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AN INVESTIGATION OF PIAGET'S CONSERVATION THEORY AND ITS IMPLICATIONS FOR TEACHING AND DEVELOPING MELODIC AND RHYTHMIC CONCEPTS.

The University of Oklahoma, D.Mus.Ed., 1973
Education, music

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THE UNIVERSITY OF OKLAHOMA
GRADUATE COLLEGE

AN INVESTIGATION OF PIAGET'S CONSERVATION THEORY AND ITS IMPLICATIONS FOR TEACHING AND DEVELOPING MELODIC AND RHYTHMIC CONCEPTS

A DISSERTATION
SUBMITTED TO THE GRADUATE FACULTY
in partial fulfillment of the requirements for the
degree of
DOCTOR OF MUSIC EDUCATION

BY
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Norman, Oklahoma
1973

AN INVESTIGATION OF PIAGET'S CONSERVATION THEORY AND ITS IMPLICATIONS FOR TEACHING AND DEVELOPING MELODIC AND RHYTHMIC CONCEPTS

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ACKNOWLEDGEMENTS

The writer wishes to express a very special thanks to Dr. Harry Fierbaugh, who guided this project from its inception to its completion. A special thanks is also expressed to Dr. John W. Renner for his generous assistance in the application of Piaget's theories to this study. Recognition and appreciation are also extended to Dr. Bill Southerd for his time and advice concerning the statistics for the study.

The writer also wishes to thank Dr. Ralph Verrastro, Dr. Gail de Stwolinski and Dr. Ernest Trumble for their encouragement, suggestions and critical reading of the manuscript. The writer is grateful to the Superintendent and the music teachers of the Norman, Oklahoma Public Schools who allowed her to evaluate the children from the music classrooms.

Finally, my love and deep appreciation are expressed to my husband, James B. Thorn, Jr., for his patience, understanding, interest and moral support throughout this period of academic pursuit.

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CHAPTER I

THE PROBLEM

Introduction

Jean Piaget, Swiss psychologist, has spent a lifetime studying how children learn. According to David Elkind, Piaget views himself as "a biologically oriented genetic epistemologist first, a psychologist second, and an educator not at all."[1] Piaget has occasionally addressed himself in general terms to educational issues without being specific about educational pedagogy. However, many educators and psychologists have discovered a relevance of Piaget's work to curriculum and teaching procedures, and have proceeded to interpret his theories and apply them to teaching procedures.

The conservation concept is basic to Piaget's developmental theories. Conservation refers to a mental stage

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[1]David Elkind, Introduction to Studies in Cognitive Growth (New York: Oxford University Press, 1969), p. xviii.

when a child recognizes the invariance of an object; and to the fact that despite alterations in the perceivable features of an object, the object has not been essentially changed. Piaget considers conservation "a necessary condition for all rational activity."[2]

Piaget developed the theory of conservation by studying children's ability to conserve weight, number, volume, quantity, length and area. In his investigation he experimented with continuous substances including water and clay and discontinuous substances including beads and shells. Piaget concluded that there are three stages of conservation development: there is an initial stage in which perceptual factors exclusively determine the judgement of a child, an intermediate stage of transition when perceptual as well as conservation considerations influence judgement, and finally, there is the final stage of complete conservation. These stages represent, according to Piaget, one manifestation of a general trend from a perceptual-intuitive to an operational orientation that characterizes the development of conceptual thinking.[3]

The change from non-conservation to conservation represents a crucial shift from a preoperational to a

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[2]Jean Piaget and Alina Szeminska, The Child's Conception of Number, trans. by C. Gattegno and F. M. Hodgson (London: Routledge and Kegan Paul, Ltd., 1952), p. 3.

[3]Herbert Zimiles, "A Note on Piaget's Concept of Conservation," Child Development (The Society for Research in Child Development, 1963), 34, 691-695.

concrete operational phase of thinking. The main characteristic of this shift is that operations on the environment previously carried out overtly, now become internalized. Reversibility is the crucial characteristic of internalized concrete operations. Literally, this means, that not only can one carry out an operation but also undo it or reverse it. Also, during the concrete operational stage a child is able to perform additional operations that are, according to Piaget, organized in the form of mathematical groupings such as multiple relationality.[4]

Piaget maintains that when conservation begins to appear in a child's thinking, a child will be able to perform certain operations including multiple classifications, multiple relationality, reversibility and seriation. A child may not be able to perform all of these until conservation is complete. Those who are currently engaged in conservation research believe also that training procedures will be in the area of these prerequisite operations.[5]

Statement of the Problem

The purpose of this study was to investigate Piaget's conservation theory and its implications for teaching and

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[4]Jerome Bruner, ed., Studies in Cognitive Growth (New York: John Wiley and Sons, Inc., 1966), p. 184.

[5]Irving Sigel, Annemarie Roeper and Frank Hooper, "A Training Procedure for the Acquisition of Piaget's Conservation of Quantity," Logical Thinking in Children (New York: Holt, Rinehart and Winston, Inc., 1968), p. 295.

developing melodic and rhythmic concepts. Specifically, the following points were investigated:

1. At what age does the conservation of melodic and rhythmic concepts appear in a child's normal development?
2. Is the conservation of melodic and rhythmic concepts a result of growth and development (age), or is it a result of specialized musical experiences? Do experiences in music groups and private lessons effect the conservation of melodic and rhythmic concepts?
3. Does the development of the conservation of melodic and rhythmic concepts follow a sequential pattern similar to that advanced by Piaget in his conservation experiments with weight, number, volume, quantity, length and area?
4. What are the implications of Piaget's conservation theory for teaching and developing melodic and rhythmic concepts to elementary school children?
5. Can the sequence of musical experiences be related to the cognitive processes that are basic to Piaget's developmental theories; especially the conservation theory?

In this study, melodic and rhythmic concepts were chosen to the exclusion of all other musical elements in

order to exemplify the relationship of Piaget's conservation theory and its implications to music education.

Need for the Study

For a number of years this writer has been concerned about the status of elementary school music. The basis for this concern rests on an apparent inconsistency of public school instruction and the conviction that many music teachers do not understand the relationship between learning processes and teaching procedures. For these reasons many music teachers have not developed generally accepted sequences of musical experiences and procedures for teaching and developing musical concepts.

This writer believes that Piaget's conservation theory is applicable to teaching musical concepts and, furthermore, that research and investigations should be conducted concerning all of Piaget's developmental theories. Research must determine the implications of those theories and how they apply for teaching and developing musical concepts. Other investigators have researched and applied Piaget's developmental theories to the academic areas of mathematics, science and reading, thereby demonstrating an awareness and need for research. However, a review of related literature disclosed that only one researcher has applied Piaget's conservation theory to music.

Marilyn Pflederer Zimmerman has evaluated children for the conservation of musical concepts. Zimmerman conducted

several studies to investigate, through experimental procedures, the relevance of one aspect of Piaget's theory of concept development, namely the principle of conservation to musical growth and development. These research projects were based upon originally constructed musical conservation tasks and were refined and revised to some degree throughout subsequent experiments. The investigator was primarily concerned with the relationship of age to conservation, the efficacy of instructing children for conservation and identifying primary categories of verbal description in non-conserving and conserving children.[6]

In this writer's opinion the results and conclusions of the Zimmerman studies needed to be verified through additional research. Since no other researcher has related Piaget's theory to teaching and developing musical concepts, Zimmerman's study has not been verified or challenged. Also, the clinical method advocated by Piaget which Zimmerman used is not infallible and therefore, the results from studies using this method needed to be verified. In addition, Zimmerman recommends that the sequence of stages in the development of concepts needed further investigation, since her results were inconclusive on this point.

This writer believes that the effect of specialized instruction in music such as participation in a musical

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[6]The Zimmerman studies are reviewed in Related Literature.

group, type of private lessons and the number of years of private lessons needed to be correlated with conservation of musical concepts as well as the age variable. The relationship of these experiential variables were not researched by Zimmerman. Furthermore, statistical data is needed to substantiate the results of the correlations.

Piaget has stressed the fact that conservation is a "necessary condition for all rational activity"[7] and this writer believes that this "necessary condition" includes music also. Because the "necessary condition" occurs during the child's elementary school years, an investigation of Piaget's developmental theories was needed in order to specifically relate them to the teaching and developing of melodic and rhythmic concepts in music.

This writer believes that musical concepts must be taught if a child is to develop a basic understanding of music. A basic understanding of musical concepts will help a child to grow and develop into the more specialized areas of musical performance and consumption. Bennett Reimer substantiates the writer's position with the question, "Given the varying capacities of people, given the limitations of time available for study, given the wide range of interest and desire, how can one share what is most valuable about one's subject with the most people in the most effective

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[7]Piaget and Szeminska, The Child's Conception of Number, p. 3.

way."[8] In answering his own question, Reimer quotes Jerome Bruner; "The most important content in every subject is that subject's 'structure'--its core of interrelated conceptions and modes of behavior which make it a unified, distinguishable discipline."[9] Reimer believes that

> Education can share the 'heart of the matter' about each subject by focusing major effort on teaching it to all children at every stage of their development, in ways relevant to both the subject's own nature and to the children's evolving modes of understanding.[10]

Jerome Bruner gives several reasons why teaching fundamental principles of a subject is important.

> Learning should not only take us somewhere; it should allow us later to go further more easily. . . . There are two ways in which learning serves the future. One is through its specific applicability to tasks that are highly similar to those we originally learned to perform. . . . A second way is through nonspecific transfer or, more accurately, the transfer of principles and attitudes.[11]

Whenever the fundamental principles of a subject are taught Bruner claims the following advantages:

> The first claim is that understanding fundamentals makes a subject more comprehensible. . . . The second claim relates to human memory. Perhaps the most basic thing that can be said about human memory is that unless detail is placed into a structured pattern, it is rapidly forgotten. . . . Third, an understanding of fundamental principles and ideas . . . is to have learned

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[8]Bennett Reimer, A Philosophy of Music Education (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1970), p. 113.

[9]Jerome Bruner, The Process of Education (New York: Random House, Inc., 1963), Chapter 2.

[10]Reimer, A Philosophy of Music Education, p. 113.

[11]Bruner, The Process of Education, p. 17.

> not only a specific thing but also a model for understanding other things like it that one may encounter. . . . The fourth claim is that by constantly reexamining material taught in elementary and secondary schools for its fundamental character, one is able to narrow the gap between 'advanced' knowledge and 'elementary' knowledge.[12]

The convictions of both Reimer and Bruner, concerning the teaching of fundamental structure, indicate that they see a need for teaching the basic concepts in music. They express that there is a need also that these concepts should be taught to children of all ages according to their level of understanding. Abraham A. Schwadron's discussion concerning"Aesthetic Values in Music"reiterates further that

> Curriculum planning in general music should involve a developmental, cyclical process appropriate to recognized levels of maturity. The transfer of musical learning from grade to grade must be achieved so that more discriminate testing of acquired generalizations can occur with increased application to less obvious forms of musical expression.[13]

Since these **educators are of the opinion** that children should be taught the basic concepts of music, the question arises, "How can we evaluate effective teaching?" There are tests that measure musical aptitude and knowledge of musical concepts but, except for the Zimmerman study, there are no measures for testing the conservation of musical concepts.

This study attempted to demonstrate that melodic and

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[12]Ibid., pp. 23-26.

[13]Abraham A. Schwadron, "Aesthetic Values in Music Education," Perspectives in Music Education: Source Book III (MENC, 1966), p. 192.

rhythmic concepts can be taught and developed in the light of Piaget's conservation theory. It also attempted to determine the learning processes that are involved in teaching and developing musical concepts.

Three popular methods for teaching music were surveyed to determine to what extent they were based upon fundamental concepts and an understanding of children's cognitive processes. The first method, The Conceptual Approach, was published by the Music Educators Conference in 1967. The method was devised by an Elementary Commission, and was implemented by that Commission in the schools of Southern California. Conceptual learnings are identified in a Scope and Sequence Chart as they are related to certain elements of music. Concepts are placed at various levels from beginning to advanced understanding of the nature and structure of music. Each new level is built on the previous level. The treatise suggests experiences and resources for teaching and developing concepts.[14]

The Discovery Method is also concerned with musical concepts. In discussing the relevance of the Discovery Method for music education, Charles B. Fowler writes,

> The most uniquely personal of all that man knows is that which he has discovered. . . . The abstraction exists first, and then a name for it is invented. . . . the process is planning the kind of learning

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[14]The Study of Music in the Elementary School--A Conceptual Approach, ed. by Charles L. Gary (MENC, 1966), pp. 232-240.

> experiences in which the desired generalizations will emerge on the unverbalized-awareness level.[15]

This method of instruction was devised by mathematics teachers in their search for new, non-verbal teaching procedures. The Discovery procedure is so structured that a student is enabled to discover a generalization and immediately apply it. Charles Fowler describes how the procedure can be applied to music, but admits that teaching through the discovery method is an art with a difficult technique.

A third method that has received considerable attention was developed by Mary Helen Richards for American teachers. It utilizes an aural approach and is based on rhythmic and melodic elements, and dynamics, tempo and ferm. It consists of listening, chanting, clapping, walking and "feeling the beat." Music symbols and concepts deal with simple ideas and become progressively more difficult. Hand signals are equally important in this method and are used to represent pitches of the pentatonic and diatonic scales. The hand signals are aids for teaching pitch and intervals.[16]

All three of the described methods emphasize the importance of teaching musical concepts, but to the writer's

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[15]Charles B. Fowler, "The Discovery Method," Perspectives in Music Education: Source Book III, reprinted from Journal of Research in Music Education, Vol. XVIII, No. 2 (Spring, 1963), p. 232.

[16]Mary Helen Richards, Threshold to Music (Palo Alto, California: Fearon Publishers, Inc., 1967).

knowledge they have not been scientifically evaluated for actual outcomes, nor have they been related to any particular theory of learning processes. In his article on curriculum Robert House concludes that

> The desirability of detailed findings of wide applicability is evident. The actual outcomes of particular areas and methods of musical instruction needs to be determined, exact methods of controlling experiences are yet unproved, and the sequence of the music programs still rests on a good deal of supposition.[17]

In summation, this writer believed that there was need for a research study to investigate Piaget's conservation theory and to learn the implications for teaching and developing musical concepts, specifically, the concepts concerning melody and rhythm. Also, there was a need to discover the implications for relating Piaget's conservation theory to the learning processes that are involved in developing musical concepts.

Delimitations

Melody and rhythm are important basic elements in the elementary school curriculum. In order to learn and understand these elements, the child must learn the concepts that relate to them. It was impossible to determine the amount of developing and evaluating this study would involve for gathering and evaluating conservation data. Therefore, melody and rhythm were chosen to exemplify the

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[17]Robert House, "Curriculum Construction in Music Education," Basic Concepts in Music Education, NSSE Yearbook 57 (Chicago, Ill.: University of Chicago Press, 1958), p. 260.

relationships between conservation and age, participation in musical groups, type of private lessons and the number of years with private lessons. The writer chose to delimit all other musical elements. Thereby, a longitudinal study was completed. Because the attention span of most children is brief, time was another delimiting factor. The period of evaluation for each child was limited to approximately twenty minutes.

According to Piaget, conservation begins to appear about the age of seven years and is complete around the age of eleven or twelve years. The study delimited children of all other ages.

Outline of Procedures

The purpose of this study was to investigate Piaget's conservation theory and its implications for teaching and developing melodic and rhythmic concepts. The research procedure was two-fold. An investigation of literature related to Piaget's conservation theory was completed. An evaluative instrument based on Piaget's conservation theory was constructed. Hypotheses were formulated and based upon the variables; age, participation in musical groups, type of private music lessons and the accumulated number of years a child received private music lessons. The null hypotheses stated that these variables have no significant effect on the conservation of melodic and rhythmic concepts. The latter three variables were included to determine whether

conservation is developed through specialized instruction or a stage of mental development.

A report of the raw data was made in tabular form. The raw data was statistically treated by employing the product moment correlation coefficient and the chi square test of significance. A summary of the study was made followed by conclusions and implications. These conclusions and implications are based on the investigation of Piaget's conservation theory and its related literature, the raw data from the evaluation, the statistical treatment of the raw data and the individual responses of the children who were evaluated.

The review of related literature formed two sections. The first section included a review of Piaget's developmental theories that relate to conservation. The second section included a survey of books, articles and research studies that are related to conservation. The survey of literature included four categories. The first category included books by Piaget and his associates, Bärbel Inhelder and Alina Szeminska. The second category included books by other authors who summarized or explained Piaget's theories. The third category of literature included research studies in music and other academic areas. The fourth category included research in conceptual learning in music.

A ten task evaluation instrument was constructed, patterned on Piaget's conservation tasks. Five of the tasks

were designed for the conservation of rhythmic concepts and five were designed for the conservation of melodic concepts (see Appendix). The ten tasks were administered to 120 children, ages seven to thirteen years, who were randomly selected from five elementary and two junior high schools in Norman, Oklahoma. The five elementary schools were chosen from different areas of the city in order to include subjects from all socio-economic levels. There are only two junior high schools in Norman.

Immediately following a brief period for getting acquainted and recording the subject's age and experience, this examiner administered the evaluation to each subject. One tape recorder was used to administer the tasks and another tape recorder was used to record the responses of each subject. The responses were transcribed onto individual score sheets and tabulated at a later date. A score of 1 was applied to each task making a total possible score of 10. For each correct response the score was 1, and for each incorrect response the score was 0.

The individual responses were evaluated subjectively by the examiner. The child's response of "same" or "different" was not sufficient evidence of conservation. Therefore, the child was asked to explain his response or to describe what he heard or saw. This explanation enabled the examiner to make a judgement concerning whether the child was actually conserving or merely guessing.

A report of the raw data was made in tabular form, including the number and percentage of correct responses for each grade. The report included another table which summarized all correct responses in all grades. A summary of typical responses was included in order to disclose reasons that children gave for making a particular judgement on a task. Also, these variables were reported in tabular form: the number of subjects in band or chorus, the number of children receiving private music lessons and the accumulated number of years with private music lessons. The range and mean ages of children in each grade was provided in still another table.

The raw data were statistically treated using two different correlational measures, the product moment correlation coefficient and the chi square test of significance. The product moment correlation coefficient, indicated by the symbol r, is used to examine the degree of an assumed relationship between two variables. It is an index of both the amount and direction of the relationship, and shows whether the relationship is positive or negative. The chi square (χ^2) test of significance is used in testing a hypothesis that a certain proportion of a population exhibits a particular attribute.

