fall at the combined median, those cases may be dropped from the analysis or 2) the groups may be dichotomized as those scores which exceed the median and those which do not. In this case, the troublesome scores would be included in the second category. The latter alternative was used in this study. A chi square value and the associated chi probability resulted.
CHAPTER IV
RESULTS OF THE STUDY

The specific problem addressed in this study was: Is there a difference in the developmental levels of non-retarded and mildly mentally retarded children on questions pertaining to physical causal thinking? Three groups were used to study the problem with comparisons being made on four Piagetian concepts. The comparisons were:

1. The mentally retarded group was compared with the non-retarded group matched on chronological age.

2. The mentally retarded group was compared with the non-retarded group on mental age.

These comparisons were made for each of four concepts: dreams, life, movement of clouds, and origin of night. The concepts used were developed by Laurendeau and Pinard (1962) directly from the work of Piaget (1930) when he investigated physical causal thinking in non-retarded children.

Method of Analysis

Due to the nature of the data obtained from the instrument (Laurendeau & Pinard, 1962), a nonparametric test was chosen: the Extension of the Median Test. Before applying the Extension of
the Median Test, it was necessary to first determine the median score for the combined groups (Siegel, 1956). If more than one score fell at the common median, then the score was dichotomized into those scores which exceeded the median and those scores which fell at or below the median (Siegel, 1956).

This study necessitated eight research hypotheses. The first four hypotheses were concerned with the performance of the retarded and non-retarded of the same chronological age on the four concepts. The research hypotheses stated that the retarded would be at lower developmental levels than the non-retarded, thus the number of scores falling at or below the median for the retarded group would be greater than for the non-retarded group. The null hypotheses stated that there would be no difference between the two groups, thus the medians would be the same. A one-tailed test was used since the hypotheses predicted a direction for the outcome.

The last four hypotheses compared the mentally retarded with the non-retarded matched on mental age. The research hypotheses stated that the two groups would be at the same developmental levels, thus the medians would be the same. For these hypotheses the research and the null hypotheses were the same. A two-tailed test was used since the four hypotheses were not directional.

The eight research hypotheses were presented in Chapter I. For statistical analysis these hypotheses were stated in the null
form. The .05 level of significance was utilized for all samples. Tuckman (1972) calls this an arbitrary level that has often been considered by behavioral scientists an acceptable level of confidence in making the decision to accept the finding as reliable or rejecting it as a chance occurrence. The computed level of significance has been reported for the reader's benefit. All results reported in this chapter were obtained through the use of the Western Michigan University Computer Center's program, NONPAR (Anema, 1972).

Hypothesis I

There will be no difference in the developmental levels of retarded and non-retarded children of the same chronological age on the concept of dream. The results of the analysis used to test this hypothesis are presented in Table 4.1. In this and subsequent tables, the obtained results were underlined.

Table 4.1

<table>
<thead>
<tr>
<th>CA Match -- Concept of Dreams</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Above the Median</td>
</tr>
<tr>
<td>Expected</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Retarded</td>
</tr>
<tr>
<td>Non-retarded</td>
</tr>
</tbody>
</table>

\[ X^2 = 7.3500 \quad df = 1 \quad p = .00671 \]
The above data indicate that there was a significant difference between non-retarded and retarded children on the concept of dream, with more retarded than non-retarded falling below the median; thus the null hypothesis is rejected and the research hypothesis supported.

Hypothesis 2

There will be no difference in the developmental levels of retarded and non-retarded children of the same chronological age on the concept of life. The results of the analysis used to test this hypothesis are presented in Table 4.2.

Table 4.2

<table>
<thead>
<tr>
<th>CA Match -- Concept of Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above the Median</td>
</tr>
<tr>
<td>Expected</td>
</tr>
<tr>
<td>Retarded</td>
</tr>
<tr>
<td>Non-retarded</td>
</tr>
</tbody>
</table>

\[ X^2 = 5.5753 \hspace{1cm} df = 1 \hspace{1cm} p = .01822 \]

The above data indicate that there was a significant difference between non-retarded and retarded children on the concept of life with more non-retarded than retarded falling above the median; thus
the null hypothesis is rejected and the research hypothesis supported.

**Hypothesis 3**

There will be no difference in the developmental levels of retarded and non-retarded children of the same chronological age on the concept of movement of clouds. The results of the analysis used to test this hypothesis are presented in Table 4.3

<table>
<thead>
<tr>
<th>Table 4.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA Match -- Concept of Movement of Clouds</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Above the Median</th>
<th>Below the Median</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expected</td>
<td>Obtained</td>
</tr>
<tr>
<td>Retarded</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Non-retarded</td>
<td>12</td>
<td>19</td>
</tr>
</tbody>
</table>

\[ X^2 = 28.2250 \quad df = 1 \quad p < .0001 \]

The above data indicate that there was a significant difference between non-retarded and retarded children on the concept of movement of clouds. The difference was in the hypothesized direction; thus the null hypothesis is rejected and the research hypothesis supported.
Hypothesis 4

There will be no difference in the developmental levels of retarded and non-retarded children of the same chronological age on the concept of the origin of night. The results of the analysis used to test this hypothesis are presented in Table 4.4.

Table 4.4

<table>
<thead>
<tr>
<th>CA Match -- Concept of Night</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Above the Median</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected</td>
<td>Obtained</td>
<td>Expected</td>
</tr>
<tr>
<td>Retarded</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Non-retarded</td>
<td>12</td>
<td>16</td>
</tr>
</tbody>
</table>

\[ X^2 = 10.3714 \quad \text{df} = 1 \quad p = .00128 \]

On the concept of night the above data indicate that there was a significant difference in the hypothesized direction between non-retarded and retarded children; thus the null hypothesis is rejected and the research hypothesis is supported.

Hypothesis 5

There will be no difference in the developmental levels of retarded and non-retarded children matched on mental age on the
concept of dreams. The results of the analysis used to test this hypothesis are presented in Table 4.5

Table 4.5
MA Match -- Concept of Dreams

<table>
<thead>
<tr>
<th></th>
<th>Above the Median</th>
<th>Below the Median</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expected</td>
<td>Obtained</td>
</tr>
<tr>
<td>Retarded</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Non-retarded</td>
<td>12</td>
<td>0</td>
</tr>
</tbody>
</table>

\[ X^2 = 1.4222 \quad df = 1 \quad p = .23304 \]

The above data indicate that there was not a significant difference between the non-retarded and retarded children on the concept of dreams, thus the null hypothesis and research hypothesis are supported.

Hypothesis 6

There will be no difference in the developmental levels of retarded and non-retarded children on the concept of life. The results of the analysis to test this hypothesis are presented in Table 4.6.
Table 4.6
MA Match -- Concept of Life

<table>
<thead>
<tr>
<th></th>
<th>Above the Median</th>
<th>Below the Median</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expected</td>
<td>Obtained</td>
</tr>
<tr>
<td>Retarded</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Non-retarded</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>

\[ x^2 = 2.2222 \quad df = 1 \quad p = .13604 \]

The above data indicate that there was a significant difference between the non-retarded and retarded children on the concept of life; thus the null hypothesis and research hypothesis are supported.

Hypothesis 7

There will be no difference in the developmental levels of retarded and non-retarded children on the concept of movement of clouds. The results of the analysis to test this hypothesis are presented in Table 4.7.

The data indicate that there was not a significant difference between the non-retarded and retarded children on the concept of the movement of clouds, thus the null hypothesis and the research hypothesis are supported.
Table 4.7

MA Match -- Concept of Movement of Clouds

<table>
<thead>
<tr>
<th></th>
<th>Above the Median</th>
<th>Below the Median</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expected</td>
<td>Obtained</td>
</tr>
<tr>
<td>Retarded</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Non-retarded</td>
<td>12</td>
<td>13</td>
</tr>
</tbody>
</table>

\[ X^2 = 3.1361 \quad \text{df} = 1 \quad p = .07658 \]

Hypothesis 8

There will be no difference in the developmental levels of retarded and non-retarded children on the concept of the origin of night. The results of the analysis to test this hypothesis are presented in Table 4.8.

Table 4.8

MA Match -- Concept of Origin of Night

<table>
<thead>
<tr>
<th></th>
<th>Above the Median</th>
<th>Below the Median</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expected</td>
<td>Obtained</td>
</tr>
<tr>
<td>Retarded</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Non-retarded</td>
<td>12</td>
<td>9</td>
</tr>
</tbody>
</table>

\[ X^2 = .0000 \quad \text{df} = 1 \quad p > .9999 \]
The above data indicate that there was not a significant difference between the non-retarded and retarded children on the concept of the origin of night; thus the null hypothesis and the research hypothesis are supported.

Summary

Eight research hypotheses were presented to study precausal thinking in non-retarded and mildly mentally retarded children. All eight research hypotheses were supported by the analysis of the data. Mentally retarded children were found to be at lower developmental levels than their non-retarded peers of the same chronological age. Mentally retarded and the non-retarded of the same mental age were found to be at the same developmental levels.

Other outcomes of the study are discussed in Chapter V. Those include information about the administration, scoring, and difficulty of the instrument used as well as a discussion about the utility of such an instrument with mentally retarded children.
CHAPTER V
SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

The specific problem addressed in this study was: Is there a difference in the developmental levels of non-retarded and mildly mentally retarded children on questions pertaining to physical causal thinking? Three groups of children were used to study the problem with comparisons for Piagetian concepts. The concepts and procedures used were developed directly from the work of Piaget (1930) in his investigation of physical causal thinking in non-retarded children. The four concepts used for group comparisons were: dreams, life, movement of clouds, and origin of night. The following comparisons were made after questioning retarded and non-retarded children on the four concepts.

1. A mentally retarded group was compared with a non-retarded group matched on chronological age.
2. A mentally retarded group was compared with a non-retarded group matched on mental age.

These two comparisons were made on each of the four concepts. This resulted in eight hypotheses. All eight research hypotheses presented for study were supported when data from the
protocols were analyzed. The expected differences in the retarded and the non-retarded of the same chronological age were found. As was expected there were no differences between the retarded and non-retarded of the same mental age.

As was stated in Chapter I, two additional purposes were also addressed in this study. The second purpose was to learn more about the administration, scoring, length, and difficulty of the Laurendeau and Pinard procedures for studying precausal thinking. A third purpose was to determine the utility of such a method with mildly retarded children.

Limitations

A number of factors can be identified which influence the generalization of the results of this study. These factors should be taken into account when interpreting the results.

Certain limitations are associated with the sample. It was necessary to use an intact sample of mildly mentally retarded children in the study. Access to mildly mentally retarded children was limited due to school policies regarding externally based research. The sample employed thus may not be representative of the population of mildly retarded students. There also was not an equal number of boys and girls in the study. In the retarded population there are not an equal number of retarded boys and girls; there are more boys (Robinson & Robinson, 1977) that are retarded.
This study, however, had a few more girls than boys.

The design used also has certain limitations. This study was a comparison of mildly mentally retarded and non-retarded children using a matched pairs design. The groups were not matched on sex or socioeconomic level due to problems in gaining access to sufficient numbers of children to make such matching feasible. They were matched on the basis of CA and MA. The use of such a procedure, while frequently used, does have the limitation of potential inequality on other variables.

The psychometric status of each retarded child was based upon estimates rather than on direct measurement, which is another limitation. Psychometric data were not available from the schools due to school policy regarding the release of information. Comparisons were made without reference to these data. A range of IQ was used instead. The pairs were matched using an estimated IQ for the retarded and using a mental age derived from the Peabody Picture Vocabulary Test (PPVT) (1965) for the non-retarded children. The work of Stephens (1971) supports use of this procedure.

Conclusions

Given the results of this study and the above limitations the following conclusions regarding the developmental levels of non-retarded and retarded children on questions pertaining to physical

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causal thinking can be drawn.

1. The findings of this study support the existence of pre-causal thinking and the forms of thought inherent in it. Realism, animism, artificialism, dynamism and finalism were all apparent in responses to the four concepts studied in both the retarded and non-retarded children. This is consistent with the findings of Laurendeau and Pinard (1962), Lerner (1968), Piaget (1930), and Russell and Dennis (1939) who observed subjective and egocentric thinking in children which is referred to as precausal thinking by Piaget (1930).

2. Both retarded and non-retarded children were found to pass through the same invariant sequence of developmental stages as has been noted in other studies with non-retarded children (Inhelder, 1968; Laurendeau & Pinard, 1962; Piaget, 1930) and retarded children (Inhelder, 1968; Stephens et al., 1974; Woodward, 1945).

3. Analysis of their responses revealed that the retarded were behind their chronological age peers in the development of precausal thinking. Their thinking was found to be more like that of their mental age mates. These findings support the findings of Inhelder (1968) who also found that the retarded were slower in

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development and seemed to fixate at one stage for longer periods of time than the non-retarded.

Conclusions can also be drawn regarding the second purpose of this study which was to learn more about the administration, scoring, length and difficulty of the Laurendeau and Pinard procedures for studying precausal thinking.

1. It can be concluded that the procedures presented by Laurendeau and Pinard can be administered successfully to children from ages 3 1/2 to 10 1/2 years, both retarded and non-retarded.

2. The scoring procedure was found to be lengthy. A great deal of caution and care must be expressed to eliminate possible rater subjectivity. It was necessary to become familiar with the variety of responses children displayed in each stage. All the questions related to each concept must be carefully analyzed by comparing the responses of the children being tested to examples given in the scoring section of Causal Thinking in the Child. Through the analysis of all questions asked on one concept, the stage for that concept can then be determined.

3. For this study it was necessary to present all four questionnaires to each child in one sitting. Limited access to the children made this necessary. The
questionnaires were presented in the same order to each child in the study. By the time the children had answered all questions on the concept of dram and the concept of life, about twenty minutes had passed. By that time evidence of restlessness became apparent. The evidence was foot tapping, playing with fingers and wiggling in the chair. The average time for administering all four questionnaires was about 30 minutes.

4. There was no difficulty in administering the questionnaires to any of the groups. The information gained from the procedure was well worth the time it took to administer.

Investigation of the third purpose of this study--to determine the utility of the Laurendeau and Pinard procedure with mildly mentally retarded children, led to the following conclusions.

1. The use of the questionnaires developed by Laurendeau and Pinard with the mildly mentally retarded, as well as the non-retarded, proved successful. The mentally retarded of all ages from 3 1/2 to 10 1/2 years were able to respond to the questions in such a manner that each concept could be categorized in a stage of precausal thinking as outlined by Laurendeau and Pinard.

2. The mentally retarded students were found to take a
longer amount of time to respond than the non-retarded. They were slower to initiate the response and they took longer to complete the response. The method was still, however, easily used with the mildly retarded children.

Implications and Recommendations

Implications

Given the limitations of and conclusions from this study, several recommendations and implications can be drawn.