The main variables in this study were (1) age, (2) participation in a musical group, (3) type of private music lessons, (4) accumulated number of years of private lessons,

and (5) the accumulated total scores for the conservation tasks. The scores for the individual tasks were treated as lesser variables so that conclusions concerning the sequential development of conservation could be made. After the initial statistical analyses were completed, it was deemed advisable to correlate the individual types of private lessons and the accumulated number of years of private lessons with the total scores of the tasks. These new variables were categorized and labeled as; no private lessons, piano lessons, instrument lessons other than piano, and piano plus another instrument or instruments. Each accumulated number of years of private lessons was correlated with the total scores.

The hypotheses were tested and a summary of the study was made. Conclusions were based on (1) the investigation of Piaget's conservation theory and (2) implications for teaching and developing melodic and rhythmic concepts. These conclusions were also based on the raw data taken from the evaluation instrument and a summary of the pupil's responses. These were substantiated by statistical analyses. The conclusions took two forms: conclusions regarding the main variables and conclusions regarding the individual tasks.

Hypotheses

The rationale for this study is based on the following propositions: (1) a child begins to conserve basic concepts in music as a result of a specific stage in his mental

development; (2) participation in a music group has a definite effect on a child's ability to conserve by increasing his motivation through peer relationships, and giving him an opportunity for daily experiences; (3) private music lessons have an effect on a child's ability to conserve musical concepts through a one-to-one interaction with the music teacher; and (4) the number of years with private music lessons has an effect on a child's ability to conserve musical concepts through the accumulation of years of experience.

Formally, the null hypotheses for this study states that: (1) age has no effect on the conservation of melodic and rhythmic concepts, (2) participation in a music group has no significant effect on the conservation of melodic and rhythmic concepts, (3) type of private music lessons has no significant effect on the conservation of melodic and rhythmic concepts, and (4) the accumulated number of years has no significant effect on the conservation of melodic and rhythmic concepts.

Definitions of Terms

Accommodation. The process by which the individual adapts his behavior to his environment.

Action. A child's physical treatment of objects in his environment.

Assimilation. The process by which the individual modifies his environment to his needs; occurs whenever an

organism utilizes something from its environment and incorporates it.

Centering. When thinking is dominated by a single dimension or "property" of an object.

Classification. Arranging objects according to individual similarities and differences--also juxtapose them in rows, squares, and circles, so that the collection forms a figure in space. The understanding of the relative sizes of an included class (at about 8 years) makes the achievement of a genuine operatory classification--also includes double classifications which involves arranging according to two dimensions (i.e., size and color).

Cognitive process. The central organizing process; the individual becomes an actor upon, rather than simply a reactor to the environment.

Cognitive structure. The systemic properties of an event; encompasses all aspects of an act, both internal and external; changes systematically as the child develops.

Equilibration. When the child integrates new information into his already existing systems of meaning through the dual processes of assimilation and accommodation.

Function. Biologically inherited modes of interacting with the environment; imposes "necessary and irreducible conditions" on structures; is invariant.

Groupings. Operational structures which give the child the means to know the world within the stable systems

of logical classification, seriation, numbers, spatial and temporal coordinates, and causality. These systems permit reversible operations, acts of knowing that can move within the system in reverse directions, i.e., from part to whole or from before to after and vice versa.

Horizontal décalage. An irregularity in the course of development of operations. A child, having mastered conservation in one area, is unable to generalize to another area involving similar operations.

Identity. In every system there is one and one only element that when combined with other elements in the system leaves the result unchanged. Negation and reciprocity depend heavily on identity (that does not change in a situation --"sameness of matter"). Piaget implied that if a child can perform operations of negation and reciprocity, he discovers "identity."

Inclusion relations. A child simultaneously considers several present collections (sets or classes) and the larger one from which they are derived.

Lattice. A structure consisting of a set of elements and a relationship that can encompass two or more of these elements.

Learning. The process of changing cognitive structure; partial understandings are revised, broadened, and related to one another.

Number. A synthesis of seriation and classification.

One-to-one correspondence. The equivalence of sets.

Operation. An action that can return to its starting point, and that can be integrated with other actions also possessing this feature of reversibility; the action is internalized.

Relationality. (Or coordination of relations). Considering two dimensions in compensatory fashion. Relationality can be subdivided into (1) ordinal relations which means placing objects in order according to increasing size, and (2) vicariant ordering which means placing equal size objects in order. In vicariant ordering the order in which the objects are counted does not matter.

Reversibility. Applies to classificatory operations and is manifested in two forms; (1) reciprocity, when changing an element necessitates a change in another element, i.e., length versus width. Reciprocity is also known as compensation, and applies to operations involving relationality. (2) Negation, also known as inversion, is when the action of changing one element can be negated, or annulled by reversing the change the operation just performed, or returning to the starting point by undoing the operation just performed.

Schemata. Structural units in Piaget's system; "Schema" (the singular) is the generic unit of structure. Schemata form a kind of framework onto which incoming sensory data can fit; is continually changing shape in order to assimilate those data.

Semiotic function. (Or symbolic function) Allows the representative evocation of objects and events not perceived at that particular moment; and makes thought possible by providing it with an unlimited field of application. This is characterized by deferred imitation, symbolic play, drawing, mental images and image-memories or language.

Seriation. Consists in arranging elements according to increasing or decreasing size (form of reversibility by reciprocity)--results in a mode of deductive composition called transitivity.

Space. Consists of ordinal partitions (proximities, separations, envelopment, openness and closedness, and coordination of proximities in linear, bidimensional, or tridimensional order).

Time and Speed. Based on three kinds of operations:

(1) Seriation of events (temporal succession).

(2) Inclusion of intervals between events occurring at a certain point in time (notion of duration).

(3) Temporal metrics (already at work in the system of musical units) are analogous to spatial metrics.

A child must judge duration in terms of content and speed.

Transductive reasoning. When a preoperational child proceeds from particular to particular, instead of proceeding from the particular to the general (induction) or from the general to the particular (deduction). Also, the child's

lack of a hierarchy of categories, caused by a lack of refinement and mobility in the child's reasoning.

CHAPTER II

RELATED LITERATURE

The investigation of related literature for this study took two forms. The first division includes a synthesis of Piaget's developmental theories that are related to the conservation theory. This summary was based on the books by Piaget and other authors in the second part of the chapter.

The second division of related literature includes four categories. The first category contains books by Piaget and his associates. All of Piaget's books are related to this study in that conservation is a basic theory in the development of cognition. The survey in this study is limited to a summary statement about the contents of each book.

The second category consists of books by other authors who summarized or explained Piaget's theories. The third category concerns research studies in conservation in music and other academic areas. The fourth category includes research in conceptual learning in music education.

Review of Piaget's Theories That are Related to Conservation Theory

To many educators, one of Piaget's most important theories concerns that of psychological development. According to Elkind, Piaget believes that psychological development is not an automatic unfolding with anatomical maturation. Rather, it is the product of maturation, environment, and personal interaction. The child matures and continuously interacts with his environment and maturation plays a part in the interaction.[18]

Piaget's basic hypothesis about learning is "that to know something is to act upon it and/or interact with it."[19] The type of experience a child acquires and the situations to which he is exposed will channel his mental performance. However, the child comes to this situation with an accumulation of experiences which Piaget calls schemata. Schemata influences his apprehension of reality. It is through manipulation of objects that a child develops schemata relating to the objects.

In Piaget's analysis of the nature of conceptual development, he concludes that intellectual structures develop in order to support the individual's adjustments to the demands of his environment. The individual's adaptation is

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[18]Elkind, Introduction to Studies in Cognitive Growth, p. xiv.

[19]John W. Renner, Robert F. Bibens, and Gene D. Shepherd, Guiding Learning In The Secondary School, Chapter 3 (New York: Harper and Row, Inc., 1972).

partly achieved by the process of assimilation and partly by the complementary process of accommodation.

When a child realizes that he has a problem, for example, a new idea or situation, he is in a state of "disequilibrium." The dual processes of assimilation and accommodation are brought to bear on the problem, and equilibrium is restored at a higher level than before. Phillips explains equilibrium thus:

> . . . Structures continually move toward a state of equilibrium, and when a state of relative equilibrium has been attained, the structure is sharper, more clearly delineated, than it has been previously. But that very sharpness points up inconsistencies and gaps in the structure that had never been salient before. Each equilibrium state therefore carries with it the seeds of its own destruction. . . .[20]

There are four factors that influence psychological development. These developmental factors are maturation, experience, social transmission and equilibration.

Physical structures limit certain aspects of cognitive development and make others possible, but maturation itself is not sufficient to explain development. Physical experience involves gaining knowledge of objects by directly observing them. This involves an internal coordination of the individual's actions which at the outset are performed on the objects, but later do not require this physical support. The third factor, social transmission, refers to the

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[20]John L. Phillips, The Origins of Intellect: Piaget's Theory (San Francisco: W. H. Freeman and Co., 1969), p. 10.

acquiring of knowledge through the techniques of reading, instruction and peer interaction. The fourth factor, equilibration, involves the child's self-regulatory processes that lead him progressively through more effective states of equilibrium.

Piaget takes into account this distinction between development and learning. Learning, in the narrow sense, consists of the acquisition of new responses restricted to a specific situation over a period of time. In other words, as a result of repeated empirical observation or external reinforcements, a child will have learned a law for a particular situation. On the other hand, development is the acquisition of a new structure of mental operations which results from the equilibration process. This learning process, Piaget believes, is the only stable and lasting type. It is only when a child has the prerequisite mental structure to assimilate new experiences that true learning takes place, and the possibility to generalize to new situations is feasible. This means that learning and development occur when a child has available the necessary equipment to make use of new experiences.

Piaget believes that development does not occur as a result of learning in the narrow sense. Instead, true learning occurs as a result of development.[21]

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[21]Herbert Ginsberg and Sylvia Opper, Piaget's Theory of Intellectual Development (Englewood Cliffs, N.J.: Prentice-Hall Inc., 1969), pp. 175-177.

Piaget formulated a "stage" theory of conceptual development. As a child passes from one stage to another, the cognitive structure is strengthened by the addition and integration of more complex schema. The order of succession in the stages of development is invariant; the age of attainment of a particular stage, however, will vary from child to child.

John L. Phillips, using Margaret Cook's translation of Piaget's The Origins of Intelligence in Children, outlines these stages and periods as follows:

Units in the Development of Intelligence According to Piaget[22]

Sensori-motor period--Six stages	
Exercising the ready-made sensorimotor schemata	0-1 mth.
Primary circular reaction	1-4 mtns.
Secondary circular reactions	4-8 mths.
Coordination of secondary schemata	8-12 mths.
Tertiary reactions	12-18 mths.
Invention of new means through mental combinations	18-24 mths.
Concrete Operations period	
Preoperational subperiod*	2-7 yrs.
Concrete Operational period	7-11 yrs.
Sometimes divided into; Stage I and Stage II, or Subperiod II and Subperiod III	
Formal Operations period	11-15 yrs.**

*Because Piaget and his co-workers have not been consistent, the reader may find slightly different classifications in other readings, especially in discussions of middle childhood.[23]

**All age ranges are approximations. In children of any age range one can find manifestations of more than one stage or period.[24]

During Piaget's experiments, he discovered that children of seven or eight years acquired "conservation," a process that describes one aspect of a child's ability to apprehend reality beyond the appearance of things.[25]

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[22]Phillips, The Origins of Intellect, p. 11.

[23]Ibid., p. 11.

[24]Ibid., p. 11.

[25]Jean Piaget, The Psychology of Intelligence, trans. by M. Percy and D. E. Berlyne (London: Routledge, and Kegan Paul Ltd., 1950).

Conservation refers to a mental stage when a child recognizes the invariance of an object, and that despite alterations in the perceivable features of an object, the object has not been essentially changed. According to Piaget, conservation is a central prerequisite for the acquisition and subsequent development of logical thought.

Since conservation occurs near the end of the preoperational subperiod, further clarification of this important level is advisable.

1. The preoperational child is perception-bound. He can only think of one variable at a time, and cannot think in abstractions.

2. Five basic characteristics of the preoperational child are:

   A. Egocentricism--the inability to think about his own thinking. The world revolves around him and he cannot take the role of another person legitimately.

   B. Irreversibility--he cannot do reverse operations--cannot reverse an object or action in thought.

   C. Centration--he centers his thinking on one variable at a time.

   D. Transductive reasoning--he reasons from the particular to the particular.

   E. Lack of conservation reasoning--he cannot

hold a concept in his cognitive structure when one element is changed or distorted.[26]

Survey of Literature Related To Piaget's Conservation Theory

The interest in cognitive processes and development during the last few decades is shown by the increased attention developmental psychologists have given to the learning process. As a result, the quantity of writings concerning the learning processes has increased, including those concerned with Piaget's developmental theories.

Four categories of selected literature were surveyed and reviewed for this study. The most important treatises were authored by Piaget and Bärbel Inhelder, his associate in Vienna, and Alina Szeminska, who was an associate at one time. The second category includes books and articles that were written about Piaget's theories. The third category includes descriptions of research that incorporated Piaget's theories. This particular body of literature illustrates what is being done in the study of conservation and related theories of Piaget's work. The fourth category includes research related to conceptual learning.

The books in the first and second categories are not reviewed in detail since the first division of the chapter on related literature reviewed Piaget's theories as a

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[26]Phillips, The Origins of Intellect, p. 59.

summary of the books. Therefore, the review of these books is limited to summary statements about the contents of each book.

Piaget and Associates

Piaget has written more than thirty full-length books and more than a hundred articles in the field of child psychology. The survey of books by Piaget and his associates is not all-inclusive because a number of his books have not been translated from the French.

Piaget's first five books were published between 1923 and 1932, along with a series of articles. The first book, Language and Thought in the Child,[27] provides naturalistic and experimental observations on a child's use of language. Piaget found, for instance, that the young child's speech is substantially uncommunicative, and that this tendency gradually decreases as a child grows older. Judgement and Reasoning in the Child[28] deals with the change in certain types of reasoning from early to late childhood. For reporting The Child's Conception of the World[29] Piaget used the

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[27]Jean Piaget, The Language and Thought in the Child, trans. by M. Gabain (London: Routledge and Kegan Paul Ltd., 1926).

[28]Jean Piaget, Judgement and Reasoning in the Child, trans. by M. Warden (New York: Harcourt, Brace and World, Inc., 1926).

[29]Jean Piaget, The Child's Conception of the World, trans. by J. and A. Tomlinson (New York: Harcourt, Brace and World, Inc., 1929).

clinical method to collect data concerning how a child views the world around him, and what he believes to be the origin of dreams, trees, sun and moon. In The Child's Conception of Physical Causality[30] Piaget describes a child's ideas on the causes of certain natural phenomena, such as the movement of clouds and rivers, the nature of shadows, and the displacement of water. Finally, The Moral Judgement of the Child[31] provides information on the development of moral behavior and judgement.

These five books indicate what Piaget was later to expand upon: a view of intellectual development consisting of a series of stages. Piaget gained considerable fame through these books and he was first recognized as an authority on child psychology by his peers.

The Origins of Intelligence in Children[32] and The Construction of Reality in the Child,[33] both published in 1936, were written by Piaget to report the study of the behavior of his own children. Piaget's observations convinced

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[30]Jean Piaget, The Child's Conception of Physical Causality, trans. by M. Gabain (Totowa, New Jersey: Littlefield, Adams and Co., 1960).

[31]Jean Piaget, The Moral Judgement of the Child, trans. by M. Gabain (New York: Harcourt, Brace and World, Inc., 1932).

[32]Jean Piaget, The Origins of Intelligence in Children, trans. by M. Cook (New York: International University Press, 1952).

[33]Jean Piaget, The Construction Of Reality in the Child, trans. by M. Cook (New York: Basic Books, Inc., 1954).

him that the thinking process derived from a child's actions not from his language. Because of this conclusion, Piaget incorporated the manipulation of concrete materials as an essential aspect of the clinical method in studying the thinking process of children of all ages.

With the cooperation of two important collaborators, Bärbel Inhelder and Alina Szeminska, Piaget determined to explore the field of scientific thought. As a result of this study, Piaget wrote The Child's Conception of Number, with the aid of Alina Szeminska.[34] Here Piaget describes the evolution of a child's efforts to master the notion of number.

An interest in the perceptual research of the "Gestalt" psychologists led Piaget and associates to a series of experiments into the nature of perception. The studies were extended to describe perception not only as an isolated process but also its relation to intelligence. In 1961, The Mechanisms of Perception[35] was published to report the results of this twenty year study.

In 1947 Piaget published a small volume entitled The Psychology of Intelligence.[36] The book is a collection of

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[34]Jean Piaget and Alina Szeminska, The Child's Conception of Number, trans. by C. Gattegno and F. M. Hodgson (London: Routledge and Kegan Paul, Ltd., 1952).

[35]Jean Piaget, The Mechanisms of Perception, trans. by G. N. Seagrim (New York: Basic Books, Inc., 1969).

[36]Jean Piaget, The Psychology of Intelligence, trans. by M. Percy and D. E. Berlyne (London: Routledge and Kegan Paul Ltd., 1950).

lectures given by Piaget in 1942 at the College de France, Paris. It was during these lectures that Piaget described an overview of his theory of mental development.

In 1948, in collaboration with Inhelder and Szeminska, Piaget published The Child's Conception of Space[37] and The Child's Conception of Geometry.[38] These two books grew out of his research into the perceptual aspects of cognition.

In 1955 Piaget and Inhelder published a book entitled The Growth of Logical Thinking from Childhood to Adolescence[39] which compared the thought processes of the adolescent with those of the younger child. In 1959, Piaget published The Early Growth of Logic in the Child.[40] In this book Piaget uses logical models to describe the mental operations of a child from seven to eleven years. It treats in particular his methods of classifying and ordering objects.

In 1966, recognizing the need for a brief introductory book on his system for the general public, Piaget and

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[37]Jean Piaget and Bärbel Inhelder, The Child's Conception of Space, trans. by F. J. Langdon and J. L. Lunzer (London: Routledge and Kegan Paul Ltd., 1956).

[38]Jean Piaget, Bärbel Inhelder and Alina Szeminska, The Child's Conception of Geometry, trans. by E. A. Lunzer (London: Routledge and Kegan Paul Ltd., 1960).

[39]Jean Piaget and Bärbel Inhelder, The Growth of Logical Thinking from Childhood to Adolescence, trans. by A. Parsons and S. Seagrim (New York: Basic Books, Inc., 1958).

[40]Jean Piaget and Bärbel Inhelder, The Early Growth of Logic in the Child, trans. by E. A. Lunzer and D. Papert (London: Routledge and Kegan Paul Ltd., 1964).

Inhelder published The Psychology of the Child. They tried to present, as briefly as possible, a synthesis, or summing up, of their work in child psychology. The earlier studies were published in a number of volumes. Some of the volumes were quite lengthy and some fairly difficult to read. This book was not intended as a substitute for the first volumes but as an overview of his entire span of work.[41]

Other Authors

In his book, The Origins of Intellect, John Phillips gives a non-technical, general summary of Piaget's theory of the development of intelligence. He presents Piaget's original theory together with illustrations of his research activities. Phillips outlines the developmental periods; sensori-motor, concrete operations and formal operations. These outlines vary somewhat from other similar discussions of Piaget's theories. Phillips final chapter discusses the educational implications of Piaget's work.[42]

In J. H. Flavell's The Developmental Psychology of Jean Piaget one can find a review of Piaget's recent work, as well as a thorough technical discussion of the theory itself. Flavell also includes a review of Piaget's studies of

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[41]Jean Piaget and Bärbel Inhelder, The Psychology of the Child, trans. by Helen Weaver (New York: Basic Books, Inc., 1969).

[42]John Phillips, The Origins of Intellect.

perception and moral concepts.[43]

Another reference book for students of Piagetian theory is Piaget's Theory of Intellectual Development: An Introduction. This text was a joint effort of a Piagetian-trained psychologist Sylvia Opper and American professor of developmental psychology, Herbert Ginsberg. The authors discuss and explain the more difficult concepts concerning the interpretation of Piaget's theory of intellectual development. Also, Ginsberg and Opper discuss the implications of Piaget's views for education, emphasizing the four factors in the development of learning; maturation, experience, social transmission and equilibration.[44]

Research in Conservation Theory

In an article in Young Children, Millie Almy says,

> As the child grows and his experience increases, one might say that he mentally stores more and more information, and constructs new and more effective ways of retrieving and applying it. . . . By the time he is in elementary school he has an array of relatively stable concepts with which to apprehend his world. It is Piaget's view that the child's response to instruction from without is always relative to whatever internal construction he has already developed.[45]

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[43]John H. Flavell, The Developmental Psychology of Jean Piaget (Princeton: D. Van Nostrand Co., Inc., 1963).

[44]Herbert Ginsberg and Sylvia Opper, Piaget's Theory of Intellectual Development: An Introduction (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1969).

[45]Millie Almy, "Spontaneous Play," Young Children (National Association for the Education of Children, Vol. XXII, May, 1967), pp. 265-276.

David Elkind, writing about Piaget's conservation concept, says, "The child discovers conservation--permanence across permanent change--with the aid of reason. It is by reasoning about his experiences that the child is able to overcome illusions and discover how things really are."[46]

A doctoral dissertation by Ina C. Uzgiris entitled "Situational Generality of Conservation" was reprinted in Child Development in 1964. The purpose of this paper was to investigate systematically the effect of varying the materials used to test the conservation of substance, weight, and volume on the observed sequential attainment of these concepts. She concluded that the study supported Piaget's theory of sequential development and that the conservation of substance, weight and volume seems to be attained in the same sequence with any material.[47]

Jan Smedslund made several studies of conservation acquisition. The initial paper dealt with the number of possible interpretations of conservation. He compares the relative merits of reinforcement-based learning as opposed to equilibration models in providing an adequate explanation of cognitive growth. Although he favors the equilibration position, Smedslund definitely acknowledges the role of

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[46]David Elkind, "Piaget's Conservation Concept," Childhood Education (Washington, D.C.: Childhood Education International, Vol. 44, January, 1968), pp. 292-294.

[47]Ina C. Uzgiris, Situational Generality of Conservation," Child Development (The Society for Research in Child Development, 1964), pp. 831-841.

experiential factors on thought processes. Most of Smedslund's research is based on the proposition that conservation is acquired through repeated exposures to conflict situations.[48]

An experiment was conducted by Sigel, Roeper, and Hooper in 1966 to attempt to teach children to conserve. They predicted that conservation would occur spontaneously if the child could master the operations of which it was composed. They concluded that the training was effective.[49]

In 1965, Gerald Gruen attempted to compare directly the relative effectiveness of training procedures derived from Smedslund's (1961) cognitive-conflict hypothesis and a conventional learning-through-reinforced-practice hypothesis.[50]

An article by Alina Szeminska called "The Evolution of Thought: Some Applications of Research Findings to Educational Practice" is included in related literature for its discussion of horizontal and vertical décalages, as described by Piaget. She emphasized the fact that the appearance of

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[48]Jan Smedslund, "The Acquisition of Conservation and Weight," Logical Thinking in Children, ed. by Sigel and Hooper (New York: Holt, Rinehart and Winston, 1963), pp. 265-280.

[49]Irving E. Sigel, Annemarie Roeper and Frank Hooper, "A Training Procedure for Acquisition of Piaget's Conservation of Quantity," The British Journal of Educational Psychology, 1966, pp. 301-311.

[50]Gerald Gruen, "Experiences Effecting the Development of Number Conservation in Children," Child Development, 1965, pp. 963-979.

the structures that are characteristic of the successive stages are many times related to precise ages. On the contrary, the ages indicated in the studies of the Geneva school clearly demonstrate the regularity of the successive stages; at the same time, however, the relation between the level of thought and age is much more complicated.[51]

Studies in Cognitive Growth was a collaboration of graduate students, professors, and postdoctoral fellows at the Center for Cognitive Studies at Harvard University. The editor-in-chief was Jerome Bruner, with Dr. Rose Richardson Olver and Dr. Patricia Marks Greenfield as co-editors. The chapters are primarily reports of research projects and are concerned with several general issues: the growth of rules of equivalence, the development of "efficient" information searching, and the establishment of invariance as a tool in thinking. Bruner states that in spite of many points of disagreement with Piaget, they are minor when compared with points of fundamental agreement.[52]

Dr. John Renner, with four assistants, replicated some of Piaget's conservation tasks in Norman, Oklahoma, through testing 252 children. The purpose of the study was

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[51]Alina Szeminska, "The Evolution of Thought: Some Applications of Research Findings to Educational Thought," Cognitive Development in Children: Five Monographs, Society for Research in Child Development (Chicago: The University of Chicago Press, 1970), pp. 611-621.

[52]Jerome Bruner, Rose Olver and Patricia Greenfield, et al., Studies in Cognitive Growth (New York: John Wiley & Sons, Inc., 1966).

to employ Piaget's theory in a practical way in the elementary classroom. The conservation task results clearly showed that all children do not become operational on all tasks at the same time. The study suggested some experiences which would encourage a child to lose his preoperational characteristics.[53]

The research reviewed for this study are examples of the type of research being conducted that are related to Piaget's conservation theory. This writer pointed out, in the need for the study, that only one researcher has applied Piaget's conservation theory to music. Since the Zimmerman studies are directly and significantly related to this study, these are reviewed in more detail.

A pilot study was conducted by Zimmerman in 1963 to study the relevance of conservation principles to musical growth and development. Musical Tasks designed to study conservation of meter, tone and rhythm were administered to a small number of five- and eight-year-old children. She concluded that children could be evaluated for conservation of musical concepts.[54]

The tasks from the pilot study were revised and

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[53]John W. Renner, et al., "Piaget is Practical," Science and Children (National Science Teachers Association, Vol. 9, No. 2, October, 1971), pp. 23-26.

[54]Marilyn Pflederer Zimmerman, "The Responses of Children to Musical Tasks Embodying Piaget's Principle of Conservation." Doctoral Dissertation. University of Illinois. University Microfilms, Ann Arbor, Mich., 1963.

tape-recorded for administration to subjects of four age levels for replication in a subsequent experiment. Eighty subjects were distributed over the ages of five, seven, nine and thirteen years. The results of this study indicated a highly significant main effect for age and that there was no variance attributable to sex of subjects. There was significant interaction between individual tasks and age, suggesting that the different tasks separated the age groups to differing degrees. However, Zimmerman concluded that there was no evidence for any "stages" in development of the musical concepts tapped in this study.

Verbal responses were evaluated and categorized into the seven following categories: (1) non-conservation; (2) an intermediate stage; (3) conservation; (4) lack of proper questions by the experimenter; (5) circular responses; (6) incorrect answer and non-conservation response; and (7) conservation type response but incorrect answer.

The second experiment was designed to appraise the effects of a brief instructional period focused on the development of some simple conservation skills in music listening, and refine the procedures used in previous studies in order to produce a better understanding of conservation and musical concepts in general. The tasks used in the previous experiments involved only brief and meaningless tonal and rhythmic patterns. According to Zimmerman, this study

developed new materials that would permit the use of complete musical phrases and would facilitate the study of a wider variety of musical concepts such as harmony, inversion and interval variations.

One hundred sixty-eight subjects from the schools in Chicago, Evanston and Skokie, Illinois were selected for the experiment; ages again ranged from five, seven, nine and thirteen years. The subjects were randomly assigned to the experimental and training groups. The experimental training consisted of a tape recording of the first phrase of "America" and eight deformations. The deformations were discussed during the training sessions.

The control group training consisted of a tape recording of phrases from the elementary school repertoire. Unlike the experimental training tape, no standard of comparison was used. During the training sessions the phrases were discussed in terms of tempo, melodic movement, pitch, range, mode, harmony and timbre.

The test tape consisted of four tasks selected from Bartok's "Music for Children." The procedure was the same as for the experimental training tape.

Two important conclusions were made as a result of this study.

> (1) There is a very strong age effect . . . with the older children being superior on every facet of the task. Apparently the superiority of the older children is not entirely attributable to better tonal memory or other response capability. Almost

certainly a better musical understanding is involved.

(2) The fact that conservation occurs easily for some kinds of stimuli suggests that it should occur for all stimuli used here. In theory there is no reason why the addition of harmony should prove less disrupting than the alteration of a rhythm pattern. The reason that it is less disrupting probably relates to the amount of previous experience and perhaps to the nature of that experience.[56]

Zimmerman conducted three other experiments, at which time she refined the tasks and replicated the above studies. Techniques and methodology were also revised and refined.

Zimmerman and Sechrest have written several articles for the Music Educators Journal, the Journal of Research in Music Education and the Council of Research in Music Education, all of which are reports of different aspects of the five experimental studies. These articles are included in the bibliography of this study.

Research in Conceptual Learning in Music

There is a wealth of current research concerning children's organization of musical concepts. Some of these research studies are reviewed in this study in order to relate Piaget's conservation theory to conceptual learning in music.

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[56]Marilyn P. Zimmerman and Lee Sechrest, How Children Conceptually Organize Musical Sounds. Cooperative Research Project No. 6-10-285. Evanston, Illinois: Northwestern University, March 31, 1967.

An important study was conducted by Andrews and Diehl. The purpose of their research was to develop a technique that would identify elementary school children's concepts of pitch, duration and loudness. It was believed that the proposed technique might reveal significant information regarding children's concepts of musical elements, and possess considerable potential as a practical measure of children's growth in concept development.

The Battery of Musical Concept Measures was administered to 601 subjects; this included trial administrations, pilot study samples, administration of the group measures and administration of the individual measures. Andrews concluded that the Battery identified fourth grade pupils' musical concepts and the measures are adequate for research purposes. Andrews and Diehl are presently revising and refining the measures.[57]

James C. Carlsen, in a research study concerning some problems in musical learning, describes concept formation.

> Conceptual behavior is the identification of similar characteristics which classify otherwise dissimilar stimuli. The process of concept formation must employ a model of perception.[58]

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[57]Frances M. Andrews and Ned C. Diehl, "Development of a Technique for Identifying Elementary School Children's Musical Concepts," Journal of Research in Music Education, Vol. XVIII (Fall, 1970), pp. 214-222.

[58]James C. Carlsen, "Some Problems in Musical Learning," Journal of Research in Music Education, Vol. 17 (1969), p. 48.

Carlsen believes that it is doubtful that any learning takes place apart from a perceptual process. The perceptual process, according to Carlsen, contains at least three components; (1) the existence of a perceptual field, (2) selective focus and (3) the internal operation of labeling and organizing. He contends that the third level of the perceptual process is when concept formation takes place.[59]

James P. O'Brien discusses the conceptual approach to music in an article in the Music Educators Journal. O'Brien states that while children are experiencing all the traditional musical activities that constitute enjoyment of music, they are also "facing musical questions, finding answers and using their solutions to attack further questions." He contends that employing the cognitive domain to explain the affective domain heightens aesthetic awareness and judgement, and provides skills for musical growth.[60]

Asahel Woodruff believes that conceptual development is in essence the concern of the educator. He holds the opinion that human beings engage in three continuing and interwoven forms of behavior that have a cumulative consistency with past experience: (1) acts of recognition and choosing, (2) acts of execution of thoughts and choices, which is

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[59] Ibid., pp. 47-50.

[60] James P. O'Brien, "How Conceptual Learning Takes Place," Music Educator's Journal (MENC, September, 1971), pp. 34-35.

sub-divided into (a) symbolic and (b) nonverbal, instrumental manipulation.[61]

Larsen and Boody applied Piaget's theory of operations in the Concrete Operational Period to the teaching of musical concepts. This writer believes that the Larsen and Boody study is highly relevant to this study, because a child must be able to perform operations in order to complete a conservation task. This writer also believes that those who are conducting research in teaching conservation are actually teaching the operations rather than the concept of conservation itself.

The Larsen and Boody study is primarily based on the Flavell treatise discussed earlier in this chapter (page 36). The Flavell publication is a review of Piaget's recent work and a technical discussion of Piaget's theory. Larsen and Boody suggest a parallel between Piaget's theory of mathematical groupings and lattices, and the teaching of musical concepts.[62]

Robert G. Petzold conducted a series of research projects to identify ways in which children, ages six to twelve, perceive and respond to the auditory presentation of musical sounds. The series of studies extended over a

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[61]Asahel D. Woodruff, "How Musical Concepts are Developed," Music Educators Journal (February, 1970), pp. 51-54.

[62]Ronald L. Larsen and Charles G. Boody, "Some Implications for Music Education in the Work of Piaget," Journal of Research in Music Education (Spring, 1971), Vol. 19, pp. 35-50.

six-year period. The several originally constructed tests required that a child make some kind of overt musical response to an aural presentation of a test item. More than 6000 tests were administered during the total project.

Findings of the Petzold study that are related to this study are outlined as follows:

> (1) All of the tasks showed that the differences between grades 1 and 3 were always significant; . . . that the children in grades 3 through 6 usually performed at approximately the same level of accuracy indicating that a plateau had been reached; and that the greatest gains were usually noted between grades 1 and 2.
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> (2) There was a definite pattern which indicated that the large number of nonmelodic responses made by first grade children were usually eliminated by second grade when greater vocal control had been attained. The next stage . . . by grade 4 or 5, was to eliminate those responses which indicated only awareness of the contour and number of tones, thus increasing the number of partially correct responses. The final stage was to transform partially correct responses to correct responses. The difficulty of the item had a direct bearing upon the rate at which this change took place since the total process was completed much earlier in the grades for easy items.
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> (3) The data for the phrase test . . . shows that learning a short musical phrase without external assistance was an extremely difficult task. Only eight out of ninety children were capable of learning the phrase by grade 4, retaining this skill for subsequent years. Furthermore, a second phrase given when these children reached sixth grade showed that they performed at only the third grade level of competence. This suggests that the learning process itself had not changed significantly during four years despite experience with a task of this kind.
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> (4) The timbre study showed that item difficulty was a function of melodic content and not of timbre.
>
> (5) In general, the ability to respond accurately to the aural presentation of rhythmic patterns of medium

difficulty and to maintain a steady beat did not change significantly once the child had completed the second grade.[63]

Petzold concluded that age (grade level) is a significant factor in the development of auditory perception and that it is obvious that this reaches a plateau no later than grade three. There are indications that the most significant changes occur between grades one and two. He also concluded that the results of the study emphasize that the ability to imitate the aural presentation of certain kinds of musical ideas is not a measure of the understanding children have of such ideas.[64]

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[63]Robert G. Petzold, "Auditory Perception in Children," Journal of Research in Music Education (Spring, 1969), pp. 82-87.

[64]Ibid., p. 87.

CHAPTER III

THE EVALUATION INSTRUMENT

Development of the Instrument

The main purpose of this study was to investigate Piaget's conservation theory and its implications for teaching and developing melodic and rhythmic concepts. One basic procedure was to construct an evaluative instrument that would determine what effect the development of mental maturity (synonymous with age for the purpose of this study) has on the ability of children to conserve melodic and rhythmic concepts. Three other variables were considered also: (1) the effect of participation in a musical group such as band and chorus (this included honor chorus and church choirs in the elementary grades), (2) type of private music lessons and (3) the accumulated number of years a child received private lessons.

Before attempting to construct an evaluation instrument for the conservation of melodic and rhythmic concepts, the writer attended a seminar pertaining to Piagetian theory during the summer of 1971. This seminar was conducted by Dr. John Renner, Professor of Education, University of Oklahoma.

In the seminar, the participants took part in a training session that required each participant to evaluate ten children using Piaget's standard conservation tasks. The evaluation scores were tabulated and compared with Piaget's figures for the same tasks. The scores were similar. The responses of the children were discussed and reasons for their responses were explained in the light of Piaget's theories.

This researcher attempted to pattern the musical conservation tasks which were used in the evaluative instrument on Piaget's original conservation tasks. The following example illustrates Piaget's task for the conservation of continuous quantity.

> The child is presented with two identical beakers (A and B), each filled with equal amounts of liquid, and is asked whether the two glasses contain the same amount or not the same amount to drink. After he agrees to the equivalence of quantities, the liquid is poured by either the examiner or the child from one of the two identical beakers (B) into a third, dissimilarly shaped beaker (C). The column of the liquid in the third glass is both shorter and wider than that in the remaining original glass (A). The child is now asked whether the two beakers (now A and C) contain equal amounts. If he asserts that they do he is asked to explain why. The liquid in C is then returned to the original beaker (B) and the child is asked again if A and B contain identical amounts. If the child consistently asserts this equality, he is conserving continuous quantity.[65]

In formulating tasks for the conservation of melodic and rhythmic concepts the researcher felt it necessary to reexamine what happens to a child's thinking as he approaches

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[65]Ginsberg and Opper, Piaget's Theory of Intellectual Development, pp. 1620163.

and attains conservation. Simply stated, a child passes from one level of actions to another level of internalized actions. These internalized actions are called operations. There are three levels in this transition as explained by Piaget in The Psychology of the Child.

1. First, there is the sensorimotor level of direct actions upon reality.
2. Second, there is a transitional level which is an advance over direct action in that actions are internalized by means of the semiotic function. This level is characterized by new and serious obstacles, such as:
   A. A problem of mentally representing what has already been absorbed on the level of action.
   B. A problem in "decentering," so his body and action assume their objective relationships with reference to all other objects and events in the universe.
   C. A problem in the reconciling of the child's own views to others (separate and multiple perspectives).
3. Third is the level of operations, which concern transformations of reality by means of internalized actions that are grouped into coherent, reversible systems (such as joining and separating).