The stage theory of development could offer the teacher a very concrete way of looking at all children's intellectual growth. When the same responses to questions are given by many children, it can be observed that the children of the same developmental stage understand the world in the same way. Listening to what the child has to say becomes important to understanding the developmental levels he/she has reached. Craig (1957) pointed out that "just as a child changes in size and weight, he is also changing in his interpretations of the environment" (p. 16). What is logical thought for the adult is not necessarily so for the child; an understanding of the characteristics of developmental stages enables the teacher to become aware of that.

The need for more precise assessment techniques with handicapped children has been stressed. The use of criterion referenced

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or informal assessment techniques, based on Piaget's stages of development, could provide information about a child that traditional psychometric testing does not. The two used in conjunction could provide more precise information about the child's level of cognitive functioning. Arranging an appropriate setting for learning experiences, as well as an appropriate curriculum for each individual child, would be facilitated by more precise information about their level and rate of intellectual development. Since assessment could be done in the classroom setting by the teacher, it could be continuous and it would be inexpensive. By being continuously aware of the child's progress, the goals and objectives in the educational plan could be constantly altered to fit the new levels of development.

The same implication was identified by Cain (1976). In discussing goals for instruction and level of cognitive development for a five-year-old, she states:

Proceeding from Piaget's framework, the teacher provides the interaction in a preoperational way, matching tasks with the level of cognitive development, just as a parent matches a child's clothes with the child's size, rather than the child's age (p. 61).

The following are some specific recommendations for further research which came as an outgrowth of this dissertation. These recommendations fall into five categories: administration of the
questionnaires; invariant sequence of development; related measures; other comparisons, and preschool. Below are the recommendations.

1. Administration of the questionnaires using one concept at each sitting instead of all four at one sitting could be explored. Controlling the order of sequence could be done to eliminate differences due to fatigue. This could be accomplished by rotating the order of presentation on a schedule; the same order of presentation would be given to every fourth child.

2. The invariant sequence of development in precausal thinking of retarded and non-retarded children could be further validated by a longitudinal study. Two recommendations are: (a) for non-verbal children the questionnaires could be translated into picture form, and (b) the same questions could be asked and the child would be expected to point to the appropriate picture.

3. Comparisons of other groups might be feasible. The non-retarded, retarded and gifted could be compared. Minority groups matched on MA with middle-class white children could be compared using the questionnaires; such questionnaires could potentially be a means of non-discriminatory testing. Slow learners could also be compared with the retarded and non-retarded.
4. Preschool children could be studied. Using an experimental and control group, the questionnaires could be administered as a pretest. An intervention could be used with the experimental group to teach the four concepts or the thought processes associated with them. The data from the posttests should provide information on the possibility of accelerating developmental stage progress through learning.

The questionnaires have been devised to investigate one aspect of cognitive development—precausal thinking. The results of such investigations could be helpful to special educators for assessment purposes. Caution should be taken to use such information only for the better understanding of cognitive development and not for labeling or lowering one's expectations for a child's performance.
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APPENDIX A

Experimental Questionnaires

THE CONCEPT OF DREAM

Instructions

Ask the child each one of the following questions, trying always to make sure he understands it well. When necessary, change the wording of the questions, using terms more familiar to the child, but be very careful never to suggest more than is included in the instructions. Record all answers verbatim.

A. General questions

"Do you know what a dream is? Do you dream sometimes at night?"

B. Specific questions

1. Origin of dreams

"Tell me, where does a dream come from?"
"Where are dreams made, where do they come from?"
"Do they come from inside of you, or from outside of you?"
"Who makes the dreams come?"
"Is it you, or someone else? Who?"

2. Location of dreams

"While you are dreaming, where is your dream? Where does it go on, in what place is it?"
"Is it inside of you, or in your room?"

(a) If the dream is internal (in the head, in the thought, etc.), say:
"If we could open your head while you are dreaming, if we could look into your head, could we see your dream?
"Why do you say that we could (not) see your dream?
"Then, where is it, in your head, your dream?"

(b) If the dream is external (in the room, on the wall, under the bed, close to the eyes, etc.), say:
"Is it in your room (on the wall, etc.) for real, or is it only as if it were there? Or does it only seem to be there?
"While you are dreaming, are your eyes closed or open?
"Then, where is the dream?
"When you dream that you are playing in the street, where is your dream? In the street, or in your room?"

(c) In both cases, go on with:
"Is there something in front of you while you are dreaming?
"Your mother, when she is in your room, can she also see your dream?
"And I, if I were in your room, could I see your dream?
"Why do you say that I could (not) see your dream?"

3. Organ of dreams
"Then, tell me, what do we dream with? Is it with our hands? With what, then?"

4. Cause of dreams
"What did you dream about, the last time?
"Why did you dream about that?"
If the child says he did not dream, ask him:
"Let's make believe you dreamed you had fallen and hurt yourself... Why did you dream about that?
"Then, do you know why we dream? Why there are dreams?"

5. Substance of dreams
"What is a dream made of? Is it made of paper? Then, what is it made of?
"Can we touch our dreams?... Why do you say that we can (cannot) touch our dreams? "Is a dream a thought, or is it a thing?"

6. Reality of dreams
"During the night, when you dream you are playing, are you playing for real? "Is it the same as when you are playing during the day? "Then, are our dreams true?"

THE CONCEPT OF LIFE

Instructions
Ask the child each one of the following questions, trying always to make sure he understands it well. When necessary, change the wording of the questions, using terms more familiar to the child, but be very careful never to suggest more than is included in the instructions. Record all answers verbatim.

A. General questions
"Do you know what it is to be alive, to be living? What does it mean? "Give me the name of some things which are alive?"

B. Specific questions
1. Individual objects
   (a) "Is a mountain alive? "Why do you say it is (not) alive?"
   (b) Continue with the following objects, asking each time the same question as in (a):

   (2) the sun     (9) a bird     (16) the rain
   (3) the table   (10) a bell     (17) a tree
   (4) an automobile (11) the wind (18) a snake
   (5) a cat      (12) an airplane (19) a bicycle
   (6) a cloud    (13) a fly      (20) a fish
   (7) a lamp     (14) the fire   (21) a pencil
   (8) a watch    (15) a flower

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2. Comparisons
   (a) "Take the rain and the fire: is one of them more alive than the other? "Why do you say that it is the . . . which is more alive?"
   (b) Continue with the following comparisons, asking each time the same questions as in (a):
   (2) " . . . the wind or a bicycle?"
   (3) " . . . a fly or a cloud?"
   (4) " . . . a child or a cat?"
   (5) " . . . a flower or an airplane?"

THE ORIGIN OF NIGHT

Instructions
Ask the child each one of the following questions, trying always to make sure he understands it well. When necessary, change the wording of the questions, using terms more familiar to the child, but be very careful never to suggest more than is included in the instructions. Record all answers verbatim.

A. General questions
   "Do you know what the night is? Tell me, what is night? "Why is it dark at night? "Where does the dark come from at night? What makes it night?"

B. Alternate sections
   In answer to the above questions, the child usually regards either one of three different phenomena as the origin of night: (1) sleep; (2) clouds (or black "air"); (3) the disappearance of the sun. According to the child's answer, proceed with the appropriate series of prepared questions listed in one of the three sections below.
   It may happen, however, that the child's initial answers do not fall exactly into one of the three categories suggested above. When this occurs, try to clarify the first response by using the child's answer in a question until his explanations indicate
which of the three phenomena he considers as being the origin of night. For instance, ask: "How does ... [use the child's initial answers] ... go about making the night?" Whenever this is necessary, record each one of the additional questions and each one of the child's answers verbatim. Should the child change the category of his answer during the questioning, ask all the questions of the section corresponding to the new category.

Section 1: sleep

"Do you sleep, sometimes, during the day? Can we sleep during the day?
"Is it dark when we sleep in the daytime?
"Then, why is it dark at night?
"Why is it dark only at night?
"Are there times when it is night and you do not sleep?
"When you stay up late at night, is it dark outside?
"Then, how is it that it is dark when you do not sleep?"

Section 2: clouds (or black "air")

"Where do these clouds come from? What makes these clouds?
"How does ... [the child's answer] ... make the clouds?
What does he make them with?
"Why do these clouds come only at night?
"The clouds at night, are they white or black?
"Can white clouds make it night?
"Why do you say that ... [the child's answer] ... ?
"During the day, are there clouds sometimes?
"Then why, when there are clouds in the daytime, is it not dark like at night?
"At night, is it black clouds which take the place of white ones, or white clouds which turn black?
"Where do the white clouds go at night?"

Section 3: disappearance of the sun

"Can you explain how it becomes dark when the sun is gone?
"Where does the sun go at night?
"Why does the sky become dark at night?
"Is the sun always there during the day? When it rains, do we see the sun?
"Then, why is it not dark like at night, when it rains?
"Then, why is it dark only at night?"

C. Concluding questions (to be asked of all children)
Ask all subjects, whatever their answers to the preceding questions may have been:
"Can we make the night in this room? If I pull the blinds down, is it going to be dark?
"Then, how is it? Where does the dark in the room come from?
"And the dark outside, what is it?
"When it is light, why is it light?
"What makes it day?"

THE MOVEMENT OF CLOUDS

Instructions
Ask the child each one of the following questions, trying always to make sure he understands it well. When necessary, change the wording of the questions, using terms more familiar to the child, but be very careful never to suggest more than is included in the instructions. Record all answers verbatim.

A. General questions
"Have you ever seen clouds moving forward?
"What makes them move?"

B. Alternate sections
In answer to the above questions, the child usually names either one of three different categories of causes behind the movement of clouds: (1) man (makes the clouds move as he walks); (2) God, celestial bodies, any meteorological phenomenon, even the clouds themselves, or man (without any reference to walking), etc.; (3) the wind. According to the child's answer, proceed with the appropriate series of prepared questions listed in one of the three sections below.
It may happen, however, that the child's initial answers do
not fall exactly into one of the three categories suggested above. When this occurs, try to clarify the first response by using the child's answer in a question until his explanations indicate to which of the three categories given above he ascribes the cause of the movement of clouds. For instance, ask: "How does ... [repeat the child's answer] ... go about making the clouds move?" Whenever this is necessary, record each one of the additional questions and each one of the child's answers verbatim. Should the child change the category of his answer during the questioning, ask all the questions of the section corresponding to the new category.

Section 1: man (as he walks)

"Can you make them move?
"When I walk and you stand still, do the clouds move?
"And at night, when everybody is asleep, do the clouds move?"

If yes:
"But you just told me it's people who make the clouds move when they are walking?"

If no:
"Why don't the clouds move?"

"Have you ever seen if the clouds move when you stand still?
"Do they move when you stand still?"

If yes:
"Then, what makes them move?"

If no:
"Why don't they move?"

"Why do the clouds sometimes move fast and sometimes move slowly?
"Can the clouds go where they want? ... Why can [can't] they go where they want?"

"Do the clouds know they are moving? Why do [don't] they know they are moving?"

"Do the clouds know it's we who make them move, when we are walking?"
"Can the wind make the clouds move?"

If yes:
"How does the wind go about making the clouds move?"
"Where does the wind come from?"
(then continue with section 3)

If no:
"Why can't the wind make the clouds move?"

Section 2: God, celestial bodies, etc.
"How does it [he, she, they] go about making the clouds move?"
[or, "How do the clouds go about moving by themselves, all alone?""]
"Do the clouds move by themselves alone, or is there something to make them move?"
"Do the clouds know they are moving?"
"Do they know it's . . . [the child's answer] . . . who make[s] them move?"
"Why do you say that they [do not] know it?"
"And . . . [the child's answer] . . . does it [he, she, they] know it makes the clouds move?"
"Can the clouds go where they want? . . . Why can [can't] they go where they want?"
"But why do the clouds move?"
"Why do the clouds move fast sometimes, and sometimes move slowly?"
"Can the wind make the clouds move?"

If yes:
"How does the wind go about making the clouds move?"
"Where does the wind come from?"
(then continue with section 3)

If no:
"Why can't the wind make the clouds move?"

Section 3: the wind
"Where does the wind come from?"
"Can the clouds make wind?"
"By moving, can the clouds make wind?"
"When there is no wind, can the clouds move by themselves?"
"Where does the wind come from?
"How is the wind made?
"Give me the name of some thing which can make wind?
"Why do the clouds move fast sometimes, and sometimes move slowly?
"Can the clouds go where they want? . . . Why do you say they can [can't] go where they want?
"Do the clouds know they are moving?
"Do the clouds know it's the wind that makes them move?
"And does the wind know it makes the clouds move?"
APPENDIX B

Scoring Procedures

CHAPTER VIII

The Concept of Dream

The responses collected in the examination on the concept of dream may be classified into four main categories. The first one contains the most primitive types of reaction, those characterized by a total incomprehension of the examiner's questions or by a flat refusal to undergo the examination. The other categories represent the three essential phases that mark progressive understanding of the phenomenon: absolute realism, mitigated realism, and integral subjectivism. These three levels of response seem to correspond closely to Piaget's stages in spite of minor differences between the two types of categories. However, we considered it necessary to make new divisions within these three general groups. The protocols of children belonging to the same stage show indeed a wide diversity which cannot be overlooked. This variation may be especially observed in the transitional stages. Thus, the mitigated realism of the second stage includes all the possible steps between the total reification of the dream, attenuated by unskillful efforts at interiorization, on the one hand, and the almost complete subjectivation of the phenomenon, together
with a residual expression of realism on the other hand. To indicate the differences in such a global interpretation and to introduce greater homogeneity in the classification, it became indispensable to discriminate substages within the more general phases.

**STAGE 0**

**Incomprehension or Refusal**

Stage 0 includes all children who refuse, or are considered inapt, to answer the questions. At no time do these children show any sign of real understanding. Most of the time, they merely accept any suggestion as the interview goes on, or else they simply break away from the examination for some other interest. Here is an example:

12 (5:0): “You know what a dream is?—Yes.—Now, tell me, where does a dream come from?—I don't know.—Where are the dreams made; they come from where?—I don't know.—Do they come from inside of you, or from outside of you?—From outside. —Who makes the dreams come?—[... ]—Is it you, or someone else?—Somebody else.—Who?—I don't know.—While you are dreaming, where is your dream, where does it go on, in what place is it?—I don't know.—Is it inside of you or in your room?—In my room.”

Protocols of this type contain no indication of understanding: the child gives no evidence whatsoever of spontaneity, and it is only when answering questions presented in the form of suggestions that he may risk a choice between the two parts of the alternative offered. Moreover, this choice always fails

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1 The first figure indicates the number of the protocol, and the second one, in parentheses, the child's age in years and (:) months.
on the second suggestion, which almost invariably reveals a total absence of personal conceptions or convictions.

Answers belonging to this level are not always easily identified. Many subjects confuse the dream with some related phenomena, such as night or sleep. Even though some such answers may appear well adapted to the questions on dreaming, the examiner must be careful not to be taken in by this illusion. The following protocol is a good illustration of this confusion:

30 (4:0): "You know what a dream is?—It's people in the bed.—Now, tell me, where does a dream come from?—In the bed.—Where are the dreams made; they come from where?—[ . . . . ]—Do they come from inside of you, or from outside of you?—Outside of me.—Who makes the dreams come?—[ . . . . ]—Is it you or some one else?—Somebody else.—Who?—Jesus in Heaven.—While you are dreaming, where is your dream, where does it go on, in what place is it?—In the bed."