Continuing, Piaget says that the clearest indication of the existence of a preoperatory period corresponding to the second of these levels is the absence of notions of conservation until about the age of seven or eight.[66]

The operations, such as the union of two classes (fathers united with mothers constitutes parents) or the addition of two numbers, are actions characterized by their very great generality since the acts of uniting, separating and arranging in order, enter into all coordinations of

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[66]Piaget and Inhelder, The Psychology of the Child, pp. 93-95.

particular actions. They are also reversible, never isolated, but always capable of being coordinated into overall systems such as classification or sequencing of numbers. These operations consist of reversible transformations. A reversible transformation always leaves some feature of the system constant. This constant invariant is what is labeled a scheme of conservation.[67]

As a result of this reexamination the musical tasks on the musical evaluation instrument were based on operations that a subject must be able to perform in order to solve the problem. Each task was constructed and administered to five children as a pilot study. Also, the tasks were revised and refined prior to the formal evaluation. During the pilot study the examiner learned that the subject must be allowed to explain his responses according to his own experiences with music. The examiner also discovered that the use of familiar songs in the task examples should be avoided because a child inevitably focused on the familiar melody instead of the element. The examiner was convinced that the child was conserving a particular melody rather than a melodic concept.

As a result of the pilot study, the examiner concluded that the examples should be two to four measures in length. Some of the examples included complete phrases while others included motives from larger phrases.

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[67]Piaget and Inhelder, The Psychology of the Child, pp. 96-97.

For validation purposes, the completed instrument was submitted to Dr. Harry Fierbaugh, Professor of Music, University of Oklahoma. Dr. Fierbaugh evaluated the instrument for musical content. For evaluation according to Piagetian principles, the instrument was submitted to Dr. John Renner, Professor of Education, University of Oklahoma. Dr. Renner has conducted several experiments and written four books applying Piaget's theories to curriculum in general and to science curricula in particular.

A mini-lesson was included with the instrument to enable the examiner to demonstrate what was expected of the child. Special instructions were included to help provide an informal atmosphere that might enable a child to freely respond. The examiner did not use the lesson-tasks word-for-word but rather as a guide. The informal and friendly setting encouraged the subject to discuss and explore the identity of the elements with which the tasks were concerned. Through the conversation technique, the examiner recorded the musical experience and thoughts of the child.

The evaluation instrument contained complete instructions that enabled the examiner to follow the same procedure for every child. Each task consisted of a melodic or rhythmic pattern presented in two forms. First, the pattern was presented in its simplest form and represents the given empirical property that remained invariant. Second, the pattern was presented with a "foil." The "foil" represents

the change made in the shape or presentation of the pattern.

The aural task examples were recorded on tape to assure that the corresponding tasks would be precisely the same each time they were presented. The visual examples were transcribed on five by eight cards. Each subject was permitted to hear the taped examples more than once if he so desired.

The instructions to the child were the same for each task. The subject was informed that there would be two musical examples. He was also reminded to focus his attention on the rhythmic (or melodic) pattern. The examiner then asked the child, "Is the rhythmic (or melodic) pattern in these two examples the same, or is it different?" After the child responded with "same" or "different," the examiner asked the child to explain his response. The child's explanation was used in order to determine whether the child was actually conserving the pattern or merely guessing. Examples of typical responses and suggestions concerning additional questions are included with each task to serve as a guide to the examiner. Further questioning was necessary when the child's response cast some doubt on his ability to conserve.

Description of the Tasks

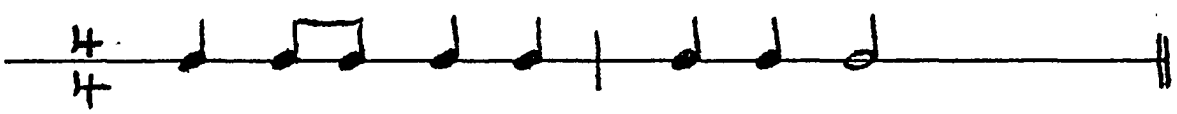
Task 1

Grade level--easy

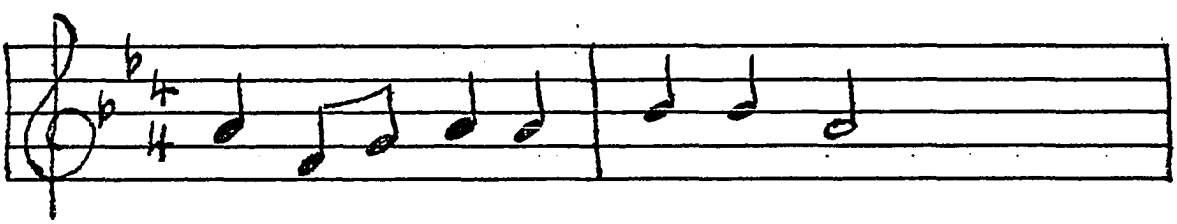
Task 1 is a rhythmic task, and it is aural. It is

based on an old French carol. The child is physically involved when he claps the rhythmic pattern, and he can hear as well as "feel" the beat and duration of the notes. Clapping also helps him to "center" on the beat and duration.

Ex. (1)--to be clapped by the examiner and repeated by the child.



Ex. (2)--the rhythmic pattern has the melody added and is on tape.



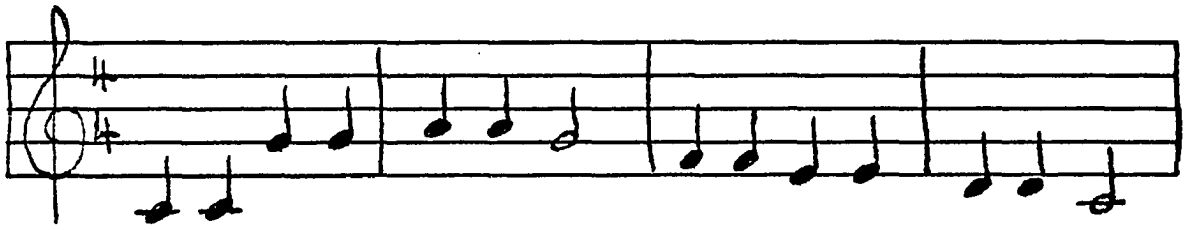
In order to conserve the rhythmic pattern after the melody has been added, the child must classify the notes into a series of events (long and short durations) and match the notes of one example to the corresponding notes in the second example.

Task 2

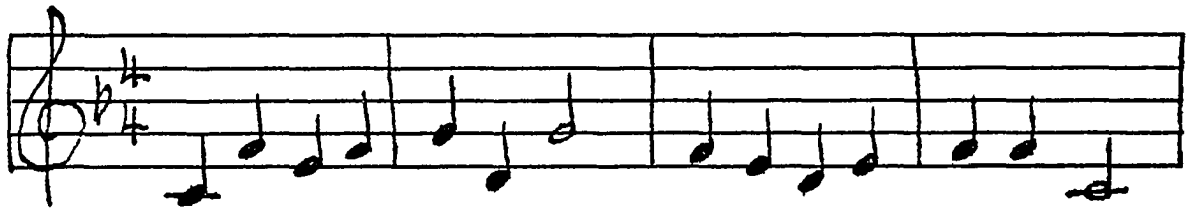
Grade level--difficult

Task 2 is a rhythmic task, and it is aural. A rhythmic pattern is used in two different melodies, "Twinkle Little Star" and "Aura Lee."

Ex. (1)--piano on tape



Ex. (2)--piano on tape



This task was included as one of the most difficult of the tasks. It was believed that in order for a child to conserve rhythm totally, he must be able to recognize and retain the overall structure of a rhythmic pattern wherever he may encounter it (in other melodies, in other keys, in augmentation or diminution).

The same operations are required for Task 2 as those for Task 1, with added complexities. The child must be able to classify the duration of the notes into a series of events, and match the notes in one example to the corresponding notes in the second example. In addition, he must classify the pitches into a series of melodic events, and match these pitches to the corresponding pitches in the second example. He must, at the same time, defocus from the melodic element and focus on the rhythmic element. In other words, the child must be able to think about two elements at the

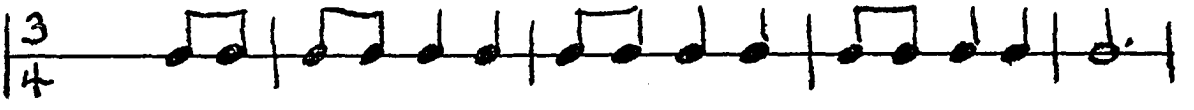
same time, which a preoperational child cannot do. In the final stage of the concrete operational period, the child should be able to form successive and simultaneous classifications and understand class inclusions. In addition to conservation, the examiner believed that this task might give some indication which element, rhythm or melody, was more easily perceived by the young children.

Task 3

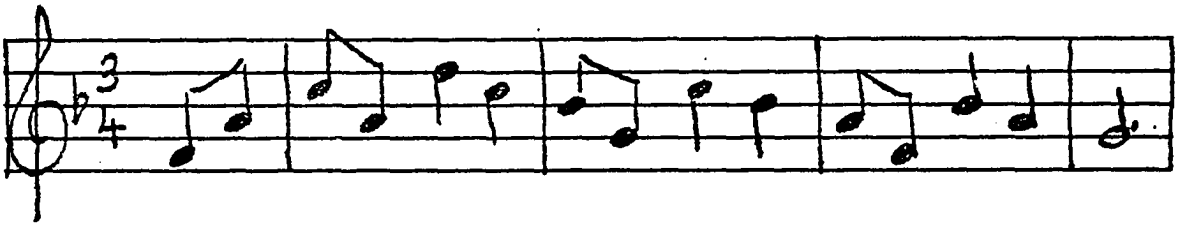
Grade level--easy

Task 3 is a rhythmic task, and it is aural and visual. It is based on the melody "Guten Abend" by Brahms. Task 3 is similar to Task 1, but it is more difficult. The examiner claps the rhythmic pattern, and the child looks at the second example on a card.

Ex. (1)--clapped by the examiner



Ex. (2)--in melodic context on a card



The rhythmic pattern begins on the third beat of the measure, includes three kinds of notes, and has a number of subdivided beats. Task 1 contains only two kinds of notes, begins on the first beat of the measure, and has no

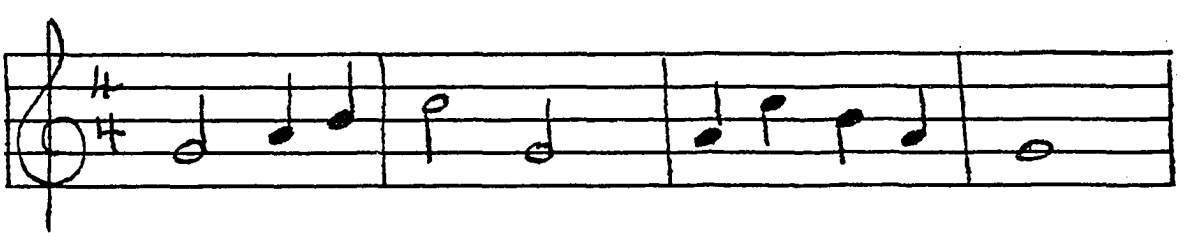
sub-divided beats. The investigator believed that the same type of problem should be presented in a visual task as well as an aural task since there is a possibility that aural and visual perception do not parallel one another in their development.

Task 4

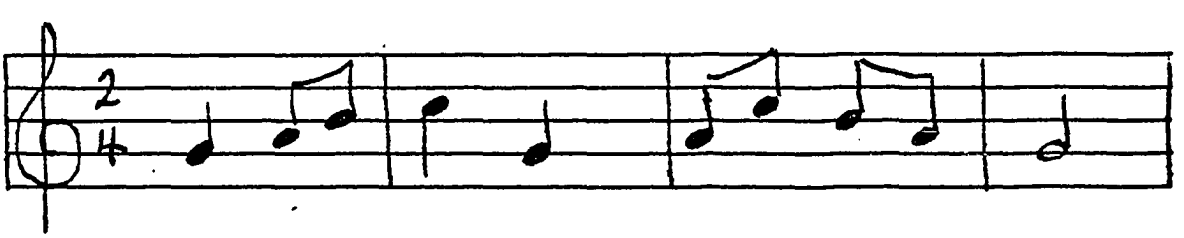
Grade level--difficult

Task 4 is a rhythmic task, and it is visual. It contains a rhythmic pattern written in two different meters; the melodic and rhythmic patterns remain constant. In the first example the note durations are twice as long as the note durations in the second example. The melody is "Chester" by William Billings.

Ex. (1)--on a card



Ex. (2)--on a card



The same operations also apply to Task 4. The child must be able to classify the duration of the notes into a series of events and match the notes in one example to the

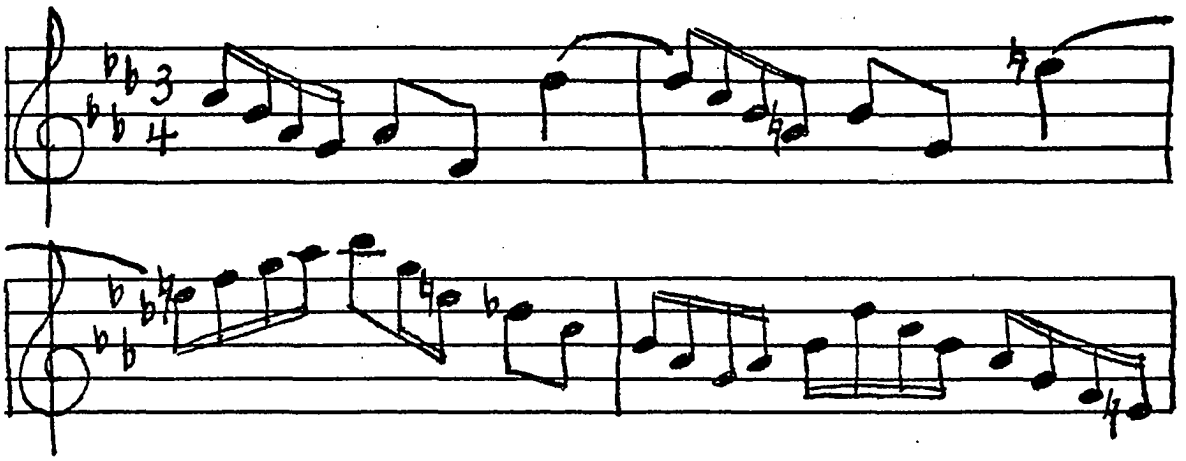
corresponding notes in the second example. The child must also classify the pitches of the notes into a series of events and match the pitches in one example to the corresponding pitches in the second example. In addition, and this is the crucial operation, he must be able to see and understand the relationships between the two complete examples. For instance, the longest note in example one is the whole note, and the other notes in this example are a half and a fourth as long as the whole note. In the second example the longest note is a half note, and the other notes in this example are a half or a fourth as long as the half note. In comparing the two examples, all of the notes in the first example are twice as long as all the notes in the second example, but the pattern is the same in both examples.

Task 5

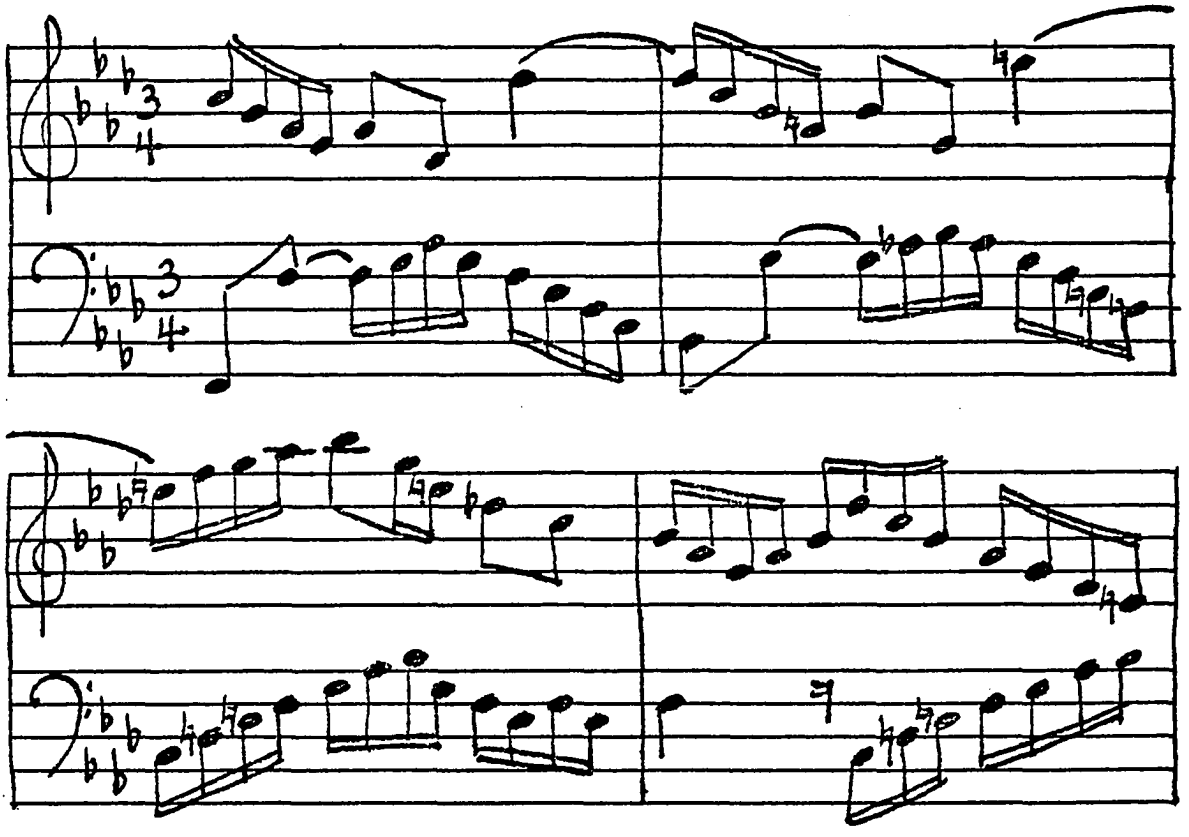
Grade level--medium

Task 5 is a rhythmic task, and it is aural. The task is based on a melody from Bach's "Two-Part Invention, No. 9." Counterpoint is a basic form, and it is used in this task to learn whether or not a child can conserve a rhythmic pattern disguised in this manner. The first example contains the melody only, and the second example includes melody and contrapuntal accompaniment. The subject is instructed to listen to the melody and say whether the rhythmic pattern is the same or different in both examples.

Ex. (1)--piano on tape



Ex. (2)--piano on tape



The necessary operations for solving the problem are the same as those required for solving Tasks 1 and 2. In addition, the child must be able to focus on the rhythmic

pattern in the second example instead of on the accompaniment. The experimenter believed this task to be of medium difficulty and would show how much conflict this type of distortion would cause in the child's ability to conserve.

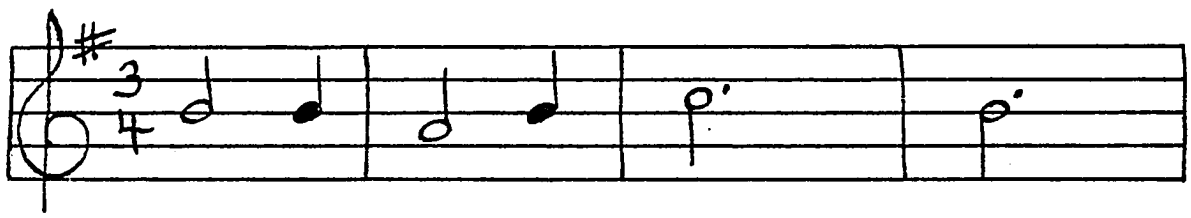
Before beginning the melodic portion of the evaluation the examiner reviewed the properties of "melody" with the child. Technical terms were used and these terms were explained in keeping with the level of a child's thinking. It was not expected that children in the primary grades would be familiar with the terms. Young children usually think in general terms, for example "high--low" and "fast--slow," rather than in specific terms.

Task 6

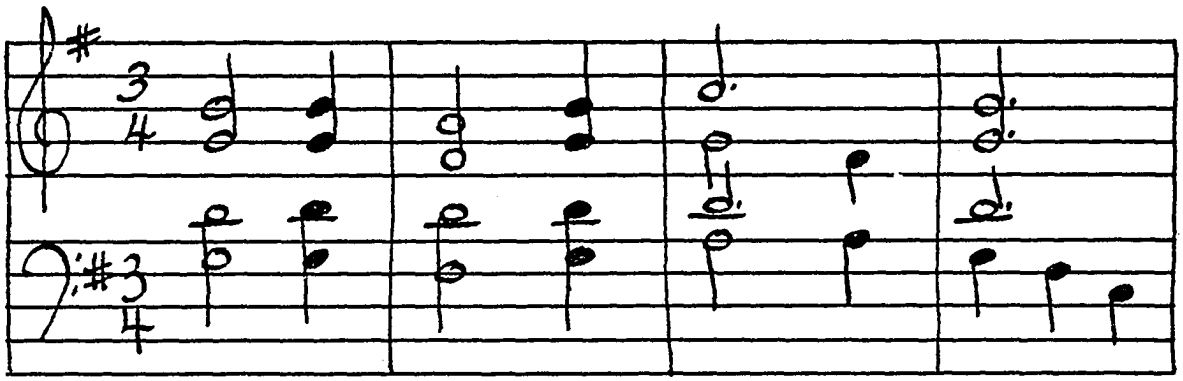
Grade level--easy

Task 6 is a melodic task, and it is entirely aural. The melody alone is played in the first example, and it is played with chordal accompaniment in the second example.

Ex. (1)--piano on tape



Ex. (2)--piano on tape



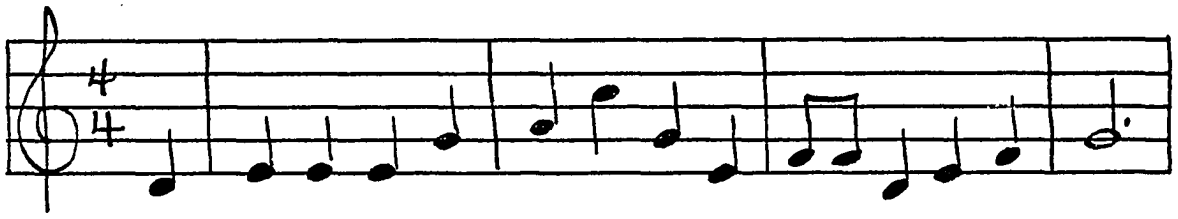
This task was included because it requires the hearer to listen to one line of music and simultaneously hear three other lines which form the accompaniment. The operations that are required in executing this task are: classifying notes into a series of melodic events, and matching pitches in one example with the corresponding pitches in the second example. The child is not expected to remember the exact pitch of each note, but he must be aware of the melodic contour to solve the problem.

Task 7

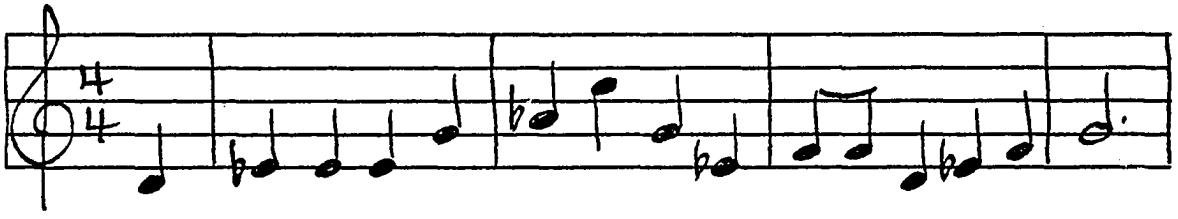
Grade level--difficult

Task 7 is a melodic task, and it is entirely aural. The task is based on an original melody which is first played in the key of C Major and repeated in the parallel key of C Minor. Two notes, E and A, are flatted in the second example. The first and last notes are the same in both examples.

Ex. (1)--piano on tape



Ex. (2)--piano on tape



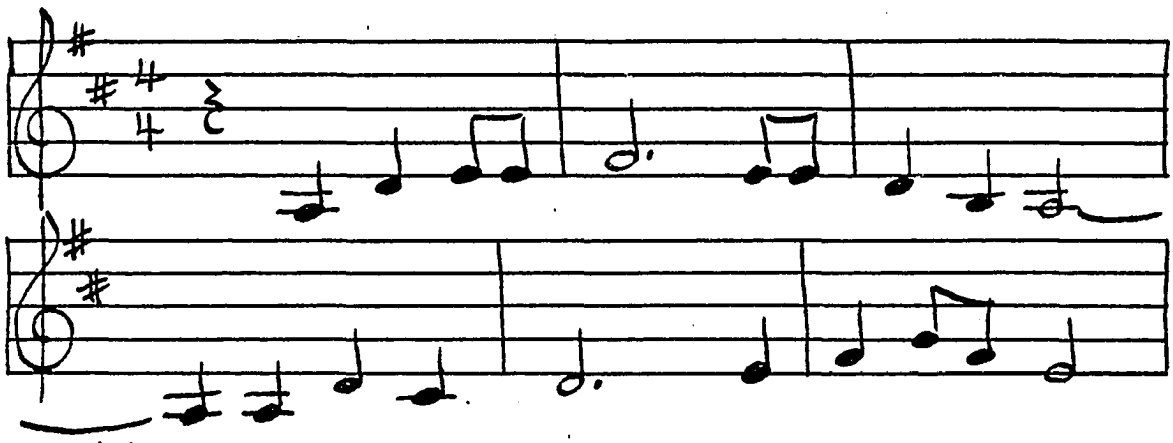
The same operations which were required to perform Task 6 are also required for this task. However, in solving the problem, the child will not be able to exactly match the pitches in the two examples, although the melodic contour is the same. Before presenting this task, the examiner instructed the child to listen for the "pattern." This task was graded at the difficult level because the minor second intervals of the minor key require rather minute aural discrimination.

Task 8

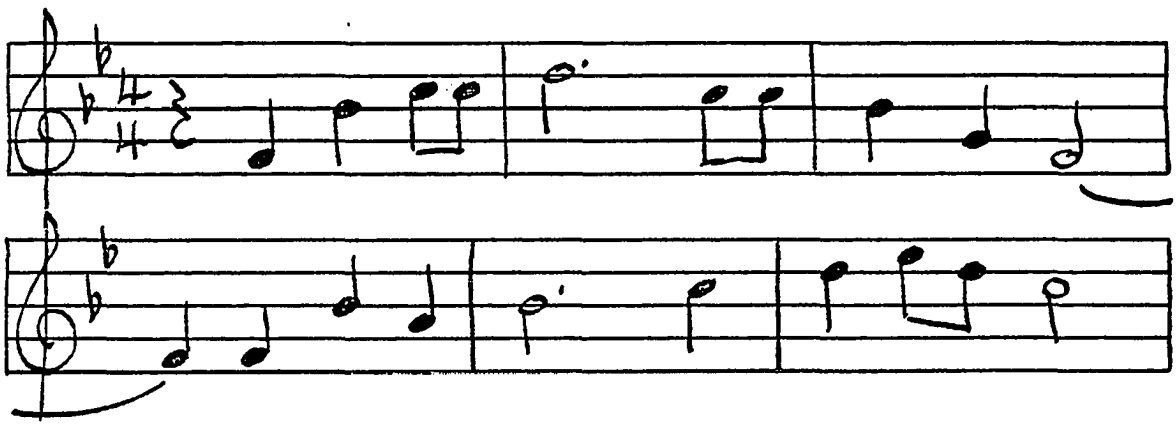
Grade level--difficult

Task 8 is a melodic task, and it is entirely visual. The task is based on the folk song "The Water is Wide." The examples are printed on 5 by 8 cards. The child is instructed to look at both examples at the same time.

Ex. (1)--on a card



Ex. (2)--on a card



The task is graded at the difficult level because it required the subject to see the intervallic structure (the relationship of each note to its preceding and following notes). The writer believes that it is important for the child to see these relationships and the melodic pattern as a "whole." This skill is necessary if a child is to learn to recognize a pattern in another context.

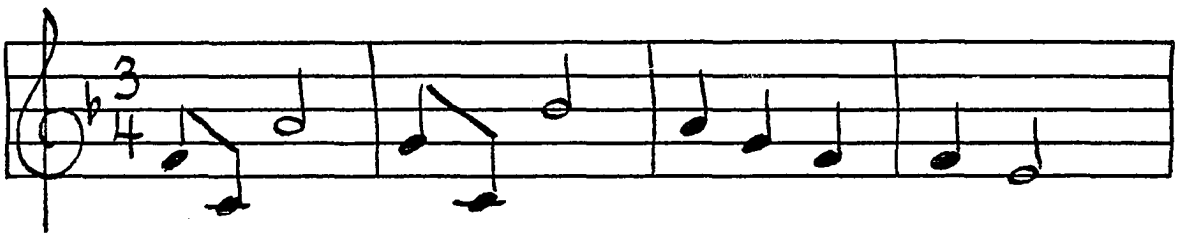
Task 9

Grade level--medium

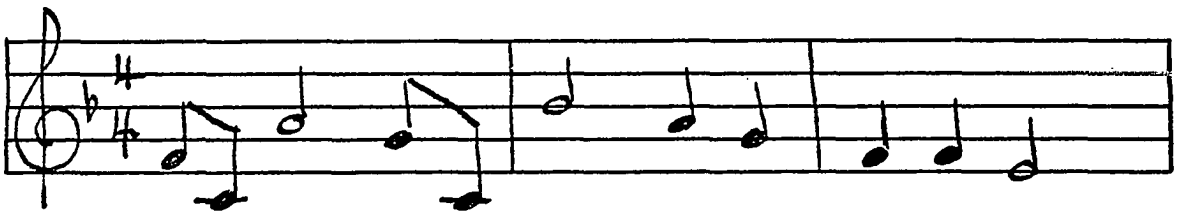
Task 9 is a melodic task, and it is visual. It is

based on the old, traditional round "Dona Nobis Pacem." The first example is written in 3/4 meter, and the second example is written in 4/4 meter. Thus, the bar lines are different in the second example.

Ex. (1)--on a card



Ex. (2)--on a card



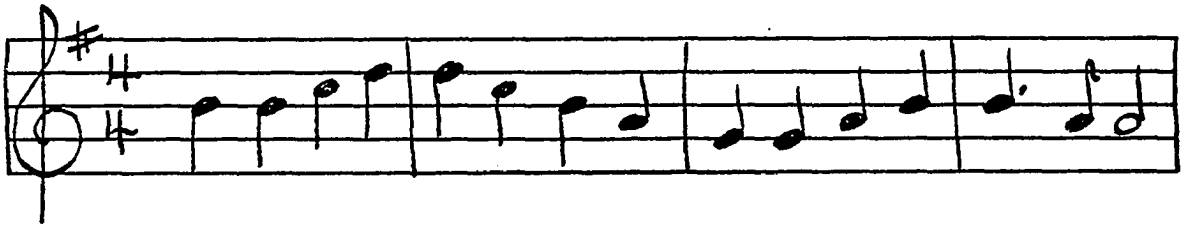
The task is graded at the medium level of difficulty, but it appears to be easy. After performing the usual classifying and matching operations, the child must focus exclusively on pitch and defocus on meter, because the measure bars are in different places in the two examples, and the notes do not fall on the same beats. This "decentering" was not necessary for the first three melodic tasks where the rhythmic and melodic patterns remained the same. The investigator believed that at least one task should separate the melodic and rhythmic elements in order to determine whether or not the child was mentally separating them.

Task 10

Grade level--easy

Task 10 is a melodic task, and it is aural. The task is based on the melody and lyrics of Schiller's "Ode to Joy" and the Choral Finale from Beethoven's Symphony No. 9, Fourth Movement. In the first example, the melody is sung by a soprano with the neutral syllable "loo." In the second example the melody is sung by a baritone (in German) and orchestral accompaniment.

Ex. (1)--soprano voice



Ex. (2)--excerpt from the recording of Beethoven's Symphony No. 9, Fourth Movement.[68]

This task is similar to Task 5 (rhythm) and Task 6 (melody) in that the second example contains an accompaniment. However, Task 10 is somewhat more complex, and it is graded at the medium level of difficulty. The distortion is tripled because of the change in voice timbre, the German words and orchestral accompaniment. This task was included in order to discover how much conflict is caused by a change

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[68]Ludwig van Beethoven, Ninth Symphony, Movement IV, Boston Symphony Orchestra, cond. by Erich Leinsdorf; Baritone--Sherrill Milnes (RCA: LSC-5010 stereo).

in voice quality, the substitution of words for the neutral syllable, and many instruments.

Selection of Subjects

The musical conservation tasks were administered to thirty seventh grade children for validation purposes. The subjects were selected from three Junior High music groups in Norman, Oklahoma. The music teachers were asked to select their best students on the criteria of attitude, motivation and musical experiences. A student profile revealed that the subjects fell into three categories of musical study: piano, piano plus other instruments, and other instruments. The accumulated number of years that a subject received private lessons was included in the student profile. There was an equal number of boys and girls in each group.

Fifteen subjects were selected from grades one, two, three, four, five and six. Furthermore, the subjects were chosen from five elementary schools in Norman, Oklahoma. Each school was from a different area so that children from all socio-economic levels were included. A total of ninety elementary children was selected by random procedures. Types of musical experience and accumulated number of years were recorded for the elementary subjects also. The categories of the types of experience were the same as those listed for the seventh grade. The accumulated number of years ranged from zero to six years. There was an equal number of boys and girls in each group.

The purpose of the study indicated the need to investigate the sequence in the development of musical concepts. The sequence in the development was expected to progress through ages seven to thirteen. In addition, these variables needed to be investigated: the effect of participation in a music group such as band or chorus, and the effect of private lessons other than piano and dancing. The study depended upon the children of seventh grade for this information. Although the seventh grade subjects were, initially, used for validating the evaluation instrument, they were also included in the final statistical analyses of all grades one through seven. The total number of subjects for the study was 120.

Administration of the Instrument

The musical conservation tasks were administered to each subject in private and by the examiner. The examiner also spent a few minutes to get acquainted with the subject and record his or her age and musical experience. A mini-lesson was taught in order to review the properties, identity and characteristics of melody and rhythm.

The mini-lesson was basically the same for all subjects, except for selected technical terms. All of the children from the primary grades were unfamiliar with the terms and responded to music as being "high" or "low" and "fast" or "slow." In addition to the mini-lesson and before each rhythmic or melodic task was presented, the examiner

reminded the subject what to listen for. Also, the subject was reminded that he could hear the examples again whenever he felt the need. Furthermore, the child was reminded again and encouraged to tell why he gave a particular response and to explain or describe exactly what he heard or saw.

The responses of the children were very good, in that they showed no hesitation in explaining their answers; very little self-consciousness was exhibited. The responses of four children were discarded because they seemed unable to describe or respond with words other than "same" or "different." They would not (or could not) discuss it further. Without a discussion the examiner could not evaluate the response. One child whose parents were from India was unable to converse in English, except in general terms. The responses of that child were not evaluated.

Description of Statistical Measures

A correlational analysis was made of the information recorded in the pre-evaluation interview, the total number of subjects in each grade who conserved in all tasks, and the total number of subjects in each grade who conserved each individual task. Two statistical measures were employed to accomplish the purpose of the study, and to explore the relationship between the variables. The two measures used were the product moment correlation coefficient and the chi square test of significance.

The correlation coefficient is applied in scientific

research to determine the relationship between two variables that can be assigned a specific quantity. This assumed relationship can be used to predict certain results. For instance, in this study the correlation coefficient measured the extent to which musical group participation and conservation scores are related. If the degree of relationship is highly correlated, then one may assume that students who participate in a musical group will have a high conservation score. When two measurements for the same individual can be paired for all the individuals in a group, the degree of relationship between the paired scores is called the correlation. The most widely used measure of relationship between two variables is the product moment correlation coefficient r.[69]

The product moment correlation is an index of relationship that can take values from -1.00 to +1.00. The correlation coefficient is expressed as a single number and is derived from the sum of products of pairs of deviation scores. It is an index of both the amount and direction of a relationship. The larger the value of r, the stronger the relationship between the two variables. If the relationship is such that large values of one variable tend to be associated with large values of the other variable, the correlation is positive; when large values of one variable tend to

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[69]Roger P. Phelps, A Guide to Research in Music Education (Dubuque, Iowa: Wm. C. Brown Company Publishers, 1969), pp. 175-180.

be associated with small values of the other, the correlation is negative. A variety of formulas exist for computation of r, each of which is derived from the basic definitional formula:

$$r = \frac{\sum Z_x Z_y}{N}$$

The r is used when a large number of scores are to be correlated, or when a more exact estimate of correlation is desired.[70]

The product moment correlation coefficient is used in this study to describe the relationships between variables and to determine whether or not the disclosed relationships exceeded chance occurrence. For instance, is the relationship between age and the conservation of melodic and rhythmic elements a real relationship or a chance occurrence? The correlation coefficient is limited to relationships within the population that yielded the sample.