Besides these frequent and somewhat logical confusions between dreaming and sleeping, there are others more unusual and more superficial, based essentially on word assonance. For instance, the French word for dream (rêve) is sometimes assimilated to that of "rat" or "Revel" (the commercial name of an ice sherbet very popular among children). Finally, the questions on dream readily lead to various fabulations, often induced by the element of fear which usually accompanies nightmares. Thus, some subjects will speak of "the big bad wolves," or "the cops chasing gangsters," or "the bad men who frighten little children," or "who bite little babies," and the like. In such circumstances, it is almost always fruitless to carry on with the examination: the child pays no attention to the questions except, once in a while, to catch a word that will allow him to elaborate further on his fanciful descriptions.

THE CONCEPT OF DREAM
STAGE 1

Integral Realism

As in Piaget's scale, the subjects belonging to stage I express their complete belief in the reality of dreams. The origin of the phenomenon is still often rather vague, but it is always external to the child. The most popular beliefs are that the dream comes from "the night," "the dark," "the window," "the trains," "the moon," "the lights," "my bed," etc. These explanations are usually coupled with an artificialistic cause: God, the Blessed Virgin, the devil, or the sandman fabricate the dreams and then send them to man. This artificialism is sometimes very complex since the child tries to explain the concrete mechanics of this fabrication. Other subjects, however, merely mention supernatural intervention. The examiner may be tempted to regard this artificialism as a simple confirmation of the belief in the external origin of the dream. However, this does not seem to be the only possible explanation. Far from being characteristic of the most primitive beliefs, the recourse to divine or supernatural beings may be observed at all levels. Indeed, even among children who hold the strongest convictions about the subjectiveness and individuality of dreams, a reference to the action of a divine power may often occur.

Even though this artificialism is almost always expressed in the same way, it undoubtedly changes in meaning throughout the course of the child's evolution. For young children, divine intervention is often assimilated to a real fabrication comparable to manual work performed by man. It may happen, then, that artificialism merges with a belief in the reality, or the external origin, of natural phenomena. With older children, however, divine action is dehumanized and the recourse to the omnipotence of God becomes necessary only as a last resort, that is, when naturalistic explanations are no longer
satisfactory to the child and he is led to look for a more distant cause. Piaget (1926) does not hesitate to compare this artificialism with that which permeates Aristotelian physics. It is well known that, according to Aristotle, the origin of all things is due to the action of a first cause, and yet the acceptance of this fact does not prevent the search for the physical laws regulating natural phenomena. Briefly, for the realistic child, the less elaborate forms of artificialism would constitute one means among others for expressing his belief in the external origin of dreams. For a child of greater maturity, on the contrary, artificialism would most frequently be equivalent to an admission of ignorance: incapable of giving a natural explanation of the dream, he calls upon the being to whom, according to what he has been taught, must be attributed the origin of all things. In its present form the questionnaire, unfortunately, does not clearly register this distinction. Hence, to avoid errors of interpretation, it seems preferable to ignore these artificialistic explanations, whatever their form, and to classify the children on the basis of the information yielded by other parts of the examination.

For the child belonging to stage 1, the events that occur in the dream have an origin external to the dreamer and also take place in front of him: "in my room," "on the wall," "in the window," "in front of me," "in the pillow," "just by our side," and the like. It is therefore not surprising to hear most children state that their eyes are open while they are dreaming. On the other hand, those who know that their eyes must be closed to sleep, and hence to dream, find themselves up against their own contradictory statements—a fact, however, which does not seem to shake their convictions.

12 (4:6): "Is it in your room for real, or is it only as if it were there?—For real.—When you dream, are your eyes closed or open?—Closed.—Then, where is your dream?—In my room.—

THE CONCEPT OF DREAM
How is it that you see your dream, if your eyes are closed?—I don’t know.”

Yet some children do try to find a solution to this problem by locating the scene of the dream as close to the dreamer as possible, while still leaving it on the outside.

27 (5:0): “[Contends in the first place that the dream is located outside, somewhere in the room.] When you dream, are your eyes closed or open?—My eyes are closed.—Then where is your dream?—Under my blanket.”

Children belonging to this stage usually agree that those who happen to be in the dreamer’s room while the dream is taking place can see the spectacle.

28 (4:0): “Your mother, when she is in your room, can she also see your dream?—Yes.—And I, if I were in your room, could I see your dream?—Of course.—Why do you say that I could see your dream?—Because I think it’s still there.”

Some subjects, perhaps already aware of the individuality of the dream, do not therefore agree that it may be seen by someone else, but the reasons they allege do not diminish its integral realism.

47 (4:6): “Your mother, when she is in your room, can she also see your dream?—No, she turns the light on; when she turns the light on, the dream goes away.”

25 (6:0): “Why do you say that I could not see your dream?—Because it is in my pillow.”

21 (5:0): “Why do you say that I could not see your dream?—Because you are not asleep.—If I were asleep?—You could see it.”

THE RESULTS
The reaction of this last subject is particularly interesting, since it is also observed equivalently among children belonging to primitive as well as to more mature stages. In some instances, the subject simply means that in order to dream one must sleep, without inferring the possibility that two persons could share the same dream. For other subjects, on the contrary—and the last case quoted is a clear example of this—the simple fact of sleeping in the same room seems sufficient to produce the same dream in all the sleepers. This is not surprising since the objects or the persons in the dream are located in the room.

Questions about the organ, the cause, the substance, and the reality of dreams elicit little additional information from subjects belonging to stage 1. For the most part, children do not understand the meaning of the questions and are ready to accept whatever suggestions are offered, no matter how improbable. Questions about the cause of the dream seem particularly baffling. Questions bearing on the reality of the dream are too equivocal to yield uniformly interpretable answers. As for the organ of the dream, it is often confused with its origin. The child will say that he dreams "with the moon," "with the clouds," "with the rain," "with God," "with my bed," and the like. A few children propose "the eyes" or "the face" as organs of the dream. Such answers merely indicate their belief in the exteriority of the phenomenon: the dream is a spectacle to be looked at. Finally, the child is also rarely capable of offering appropriate answers to questions bearing on the substance of dreams; but when he does, there are always manifestations of realistic beliefs typical of this stage: the dream is made of "cloth," "dough," "wall plaster," "wood," "skin," and the like. Here again, the same lack of differentiation between dreaming and reality prevails: if the content of the dream includes people, it is made of "skin"; if it involves objects, or if it is seen on the wall, it is made of "wood."
“cloth,” and so on. It is thus quite natural for children belonging to this stage to accept the possibility of touching their dreams.

16 (4:0): “Can we touch dreams?—Yes, they do not move.”

When some children reject this possibility, they usually cannot justify their answer; or if they attempt an explanation, the reasons offered serve only to confirm their realistic beliefs.

5 (4:6): “Having dreamed of Santa Claus, asserts that his dream is made of snow.—Can we touch our dreams?—No.—Why?—Because it’s made of snow.—But the snow, we can touch it!—When you do not have gloves, you cannot touch it.”

15 (6:0): “Can we touch our dreams?—No, it is not allowed. When you touch it, there are prickles and they stick to your hands.”

17 (5:0): “Can we touch our dreams?—No.—Why can’t we touch them?—Because it’s bad.—How do you know?—I have known that for a long time.—What does it do?—It eats you up.”

An example of the emotional reaction aroused by the questions is observable in this last subject. These reactions are very frequent and may follow upon any question. They do not seem to be typical of any particular stage and they often jeopardize the effective continuation of the examination. For example, a little girl had to be classified in stage 0 because she started to cry at the very first question and categorically refused to answer any additional question on dreaming. Repeated attempts to resume the examination during later periods failed to change the child’s attitude.

Finally, it should be stated that the realism of stage 1, particularly among the less primitive, is sometimes expressed in
more subtle terms than those of the examples given above. Some children, indeed, recognize that there is a difference between the content of dreams and the content of everyday reality. They know that the dream is essentially an illusion, yet they continue to consider it an objective phenomenon, that is, external to the dreamer. One such example will bring this out:

21 (5:0): "You know what a dream is?—Yes.—Do you dream sometimes at night?—Yes.—Now, tell me, where does a dream come from?—It comes from outside; I don't know.—Where are the dreams made, where do they come from?—In heaven, perhaps. I don't know.—Do they come from inside of you, or from outside of you?—From outside of me.—Who makes the dreams come?—Jesus . . . I don't know.—Is it you or is it somebody else?—Somebody else.—Who?—Jesus, perhaps.—While you are dreaming, where is your dream, where does it go on, in what place is it?—In front of me.—Is it inside of you or in your room?—In my room.—Is it in your room for real, or is it only as if it were there? Or does it only seem to be there?—It is as if it were in my room, but it is not there for real.—While you are dreaming, are your eyes closed or open?—Closed.—Then, where is your dream?—In my room when I am dreaming.—When you dream that you are playing in the street, where is your dream, where is it?—In the street. I cannot dream in the street because I never play there.—Is there something in front of you, when you are dreaming?—Yes, but they are not real people.—[ . . . ]—Why do you say that I could not see your dream?—Because you are not asleep.—If I were asleep?—You would see it.—[ . . . ]—What is a dream made of?—With nothing. It can be seen the same as I see you there."

For this child, the dream is surely realistic. It depends in no way upon the intervention, voluntary or not, of the sleeper: it exists in itself, it comes from the outside and takes its place in front of the sleeper. But, at the same time, it is different from
everyday reality: there is something in front of the sleeper, but "they are not real people." To repeat a comparison already suggested by Piaget, the dream is assimilated to that privileged universe of the child which contains, among other things, fairies and ghosts. The child knows that the dream is illusory; he does not confuse it with real objects and persons. But he nevertheless remains essentially realistic, since he does not yet recognize any subjective element. In short, to account for the various phenomena of everyday reality, the child creates a second universe for himself, just as objective to him as the first, but reserved for beings who are more alien, or less accessible to him.

STAGE 2

Mitigated Realism

Between the stage of absolute realism and that of integral subjectivism, there is a transitional period in which the progressive interiorization of the dream can be witnessed. This transition usually takes the form of a continuous oscillation between the interiorization and externalization of the phenomenon. Contrary to Piaget's predictions, no unique type of confusion can be noted. According to him, the child belonging to this intermediate stage should see the dream as coming from the inside, but taking place on the outside, somewhat like what happens at the cinema: the image comes from within the apparatus, but it is projected on the outside. The results of the present study show beyond doubt that this type of confusion is far from being the only one to occur, even if it does arise more often than other types. As a matter of fact, the completely opposite conception is quite often observed. For several children, the dream takes its origin on the outside and goes on in the inside, as for instance, "in the eyes," "in the
head,” “in the ear,” “in the tummy,” etc. At first glance, one might be tempted to explain the emergence of this new type of response by the structure of the questionnaire. The questions about the origin of dreams are possibly more insistent in the present examination than in Piaget’s and may thus entail the risk of inducing children to elaborate rather special explanations. This hypothesis, however, does not seem likely for three main reasons. In the first place, the above-noted insistence of the questions does not in fact lead the children to attribute an external origin to the dream; it rather favors responses of an artificialistic type (e.g., God, heaven, the devil, etc.), and it has been seen that these responses are never interpreted here in terms of external origin. In the second place, this new type of reaction is not more exclusive than the one referred to by Piaget: the same questionnaire elicits a large variety of explanations, a variety which would probably not occur if the questions were not so pointedly suggestive. Finally, even on a purely theoretical basis, it is not evident that this type of response would be more artificial than the type described by Piaget: if the child, as he begins to rid himself of pure realism, becomes particularly impressed by the fact that the dream is not visible to others, and if he is not yet in a position to understand the complete subjectivity of the phenomenon, it is only natural that he should seek first to interiorize the course of the spectacle rather than its origin. At any rate, the main reason for the difference between our results and those of Piaget is probably due to the number of children examined. It may well be that Piaget has examined too few children belonging to the intermediate stage to allow for the possible emergence of all types of reactions.

This mitigated realism may manifest itself in a number of ways. Besides the two types of reaction already described, others are also observed. They may be less clearly defined, but no less indicative of the hesitancy characteristic of the child.
of this level. Thus, some subjects will alternately suggest an external and an internal origin, an interior and an exterior development, and so on, without, however, arriving at the exclusion of either of the two hypotheses. Others will accept the subjectiveness of the dream without hesitation, but with a residue of realism: for instance, they will uphold the possibility that others can see the dream inside the head of the dreamer, but the dream remains material in spite of its essentially personal and internal character.

30 (9:0): "While you are dreaming, where is your dream, where does it go on, in what place is it?—In my head.—Is it inside of you or in your room?—Inside of me.—If we could open your head while you are dreaming, could we see your dream?—Yes.—Why do you say we could see your dream?—Because it's like a story, like a little play."

Still almost all the answers given by some other children, undoubtedly closer to stage 1, reveal a realistic attitude; the few subjective elements they may resort to are very precarious and become submerged in a mass of contradictory statements. As may be noted, the protocols classified as belonging in stage 2 show a great variety and represent about all the degrees of transition between the two opposite attitudes: absolute realism and integral subjectivism. Since the meaning value of a classification depends on the homogeneity of its classes, it becomes important to divide these various protocols into subclasses typical of the main steps of this transition. At first glance, many clues seemed to be of possible use in making these discriminations; but all of them had to be eliminated successively for inefficacy. For instance, children for whom realism was still predominant were inclined to locate the dream "in the tummy" or "in the heart," rather than "in the head," "in the eyes," or even "in the imagination." If this indication could have been used to identify two widely diver-
gent classes of subjects, the task would undoubtedly have been greatly simplified. But this criterion would have met with too many exceptions. The subdivision actually adopted includes three substages, but it admittedly does not comprise all the gradations that might be desired. The analysis has shown that further subdivisions were in fact useless or even superficial; indeed, different responses may manifest the same level of development and may be given by children of the same age.

SUBSTAGE 2

The explanations offered by children in substage 2A are almost totally identical with the realistic answers of stage 1. These subjects, however, make an effort, still very faltering and awkward, to interiorize the dream, when questioned on either its origin, on its course, or on any other aspect of the phenomenon. Frequently, this attempt at interiorization is almost immediately denied by the child.

2 (4:6): "[Begins by stating that the dream comes from heaven and hell.] While you are dreaming, where is your dream, where does it go on, in what place is it?—In my heart.—Is it inside of you or in your room?—In my room.—You told me a moment ago that the dream was in your heart. Then, if we could open your heart while you are dreaming, if we could look into your heart, could we see your dream?—No.—Why do you say that we could not see your dream?—Because I don't want to.—Then, where in your heart is your dream?—It is not in my heart, it came out there."

For other children, the denial is not explicit. The subjective element is no sooner expressed than it seems to be simply forgotten and is disregarded in subsequent answers.

44 (4:6): "Tell me, where does a dream come from?—From the kitchen.—Where are the dreams made, where do they come from?

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You close the door, then the little girl she comes in with her schoolbag. Do the dreams come from inside of you, or from outside of you? From outside. Who makes the dreams come? It's ourselves: we sleep, then we dream. While you are dreaming, where is your dream, where does it go on, in what place is it? Outside. Is it inside of you or in your room? In my room. Is it in your room for real, or is it only as if it were there? Or does it only seem to be there? For real, yes. Why do you say that I could see your dream? Because we sleep, then the dream opens the door, then it shuts the door, then it comes in to pay us a visit.

For this subject, it seems that the dream is a reality independent of the dreamer. Even though he claims to have the power of calling them forth, he persists in assimilating the dreams to personages really existing. The question may even be raised whether the child's statement “it's ourselves, we sleep, then we dream” truly indicates the beginnings of a belief in the personal origin of dreams. It could just as well be a simple description of events in the order of their inevitable succession (ourselves, we sleep, then the dream comes), or else a manifestation of the magical thinking which leads small children to claim exceptional powers for themselves. At any rate, since the data do not allow a delimitation of the exact scope of the child's remarks, it seems reasonable to assign them the more advanced meaning, and to give the child credit for it.

SUBSTAGE 2B

In substage 2B, there is a steadier balance between realism and subjectivism. It may even happen that answers tinged with realism are definitely the minority. But because the ratio of these two attitudes is almost always impossible to ascertain and inevitably involves debatable interpretations, it seems
more in order to class all the protocols in the same given group, even at the risk of attenuating their essential diversity. In short, as soon as subjective elements play a definite role in the child’s explanation, and as long as this explanation still indicates a confusion between the interiority and the exteriority of the dream, the protocol is classified in substage 2B. This confusion is clearly apparent whenever a subject rightly belongs to the present level.

32 (6:0): "Then, tell me, where does a dream come from?—When you sleep.—Where are the dreams made, where do they come from?—In the house.—Where is the house?—In the bed.—Where in the bed?—In the eyes.—Do the dreams come from inside of you, or outside of you?—From outside.—Who makes the dreams come?—Accidents, as if a car would turn upside down.—[... ]—It's people like ourselves.—Why are they the ones to make the dreams come?—They are the ones who make the accident.—While you are dreaming, where is your dream, where does it go on, in what place is it?—In front of ourselves.—Is it inside of you or in your room?—In my room.—Is it in your room for real, or is it only as if it were there? Or does it only seem to be there?—For real.—While you are dreaming, are your eyes closed or open?—Closed.—Then, where is the dream?—In front of me.—Is there something in front of you, while you are dreaming?—Yes.—Your mother, when she is in your room, can she also see your dream?—No.—And I [... ]?—No.—Why do you say that I could not see your dream?—Because it's inside of me, but in front of me. I don't understand that at all. I am all mixed up!—Then, tell me, what do we dream with?—With the eyes.—If we could open your eyes while you are dreaming, could we see your dream?—No.—Why do you say that we could not see your dream?—It's in front. It's also inside of me. I'm all mixed up.—Then, where is your dream?—I don't know."

This example is of course exceptional for the clearness of the hesitations and doubts elicited by the questioning. Most chil-
dren of this stage, however, make much stronger statements, even if these are just as contrary to the truth.

16 (7:0): "Then tell me, where does a dream come from?—It comes from the night when it is dark.—Where are the dreams made?—I don’t know.—Do they come from inside of you or outside of you?—From outside of me.—Who makes the dreams come?—Perhaps the wind pushes the dreams.—[ . . . ]—While you are dreaming, where is your dream, where does it go on, in what place is it?—In my heart.—Is it inside of you or in your room?—Inside of me.—If we could open your heart while you are dreaming, if we could see into your heart, could we see your dream?—No.—Why do you say that we could not see your dream?—It’s invisible, a dream.—Then, where is it, in your heart, your dream?—It’s everywhere in my heart.—[ . . . ]—Then, tell me, what do we dream with?—You think about it, it falls into your head, and it goes into your heart.”

20 (9:0): “Then, tell me, where does a dream come from?—We think . . . It comes into our head.—Where are the dreams made, where do dreams come from?—From ourselves, on the forehead . . . no, in the forehead. We think.—Do they come from inside of you, or from outside of you?—From within me.—Who makes the dreams come?—God. He says: let them come!—[ . . . ]—While you are dreaming, where is your dream, where does it go on, in what place is it?—By our side.—Is it inside of you or in your room?—In my room.—Is it in your room for real, or is it only as if it were there? Or does it only seem to be there?—It’s only as if.—While you are dreaming, are your eyes closed or open?—Closed.—Then, where is your dream?—It’s in our room, but we think about it with our head.—If we could open your head while you are dreaming, if we could look into your head, could we see your dream?—No.—Why do you say that we could not see it?—Because . . . we see it . . . because it’s invisible . . . because it’s God. If He wants us to see it, we can see it.—Then, where is it in your head, your dream?—On the forehead.”
Examples need not be multiplied. It can be seen clearly enough how children of substage 2B account for their dreams. The internal and subjective element is inevitably supplemented by some contribution from the outside. This realistic background may be strictly limited to the acceptance of the possibility that others may see the same dream. For some subjects, indeed, the dream arises from within ("from the eyes," "from the head," "from the mind," and so on), and develops inside also ("in the tummy," "in the head," "in the mind," and so on). The fact, however, that the dreamer is not the only one who can look at the spectacle reveals a residual confusion between the interiority and the exteriority of the phenomenon.

**SUBSTAGE 2C**

The only trace of realism remaining in all children classified in substage 2C consists in granting a certain materiality to the dream. The dream is interior; it is even invisible under normal conditions, but it could be touched or seen if the head of the dreamer could be opened without waking him up, because "it's a paper running through the head," "it comes written sometimes," "it's made of cloth," etc. The child may even deny the possibility of seeing the dream inside the head, but the reason he gives is not sufficient to prove that he believes that the dream is not material.

50 (6:0): "While you are dreaming, where is your dream, where does it go on, in what place is it?—In my head.—Is it inside of you or in your room?—Inside of me. It can't be in my room. If I dream of a wolf, and then it comes into my room, brrr . . . .—If we could open your head while you are dreaming, if we could look into your head, could we see your dream?—No.—Why do you say that we could not see your dream?—If Jesus sees you opening my head, He removes my dream; a dream belongs to us.—Then, where is it

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in your head, your dream?—Near the ears, because I must hear it.
—[ . . . . ]—What is a dream made of?—With earth, and all that. . . .”

For this child it is obvious that the dream is invisible, not because of its immateriality but because of its individuality. The remainder of the examination clearly shows that, in spite of the initial negative response, the dream is assimilated to a material, physical object: it has an exact location in the head, and it is compared to familiar objects (it is made “with earth, and all that”).

The opportuneness of grouping responses of this type in a special category may no doubt be questioned. Since they must be interpreted as another indubitable form of realism, why classify in substage 2C confusions bearing on the immateriality of the dream, and relegate to substage 2B those relating rather to its interiority? The main reason for this differentiation derives from the fact that the confusion of internal and external is still more primitive than that of material and immaterial. Piaget (1926) has already noted a rather marked timelag in the disappearance of these two particular forms of realism.

... the distinction between internal and external . . . becomes complete at about the age of 9-10 (beginning of third stage). Finally, it is not till about 11 that this distinction between internal and external leads the child definitely to understand that the dream is not a material image, but simply a thought [p. 121].

Over and above providing more precise chronological information, the present experiment completely supports Piaget’s observations since, on that point, the median age of substage 2C children (material-immaterial confusion) is 7:1 while the median age of substage 2B children (internal-external confusion) is only 5:8. Such a difference is certainly not to be dis-
regarded. It is all the more striking for being derived from a very crude statistical technique, a technique which, when applied to truncated distributions, tends to minimize existing differences.

STAGE 3

Integral Subjectivism

During the third stage, all traces of realism disappear. The origin of the dream and its course are henceforth interiorized: they are located "in the head," "in the imagination," "in the mind," etc. Let it be noted immediately that, for Piaget, the fact of locating the dream in the eyes would constitute a residue of realistic thinking. But it seems that it is chiefly because children note the visual quality of the dream that they locate it in the eyes. At the same time, subjects insist so much on the internal character of the phenomenon that it would be illogical to ascribe realistic beliefs to them.

40 (8:0): "While you are dreaming, where is your dream, where does it go on, in what place is it?—In my eyes. Not near my eyes: in my eyes."

11 (8:0): "What do we dream with?—With our eyes closed."

The subject of this stage not only interiorizes the dream, but he also states that it cannot be seen by others because "it's my own thinking," "it's my imagination," "we build it in ourselves," "thought cannot be seen," etc. Even if the head of the dreamer were opened, his dream could not be seen because "thought is invisible," "it's a spirit," "it's thinking and that has no place," etc. Moreover, the cause of the dream is almost always objective: "it's because we have thought about that during the day, and it comes back to our mind during the
night,” “it’s because we have overeaten,” “we are not lying down properly,” “we are not sleeping well,” etc. Finally, the dream is made “of thoughts,” “of nothing,” “of imagination,” “of voices,” “of air,” “of shadows,” or of any other substance that the child may think of in an attempt to express immateriality. In short, the dream is personal, interior, invisible, and immaterial.

The child’s remarks are often ambiguous and may lead the examiner to suspect that they reveal residues of realistic beliefs when in fact there are none. In this matter, some confusions noted by Piaget proved to be more verbal than real. For instance, he mentions a confusion between the origin of dreams and the persons or things dreamed about. And, in fact, responses of this kind may occur.

37 (10:0): “Then tell me, where does a dream come from?—From what you see.”

48 (11:0): “Who makes the dreams come?—The things we dream of.”

In all such cases, however, the continuation of the examination can disclose the exact meaning of these expressions: things seen during the day come back to the mind during sleep and are, in this sense, the origin of the dream. Therefore, this explanation does not entail a real confusion between internal and external, but rather points to the origin of the dream by stating one of its causes. Subjects are sometimes very explicit in this ascription.

22 (11:0): “It can be a thing you have seen or heard and which is imagined differently, but on the same topic.”

6 (10:0): “When during the day you see something dreadful on television, you don’t like that . . . And then, in the evening, you dream of that during the night.”
15 (9:0): "If, for instance, before you go to bed, you see cowboys on television, you have a nightmare. But you can dream a nice dream, if you have read good books."

A similar pseudo confusion is frequently elicited by the questions on the location of the dream. The child does not seem to grasp the exact scope of the questions and describes the place where the events of the dream occur, or also the place where the sleeper is during the dream.

3 (9:0): "While you are dreaming, where is your dream, where does it go on, in what place is it?—Let's say in a house, outside, on the lakes, anywhere sometimes."

114 (11:0): "[Same question.]—It depends on the dream you have; if you dream that you are in Africa, it is in Africa."

102 (12:0): "[Same question.]—If we are at home in our bed, it's going on at home."

There again, answers to subsequent questions inevitably rule out the hypothesis of a true confusion. These various examples indeed illustrate clearly the danger of an isolated, and possibly too literal, interpretation of the child's remarks. In fact, the questions are not always taken in the sense intended by the examiner. It is thus important to base the diagnosis on the whole set of explanations given by a subject. Some questions, perhaps too suggestive, often elicit incorrect answers even from subjects who belong to stage 3. In this respect, special mention should be made of the third and fifth questions on the origin of dreams ("Do dreams come from inside of you, or outside of you? Is it you, or is it somebody else?"), and also of the second question on the location of dreams ("Is it inside of you or in your room?"). When the remainder of the examination does not corroborate the errors to which these questions may
have given rise, it seems that such errors should be attributed to a misunderstanding of the meaning of the questions themselves, and not to confusions deriving from genuine realism.

Among children of stage 3, which is characterized by the disappearance of realism, many will occasionally still resort to precausal beliefs of another sort. For instance, numerous explanations tinged with artificialism, finalism, or moralism may be found. In fact, these other forms of primitive thinking do not appear during the third stage exclusively. The preceding stages all show evidence of a constant mixture of realistic, artificialistic, and finalistic conceptions. But until realism has completely disappeared, it does not seem essential, in the determination of stages, to grant particular importance to other forms of precausality. It is altogether normal that realism should be accompanied by various precausal beliefs, since it is the very source of these beliefs. At the third stage, however, it becomes mandatory to take note of the other manifestations of precausal thinking, in order to avoid identifying the disappearance of realism with the concurrent disappearance of any other form of precausality. The division of stage 3 into two substages aims precisely at making this distinction clear.

**Substage 3A**

Substage 3A is comprised of all children who, although they say that the dream is interior, personal, and immaterial, will occasionally call upon artificialistic, finalistic, or moralistic factors. Here are some examples.

40 (9:0) : "Then, tell me, where does a dream come from?—From the dreadful things we have seen or read. Where are dreams made, where do they come from?—From our thinking. Do they come from inside of you or from outside of you?—From inside of me. Who makes the dreams come?—God. Is it you or somebody else?—Somebody else. Who?—God. While you are
dreaming, where is your dream, where does it go on, in what place is it?—In my head.—Is it inside of you or in your room?—Inside of me."

34 (9:0): "... Then, do you know why one dreams, why there are dreams?—It's God who allows it."

40 (10:0): "[Same question.]—To make a change."

51 (12:0): "[Same question.]—To make us laugh."

35 (6:0): "[Same question.]—Sometimes, it teaches us a lesson."

111 (11:0): "[Same question.]—Because we have to have some."

As may be seen, finalistic remarks almost always occur at the same point in the examination. Admittedly the wording of the questions on the cause of the dream has something to do with this; yet finalism does not, on that account, become artificial. If with some children the "why" calls for an explanation in terms of finality, it is precisely because their thinking is naturally oriented toward this primitive form of causality.

SUBSTAGE 3B

Children of substage 3B give a perfect explanation of the dream, and the questioning no longer brings out any indication of precausal thinking.

26 (12:0): "Then, tell me, where does a dream come from?—From our intelligence.—Where are dreams made?—In our memory.—Do they come from inside of you, or from outside of you?—From inside of me.—Who makes the dreams come?—Sleep.—[.. ..]—While you are dreaming, where is your dream, where does it go on, in what place is it?—Inside of me, in my thinking.—Is it inside of you or in your room?—Inside of me.—If we could open your head while you are dreaming, and if we could look into your head,
could we see your dream?—No.—Why do you say that we could not see your dream?—It's invisible, it's my thinking.—Then, where in your head is your dream?—In my thinking.—Is there anything in front of you, while you are dreaming?—Yes.—What is in front of you?—The things which are there, in my room.—[ . . . ]—Why do you say that I could not see your dream?—It's inside of me, it's invisible.—Then, tell me, what do we dream with?—With our thinking.—[ . . . ]—Then, do you know why we dream, why there are dreams?—It is caused by our digestion, our digestion is bad.—What is a dream made of?—With nothing, with thinking."
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Because it makes allowance for all these observations, the developmental scale finally adopted here differs noticeably from Piaget's. It includes four main stages. Stage 0 contains children for whom the words "living" and "life" represent no definite concept. The three following stages describe the main steps marking the progressive distinction between animate and inanimate or, better, the gradual disappearance of animistic beliefs.