Chi square test of significance is employed when an investigator is interested in determining whether certain variables are independent in the population that yielded the sample. He selects a sample from a population and determines the proportion possessing the attribute and the proportion not possessing the attribute. The chi square statistic is

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[70]William J. Meyer, "Descriptive Statistics," Understanding Educational Research, ed. by Deobold Van Dalen (New York: McGraw-Hill, Inc.), pp. 355-365.

employed to determine the extent of the probability that the observed proportion is a departure from chance occurrence.

The chi square test of significance can be used in a variety of situations where categories are adequately defined, and where there is a basis for determining theoretical or expected frequencies. Chi square is a widely used statistic, and one of its more important applications is in testing hypotheses by comparing observed and experimental data to theoretical expected frequencies based on a hypothesis. Chi square is applicable when data can be represented in a contingency table. When the observations of two variables are classified in a two-way table consisting of a cross-tabulation of classes of observations, with the frequency of each cross-classification shown, they are known as contingency data. Generally, one wants to know whether or not the variables are related. In the contingency table, the values of one variable are placed in rows (horizontal) and values of the other variable are placed in columns (vertical). The formula for the chi square test of significance is,

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

O--observed frequency

E--expected frequency[71]

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[71]Meyer, "Inferential Statistics," Understanding Educational Research, pp. 406-413.

The chi square is an example of inferential, or non-parametric statistics. This refers to generalizations or inferences "about data obtained from a sample which are related to the population as a whole."[72]

The chi square statistic is employed in this study to facilitate the implications for teaching and developing rhythmic and melodic concepts, and to generalize the findings of the study to the population that yielded the sample.

Traditionally, a researcher is expected to select a certain level of significance in order to reject or retain a null hypothesis. This researcher chose not to set a certain level. The departure from tradition is in keeping with a newer trend in the statistics field that advocates reporting the significance levels of all results. That is, if a result is significant at the .12 level, it should be reported accordingly. This results in an estimate of probability rather than a true test of the hypotheses that certain variables are independent in the population that yielded the sample. Kerlinger cites several publications that discuss this trend in more detail.[73]

Examples of the above method of reporting the significance levels of all results are found in reports of experimental research concerning Piaget's theories. It would

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[72]Ibid., pp. 369-370.

[73]Fred N. Kerlinger, Foundations of Behavioral Research, 2d ed. (New York: Holt, Rinehart and Winston, Inc., 1973), pp. 166-171.

appear that certain researchers believe that the reporting of all results is important in replications of their research projects.[74]

Therefore, this researcher chose not to select the .05 or .01 level of significance and based the decision on the foregoing evidence. The null hypothesis is rejected or retained by using an estimate of probability that certain variables are independent in the population that yielded the sample.

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[74]Ellin Kofsky, "A Scalogram Study of Classificatory Development," Logical Thinking in Children, ed. by Sigel and Hooper (New York: Holt, Rinehart and Winston, Inc., 1968), p. 221.

CHAPTER IV

RESULTS AND STATISTICAL ANALYSES

Summary of the Raw Data

The raw data consists of the scores from the musical evaluation instrument, tabulation of musical experiences of the subjects, and typical responses of the children to the tasks. The first part of the raw data consists of the typical responses of the subjects and tables of the tabulated number of correct responses in each grade for Tasks one through ten (Tables 1 - 10). Table 11 is a composite of the percentage of correct responses for each task per grade, including the total score. The final part of this report includes the tabulations of the range of ages for each grade (Table 12); the number of subjects in band or chorus (Table 13); the number of students who have received private music lessons and the accumulated number of years of private music lessons (Tables 14, 15, and 16).

Task 1--Rhythm

This task consists of a rhythmic pattern which is clapped by the examiner, repeated by the subject, then played

in a melodic context on the piano (a melody is added to the rhythmic pattern).

The children had no difficulty clapping the rhythmic pattern and recognized it as the same when the melody was added. When asked to describe what they heard, some of the younger children said, "all of the notes were the same (or slow) except two notes near the beginning." Those who knew the technical terms said, "all were quarter notes except the second and third notes, and they were eighth notes."

The children who responded with incorrect answers gave one of the following reasons why the pattern was different when the melody was added:

1. It was different. I didn't hear any eighth notes.
2. No, it is not the same. Some of it went up too high. (This is an example of a child's focusing on the pitch rather than the duration of the notes.)
3. It is different. The second example went higher than the clapping did.

TABLE 1.--The number and percentage of correct responses in each grade for Task 1

Grade	Number of Subjects	Number of Correct Responses	Percentage of Correct Responses
7	30	28	93%
6	15	14	93%
5	15	14	93%
4	15	14	93%
3	15	9	60%
2	15	11	73%
1	15	11	73%

Task 2--Rhythm

Task 2 consists of two different melodies that have the same rhythmic pattern, "Twinkle Little Star" and "Aura Lee." These melodies are played on the piano. Tasks 2 and 4 are two of the most difficult. Before playing the two examples the examiner reviewed again the basic elements in rhythm that the subject was to listen for. These include kind of notes, duration of notes, and patterns that are formed by notes.

The subjects who conserved Task 2 were asked to describe what they heard. Typical responses were:

1. I counted. The different pitches made it hard, but I am pretty sure the rhythm is the same.
2. Each note came exactly on the beat.

3. It was the same. I had to listen to the beat, because the second one had a different tune and confused me.

4. They are different. This subject at this point hummed both examples and decided that the rhythmic patterns were the same.

5. Same rhythm, not the same notes. Most were quarter notes, except one half note in the middle and one at the end.

The subjects who gave incorrect responses to Task 2 were confused when asked to explain their answers. Some students claimed that when the tune was different the rhythm was different also. All of the students heard the examples twice, and some of the students heard the examples a third time. Typical responses were:

1. I think it is different. I can't really explain it. It just sounds different.

2. It is different. I heard a half note in the first one, and I didn't hear a half note in the second one.

3. It is different. The middle of the second one was faster.

   Examiner: Do you mean the speed was faster or some of the notes were shorter?

   Answer: The notes were shorter.

4. They are different. In the second one the notes were longer. The first one had pauses between the notes.

5. Different. The second one went down where the first one stayed in place.

6. Different. The second one jumped around more.

7. Different. There are some extra notes in one of them.

   After a second hearing: There were all quarter notes in both examples.

TABLE 2.--The number and percentage of correct responses in each grade for Task 2

Grade	Number of Subjects	Number of Correct Responses	Percentage of Correct Responses
7	30	16	53%
6	15	6	40%
5	15	5	33%
4	15	4	26%
3	15	0	0%
2	15	2	13%
1	15	1	7%

Task 3--Rhythm

Task 3 consists of a rhythmic pattern that is clapped by the examiner and repeated by the subject. The subject is shown a card with the rhythmic pattern in a melodic context. The example is not played.

The responses for this task were similar to those for Task 1. The typical correct responses were: "It is the same. The first four notes were shorter, then two were longer, then two shorter, then two longer, then two shorter, and the last note was very long." Those students who knew the technical terms described where the eighth notes and quarter notes fell in the pattern.

TABLE 3.--The number and percentage of correct responses in each grade for Task 3

Grade	Number of Subjects	Number of Correct Responses	Percentage of Correct Responses
7	30	27	90%
6	15	15	100%
5	15	14	93%
4	15	12	80%
3	15	11	73%
2	15	14	93%
1	15	10	66%

Task 4--Rhythm

Task 4 consists of a rhythmic pattern in melodic context. It is presented first in 4/4 meter and repeated a second time in 2/4 meter. The change from 4/4 to 2/4 changes the duration of the notes to half as long in the second example as in the first example, while the pattern remains the same.

The typical responses of children who conserved the rhythmic pattern were:

1. They are the same. One is in 4/4 and one is in 2/4. If you played it on the piano, it would sound the same, only one would be faster than the other.
2. The same. The time is doubled in one.
3. The same, except the 2/4 is just cut in half.
4. The same rhythmic pattern. There would be a different speed.

5. The same, but the time signature is different. Each one of the notes in 2/4 is half as long as those in 4/4. It would be the same rhythmic pattern but faster.

6. The same, because one is 2/4, the other 4/4, so it's the same. No, that's not right. If you clapped them, they would sound alike.

7. There are the same number of notes in the measures. After further questioning: One is twice as fast, but the pattern is the same.

8. The same. That's 2/4 and that's 4/4. The notes have the same value. No, that's not right. There are the same number of notes in each measure.

Some students were very firm in their belief that the pattern was the same, but they could not explain the relationships. Typical answers of those subjects who gave incorrect responses were:

1. The same notes, but I don't think it is the same rhythm.

2. The same notes--they are on the same lines and spaces, but one would go faster than the other. There are longer notes in one that makes the rhythm different.

3. It's different. The kind of notes are different.

4. The same. The notes are on the same lines and spaces. The only thing different is the quarter notes and half notes.

5. Different. (This student then compared each note in one example with the corresponding note in the other example to prove his point.)

6. All the notes will sound the same, only the G at the top gets two impulses and the G at the bottom gets four impulses. (This was typical of band students to use the term "impulses" to explain eighth notes--quarter notes get two impulses.)

TABLE 4.--Number and percentage of correct responses in each grade for Task 4

Grade	Number of Subjects	Number of Correct Responses	Percentage of Correct Responses
7	30	12	40%
6	15	1	7%
5	15	3	20%
4	15	2	13%
3	15	2	13%
2	15	0	0%
1	15	0	0%

Task 5--Rhythm

Task 5 consists of four measures of a Bach Invention. First the melody is played and then it is repeated with its contrapuntal accompaniment. The examiner asks the subject if the rhythmic pattern of the melody in the two examples is the same or different.

Typical answers of the subjects who conserved Task 5 were:

1. The same, except the second one had some harmony added.
2. The same. You added another part.
3. The same. I had to listen hard for the melody, because the added part was confusing.
4. It sounded the same, but number two had a counterpart.

5. The same. The top parts had the same rhythm. The second one had another part playing a different scale.

6. The same. I had to listen to the top part, because that other part almost got me off.

The examiner asked him to explain that other part,

It kind of co-ordinated with the top part.

Typical answers of those subjects who gave incorrect responses to Task 5:

1. It's different. The first one had high and the second one high and low.

After being asked again about the rhythmic pattern,

It's different, because the second one had more notes in it.

2. It's different, because the second one goes lower than the first one.

3. It's different. The second one moves around more than the first one.

TABLE 5.--Number and percentage of correct responses in each grade for Task 5

Grade	Number of Subjects	Number of Correct Responses	Percentage of Correct Responses
7	30	27	90%
6	15	13	86%
5	15	13	86%
4	15	14	93%
3	15	9	60%
2	15	7	46%
1	15	6	40%

Task 6--Melody

Task 6 marks the melodic portion of the evaluation. This task consists of a melody played alone and then repeated, arranged in four part harmony. The examiner asks the subject if the melodic pattern is the same in both examples or is it different.

The subjects' responses to this task demonstrate what children hear and how they express what they hear. Typical responses from children who conserved Task 6 were:

1. Sounded the same. The second one had something added.
2. The same. The counterpart made the second one sound lower.
3. The same melody but they were in different keys.
4. Same. The second one had more notes, but the top part was the same. The second one had parts or something added to it.
5. I think it was the same. That other part kind of threw me off.

Typical incorrect responses to Task 6 are:

1. Different, because there is another part added on.
   Examiner: O.K., but is it the same melody that the part was added to?
   Subject: No, it was different.
2. Different. The first one went up high. The second one was lower.
3. That's very confusing.

   After hearing the examples again,

   It was different, because the second one went up higher in some places.
4. Different. The first one had a tune, and the second one didn't have much of a tune.

5. Different. The second one was lower.

6. Different. The first one went up and the second one went down.

   Examiner: Where?

   Subject: In about the second measure.

TABLE 6.--Number and percentage of correct responses in each grade for Task 6

Grade	Number of Subjects	Number of Correct Responses	Percentage of Correct Responses
7	30	24	80%
6	15	10	66%
5	15	11	73%
4	15	11	73%
3	15	8	53%
2	15	4	26%
1	15	7	46%

Task 7--Melody

Task 7 consists of a simple melody played first in the major and then in the minor mode. This involves flatting four notes in the second example. The examiner asks if the melodic pattern is the same or different in the two examples.

Typical conservation responses to Task 7 were:

1. Same melody, but the second one sounds like it was minor.

2. Different. Some of the notes went a little lower in the second one.

An explanation followed concerning which notes went lower and how much lower. A response was accepted as correct if the explanation was correct.

3. Same. The second one sounded like some of the notes were flatter.

4. Different. The second one changed some of the notes to a half step lower.

5. Same melody. Some notes were changed (lowered), but it started and stopped on the same notes as the first one.

Typical incorrect responses for Task 7 were:

1. Same melody but a different rhythm.

This response was considered to be incorrect because the student could not separate the rhythmic and melodic concepts even though he sensed something was different.

2. Seemed the same, but one sounded like it was an octave lower.

3. Different. In the first it went up and the second one went down at the beginning.

4. Same exactly. Nothing at all was different.

5. Same, but the second one was lower than the first.

6. Different. The second one sounded like it started lower and played the whole thing lower.

More discussion was necessary for Task 7 in order to decide what the subject was actually hearing.

TABLE 7.--Number and percentage of correct responses in each grade to Task 7

Grade	Number of Subjects	Number of Correct Responses	Percentage of Correct Responses
7	30	22	73%
6	15	11	73%
5	15	5	33%
4	15	4	26%
3	15	6	40%
2	15	3	20%
1	15	4	26%

Task 8--Melody

Task 8 consists of a folk melody that is written in two different keys. The subject is shown the melody on two separate cards. He is not allowed to hear the examples. The examiner asks if the melodic pattern is the same in these two examples or is it different.

Typical conservation responses for Task 8 were:

1. Same. The notes are in the same place. (Explanation)--I mean the same distance is between the notes. They are in different keys but the melody is the same.

2. Different. They have the same beat, but they don't follow each other. Wait a minute--they go up the same distance each time. The key is different, but I think the melody is the same.

3. Same. The melodic pattern is the same, but it's in a different key.

4. Looks like the same melody but one is lower.

5. Same, but it's in a different key. The melody goes up and down the same distance.

6. Looks the same. The key is different, but the tune is the same.

Typical incorrect responses to Task 8 are:

1. It has the same rhythm.

After further questioning:

No, it's not the same melody.

2. The second one is in a lower key.

After further questioning:

No, they are different.

3. Different. The notes are different.

4. Different melody, but the rhythm is the same.

5. Different. They don't start on the same notes. One is in sharps and the other in flats.

6. Different. Some of the notes are higher.

Examiner:

Do you mean all the notes in one example are higher, or just some of the notes in one example are higher?

Subject:

Just some of the notes.

7. Different. One is in sharps and one in flats. They are both in 4/4 time, the kind of notes are the same, but they are not on the same lines and spaces.

TABLE 8.--Number and percentage of correct responses in each grade to Task 8

Grade	Number of Subjects	Number of Correct Responses	Percentage of Correct Responses
7	30	22	73%
6	15	7	46%
5	15	4	26%
4	15	5	33%
3	15	1	7%
2	15	0	0%
1	15	1	7%

Task 9--Melody

Task 9 consists of a melody that is written in 3/4 meter and repeated in 4/4 meter. It is presented to the subject on two separate cards. He is allowed to study and compare the two examples. The examiner asks if the melodic pattern is the same or different.

Typical conservation responses for Task 9 were:

1. The same. It has different time, but it's the same melody.
2. Has a different time signature, but it's the same melody.
3. Same. The notes on the lines and spaces are the same.
4. Same, but they have a different key (time?). One is in 3/4 and one is in 4/4.
5. Same. Same notes all across even though some are in a different measure.

Typical incorrect responses to Task 9 were:

1. The notes are the same, but the time is different. The subject then compared the notes in each measure. Since there were more notes in some measures than the corresponding measures in the second example, he decided that the melodic pattern was different.

2. The melody is the same, but the melodic pattern is different because the time signature is different. The rhythmic pattern is the same because you come out together in the end.

3. The melodic pattern is different because there are more notes in the measures in one of them.

4. Different. I can't figure out why, it just looks different.

The responses to this task needed additional discussion between the examiner and subject, as did Task 8, to be sure the student was saying what he intended to say. Sometimes the student was correct, but was using a word that had a different connotation than what he intended. No effort was made to correct the use of the word, but simply to learn what the student meant by the use of the word.

TABLE 9.--Number and percentage of correct responses in each grade for Task 9

Grade	Number of Subjects	Number of Correct Responses	Percentage of Correct Responses
7	30	23	77%
6	15	13	86%
5	15	9	60%
4	15	10	66%
3	15	6	40%
2	15	6	40%
1	15	2	13%

Task 10--Melody

Task 10 consists of a melody that is sung by a soprano on the neutral syllable loo. The melody is repeated by a baritone. Words and orchestral accompaniment are also added. The examiner asks if the melodic pattern is the same in the two examples or is it different.

Typical conservation responses for Task 10 were:

1. Same. They had different keys and different voices.
2. I couldn't tell because I was listening to the instruments.

After a second hearing:

The melody was the same.

3. The second one is lower than the first, but it's the same song.
4. Same, but in the second one the guy was singing in a lower pitch.

5. Different melody. The first one had a higher voice than the second one.

After further questioning:

They were singing the same thing.

6. Same. He sang the same notes she did.

Typical incorrect responses to Task 10 are:

1. They're different.

2. Different. I don't know why--they just seemed different. The first one went up and down more.

3. Different melody. The first one had a higher voice than the second one, and they sang a different tune.

4. Different. The first one moved up and down more. And it went higher and lower more.

TABLE 10.--Number and percentage of correct responses in each grade for Task 10

Grade	Number of Subjects	Number of Correct Responses	Percentage of Correct Responses
7	30	25	83%
6	15	10	66%
5	15	14	93%
4	15	9	60%
3	15	8	53%
2	15	6	40%
1	15	3	20%

Table 11 is a composite of the total scores for the individual tasks using the percentage of conservation responses in each grade. The mean score and standard

deviation for each grade is included.

TABLE 11.--Composite of total scores

Task Number	Grade Level						
	7	6	5	4	3	2	1
1	93	93	93	93	60*	73	73
2	53	40	33	26	0*	13	7
3	90	100	93	80	73*	93	66
4	40	7*	20	13	13	0	0
5	90	86	86*	93	60	46	40
6	80	66	73	73	53	26*	46
7	73	73	33	26*	40	20	26
8	73	46	26	33	7	0	7
9	77	86	60*	66	40	40	13
10	83	66	93	60	53	40	20
Total Percentage	73	65	65	61	41	45	37
Mean Scores	7.53	6.66	6.13	5.66	4.00	3.53	3.00
Standard Dev.	1.61	1.06	1.89	1.80	2.03	1.80	1.65

*A deviation in the increasing attainment of conservation in musical concepts is noted--this deviation is discussed in Chapter V.