STAGE 0
Incomprehension or Refusal

Stage 0 comprises the subjects who obviously do not understand the meaning of the questions. Some children admit spontaneously that they do not know what it is all about and simply refuse to be examined; other children answer at random without ever giving any valid reason for their affirmations or denials.

21 (4;6): "You know what it is to be alive? What does it mean?—I don't know.—Is a mountain alive?—No.—Why do you say it is not alive?—Because it is sand.—The sun?—Yes.—Why?—It's warm when the sun is there.—The table?—Yes.—Why?—Because it's alive.—An automobile?—No.—Why?—Because it's not alive.—A cat?—Yes.—Why?—It says 'meow.'—A cloud?—No.—Why?—It's a sky, a cloud."

15 (6;0): "You know what it is to be alive, to live?—No.—What does it mean, do you think?—It means we have fallen into a ditch.—You, are you alive?—No.—Give me the name of some thing which is alive?—Heaven . . . I don't know what it means.—Is a mountain alive?—Yes.—Why?—I don't know.—The sun?—Yes.
Why?—I don’t know.—The table?—No.—Why?—Because it’s not alive.—An automobile?—No.—Why?—[ . . . ]—A cat?—Yes.—Why?—A little boy told me.”

As in the questionnaire on dreams, it is possible to observe here certain confusions arising from word assonance. One subject, for instance, will confuse the word vivant (alive) with the boy’s name “Yvan,” or simply with vent (wind), and thus will readily speak of the “cold,” of “wings to fly,” of “trees making wind by shaking their leaves,” etc. Another will mistake the expression être en vie (to be alive) for avoir envie (to have a longing for), and will freely indulge in increasingly fantastic associations. The absence of a genuine concept is also manifested by constant contradictions. Reasons proposed are even at times very similar to those met with at superior stages; but the fact that the child appeals without distinction to the same reason to attribute or to deny life clearly indicates that his explanations are not genuine. Instead of being crystallized in a concept, they rather constitute mere descriptions or free associations.

13 (6:0): “You know what it is to be alive?—Yes.—What does it mean?—To be born.—Give me the name, tell me some thing which is alive.—Animals.—A mountain?—No.—Why?—I know it.—The sun?—No.—Why?—Because I know it.—The table?—No.—Why?—I know it.—An automobile?—No.—Why?—It runs.—A cat?—Yes.—Why?—We often see some cats.—A cloud?—Yes.—Why?—Because I say so.—A lamp?—No.—Why?—Because it’s not alive.—A watch?—No.—Why?—Because it runs.—A bird?—Yes.—Why?—Because it flies in the air.—A bell?—No.—Why?—Because I know it.—The wind?—No.—Why?—Because it’s something cold and it does not run.—An airplane?—No.—Why?—Because it flies in the air, like birds.—A fly?—Yes.—Why?—Because it flies in the air.”

THE RESULTS
The child's contradictions should not cause surprise: they are normal for him. Being still unaware of the principles of logic, the young child in his thinking naturally resorts to juxtaposition. By the operation of this mechanism, all the elements related to a given concept are, so to speak, agglutinated without any hierarchy in such a way that the child's attention will be centered successively on the various and often contradictory aspects of the reality under his immediate consideration. He will thus declare the *automobile* to be alive "*because it runs,*" while, a few minutes later, he will refuse life to the same automobile "*because it does not breathe, it does not eat, it has no soul,*" and the like. Since these contradictions are typical of infantile prelogical thinking, is one justified in relegating to stage 0, that is, to the level of subjects who manifest an obvious lack of understanding of the questions, the children who contradict themselves by using the same reasons without distinction to explain both life and nonlife? In answer to this question, let it be recalled that this last type of contradiction is not entirely comparable to that deriving from the mechanism of juxtaposition. Juxtaposition usually leads to a contradiction in the sequence of judgments, but the affirmations rest each time upon consistent grounds: movement, for instance, is always a sign of life, and the absence of anthropomorphic traits is always a sign of nonlife. Now, as can be seen in the protocol given above, this consistency is exactly what is lacking in children classified in stage 0: on the one hand, the "*yes's*" or the "*no's,*" and, on the other, the reasons invoked in each of these cases are completely independent from each other. Moreover, we meet enough subjects who always give indiscriminately the same answer (always "*yes*" or always "*no*") to all items of the questionnaire. In short, the children of this stage do not seem to attach any particular importance to their answers; they are led by their fancy, and their explanations most often arise from pure description.

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STAGE 1

Animistic Thinking Based upon Usefulness, Anthropomorphism, or Movement

The stage 1 subjects commit errors of the animistic type by attributing life to one or many inanimate objects. These errors derive from the fact that the criteria they use are inadequate (usefulness), imperfect (anthropomorphism), or simply incomplete (movement). More frequently a combination of two, and sometimes even of three, of these criteria can be observed.

11 (10:0): “You know what it means to be alive?—Yes.—What does it mean?—It means that we are alive, that our soul is with our body.—Give me the name of some thing which is alive.—A cat, a dog, a person, a bear, a crocodile, a parrot, a bird.—Is a mountain alive?—Well...yes, I mean...it's alive: it holds itself together. —Why do you say it is alive?—Because it stands up.—The sun?—Yes.—Why?—Because it gives light.—The table?—Yes.—Why?—Because it stands up.—An automobile?—Yes.—Why?—Because it stands up and then it runs.—A cat?—Yes.—Why?—Because you can see: it walks, and then it mews.—A cloud?—No.—Why?—Because it does not stand up, it does not run, it does not speak.—A lamp?—No...yes...no.—Yes or no?—No.—Why?—It does not speak, it does not walk, it does not see.—A watch?—No.—Why?—It does not walk, then it does not speak.—A bird?—Yes.—Why?—Because it sings, and then it flies.—A bell?—No.—Why?—Because it does not see, it does not walk.—The wind?—Yes...let's say yes.—Why?—Because it gives us air, I don't know.—An airplane?—No.—Why?—Because it does not talk.—A fly?—Yes.—Why?—Because it flies.—The fire?—[Hesitates]...Yes.—Why?—Because it burns, and then it comes up all of a sudden.—A flower?—Yes.—Why?—Because it grows then...that's all.—The rain?—Yes.—Why?—Because it falls....”

10 (7:0): “You know what it is to be alive?—Yes.—What does it mean?—That we are not dead.—Give me the name, tell me some

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thing which is alive?—A cow, people, dogs, cats, rabbits.—A mountain?—No.—Why?—It does not move.—The sun?—Yes.—Why?—It moves about.—The table?—No.—Why?—It does not move.—An automobile?—No.—Why?—It does not move.—A cat?—Yes.—Why?—It moves.—A cloud?—Yes.—Why?—It moves.—The wind?—Yes.—Why?—It moves.—An airplane.—Yes.—Why?—Because it moves.—The rain?—Yes.—Why?—Because it moves.—A tree?—No.—Why?—Because it does not move.—A snake?—Yes.—Why?—Because it moves.—A bicycle?—Yes.—Why?—Because it moves."

52 (4,6): "You know what it is to be alive?—No.—What does it mean?—I don't know.—Give me the name, tell me some thing which is alive.—My turtle.—Is a mountain alive?—No.—Why?—It does not have a mouth.—The sun?—Yes.—Why?—It has a mouth.—The table?—No.—Why?—It does not have a mouth.—An automobile?—Yes.—Why?—It has wheels.—A cat?—Yes.—Why?—It has mouths.—A cloud?—Yes.—Why?—It has mouths since it rains.—[ . . . ]—The wind?—Yes.—Why?—It has mouths; it blows."

As may be noted, in spite of the imperfection, and sometimes of the diversity, of the criteria invoked, the child's thinking is always consistent. He never resorts to the same reason to attribute or to refuse life. As to the number of errors, it varies widely from one subject to another. There are many children who endow all or almost all of the objects listed in the questionnaire with life. On the other hand, many children make only one or two mistakes. If there were a definite relationship between the number of errors and the age of the child, it would no doubt be advantageous to subdivide the subjects of stage I into two or several substages, and to classify only the more animistic subjects in the most primitive stages. But, as indicated in Table 10, this relationship is far from obvious: the children of each age are distributed about equally in re-
pect to the number of errors. Under these conditions, any division seems altogether arbitrary. The same observations may also be made about the possible relationship between the frequency of errors and the type of criterion resorted to; but as children generally offer two or three different types of explanation, no particular tendency can be isolated.

Finally, another kind of error that occurs quite frequently among stage 1 subjects should be noted. It is the denial of life to animate objects, such as plants, and even, at times, certain animals. These errors may not be an indication of animistic thinking, but they surely show how primitive is the concept of life held by these children. These errors are the direct consequence of the use of an imperfect criterion: it is because life is identified with movement, for instance, that some objects
"planted in the ground," and, in this sense immobile, are considered to be inanimate; it is also because the living must have "legs" or "feet" that life is refused to the fish or to the snake. These, no doubt, must be regarded as striking examples of the consistency noted above.

STAGE 2

Autonomous Movement with Some Residual Animistic Thinking

The essential advance of subjects in this stage over those of the first stage is the discovery of autonomous movement. From then on, these subjects distinguish between mobile objects which receive their impetus from an external source and those which move by themselves. Even though life is reserved to this last category, two main reasons still prevent the complete disappearance of animism. In the first place, the child persists for a long time in deluding himself about the real source of the movement of objects. The more removed these objects are from his experience or his direct knowledge, the more persistent these illusions: accordingly, animism will recede much more rapidly in his answers on mechanical objects (e.g., bicycle, automobile) than in those on natural phenomena (e.g., sun, wind, and so on). In the second place, the discovery of autonomous movement does not definitively displace the inadequate or imperfect criteria of the first stage. In fact, the most frequent occurrence is that the child relies upon autonomy to justify some of his responses, but for the other responses still resorts frequently to usefulness of objects, to their possessing anthropomorphic traits, or to their general movement. All subjects of this stage, however, at least make a mention of autonomous movement.

THE CONCEPT OF LIFE

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"You know what it is to be alive?—Yes.—What does it mean?—One is born.—Give me the name of some thing which is alive.—People.—A mountain?—No.—Why?—It does not move, it cannot eat.—The sun?—Yes.—Why?—It does not eat, but it turns around.—The table?—No.—Why?—It cannot eat.—An automobile?—No.—Why?—We have to make it run ourselves.—A cat?—Yes.—Why?—It can eat.—A cloud?—Yes.—Why?—Because they bump together and the rain falls.—A lamp?—No.—Why?—It doesn't light up by itself.—A watch [examiner points at electric clock on the wall]?—No.—Why?—It can go around but it's because it is connected.

The sun?—Yes.—Why?—It's like ourselves; it lies down; in the morning it wakes up [c'est comme nous autres; il s'en va se coucher; le matin il se réveille].—The table?—No.—Why?—It's only wood.—An automobile?—No.—Why?—It's tin and iron.—An airplane?—No.—Why?—It's only wood, then a motor makes it fly.—A fly?—Yes.—Why?—It flies.—The fire?—No.—Why?—You have to light it up with matches.

What does it mean to be alive?—It means that you can move about, play, that you can do all kinds of things.—Give me the name of some thing which is alive.—You.—Is a mountain alive?—Yes.—Why?—Because it has grown by itself.—The sun?—Yes.—Why?—Because it gives light.—The table?—No.—Why?—Because the tree which was used to make the table is dead.[...].—A cloud?—Yes.—Why?—Because it sends water on the earth.—The wind?—Yes.—Why?—Because it pushes things.—The fire?—No.—Why?—Because it cannot light up by itself.

All the children of stage 2 make errors and attribute life to some inanimate objects. This is indeed the feature which distinguishes children of this stage from those of the next stage who, while using the same criteria of classification, will no longer show any trace of animism. As to the possible relationship between the number of errors and the child's age, the
data are erratic and do not warrant any attempt at a differentiation (Table 11). On the other hand, the child's lack of a system is here again an impediment to the identification of any sort of relationship between the number of errors and the type of criterion resorted to.
Total Disappearance of Animistic Thinking

The third stage corresponds to the fourth level of Piaget's scale. It comprises all the subjects who never grant life to inanimate objects, at least to those listed in the questionnaire. Life is reserved to animals and plants, or to animals only. Explanations may refer to autonomous or general movement, to anthropomorphism, or to usefulness, indiscriminately.

111 (12:0): "You know what it is to be alive?—Yes.—What does it mean?—We are not dead. Our blood keeps running, we are not separated from our soul.—Give me the name of some thing which is alive?—Human persons, animals, vegetables, fruits.—A mountain?—No.—Why?—It's like the carpet on the floor.—The sun?—No.—Why?—It's like a light.—The table?—No.—Why?—It's made of wood.—An automobile?—No.—Why?—It's made of metal.—A cat?—Yes.—Why?—It walks, it mews.—A cloud?—No.—Why?—It's water, vapor.—A lamp?—No.—Why?—It is used to hold a light; it's like a decoration.—A watch?—No.—Why?—It runs with electricity. —[...].—The fire?—No.—Why?—We make it ourselves; it does not make itself.—A flower?—Yes.—Why?—It grows, it's vegetal."

6 (9:0): "... The sun?—No.—Why?—The sun, it gives light to the earth, while an animal, it runs, and then, as for us, we speak.—The table?—No.—Why?—It does not move.—An automobile?—No.—Why?—It's not a person, nor an animal, then it's made of metal.—A cat?—Yes.—Why?—It moves, it mews.—A cloud?—No.—Why?—It's not an animal, nor a person, it doesn't speak; it moves, but it doesn't run.—A lamp?—No.—Why?—Because it doesn't move or speak.—A watch?—No.—Why?—It doesn't speak.—A bird?—Yes.—Why?—It moves, it walks in the air, it flies.—A bell?—No.—Why?—It's made of iron, it doesn't speak.—The wind?—No.—Why?—It talks to us; it doesn't move.—An airplane?"
—No.—Why?—It’s made of iron.—A fly?—Yes.—Why?—It moves, it flies in the air, it stings.—The fire?—No.—Why?—It doesn’t speak; it doesn’t run.—A flower?—No.—Why?—It doesn’t talk.—The rain?—No.—Why?—It’s water; it doesn’t talk, it doesn’t run, it doesn’t move.—A tree?—Yes.—Why?—It grows; it has foliage

... The flower also is alive; the plant has a kind of life, because it grows.”

16 (9:0): “... A mountain?—No.—Why?—It doesn’t walk, it always remains at the same place.—The sun?—No.—Why?—It cannot move, it remains always at the same place.—The table?—No. —Why?—It cannot displace itself.—An automobile?—No.—Why? —It needs a motor to make it run.—A cat?—Yes.—Why?—It can walk.—A cloud?—No.—Why?—It cannot displace itself.—A lamp?—No.—Why?—It cannot walk by itself.—A watch?—No.—Why?—It cannot displace itself.—A bird?—Yes.—Why?—It can fly.—A bell?—No.—Why?—It needs a man to ring it.—[... ]—The fire?—No.—Why?—It does not displace itself as it wishes.”

Most often stage 3 children still refuse life to plants. They do so as much for reasons of autonomy (e.g., “it does not move by itself, it’s the wind which makes them move,” “it does not grow by itself, they have to be planted”; and so on) as for anthropomorphic reasons (e.g., “it does not have a soul, an intelligence, a will”; “it does not have any eyes, any feet”; and the like). In fact, among the 155 subjects of this stage, only 53 regard the flower and the tree as being alive. On the other hand, some children grant life to the mountain; but, then, according to all indications, instead of thinking of the mountain as such, they rather make allusion to the covering trees or vegetation (e.g., “it is living because it has roots”). In spite of appearances, these answers are evidently not animistic at all. Some exceptional subjects (11 in all) also deny life to one or the other of the animals listed in the questionnaire. In almost every case, these are animals which the child meets less fre-
quently (e.g., snake), or which he habitually associates with death (e.g., the fly, which, as a matter of fact, brings the child to speak occasionally of fly swatters). Some surprise may perhaps arise at finding in the last stage subjects who limit living beings to such an exaggeratedly restricted domain. But it must be recalled that the scale of stages does not seek to shed light on the accuracy of the infantile concept of life, but rather on the evolution and the extension of animistic beliefs. The recognition of life, especially of plant life, depends much more upon school learning than upon the natural, personal development of thought.

Stage 3 also includes subjects who, in answering the last five questions, regard some inanimate objects as more “alive” than others, even though they refrained, in the course of the examination proper, from attributing life to any of these.

48 (9:0): "Is there one of these two which is more alive than the other: the rain or the fire?—The rain.—Why?—Because it puts out all kinds of things and it makes the plants grow.—The wind or a bicycle?—The bicycle.—Why?—Because it runs on wheels and it's a little more alive than the wind."

15 (10:0): "... the rain or the fire?—Yes, the rain.—Why?—Because the rain can put out the fire, but the fire cannot put out the rain.—The wind or a bicycle?—Yes, the wind.—Why?—The wind, when there is a storm, it never stops; a bicycle, it needs some one to make it work."

These responses still seem to be tainted with animism. It would be unwise, however, to take these various assertions literally: they are probably due to the excessively suggestive form of the questions. These questions, in their present form, hint at the possible existence of various levels within life itself and easily lead the subject to introduce refinements of which he might never have thought by himself. The artificial charac-

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STAGE 0
Incomprehension or Refusal

The stage 0 children do not answer the questions at all. They remain completely speechless or occasionally break this silence only to give way to all kinds of associations elicited by the words of the examiner, but without really answering the questions.

46 (5:0): “You know what the night is?—No.—Tell me, what is night?—I don’t know.—Why is it dark at night?—The beggars, and then the bandits are outside.—Where does the dark come from at night? What makes it night?—I don’t know.—Can we make the night in this room? If I pull the blinds down, is it going to be dark?—Yes.—Then, how is it, where does the dark in the room come from?—I don’t know, and then I don’t want to play at that any more.”

40 (4:0): “You know what the night is?—Yes.—Tell me, what is night?—It’s bad men.”

25 (5:0): “You know what the night is?—[ . . . ]—Tell me, what is night?—The sun.—Why is it dark at night?—There is too much sun.—Where does the dark come from at night? What makes it night?—It comes in the back and in front.”

The belief that night is filled with strange beings or animals is not specific to stage 0 children. On the contrary, these emotional descriptions are very frequent; but most of the subjects add explanations which allow them to be included in one of the ulterior stages. It should, however, be noted that stage 0 contains only eleven subjects; this is sure evidence of the familiarity the phenomenon of night has for children. Be it as it may, subjects who do not really respond to the questionnaire must, in spite of their small number, be grouped in a special category.
STAGE 1

Absolute Artificialism

Stage 1 subjects usually begin by explaining the night in a finalistic manner: "the night is made for sleeping," it becomes dark "so we may go to sleep," or "to let us know that it is time to go to bed," etc. A few children hold strictly to these interpretations, remaining unshaken by the examiner's remarks on the possibility of sleeping during the day. In most cases, however, the insistence of the questions will elicit a more explicit artificialistic explanation in the form of recourse to the action of God, or again, but much more rarely, to the intervention of terrestrial agents. This artificialism is of a radical type: night is manufactured or controlled directly by this agent, and never through the intervention of astrological, physical, or meteorological agents, or even of pseudo-meteorological substances such as smoke, dark air, and so on. If the child believes that the maker of the night uses materials or instruments, he will speak of "black chalk," for instance, "ink," "electric lights to shut off," "window shades to lower," and the like. The very large majority of subjects, however, place God Himself at the origin of night and for this reason, no doubt, do not even find it necessary to call in material elements; the omnipotence of the divine will or word and the efficacy of certain means, practically related to magic or legerdemain, are amply sufficient to explain the emergence of night.

Subjects may refer to the moon and the stars, the nightly presence of which they have had the opportunity to observe. When answering questions on the cause of day (the last items in the questionnaire), they will even go as far as to speak of the sun; but for all these stage 1 children, celestial bodies play no active role in the formation of night. The moon and the stars emerge simultaneously with the night; they come with the night, but are not the cause of it. Also, the sun shines dur-
ing the day, but its role is limited to the embellishment of certain days: some days are sunny, others are not.

3 (7:0): "You know what the night is?—Yes.—Tell me, what is night?—It's for sleeping, then it becomes dark, then there are stars, and then the moon.—Why is it dark at night?—Because it's the evening.—Why is it dark when it is evening?—Because it's no longer the day.—Why is it dark, when it is no longer the day?—Because the day is over.—Why is it dark, when the day is over?—Because we must sleep.—Where does the dark come from at night?—From the sky.—What makes it night?—God.—How does He make it?—He takes His hands.—And then?—He takes something, then it becomes dark.—What thing does He take?—A black thing.—What thing?—A blanket.—What does He do with it?—He says something, then the blanket disappears and then it becomes black.—What becomes black?—The sky."

21 (8:0): "... Can we make the night in this room? If I pull the blinds down, is it going to be dark?—No, because outside it will not be dark.—But, in the room, it will be dark?—Yes, it will be dark.—Then, how is it, where does the dark in the room come from?—It comes from the blinds, because someone has pulled down the blinds.—And the dark outside, what is it?—It's night.—When it is light, why is it light?—Because it's not the evening, it's the morning.—What makes it day?—The sun shines.—Yes, but what makes it day?—It's God."

This last subject may possibly have understood "Qu'est-ce qu'il fait, le jour?" ("What does it do in the daytime?") instead of "Qu'est-ce qui fait le jour?" ("What makes it day?"), and then his answer "il fait soleil" ("the sun shines") has a natural explanation. But this answer does not lead him to revise his first conceptions; as soon as the exact meaning of the question is grasped, he reverts to artificialistic interpretations, the explanatory value of which seems to him irrefutable.

Two main tendencies may be distinguished among the sub-
jects of stage 1. They correspond to two substages, the first comprising exclusively finalistic interpretations (substage 1A), and the second interpretations (substage 1B) both artificialistic and finalistic, or exclusively artificialistic.

**SUBSTAGE 1A: FINALISTIC INTERPRETATIONS**

The subjects of substage 1A do not yet state their interpretations in a precise artificialistic form: they merely explain the night on the basis of its finality, or its usefulness to man.

40 (5:0): "You know what the night is? Tell me, what is night?—It's when we sleep.—Why is it dark at night?—It means that we keep lying down all the time.—Where does the dark come from at night? What makes it night?—[Silence].—Do you sleep sometimes during the day?—Yes.—Is it dark when you sleep during the day?—No.—Then, why is it dark at night?—Because it's time to go to bed.—Why is it dark only at night?—Because it's time to go to bed. —Does it happen sometimes that it is night and you are not sleeping? When you stay up late at night, is it dark outside?—Yes.—Then, how is it that it is dark and that you do not sleep?—Because sometimes I stay up later.—Can we make the night in this room? If I pull the blinds down, is it going to be dark?—Yes.—Then, how is it, where does the dark in the room come from?—It's because the blinds are closed.—And the dark outside, what is it?—It's bad; some bad men walk by, during the evening.—When it is light, why is it light?—Because it's time to get up.—What makes it day?—[Silence]."

It may not seem to the point to reserve one definite stage to these exclusively finalistic interpretations in a scale dealing with the evolution of artificialism. But all artificialistic beliefs derive precisely from this finalism. The child begins by seeking the *why* of things before questioning himself about the *how*. Since the cause of every thing is always interpreted in relation to man, the child will also attribute its origin to man.

**THE ORIGIN OF NIGHT**
This interpretation of Piaget's, which considers infantile artificialism as growing out of finalism, is completely corroborated by the present results: subjects who hold exclusively to finalism (substage 1A) are younger than those who appeal to artificialistic elements (substage 1B and stage 2). Indeed, children of later stages will almost unfailingly invoke reasons of usefulness before establishing relationships of an artificialistic type.

**SUBSTAGE 1B: FINALISTIC AND ARTIFICIALISTIC, OR EXCLUSIVELY ARTIFICIALISTIC INTERPRETATIONS**

The most explicit artificialistic beliefs become manifest in stage 1B; but they are still intermingled, in most subjects, with finalistic remarks.

13 (4:0): "You know what the night is? Tell me, what is night?—It's in my room. You cannot go outside at night.—Why is it dark at night?—Because if you don't sleep, Santa Claus doesn't give you any toys.—Then why is it dark at night?—Because we sleep.—Where does the dark come from at night? What makes it night?—Well, bandits, they make something; that comes from...mother pulls the blinds down, then it's very dark.—Do you sleep sometimes during the day?—Yes.—Is it dark when you sleep during the day?—Yes.—It's dark everywhere?—Yes.—Then why is it dark at night?—Because we sleep, and then because mother puts the light out.—Does it happen sometimes that it is night and you are not sleeping?—Yes.—When you stay up late at night, is it dark outside?—Yes.—Then, how is it that it is dark and that you do not sleep?—Well, mother puts the light out because daddy, he is sleeping.—Can we make the night in this room? If I [ .. ]?—Yes.—Then how is it, where does the dark in the room come from?—Well, it's... Where?... Well, we pull the blinds, then it's dark.—When it is light, why is it light?—Because mother sometimes, she washes the dishes, then she puts the light on.—Yes, but outside, why is it light?—Well, mother puts the light on, then it goes that far.—
What makes it day?—It's ... I don't recall. Well, it's mother who puts the light on, and this makes the day."

35 (6:0): "You know what the night is? Tell me, what is the night?
—It's when it's dark.—Why is it dark at night?—To go to bed.—Where does the dark come from at night? What makes it night?—God.—How does God do it?—God calls the dark, it's to put us to sleep.—Do you sleep sometimes during the day? Can we sleep during the day?—Yes.—Is it dark when we sleep during the day?
—No.—Then, why is it dark at night?—For sleeping.—Are there times when it is night and you do not sleep?—Yes.—When you stay up late at night, is it dark outside?—Yes.—Then, how is it that it is dark when you do not sleep?—I don't know. It's because we are supposed to sleep.—Is it possible to make this room dark? If I [ . . . ]?—Yes.—How is it then? Where does the dark in the room come from?—It's because the windows have been shut out; the dark comes from the blind.—And the dark outside, what is it?
—It's the sky.—When it is light, why is it light?—Because the dark has gone.—What makes it day?—God; He says to the dark: go away."

The essential characteristics of absolute artificialism specific to the first stage are easily identified in these children. No further examples need be given since, with the exception of very few subjects who maintain strictly artificialistic explanations without any apparent finalism, the protocols are markedly homogeneous.

STAGE 2

Semiartificialistic and Semiphysical Interpretations

In stage 2, artificialism assumes a more disguised form: the fabricating agent is still necessary, but henceforth uses natural, physical elements (e.g., clouds, fog, sun, and so on), or, more rarely, artificial material (e.g., the smoke from trains or
The child will also often add animistic elements to his explanation: the sun goes down (se couche) and causes the night, because "he too must take a rest"; the clouds wander about in the sky and come to hide the sun, "because they want to do it"; etc.

Two important differences between this and Piaget's classification are to be noted at this point. First of all, the disappearance of the sun becomes an important explanatory factor not only at the last stage of the evolution but already at the beginning of this intermediate level. Secondly, animism is coupled with artificialism, or even pure physicalism, often enough to raise doubts about Piaget's interpretation on the incompatibility of these various types of beliefs. According to him, when the child outgrows the period of mythological artificialism (stage 1) and reaches the period of technical artificialism (the present stage 2), or that of pure physicalism (stage 3), the advent of these more mature modes of explanation should mark the disappearance of animistic beliefs which, from then on, have become useless. Now, among the subjects examined here, as many as 43 are patent exceptions to that rule. This number admittedly constitutes a minimum, since many children adopted the popular expression "le soleil s'en va se coucher" ("the sun goes down") which makes it impossible for the examiner to determine whether the expression still conceals traces of animism. These facts are not really so difficult to understand. It seems only natural that stars, clouds, smoke, and the like, even though made by man or God, should be endowed with some kind of consciousness or life so that they may obey the will of their maker. The child finds no other way to explain the docility of natural elements. Animistic thinking, on the other hand, is so tenacious that it survives even after the disappearance of the artificialism resorted to by the child in his explanation of night. As a matter of fact, the analysis of the questionnaire on life has shown that the sun
and the clouds are among the objects most frequently and most lastingly regarded as living. It is not, then, surprising that to explain the night the child may rely exclusively on the disappearance of the sun or the arrival of clouds, while still granting them life or consciousness.

Thus stage 2 comprises all the children whose artificialism is interspersed with physical elements. These interpretations are almost always coupled with finalism, and sometimes even with animism.

5 (6:0): "You know what the night is?—Yes.—Tell me, what is night?—[Silence]—Why is it dark at night?—It's time to go to bed.—Where does the dark come from at night? What makes it night?—When there is no sun; the sun, it rolls like a ball, then it goes very far.——Then, why is it dark at night?—It's because it's time to go to bed.—Why is it dark only at night?—It's time to go to bed.—[. . . .]—Explain to me how it is that it is dark when there is no more sun.—The sun goes far away; he is tired; God has taken away the sun, then He made it fall like a ball.—Where does the sun go, when it is night?—It comes here sometimes, it goes at my little cousin's who lives far away.—Why does the sky become dark at night?—This is why, the sun is gone.—[. . . .]—Then, how is it, where does the dark in the room come from?—The sun will not be there.—And the dark outside, what is it?—I don't remember. Then the clouds always stay white, then the sun also.—When it is light, why is it light?—[Silence.]—What makes it day?—When the sun comes about, he makes the day, it's time to . . . lunch."