Grade was the only variable that could be controlled and was used as a basis for determining the effect that mental growth had on the conservation of melodic and rhythmic concepts. The subjects' chronological ages were recorded.

The following table gives the range of the ages per grade with the means and standard deviations.

TABLE 12.--Ages of subjects

Grade	Subjects (number)	Range of Ages (year and month)	Mean	Standard Deviation (months)
7	30	12.5 - 13.10	12.11	4
6	15	11.6 - 12.7	12	4
5	15	10.10- 11.7	11.1	3
4	15	9.6 - 11.1	10.4	5
3	15	9.0 - 10.1	9.6	3
2	15	7.5 - 9.1	8.2	5
1	15	7.0 - 8.3	7.3	4

Participation in a musical group was the second variable in this study. The following table shows the number of students with experience in band or chorus.

TABLE 13.--Number of subjects in band or chorus

Band . . . . . 10 students

Chorus . . . . 20 students

Neither. . . . 90 students

The third variable in this study was the accumulated years of private music lessons on all instruments. The table shows the number of students in all grades for each accumulated number of years with private lessons. The first

column shows the accumulated number and the second column the number of students.

TABLE 14.--Number of subjects with private music lessons, and number of years with private lessons

Years	Subjects
8	1
7	3
6	3
5	4
4	9
3	9
2	8
1	24
0	59

The fourth variable was the type of private music lessons. The following table gives the number of students in all grades with private music lessons in each type of instrument. The type of instrument labeled instrument other than piano includes band instruments, string instruments, guitar and dancing (although dancing is not an instrument, two students reported private dancing lessons and the examiner believed it should be reported as specialized instruction).

TABLE 15.--Number of subjects with each type of lessons

Instrument other than piano	16 students
Piano	30 students
Piano plus another instrument	15 students
No private lessons	59 students

Table 16 gives the distribution of the accumulated number of years and the type of private lessons per grade. Column one is the grade with the other columns giving the total number of subjects, the number of subjects with private lessons, the mean number of years with private lessons, and the number of subjects with each type of private lessons.

TABLE 16.--Composite

Code for type of private lessons:

(1)--instrument other than piano
(2)--piano
(3)--piano plus another instrument

Grade	Number of Subjects	Number of Subjects with Private Lessons	Mean Number of Years	Number of Subjects with Each Type
7	30	27	3.4	(1)--4 (2)--13 (3)--10
6	15	10	2.4	(1)--3 (2)--6 (3)--1
5	15	9	3.0	(1)--3 (2)--3 (3)--3
4	15	8	1.75	(1)--2 (2)--5 (3)--1
3	15	6	1.5	(1)--3 (2)--3 (3)--0
2	15	0	0	(1)--0 (2)--0 (3)--0
1	15	1	1.0	(1)--1 (2)--0 (3)--0

Statistical Analyses

Restatement of the Hypotheses

The variables that were considered in this study are those based on age, musical group participation, type of private music lessons, the accumulated number of years a

child received private music lessons and musical conservation evaluation scores. The null hypotheses, previously stated in Chapter I, are as follows.

1. Age has no significant effect on the conservation of melodic and rhythmic concepts.
2. Participation in a musical group has no significant effect on the conservation of melodic and rhythmic concepts.
3. The type of private music lessons has no significant effect on the conservation of melodic and rhythmic concepts.
4. The accumulated number of years with private music lessons has no significant effect on the conservation of melodic and rhythmic concepts.

List of Variables

The most important result of this study was expected to be the effect that age has on the conservation of melodic and rhythmic concepts. This effect was expected to determine the practicality of evaluating children for musical conservation, and to determine whether or not there is a sequential pattern identifying the three levels in the development of conservation. The tasks were graded as (1) easy, (2) medium and (3) difficult. Subjects were considered to be in the final stage of complete conservation if they were able to

perform 75% or more of the tasks.[75]

The first five variables were considered the main variables because they are the main areas in the study; age, participation in a musical group, type of private music lessons, the accumulated number of years with private lessons and the subjects' scores on the musical conservation evaluation.

Variable 1--Grade level

Variable 2--Music group (band or chorus)

Variable 3--Type of private lessons

Variable 4--Accumulated number of years with private lessons

Variable 5--Total musical conservation scores

The scores for the individual conservation tasks were treated as lesser variables. These correlations were used in the conclusions about the individual tasks.

Variable 6--Task 1

Variable 7--Task 2

Variable 8--Task 3

Variable 9--Task 4

Variable 10--Task 5

Variable 11--Task 6

Variable 12--Task 7

Variable 13--Task 8

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[75]Jean Piaget, Judgement and Reasoning in the Child, p. 100.

Variable 14--Task 9

Variable 15--Task 10

Each type of private music lessons, and each accumulated number of years with private music lessons were also correlated with the total conservation scores. These final variables are:

Variable 16--No private lessons

Variable 17--Instrument other than piano

Variable 18--Piano

Variable 19--Piano plus another instrument

Variable 20--0 years

Variable 21--1 year

Variable 22--2 years

Variable 23--3 years

Variable 24--4 years

Variable 25--5 years

Variable 26--6 years

Variable 27--7 years

Variable 28--8 years

The correlations are reported in the following manner:

Variable 1--Grade with Variables 6 through 15 (Tasks 1 to 10)

Variable 2--Music group with Variables 6 through 15 (Tasks 1 to 10)

Variable 3--Accumulated number of years with Variables 6 through 15 (Tasks 1 to 10)

Variable 4--Type of private lessons with Variables 6 through 15 (Tasks 1 to 10)

Variable 1 (grade) with Variable 5 (total score)

Variable 2 (music group) with Variable 5 (total score)

Variable 3 (accumulated years with private lessons) with Variable 5 (total score)

Variable 4 (type of private lessons) with Variable 5 (total score)

Variable 16 (no private lessons) with Variable 5 (total score)

Variable 17 (instrument other than piano) with Variable 5 (total score)

Variable 18 (piano) with Variable 5 (total score)

Variable 19 (piano plus another instrument) with Variable 5 (total score)

Variable 20 with Variable 5 (total score)

Variable 21 with Variable 5 (total score)

Variable 22 with Variable 5 (total score)

Variable 23 with Variable 5 (total score)

Variable 24 with Variable 5 (total score)

Variable 25 with Variable 5 (total score)

Variable 26 with Variable 5 (total score)

Variable 27 with Variable 5 (total score)

Variable 28 with Variable 5 (total score)

The first hypothesis states that age has no significant effect on the conservation of melodic and rhythmic concepts. Tables 17A to 17J give the statistical figures for the grade level variable* and scores on the individual tasks of the musical conservation evaluation.

TABLE 17A.--Correlations of age with tasks

(The table gives the number of correct responses in each grade for Task 1 and the level of significance for the relationship between grade and the ability to perform Task 1.)

Variable 1--Grade Total number of subjects--120

Variable 6--Task 1

Grade	Number of Correct Responses to Task 1
7	28
6	14
5	14
4	14
3	9
2	11
1	11

$r = .2601 -- p < .01$

$X^2 = 13.94475 -- p < .05$

DF = 6

*The conversion table for the mean ages of each grade level is on page 95.

TABLE 17B--Correlations of age with tasks

(The table gives the number of correct responses for Task 2 in each grade, with the level of significance of the correlation.)

Variable 1--Grade Total number of subjects--120

Variable 7--Task 2

Grade	Number of Correct Responses to Task 2
7	16
6	6
5	5
4	4
3	0
2	2
1	1

$r = .3952 -- p < .01$

$\chi^2 = 21.50478 -- p < .01$

DF = 6

TABLE 17C.--Correlations of age with tasks

(The table gives the number of correct responses in each grade for Task 3, and the level of significance of the relationship between grade and the ability to perform Task 3.)

Variable 1--Grade Total number of subjects--120

Variable 8--Task 3

Grade	Number of Correct Responses to Task 3
7	27
6	15
5	14
4	12
3	11
2	14
1	10

$r = .1961 -- p < .05$

$\chi^2 = 11.17075 -- p < .10^*$

DF = 6

*Cannot be differentiated from chance.

TABLE 17D.--Correlations of age with tasks

(The table gives the number of correct responses in each grade for Task 4, and the level of significance for the relationship between grade and the ability to perform Task 4.)

Variable 1--Grade Total number of subjects--120

Variable 9--Task 4

Grade	Number of Correct Responses to Task 4
7	12
6	1
5	3
4	2
3	2
2	0
1	0

$r = .3326 -- p < .01$

$\chi^2 = 19.19998 -- p < .01$

DF = 6

TABLE 17E.--Correlations of age with tasks

(The table gives the number of correct responses in each grade to Task 5, and the level of significance for the relationship between grade and the ability to perform Task 5.)

Variable 1 --Grade Total number of subjects--120

Variable 10--Task 5

Grade	Number of Correct Responses to Task 5
7	27
6	13
5	13
4	14
3	9
2	7
1	6

$\underline{r}$ = .4102--$p < .01$

χ^2 = 25.87886--$p < .001$

DF = 6

TABLE 17F.--Correlations of age with tasks

(The table gives the number of correct responses in each grade for Task 6, and the level of significance for the relationship between grade and the ability to perform Task 6.)

Variable 1 --Grade Total number of subjects--120

Variable 11--Task 6

Grade	Number of Correct Responses to Task 6
7	22
6	10
5	11
4	11
3	8
2	4
1	7

$r = .2630 -- p < .01$

$\chi^2 = 13.11571 -- p < .05$

DF = 6

TABLE 17G.--Correlations of age with tasks

(The table gives the number of correct responses in each grade for Task 7, and the level of significance for the relationship between grade and the ability to perform Task 7.)

Variable 1 --Grade Total number of subjects--120

Variable 12--Task 7

Grade	Number of Correct Responses to Task 7
7	22
6	11
5	5
4	4
3	6
2	3
1	4

$r = .3821$--$p < .01$

$\chi^2 = 23.32866$--$p < .001$

DF = 6

TABLE 17H.--Correlations of age with tasks

(The table gives the number of correct responses in each grade for Task 8, and the level of significance for the relationship between grade and the ability to perform Task 8.)

Variable 1 --Grade Total number of subjects--120

Variable 13--Task 8

Grade	Number of Correct Responses to Task 8
7	22
6	7
5	4
4	5
3	1
2	0
1	1

$r = .5427 -- p < .01$

$\chi^2 = 40.19997 -- p < .001$

DF = 6

TABLE 17I.--Correlations of age with tasks

(The table gives the number of correct responses in each grade for Task 9, and the level of significance for the relationship between grade and the ability to perform Task 9.)

Variable 1 --Grade

Total number of subjects--120

Variable 14--Task 9

Grade	Number of Correct Responses to Task 9
7	23
6	13
5	9
4	10
3	6
2	6
1	2

$\underline{r} = .4309$--$p < .01$

$\chi^2 = 26.01869$--$p < .001$

DF = 6

TABLE 17J.--Correlations of age with tasks

(The table gives the number of correct responses in each grade for Task 10, and the level of significance for the relationship between grade and the ability to perform Task 10.)

Variable 1 --Grade Total number of subjects--120

Variable 15--Task 10

Grade	Number of Correct Responses to Task 10
7	25
6	10
5	14
4	9
3	8
2	6
1	3

$r = .4217$--$p < .01$

$\chi^2 = 27.12885$--$p < .001$

DF = 6

The second null hypothesis states that participation in a musical group has no significant effect on the conservation of melodic and rhythmic concepts. Tables 18A to 18J give the statistical figures for the musical group variable and the scores on the individual tasks of the musical conservation evaluation.

TABLE 18A.--Correlations of group participation with tasks

(The number of correct responses in each group for Task 1, and the level of significance for the relationship between music group and the ability to perform Task 1.)

Variable 2--Music groups

Variable 6--Task 1

Music Group	Number of Correct Responses to Task 1
None	73
Band	10
Chorus	18

$r = .1178$--$p < .20$*

$\chi^2 = 3.00240$--$p < .30$*

DF = 2

Total number of subjects--120

*Cannot be differentiated from chance.

TABLE 18B.--Correlations of group participation with tasks (The number of correct responses in each group for Task 2, and the level of significance for the relationship between music and the ability to perform Task 2.)

Variable 2--Music groups — Variable 7--Task 2

Music Group	Number of Correct Responses to Task 2
None	18
Band	7
Chorus	9

$r = .2639$--$p < .01$

$\chi^2 = 14.36388$--$p < .001$ Total number of subjects--120

DF = 2

TABLE 18C.--Correlations of group participation with tasks

(The number of correct responses in each group for Task 3, and the level of significance for the relationship between music group and the ability to perform Task 3.)

Variable 2--Music groups — Variable 8--Task 3

Music Group	Number of Correct Responses to Task 3
None	76
Band	8
Chorus	19

$r = .0971$--$p < .35$*

$\chi^2 = 1.80468$--$p < .50$* Total number of subjects--120

DF = 2

*Cannot be differentiated from chance.

TABLE 18D.--Correlations of group participation with tasks

(The number of correct responses in each group for Task 4, and the level of significance for the relationship between music group and the ability to perform Task 4.)

Variable 2--Music groups Variable 9--Task 4

Group	Number of Correct Responses to Task 4
None	8
Band	7
Chorus	5

$r = .2553$--$p < .01$

$\chi^2 = 25.39998$--$p < .001$ Total number of subjects--120

DF = 2

TABLE 18E.--Correlations of group participation with tasks

(The number of correct responses in each group for Task 5, and the level of significance for the relationship between music group and the ability to perform Task 5.)

Variable 2--Music groups Variable 10--Task 5

Group	Number of Correct Responses to Task 5
None	62
Band	8
Chorus	19

$r = .2236$--$p < .05$

$\chi^2 = 6.01667$--$p < .05$ Total number of subjects--120

DF = 2

TABLE 18F.--Correlations of group participation with tasks

(The number of correct responses in each group for Task 6, and the level of significance for the relationship between music group and the ability to perform Task 6.)

Variable 2--Music groups Variable 11--Task 6

Music group	Number of Correct Responses to Task 6
None	51
Band	8
Chorus	14

r = .1256--$p < .10$*

χ^2 = 2.90294--$p < .30$* Total number of subjects--120

DF = 2

TABLE 18G.--Correlations of group participation with tasks

(The number of correct responses in each group for Task 7, and the level of significance for the relationship between music group and the ability to perform Task 7.)

Variable 2--Music groups Variable 12--Task 7

Group	Number of Correct Responses to Task 7
None	33
Band	7
Chorus	15

r = .3102--$p < .01$

χ^2 = 12.25174--$p < .01$ Total number of subjects--120

DF = 2

*Cannot be differentiated from chance.

TABLE 18H.--Correlations of group participation with tasks

(The number of correct responses in each group for Task 8, and the level of significance for the relationship between music group and the ability to perform Task 8.)

Variable 2--Music groups Variable 13--Task 8

Group	Number of Correct Responses to Task 8
None	18
Band	8
Chorus	14

$r = .4502$--$p < .01$

$\chi^2 = 29.0999$--$p < .001$ Total number of subjects--120

DF = 2

TABLE 18I.--Correlations of group participation with tasks

(The number of correct responses in each group for Task 9, and the level of significance for the relationship between music group and the ability to perform Task 9.)

Variable 2--Music group Variable 14--Task 9

Group	Number of Correct Responses to Task 9
None	46
Band	8
Chorus	15

$r = .2054$--$p < .05$

$\chi^2 = 6.08127$--$p < .05$ Total number of subjects--120

DF = 2

TABLE 18J.--Correlations of group participation with tasks

(The number of correct responses in each group for Task 10, and the level of significance for the relationship of music group to the ability to perform Task 10.)

Variable 2--Music groups

Variable 15--Task 10

Group	Number of Correct Responses to Task 10
None	50
Band	8
Chorus	17

$r = .2437 -- p < .05$

$\chi^2 = 7.47852 -- p < .05$

DF = 2

Total number of subjects--120

The third null hypothesis states that the type of private music lessons has no effect on the conservation of melodic and rhythmic concepts. Tables 19A to 19J give the statistical figures for the type of private music lessons variable and the scores for the individual tasks on the musical conservation evaluation.

TABLE 19A.--Correlation of type of private music lessons with tasks

(The first column of the table lists the type of private music lessons, the second column gives the number of students having each type, and the third column gives the number of correct responses of those students having that type.)

Variable 4--Type of private lessons

Variable 6--Task 1

Type	Number of Students	Number of Correct Responses
No private lessons	59	45
Instrument other than piano	16	13
Piano	30	28
Piano plus another instrument	15	15

$r = .2491 -- p < .05$

$\chi^2 = 7.57545 -- p < .10^*$

DF = 3

Total number of subjects--120

*Cannot be differentiated from chance.

TABLE 19B.--Correlation of type of private music lessons with tasks

(The first column of the table lists the type of private music lessons, the second column gives the number of students having each type, and the third column gives the number of correct responses of those students having each type.)

Variable 4--Type of private lessons

Variable 7--Task 2

Type	Number of Students	Number of Correct Responses
No private lessons	59	7
Instrument other than piano	16	7
Piano	30	10
Piano plus another instrument	15	10

$r = .3770 -- p < .01$

$\chi^2 = 20.97787 -- p < .001$

DF = 3

Total number of subjects--120

TABLE 19C.--Correlation of type of private music lessons with tasks

(The first column of the table lists the type of private music lessons, the second column gives the number of students having each type, and the third column gives the number of correct responses of those students having each type.)

Variable 4--Type of private lessons

Variable 8--Task 3

Type	Number of Students	Number of Correct Responses
No private lessons	59	49
Instrument other than piano	16	14
Piano	30	26
Piano plus another instrument	15	14

$\underline{r}$ = .0888--$p < .35$*

χ^2 = 1.12323--$p < .80$*

DF = 3

Total number of subjects--120

*Cannot be differentiated from chance.

TABLE 19D.--Correlation of type of private music lessons with tasks

(The first column of the table lists the type of private music lessons, the second column gives the number of students having each type, and the third column gives the number of correct responses of those students having each type.)

Variable 4--Type of private lessons

Variable 9--Task 4

Type	Number of Students	Number of Correct Responses
No private lessons	59	1
Instrument other than piano	16	6
Piano	30	7
Piano plus another instrument	15	6

$r = .3579$--$p < .01$

$\chi^2 = 21.36203$--$p < .001$

DF = 3

Total number of subjects--120

TABLE 19E.--Correlation of type of private music lessons with tasks

(The first column of the table lists the type of private music lessons, the second column gives the number of students having each type, and the third column gives the number of correct responses of those students having each type.)