16 (7:0): "You know what the night is? Tell me, what is night?—It's when it's dark.—Why is it dark?—Because the sun is not there. It's trains which make black smoke.—Where does the dark come from at night? What makes it night?—It's the sky which has become dark.—Where does it come from, this smoke? What makes this smoke?—You put coal in, it burns and this makes smoke and it goes up in the sky.—How do the trains make this smoke?—It's because they go by very, very fast.—[. . . .]—Explain to me how it is.
is that it is dark when there is no more sun?—Because the sun is not there. It cannot give any more light. It's the moon which is there.—Where does the sun go, when it is night?—Down under us, there are also people.—Why does the sky become dark at night?—Because the smoke goes down.—[ . . . ]—What makes it day?—It's when you work, and the children go to school."

49 (9:0): "... Tell me, what is night?—It's dark.—Why is it dark at night?—The clouds make it dark.—Where does the dark come from at night...?—From the sky.—Where do these clouds come from?—From the sky.—How does the sky make these clouds, with what does it make them?—It's good Jesus. He makes them and hangs them in the sky. He makes them alone, with nothing.—[ . . . ]—Are the clouds of the night white or black?—They're white.—[ . . . ]—When it's light, why is it light?—It's good Jesus. He makes it light. He says: light! Then, it's light."

40 (8:0): "... Tell me, what is night?—When we sleep.—Why is it dark at night?—To sleep.—Where does the dark come from at night?—The dark, it comes from the sky. It's God who wants it.—[ . . . ]—Then, why is it dark at night?—Don't know. It's because God wants it.—Why is it dark only at night?—Because the sun goes away.—[ . . . ]—Explain to me how it is that it is dark when there is no more sun.—Because the sun lights up; then, when it's gone there is nothing to light up, except the moon a little bit.—Where does the sun go at night?—It goes down in the clouds [il se couche dans les nuages].—[ . . . ]—Then, why is it not dark like during the night, when it rains?—Because the sun is there in the air, even if you don't see it: it's the water which hides the sun.—Then, why is it dark only at night?—Because the sun is down [est couché]."

These various examples effectively illustrate the more mature artificialism of stage 2 children. This artificialism gradually yields to physical explanations which use natural elements such as the clouds, or even artificial ones such as the smoke. But the action of these elements is far from being perfectly
understood and considered as objective by the child. In some aspects, this action is comparable to the intervention of human beings, and it is through this anthropomorphism that the child’s animism is revealed.

It is also instructive to note how the various types of explanation are intermingled in the child’s mind. As clearly shown by the second example quoted above, some subjects may, at a given moment, mention the physical elements, but they immediately neglect these in favor of artificialistic explanations, obviously more satisfactory. For the third subject, on the contrary, the various elements are much better integrated and compose a single system to which physicalism and artificialism contribute in nearly equal parts. For the last subject, finally, this balance is again broken, but now in favor of physicalism. This shows clearly the characteristic function of an intermediate stage, which is to group together almost all the possible steps between two opposite conceptions. However, individual differences in verbal fluency are so great that it becomes an impossible task to assess, without bias, the relative importance of the various components of a child’s protocol. It is therefore necessary to resort to a less refined classification which undoubtedly makes up in objectivity what it may have lost in subtlety.

STAGE 3
Absolute Physicalism

The third stage is characterized by the disappearance of artificialistic notions. Henceforth the darkness of night is explained by the action of strictly physical and natural elements: disappearance of the sun, formation of clouds through evaporation from the seas, movement of winds, thickening of fog, and the like. The system the child chooses to adopt does not,
as may readily be foreseen, always conform with reality. Even explanations given at school are seldom completely reflected in the child's answers. Most children develop a personal theory in which the details, in particular, seem to spring from the imagination. But, whatever its value, the system elaborated is limited to the intervention of physical elements: night is no longer the result of some fabrication; it is essentially a natural phenomenon.

The disappearance of artificialism, however, does not entail the simultaneous disappearance of the other forms of pre-causality. The finalistic ties between night and sleep prove to be particularly enduring: of the 183 subjects of stage 3, 77 still rely in part on finalistic reasons. Moreover, some 20 of these 77 subjects openly use animistic terms—hence the necessity of distinguishing two substages.

**SUBSTAGE 3A: PHYSICALISM STIL TAINED WITH FINALISM OR ANIMISM**

For the children of substage 3A, the origin of night is natural, but the explanation is saturated with finalistic beliefs relating night to sleep, and day to work. Moreover, the celestial bodies or the meteors responsible for the forming of the night are sometimes explicitly considered to be alive.

21 (9:0): "... Why is it dark at night?—Because I had a completely sleepless day, and then at night we must rest.—Where does the dark come from at night? What makes it night?—I was about to say the clouds, but it's not that.—[....]—Then why is it dark at night?—Because it's not the day.—Why is it dark only at night?—For resting, because we had a sleepless day.—[....]—You have spoken, a moment ago, of the clouds. Where do the clouds come from, what makes the clouds?—The wind; [then, in a very low voice] no, it's not that.—Then how does the wind make the clouds? How does it make them?—With all the fog of the wind, this makes the clouds.—Why do they come only at night, these clouds?—It's
because during the day they rest, and at night they get up.—Can white clouds make the night?—No. Ah! it’s true!—Why do you say that...?—Because the night is dark and the clouds must be black.
—[... ]—Then it is black clouds which take the place of white ones, or white clouds which turn black?—The white clouds become black.—[... ]—Then how is it, where does the dark in the room come from?—It’s because the light illuminates and we shut out the light, we block it.—And the dark outside, what is it?—It’s the light... the sun goes away.—Explain to me how it is that it is dark when the sun is no longer there.—The sun goes down [va se coucher] and there is no more light.—Where does the sun go at night?—It goes down behind the sky [il se couche derrière le firmament].—Why does the sky become dark at night?—Because the sun is gone.

14 (10:0): “...Why is it dark at night?—To go to bed. To tell us when to go to bed, or when to come inside.—Where does the dark at night come from? What makes it night?—It’s dark because the sun goes away.—Explain to me how it is that it is dark when the sun is no longer there.—It’s the sun which lights up the earth.—Where does the sun go at night?—It goes on the other side: it lights up half of the earth. —[... ]—Then, why is it not dark as during the night, when it rains?—Because the clouds are not black, they are white; it lights up a little bit.”

These examples clearly illustrate how, with the help of the examiner’s questions, children end up by defining quite precisely notions which were at first very vague. This initial confusion can probably be attributed to their unfamiliarity with the problem proposed and is observable at all levels. But children of the present stage are characterized as being satisfied with strictly astrological or meteorological solutions. As for finalistic beliefs, they are extremely tenacious. After having generated artificialism, they still survive for some time. Piaget takes this as a proof of the fact that, instead of disappearing all at once, human or theological artificialism undergoes a mere
transformation whereby all attributes hitherto reserved to man or God are now ascribed to natural phenomena.

**SUBSTAGE 3B: PHYSICALISM FREED FROM ANY PRECAUSALITY**

In stage 3B, the interpretation sheds all remnants of pre-causal thinking. Darkness comes from the disappearance of the sun which now hides "behind the clouds" or "behind the mountains," or goes "to illuminate other countries," or disappears "to the west," "to the east," "to the south," or "to the north," or "does not move but the earth turns on itself," and the like. Some answers still remain ambiguous (e.g., "the sun goes down" [va se coucher], "the sun hides behind the clouds," and so on); but, because they belong to adult colloquial vocabulary, it is not possible to regard them as sure evidence of animistic thinking.

23 (12:0): "... Tell me, what is the night?—It's when the sun goes down. It's dark.—Why is it dark at night?—Because the sun is down and it's the sun which projects light during the day.—Where does the dark come from at night? What makes it night?—It comes from nowhere, it's the color of the sky. In the daytime, it's the sun which makes it blue, and when the sun is gone it becomes dark.—[... ]—Where does the sun go at night?—Behind the clouds.—Where to?—To the east, I think.—What clouds?—Any of them.—[... ]—Then why is it not dark like at night when it rains?—It's only because it's hidden by the clouds.—Then why is it dark only at night?—Because at night, it is not there, it is behind the moon."

48 (12:0): "... Why is it dark at night?—Because the earth turns on itself, then this produces the day and the night.—Where does the dark come from at night? What makes it night?—It comes from the absence of the sun.—Explain to me how it is that it is dark when the sun is no longer there?—It's the sun which produces light, and so if the sun is absent, we cannot have this light.—Where does the sun go at night?—The sun is on the other side of the earth. It's not the sun which goes, it's the earth which turns."
The Movement of Clouds

STAGE 0
Incomprehension or Refusal

In stage 0, the usual features are to be observed again: refusal to answer the questions; refusal to acknowledge the movement of clouds; obvious lack of understanding of questions; inability to find personal solutions; and, consequently, total acceptance of the examiner's suggestions. Some explanations belong to pure imagination and cannot be assimilated to real beliefs.

18 (4:0): "... What makes the clouds move?—Me.—How is that? —I make it move with my hands."

46 (4:0): "... What makes the clouds move?—Serge, my six-year-old brother."

27 (5:0): "... What makes the clouds move?—God.—How does God go about making the clouds move?—He throws a paper.—Can the clouds move by themselves, or is there something to make them move?—There is something, a paper."

Except for some purely verbal confusions (the word nuage [cloud] taken for sauvage [savage] or image [image]), most children start talking about all kinds of things so that it becomes impossible to identify the starting point of their various lucubrations. Thus, to account for the movement of clouds, there will be references to "microbes," "children with fireworks," "house and church," "police and firemen," "factories which are tied behind," etc.
At first glance, some explanations may be compared with those given at later stages, but the details added by these stage 0 subjects betray a total lack of understanding.

44 (4:0): “... What makes the clouds move?—The machines.—How do the machines go about making the clouds move?—It's because they want, they make them crush the man.—Do the clouds move by themselves, or is there something to make them move?—There are wheels [manifestly speaks of an automobile].—[... ]—Why do you say they know?—Because the man, he wants to break the car, then... the slippers are under the car.”

41 (4:6): “... What makes the clouds move?—The Blessed Virgin.—How does the Blessed Virgin go about making them move?—She is dressed.—[... ]—Why do you say that they know?—Because the Blessed Virgin wants them to lunch.—[... ]—But why do they move, the clouds?—Because they think that a Blessed Virgin walks alone.”

Another type of explanation which is very frequent among the younger children merits special notice. It consists in imagining that the clouds are moving “because they have feet.” Answers of this kind come from a superficial association with the word “marcher” (to move, which also means to walk) and manifest a complete ignorance on the part of the subject.

23 (5:0): “... What makes them move?—The moons.—How do the moons go about making the clouds move?—They walk.—Who?—The moons.—[ ... ]—Why do you say that they know?—Because they have feet.—[ ... ]—Why can they go where they want?—Because...—Because of what?—Because they have feet.—But why do the clouds move?—You don't know why?—No.—It's because they have feet.—Then, what does this do?—It's because they are unable to walk if they don't have feet.—Why do the clouds sometimes move fast and sometimes move slowly?—Because, if somebody scares them, they run fast.”

THE MOVEMENT OF CLOUDS
In some cases, it is not the addition of inconsequential details, but rather the total absence of explanatory remarks which justifies the classification in stage 0. These children are indeed satisfied with mentioning "God," "the moon," "thunder," "rain," or even the "wind," and so on, in answer to the first question on the cause of the movement of clouds, but they are afterwards incapable of justifying, even in a rudimentary way, the meaning of this first answer. This inability can no doubt be explained by the lack of real notions on the subject, and the occasional spontaneous remarks are pure associations elicited by the examiner's questions. To bring the child to speak about the clouds is almost always tantamount to inducing him to display his knowledge of meteorological phenomena or of celestial bodies, topics he naturally likes to talk about. However, there is a great danger of mistaking simple remarks for real explanations. It seems preferable, even at the risk of being too rigorous in the assessment of the protocols, not to classify children in higher stages unless they prove capable of developing a system of explanation consistent with the phenomenon to be accounted for. The system does not have to conform with reality; it suffices that the various elements chosen by the child be verisimilar and be expressly applied to the explanation of the phenomenon. When these minimal requirements are lacking, the protocols are classified in stage 0 and are thus considered equivalent to interpretations based upon pure imagination, fabulation, or ignorance.

STAGE 1

Human or Divine Action

In stage 1, the explanation of the movement of clouds gives rise to all the modes of precausality already described. However, realism and artificialism constitute the basis of all the
various elaborations and are thus typical of this first level. The other types of precausal relations are frequently grafted upon this initial structure, but in an irregular and sporadic fashion.

Realism is manifested through beliefs of a magical type: it is we who, by walking, make the clouds move. Divine artificialism permeates most answers and constitutes the most general characteristic of this stage. Animism is sometimes coupled with the foregoing explanations and serves mainly to account for the submission of clouds to divine commands or to human signals. A fourth type of precausal thinking, dynamism, is shown here for the first time and also completes the interpretations just mentioned: the child appeals to dynamism to provide the clouds with the power to move by themselves, and thus to fulfill their function. Lastly, finalism is used occasionally to emphasize the fact that clouds have to move.

29 (7:0): "... What makes the clouds move?—God. —How does God go about making the clouds move?—God gets inside, then makes them move like a car. —Do the clouds move by themselves, or is there something to make them move?—They move by themselves. —Do the clouds know that they are moving?—Yes. —Do they know that it is God who makes them move?—Yes. —Why do you say that they know?—Because it's heavy inside, then they know it. —[....]—Can the clouds go where they want?—No. —Why can't they go where they want?—Because it's God who drives and brings them where He wants. —But why do the clouds move? —To follow us when we walk, to know where we are going. —Why do the clouds sometimes move fast and sometimes move slowly?—Because when we go fast, God makes them go fast; then when we don't go fast, God makes them go slowly. —Yourself, can you make the clouds move?—Yes. —When I walk and you stand still, do the clouds move?—Yes. —And at night, when everybody is asleep, do the clouds move?—No. —Why don't they move?—Because, during the night, people will not move. People must move for the clouds to move. —[....]—Do the clouds move when you stand still? —No. —Why don't they move?—Because if we stand still, God sees
that we're stopping, then He stops the clouds also.—Can the wind make the clouds move?—No.—Why can't the wind make the clouds move?—Because the trees are not high enough.”

The last remark made by this subject should be noted. Surprising as it may seem, it manifests a conception particularly widespread among children, and already noted by Piaget: the wind comes from trees, or more generally, from all the objects whose movement is in reality caused by the wind.

23 (4:0): “… Can the wind make the clouds move?—Yes.—How does the wind go about making the clouds move?—Because it shakes hard.—Where does the wind come from?—Well, it comes from the trees.”

12 (6:0): “… How does the wind go about making the clouds move?—It brings it with its branches.”

108 (11:0): “… Give me the name of some thing which can make some wind.—A tree.”

Unfortunately, the data do not permit a more detailed study of these beliefs on the origin of the wind. Too many children refused to admit the participation of the wind in the movement of clouds and, consequently, were not given the last part of the examination.

The example quoted above, 29 (7:0), is noteworthy for the richness of its content: all modes of precausality are simultaneously and explicitly displayed. Such protocols are very rare. The systems most often resorted to do not include more than two or three types of relationships variously combined; while leaving a clearly preponderant place to explanations of an artificialistic type. This artificialism is moreover restricted to the intervention of a God who is quite often humanized,
and whose action may take all forms from physical contact to remote control.

48 (7:0): "... What makes the clouds move?—God.—How does He go about...?—He pushes them with his hands."

43 (4:6): "... What makes the clouds move?—The same thread which makes the sun move. It's God who holds the thread."

9 (4:0): "... Do the clouds move by themselves, or is there something which makes them move?—There is something to make them move. The Child Jesus pushes a button, then they move, the clouds.—Why do the clouds sometimes move fast and sometimes move slowly?—Because Jesus pushes another button, and then He makes them move fast."

18 (6:0): "... What makes the clouds move?—It's God.—How does He go about...?—He just has to say: 'I want the clouds to move,' and they move."

8 (7:0): "... How does God go about...?—God makes them move by himself, with nothing, nothing."

To summarize, in stage 1, the movement of clouds is explained by causes foreign to both meteorology and physics. The artificialistic or magical techniques fully satisfy the children's intelligence. They do not themselves think of attributing a role, no matter how trifling, to phenomena contiguous in time or space such as celestial bodies, rain, wind, and the like. They never even mention these agents, and it is only at the examiner's suggestion that some subjects will accept the role of the wind. But this concession is in no way a genuine conviction since, at the first opening, most subjects revert to their primitive system.

9 (5:0): "... What makes the clouds move?—They move by themselves when we walk.—[ ... ]—Can the wind make the clouds
move?—Yes.—How does the wind go about making the clouds move?—I don't know. When the wind is strong, the clouds move fast.—[... ]—Why do the clouds sometimes move fast and sometimes move slowly?—Because, when we run, they move fast; then when we do not run, they don't move fast."

Even though reverting to his initial belief, the child has nevertheless accepted the examiner's suggestion. Is this the indication of a slightly superior intellectual level, due to greater permeability to external influences? This hypothesis is not supported by the present results, because there are no observable differences in age between children who accept the suggestion about the wind and those who do not. It is therefore not possible to assume that there is a difference in level between the two groups and to classify them into substages.

STAGE 2

Autonomous Movement, or Action of Other Celestial Bodies

In the second stage, magical beliefs have completely disappeared. God's action is also much less frequent and above all much less exclusive. The child no longer considers that this action alone is sufficient to explain the movement of clouds: he always adds the necessary cooperation of an intermediary agent, chosen among celestial bodies, or among atmospheric phenomena, with the exception of winds.

21 (7:0): "... What makes the clouds move?—The sky.—How does the sky go about making them move?—It's God who makes that go.—Then, what do the clouds move with? What makes them move?—The stars.—How do the stars go about making the clouds
move?—The stars slide on the sky, it makes the sky go forward, it makes the clouds move.”

However, interpretations of this kind, based partly upon divine intervention, are exceptional in the second stage. The topics most frequently introduced are of two types. The first of these seeks the cause of the movement of clouds in cosmology or meteorology; but because he is still incapable of postulating the wind as the origin of this movement, the child will resort in turn to the sun, the earth, the moon, the stars, the sky, the rain, and so on. Briefly, because he thinks in a syncretic way, he is led to postulate causal relationships between phenomena which are simply contiguous in space or time.

26 (8:0): “... What makes the clouds move?—It’s the earth, the earth which turns.—How does the earth go about making the clouds move?—The earth turns, then the sky turns with it, then the clouds turn.—[... ]—Do the clouds move by themselves, or is there something to make them move?—It’s the earth.—[... ]—Why do the clouds sometimes move fast and sometimes move slowly?—The earth turns fast sometimes, then sometimes slowly.”

49 (8:0): “... What makes the clouds move?—The sun.—How does the sun go about making the clouds move?—With its light. At night it’s the moon which makes them move.—[... ]—But why do the clouds move?—Because the sun makes them move.—Why do the clouds sometimes move fast and sometimes move slowly?—It’s the sun which makes them move fast sometimes, and sometimes slowly.”

29 (8:0): “... What makes the clouds move?—The sky.—How does the sky go about making the clouds move?—It moves, then it brings them. ... it’s not anything which makes the clouds move ... [long meditation] ... When it has to rain, they go everywhere. —What makes them go everywhere?—The sky.—How does the sky go about ...?—It hitches them to itself ... the sky moves by itself.”

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The topics of the second type rest upon an apparently integral
dynamism; the clouds move by themselves, without being
openly influenced or directed by any external agent. In stage
1, the few manifestations of dynamism were but accessory:
the clouds could move by themselves in order the better to
comply with the orders of man or God. In the second stage, on
the contrary, the clouds are no longer directly submitted to
somebody's will, and they move about on their own power.

22 (5:0): "... What makes the clouds move?—They move along
by themselves, all alone. — How do the clouds go about moving
along by themselves?—I don't know. — [ ... ]—Do they know
that they move along?—No, they don't have eyes.—[ ... ]—Why
can they go where they want?—Because they like that.—But why
do the clouds move?—Because they are lonesome.—Why do they
sometimes move fast and sometimes slowly?—When it rains hard,
they go fast; when it doesn't rain, they don't go fast."

38 (11:0): "... What makes the clouds move?—Nature.—What
in nature?—They move by themselves.—How do they go about
moving by themselves?—It's because it's like a ball of water, it
gives water.—[ ... ]—Why can't they go where they want?—
Because sometimes it's too big, and they burst and they cannot go
any further when they are open.—But why do the clouds move?—
To go to some other places.—Why do the clouds sometimes go
fast and sometimes slowly?—When they are heavier, they move
more slowly."

Finalistic or animistic remarks are often added to all these
explanations. Upon the examiner's suggestions, the child may
also resort to the wind in his interpretations. The presence or
absence of either one of these elements does not seem, how-
ever, to reflect any perceptible difference in developmental
level, and the statistics do not warrant any subdivision based
on these factors. The essential features of this level are thus

THE RESULTS

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the total disappearance of magical realism and divine artificialism as exclusive causes of the movement of clouds, and the introduction of physical factors which are, however, still inadequate. These physical factors are generally quite sufficient to explain the phenomenon; but in the child's system, it may happen, although not very often, that they must still be supplemented by God's action to be effective.

A cursory analysis of this intermediate stage seems to indicate that it is not continuous with adjacent stages. For the first time, in fact, the intermediate level is not characterized by the child's oscillation between two opposite conceptions. What is visible, on the contrary, is that new beliefs have come to replace those of the preceding level, and these new beliefs seem to have nothing in common with those which will prevail at the next level. It becomes difficult, under these conditions, to explain the linking of these stages and, especially, to determine the psychological significance of this intermediate level. On closer examination of the protocols, however, it is possible to see that this discontinuity is but apparent. Under the guise of physicalism, the child's explanations still conceal relationships of the artificialistic type. It is sufficient to observe how the child conceives the manner in which heavenly bodies act upon each other to become convinced that this action is in no way assimilated to physical or chemical influences, but rather to human gestures.

8 (8:0): "... What makes the clouds move?—The sun.—How does it go about . . . ?—It blows on them."

23 (8:0): "[Same question.]—Vapor.—How does it go about . . . ?—By pushing them."

49 (7:0): "[Same question.]—The moon.—How does it go about . . . ?—It drags them."

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35 (10:0): “[Same question.]—The sun. When the sun is hidden, and it wants to show itself, it pushes them.”

21 (4:0): “[Same question.]—The sun. It hides in the clouds; it steers the wheel.”

The anthropomorphism of all these responses shows unequivocally the persistence of stage 1 artificialistic beliefs: with only slight differences, the same procedures remain effective. Celestial bodies are substituted for man or God; in this sense, it may be said that, though the technician is no longer the same, the technique used does not change. In short, instead of disappearing, stage 1 artificialism is merely transformed. It is associated with more natural physical concepts, but it still remains operative. Thus here again, in spite of appearances, the usual feature of intermediate levels is shown in a mixture of varying ratios of two opposite conceptions.

The protocols are not always so clearly related to artificialism. Whenever the child declines to give precisions on the action of sun or earth, or whenever he pronounces in favor of the autonomous movement of the clouds, the examiner might be tempted to interpret this response in terms of absolute physicalism. Yet, how can an effective action of celestial bodies on clouds be imagined without resorting, at least implicitly, to artificial and even magical procedures? How, for example, can the sun cause the clouds to move forward without being itself considered as an omnipotent being who, like God, imposes his will on the clouds, chases them, draws them along with Him, and so on? Further, even autonomous movements of clouds follow certain rules which express an almost inevitably anthropomorphic finalism: clouds move to water gardens in all countries, or to produce the night by hiding the sun. Thus, it is still man’s will which subordinates the movements of clouds to its own purposes, even though this subjection is not made explicit in the child’s answers.
STAGE 3

Action of the Wind (or Movement Regarded as Illusive)

The stage 3 child finds the correct explanation by himself: he spontaneously designates the wind as the cause of the movement of clouds, and almost always holds to mechanical or physical principles.

3 (10:0): "... What makes the clouds move?—The wind.—Where does the wind come from?—From nowhere, it's always there.—Can the clouds make wind?—No.—[... ]—Give me the name of some thing which can make wind?—A fan.—Why do the clouds sometimes move fast and sometimes slowly?—Because sometimes the wind pushes them hard, then some other times not hard.—Can the clouds go where they want?—No.—Why do you say that they cannot go where they want?—Because if the wind blows on one side, they must go that way."

Also classified in stage 3 are the few subjects for whom the movement of clouds is not real but illusive. This interpretation, even though incorrect, is not without meaning and is completely based upon objective physical criteria. Because they already know that the apparent movement of the sun is illusive, many children undoubtedly apply the same explanation to the movement of clouds.

25 (8:0): "... What makes the clouds move?—They don't move. We are the ones who move. The clouds always remain at the same place; then when we walk, they seem to move, but it's not true."

However, the fact that children come to discover the role of the wind in the movement of clouds, or to consider this movement illusive, does not necessarily imply that all primitive beliefs have vanished completely. Elements of precausal thinking will still continue for some time and permeate their
explanatory systems. In order to mark with greater precision the moment of accession to pure physicalism, it is necessary to distinguish two substages.

**SUBSTAGE 3A: CORRECT EXPLANATIONS, BUT STILL TAINTED WITH PRECAUSALITY**

Substage 3A comprises the protocols characterized by some residual forms of precausality. The most enduring beliefs are perhaps the artificialistic and finalistic notions of previous levels, but they are too often combined with manifestations of animistic and dynamistic thinking to be considered as typical of this substage.

15 (6:0): "... What makes the clouds move?—It's God with the wind. He has a large mouth and He blows."

28 (10:0): "[Same question.]—The wind.—Where does the wind come from?—From a big man, like the one in our first grade book."

13 (8:0): "[Same question.]—They move by themselves, the clouds! It's because it's like smoke; then smoke, it goes up by itself in the sky.—Why do the clouds sometimes move fast and sometimes move slowly?—Because when they go fast, it's because the wind blows on them.—[ . . . ]—Where does the wind come from?—From nowhere."

104 (12:0): "... What makes the clouds move?—Isn't it the earth which turns?—How does the earth go about making the clouds move?—The clouds stay there and the earth turns and they seem to move.—[ . . . ]—But why do the clouds move?—To rain almost everywhere, not always at the same place."

3 (10:0): "... Why do you say that they can go where they want?—Because they move. If the cloud doesn't want to go in the direction of the wind, the cloud will stop so that it won't go."

These few examples effectively illustrate how recourse to
physical causes is often associated with concepts that are still essentially primitive. The appeal to artificialism is particularly clear. Instead of acting directly upon the clouds, God hereafter uses an intermediate agent: He Himself makes the wind which takes upon itself the task of moving clouds. It may sometimes be asked whether these protocols do not rather belong to the second stage, wherein it is precisely these semi-artificialistic and semiphysical explanations that predominate. Two complementary reasons seem, however, to speak against this proposal. In the first place, the artificialism of the previous stages bears directly upon the movement of clouds, while that of substage 3A concerns the origin of the wind. It would indeed be illogical to neglect these latter manifestations of artificialism; but it would be equally so to assimilate them without further ado to the former since the questionnaire is specifically concerned with the child's ideas on the movement of clouds, and not on the origin of the wind. It is, moreover, a very likely supposition that, among the forms of artificialism, the slowest in disappearing are those related to the explanation of the origin of things. Should this hypothesis be correct, the fact of resorting to an intermediate physical cause, even if artificialistic in its own origin, would manifest a progress in the evolution of thinking. The second reason, which is purely statistical, confirms the preceding observation, for the median age of stage 3A children is almost two years more than that of the children of the preceding level. Such a considerable difference in age cannot be ascribed to chance and strongly suggests that there are in effect two genuine levels of development.

SUBSTAGE 3B: CORRECT EXPLANATIONS FREED FROM ANY PRECAUSAL THINKING

In substage 3B, the movement of clouds is explained exclusively by the wind or as the result of an illusion, and no trace
of primitive beliefs is observed. The child’s notions on the origin of the wind are not always exact, but they no longer depend upon gross artificialism: the wind usually comes from the sky, from a disturbance of the air, from the rotation of the earth, from the trees, the oceans, or even the clouds themselves. This last type of explanation is rather infrequent, however, and seems generally to derive from questions that are too suggestive, as is aptly illustrated in the following examples.

36 (12:0): “... Where does the wind come from?—I have never asked myself that question. I am puzzled. —When moving, can the clouds make wind?—It’s the wind which makes them move, they cannot make wind. It’s like a mass of air . . . that can make some wind, yes. —When there is no wind, can the clouds move by themselves?—I don’t think so. They would stay in the same place. I would be surprised. —Where does the wind come from?—It comes from the clouds, a little, one could say. When the wind carries the clouds, the clouds happen to produce some other wind also.”

37 (12:0): “... Where does the wind come from?—From the sky. —Can the clouds make wind?—No. —While moving, can the clouds make wind?—Yes. The wind, it would come from the clouds, then!—When there is no wind, can the clouds move by themselves?—No. —Where does the wind come from?—From the clouds.”

It may be finally noted that one of the questions is often misunderstood by children and may elicit pseudo-animistic answers; for many children the expression, “to go where they want,” is taken to mean, “to go anywhere,” and thus gives rise to affirmative answers.

28 (12:0): “... Can the clouds go where they want?—Yes. —Why do you say that they can go where they want? —Because the wind places them anywhere.”