Variable 4 --Type of private lessons

Variable 10--Task 5

	Number of Students	Number of Correct Responses
No private lessons	59	36
Instrument other than piano	16	13
Piano	30	27
Piano plus another instrument	15	13

$r = .2778$--$p < .01$

$\chi^2 = 10.89230$--$p < .05$

DF = 3

Total number of subjects--120

TABLE 19F.--Correlation of type of private music lessons with tasks

(The first column of the table lists the type of private music lessons, the second column gives the number of students having each type, and the third column gives the number of correct responses of those students having each type.)

Variable 4 --Type of private lessons

Variable 11--Task 6

Type	Number of Students	Number of Correct Responses
No private lessons	59	30
Instrument other than piano	16	11
Piano	30	21
Piano plus another instrument	15	11

$r = .1899 -- p < .10^*$

$\chi^2 = 4.93180 -- p < .20^*$

DF = 3

Total number of subjects--120

*Cannot be differentiated from chance.

TABLE 19G.--Correlation of type of private music lessons with tasks

(The first column of the table lists the type of private music lessons, the second column gives the number of students having each type, and the third column gives the number of correct responses of those students having each type.)

Variable 4 --Type of private lessons

Variable 12--Task 7

Type	Number of Students	Number of Correct Responses
No private lessons	59	14
Instrument other than piano	16	11
Piano	30	21
Piano plus another instrument	15	9

$r = .3684$--$p < .01$

$\chi^2 = 23.26634$--$p < .001$

DF = 3

Total number of subjects--120

TABLE 19H.--Correlation of type of private music lessons with tasks

(The first column of the table lists the type of private music lessons, the second column gives the number of students having each type, and the third column gives the number of correct responses of those students having each type.)

Variable 4 --Type of private lessons

Variable 13--Task 8

Type	Number of Students	Number of Correct Responses
No private lessons	59	8
Instrument other than piano	16	6
Piano	30	16
Piano plus another instrument	15	10

$r = .4389 -- p < .01$

$\chi^2 = 23.40634 -- p < .001$

DF = 3

Total number of subjects--120

TABLE 19I.--Correlation of type of private music lessons with tasks

(The first column of the table lists the type of private music lessons, the second column gives the number of students having each type, and the third column gives the number of correct responses of those students having each type.)

Variable 4 --Type of private lessons

Variable 14--Task 9

Type	Number of Students	Number of Correct Responses
No private lessons	59	27
Instrument other than piano	16	11
Piano	30	21
Piano plus another instrument	15	10

$r = .2031$--$p < .05$

$\chi^2 = 6.58863$--$p < .20$*

DF = 3

Total number of subjects--120

*Cannot be differentiated from chance.

TABLE 19J.--Correlation of type of private music lessons with tasks

(The first column of the table lists the type of private music lessons, the second column gives the number of students having each type, and the third column gives the number of correct responses of those students having each type.)

Variable 4 --Type of private lessons

Variable 15--Task 10

Type	Number of Students	Number of Correct Responses
No private lessons	59	27
Instrument other than piano	16	13
Piano	30	22
Piano plus another instrument	15	13

$r = .3148$--$p < .01$

$x^2 = 14.69197$--$p < .01$

DF = 3

Total number of subjects--120

The fourth null hypothesis states that the accumulated number of years with private lessons has no significant effect on the conservation of melodic and rhythmic concepts. Tables 20A to 20J give the statistical figures for the number of years variable and the scores for the individual tasks on the musical conservation evaluation.

TABLE 20A.--Correlations of number of years with private music lessons and tasks

(The table gives each accumulated number of years and the number of correct responses of students with each accumulated number of years. The table also gives the level of significance for the relationship of number of years to the ability to perform Task 1.)

Variable 3--Accumulated number of years with private lessons

Variable 6--Task 1

Accumulated Number of Years	Number of Correct Responses to Task 1
8	1
7	3
6	3
5	4
4	9
3	8
2	8
1	20
0	45

$r = .2324$--$p < .05$

$\chi^2 = 8.19034$--$p < .50$*

DF = 8

Total number of subjects--120

*Cannot be differentiated from chance.

TABLE 20B.--Correlations of number of years with private music lessons and tasks

(The table gives each accumulated number of years and the number of correct responses of students with each accumulated number of years. The table also gives the level of significance for the relationship of number of years to the ability to perform Task 2.)

Variable 3--Accumulated number of years with private lessons

Variable 7--Task 2

Accumulated Number of Years	Number of Correct Responses to Task 2
8	1
7	2
6	1
5	3
4	4
3	4
2	4
1	8
0	7

$\underline{r} = .3671 -- p < .01$

$\chi^2 = 21.35405 -- p < .01$

DF = 8

Total number of subjects--120

TABLE 20C.--Correlations of number of years with private music lessons and tasks

(The table gives each accumulated number of years and the number of correct responses of students with each accumulated number of years. The table also gives the level of significance for the relationship between number of years and the ability to perform Task 3.)

Variable 3--Accumulated number of years with private lessons

Variable 8--Task 3

Accumulated Number of Years	Number of Correct Responses to Task 3
8	1
7	3
6	3
5	4
4	8
3	9
2	6
1	20
0	49

r = .1476--$p < .10$*

χ^2 = 4.64122--$p < .80$*

DF = 8

Total number of subjects--120

*Cannot be differentiated from chance.

TABLE 20D.--Correlations of number of years with private music lessons and tasks

(The table gives each accumulated number of years and the number of correct responses of students with each accumulated number of years. The table also gives the level of significance for the relationship between number of years and the ability to perform Task 4.)

Variable 3--Accumulated number of years with private lessons

Variable 9--Task 4

Accumulated Number of Years	Number of Correct Responses to Task 4
8	1
7	1
6	1
5	2
4	2
3	3
2	3
1	6
0	1

$\underline{r}$ = .3620--$p < .01$

χ^2 = 24.62199--$p < .01$

DF = 8

Total number of subjects--120

TABLE 20E.--Correlations of number of years with private music lessons and tasks

(The table gives each accumulated number of years and the number of correct responses of students with each accumulated number of years. The table also gives the level of significance for the relationship between number of years and the ability to perform Task 5.)

Variable 3 --Accumulated number of years with private lessons

Variable 10--Task 5

Accumulated Number of Years	Number of Correct Responses to Task 5
8	1
7	3
6	3
5	4
4	7
3	7
2	6
1	22
0	36

$\underline{r} = .2328 -- p < .05$

$\chi^2 = 13.11774 -- p < .20$

DF = 8

Total number of subjects--120

TABLE 20F.--Correlations of number of years with private music lessons and tasks

(The table gives each accumulated number of years and the number of correct responses of students with each accumulated number of years. The table also gives the levels of significance for the relationship between number of years and the ability to perform Task 6.)

Variable 3 --Accumulated number of years with private lessons

Variable 11--Task 6

Accumulated Number of Years	Number of Correct Responses to Task 6
8	1
7	1
6	3
5	2
4	8
3	5
2	5
1	18
0	30

$\underline{r}$ = .1273--$p < .10$

χ^2 = 11.30312--$p < .20$

DF = 8

Total number of subjects--120

TABLE 20G.--Correlations of number of years with private music lessons and tasks

(The table gives each accumulated number of years and the number of correct responses of students with each accumulated number of years. The table also gives the level of significance for the relationship between number of years and the ability to perform Task 7.)

Variable 3 --Accumulated number of years with private lessons

Variable 12--Task 7

Accumulated Number of Years	Number of Correct Responses to Task 7
8	1
7	2
6	3
5	4
4	4
3	6
2	4
1	17
0	14

$r = .3513 -- p < .01$

$\chi^2 = 29.26907 -- p < .001$

DF = 8

Total number of subjects--120

TABLE 20H.--Correlations of number of years with private music lessons and tasks

(The table gives each accumulated number of years and the number of correct responses of students with each accumulated number of years. The table also gives the level of significance for the relationship between number of years and the ability to perform Task 8.)

Variable 3 --Accumulated number of years with private lessons

Variable 13--Task 8

Accumulated Number of Years	Number of Correct Responses to Task 8
8	0
7	2
6	3
5	3
4	3
3	5
2	6
1	10
0	8

$r = .3555$--$p < .01$

$\chi^2 = 30.50632$--$p < .001$

DF = 8

Total number of subjects--120

TABLE 20I.--Correlations of number of years with private music lessons and tasks

(The table gives each accumulated number of years and the number of correct responses of students with each accumulated number of years. The table also gives the level of significance for the relationship between number of years and the ability to perform Task 9.)

Variable 3 --Accumulated number of years with private lessons

Variable 14--Task 9

Accumulated Number of Years	Number of Correct Responses to Task 9
8	1
7	2
6	2
5	2
4	6
3	7
2	5
1	17
0	27

$r = .2442 -- p < .05$

$\chi^2 = 17.45935 -- p < .05$

DF = 8

Total number of subjects--120

TABLE 21J.--Correlations of number of years with private music lessons and tasks

(The table gives each accumulated number of years and the number of correct responses of students with each accumulated number of years. The table also gives the level of significance for the relationship between number of years and the ability to perform Task 10.)

Variable 3--Accumulated number of years with private lessons

Variable 15--Task 10

Accumulated Number of Years	Number of Correct Responses to Task 10
8	1
7	3
6	3
5	4
4	7
3	7
2	6
1	22
0	36

$r = .2328 -- p < .05$

$\chi^2 = 13.11774 -- p < .20$

DF = 8

Total number of subjects--120

Correlations of Total Score with the Main Variables

TABLE 21.--Correlation of age and all tasks

(The first column of the table lists the possible total scores; the middle columns show how many students in each grade made each possible score; the last column shows the number of students in all grades who made each possible score.)

Variable 1--Grade

Variable 5--Total scores

Total Scores	Grade Level							Total Number Students Making each Score
	7	6	5	4	3	2	1	
10	5							5
9	4	1	2	2				9
8	4	4	2					10
7	7	5		2	2	1	1	18
6	7	2	7	7	4	2		29
5	3	1	2			2	1	9
4		1	1	2	1	1	3	9
3		1			3	4	3	11
2			1	1	4	3	5	14
1				1	1	2	1	5
0							1	1

$r = .6754$--$p < .01$

$\chi^2 = 106.73788$--$p < .001$

$DF = 60$

TABLE 22.--Correlation of group participation and all tasks

(The first column of the table lists the possible total scores; the middle columns show the number of students in each group that made each possible score; the last column gives the total number of students in all groups that made each possible score.)

Variable 2--Music group

Variable 5--Total scores

Total Scores	No Group	Band	Chorus	Number of Students in All Groups Making Each Score
10	0	2	3	5
9	5	2	2	9
8	6	1	3	10
7	11	3	4	18
6	22	2	5	29
5	6		3	9
4	9			9
3	11			11
2	14			14
1	5			5
0	1			1

$r = .4262 -- p < .01$

$x^2 = 37.54703 -- p < .05$

DF = 20

TABLE 23.--Correlation of the number of years with private music lessons and tasks

(The first column of the table lists the possible total scores; the middle columns show the accumulated number of years and the number of students with each accumulated year that made each possible score; the last column gives the total number of students with private lessons who made each score.)

Variable 3--Accumulated number of years with private lessons

Variable 5--Total scores

Total Scores	Accumulated Number of Years									Total Number of Students
	0	1	2	3	4	5	6	7	8	
10		1			2	1	1			5
9		4	1	2		1			1	9
8	2	3	1	1	1		1	1		10
7	5	3	3	3	2	1		1		18
6	14	8	2	1	1	1	1	1		29
5	5	2	1	1						9
4	7				2					9
3	9	2								11
2	12			1	1					14
1	4	1								5
0	1									1

$r = .4689 -- p < .01$

$\chi^2 = 91.38217 -- p < .10^*$

$DF = 80$

*Cannot be differentiated from chance.

TABLE 24.--Correlations between each accumulated year of private lessons and total score

(The table shows the correlations between each number of years with private lessons and the total scores.)

Variable 20--(no accumulated years) and Variable 5 (total scores)

$\underline{r}$ = .5495--$p < .01$

χ^2 = 38.45357--$p < .001$

DF = 10

Variable 21--(1 year of private lessons) and Variable 5 (total scores)

$\underline{r}$ = .2081--$p < .05$

χ^2 = 11.20471--$p < .50^*$

DF = 10

Variable 22--(2 years of private lessons) and Variable 5 (total scores)

$\underline{r}$ = .1523--$p < .10^*$

χ^2 = 6.85960--$p < .80^*$

DF = 10

Variable 23--(3 years) and Variable 5 (total scores)

$\underline{r}$ = .1379--$p < .20^*$

χ^2 = 8.45357--$p < .70^*$

DF = 10

*Cannot be differentiated from chance.

TABLE 24--Continued

Variable 24--(4 years) and Variable 5 (total scores)

$r = .1120$--$p < .20^*$

$\chi^2 = 14.37949$--$p < .20^*$

DF = 10

Variable 25--(5 years) and Variable 5 (total scores)

$r = .1913$--$p < .10^*$

$\chi^2 = 8.31153$--$p < .70^*$

DF = 10

Variable 26--(6 years) and Variable 5 (total scores)

$r = .1650$--$p < .10^*$

$\chi^2 = 10.64544$--$p < .50^*$

DF = 10

Variable 27--(7 years) and Variable 5 (total scores)

$r = .0994$--$p < .35^*$

$\chi^2 = 4.71952$--$p < .90^*$

DF = 10

Variable 28--(8 years) and Variable 5 (total scores)

$r = .1320$--$p < .20^*$

$\chi^2 = 12.43697$--$p < .30^*$

DF = 10

*Cannot be differentiated from chance.

TABLE 25.--Correlation of type of private lessons and all tasks

(The first column of the table lists the possible total scores; the middle four columns show the number of students with each type of private lessons who made each possible score; the last column shows the total number of students with private lessons who made each possible score.)

Code for type of lessons:

0--no private lessons
1--instrument other than piano
2--piano
3--piano plus another instrument

Total Scores	Type of Lessons				Total Number of Students
	0	1	2	3	
10		1	2	2	5
9		4	3	2	9
8	2	1	4	3	10
7	5	2	7	4	18
6	14	4	9	2	29
5	5	1	2	1	9
4	7		1	1	9
3	9	2			11
2	12	1	1		14
1	4		1		5
0	1				1

$r = .5282 -- p < .01$

$\chi^2 = 50.14848 -- p < .05$

$DF = 30$

TABLE 26.--Correlations between each type of private lesson and the total score

(The table shows the correlation between each type of private music lessons and the total scores.)

Variable 16--(no private lessons) and Variable 5 (total scores)

$\underline{r}$ = .5495--$p < .01$

χ^2 = 38.45357--$p < .01$

DF = 10

Variable 17--(instrument other than piano) and Variable 5 (total score)

$\underline{r}$ = .1733--$p < .10$*

χ^2 = 10.94336--$p < .50$*

DF = 10

Variable 18--(piano) and Variable 5 (total scores)

$\underline{r}$ = .2718--$p < .01$

χ^2 = 11.95898--$p < .30$*

DF = 10

Variable 19--(piano plus another instrument and Variable 5 (total scores)

$\underline{r}$ = .2966--$p < .01$

χ^2 = 13.88330--$p < .20$*

DF = 10

*Cannot be differentiated from chance.

Testing the Hypotheses

The raw data was treated to a two-fold statistical measurement. The correlation coefficient was employed to describe the relationships between the conservation scores and age, participation in a music group, number of years with private lessons and type of private lessons. The hypothesis test of the correlation coefficient determined whether or not the disclosed relationship exceeds chance occurrence in the sample population. The chi square statistic was employed in order to generalize and make inferences to the population that yielded the sample.

Null Hypothesis 1

Age has no significant effect on the conservation of rhythmic and melodic concepts. The probability level for the correlation coefficient is .01, which indicates that the relationship between age and conservation exceeds chance occurrence and is a true relationship in the sample population. The chi square level of .001 indicates that the relationship between age and conservation exceeds chance occurrence in the population that yielded the sample. The null hypothesis, therefore, can be rejected at those levels.

Null Hypothesis 2

Participation in a music group has no significant effect on the conservation of rhythmic and melodic concepts. The probability level for the correlation coefficient is .01,

which indicates that the relationship between participation in a music group and conservation of rhythmic and melodic concepts exceeds chance occurrence and is a true relationship in the sample population. The chi square level of .05 indicates that the relationship between participation in a music group and conservation exceeds chance occurrence in the population that yielded the sample. The null hypothesis, therefore, can be rejected at those levels.

Null Hypothesis 3

Type of private lessons has no significant effect on the conservation of rhythmic and melodic concepts. The probability level for the correlation coefficient is .01, which indicates that the relationship between the type of private lessons and the conservation of rhythmic and melodic concepts exceeds chance occurrence and is a true relationship in the sample population. The chi square level of .05 indicates that the relationship between type of private lessons and conservation exceeds chance occurrence in the population that yielded the sample. The null hypothesis, therefore, can be rejected at those levels.

Null Hypothesis 4

The number of years that a child has private lessons has no significant effect on the conservation of rhythmic and melodic concepts. The probability level for the correlation coefficient is .01, which indicates that the relationship

between the number of years a child has private lessons and conservation of rhythmic and melodic concepts exceeds chance occurrence and is a true relationship in the sample population. The chi square level of .10, however, indicates that the relationship cannot be differentiated from chance in the population that yielded the sample. Therefore, the null hypothesis is retained.

The lesser variables, which are the individual tasks, are shown in the following tables with correlations between each main variable and each task. The lesser variables were not included in the null hypotheses, but important in discussing the significance of the main variables.

TABLE 27.--Correlation of each task and age

Main Variable	Task	r $p<$	χ^2 $p<$
Age	1	.01	.05
	2	.01	.01
	3	.05	.10*
	4	.01	.01
	5	.01	.001
	6	.01	.05
	7	.01	.001
	8	.01	.001
	9	.01	.001
	10	.01	.001

The table indicates that age is a highly significant factor in the ability to conserve rhythm and melody in all of the tasks except number three. The χ^2 value for Task 3 ($p<.10$)* barely approaches an acceptable level.

*Cannot be differentiated from chance.

TABLE 28.--Correlation of each task and group participation

Main Variable	Task	r $p<$	χ^2 $p<$
Group participation	1	.20*	.30*
	2	.01	.001
	3	.35*	.50*
	4	.01	.001
	5	.05	.05
	6	.10*	.30*
	7	.01	.01
	8	.01	.001
	9	.05	.05
	10	.05	.05

The table indicates that participation in band or chorus had a significant effect on the ability to perform Tasks 2, 4, 7 and 8. These four tasks were the most difficult in the evaluation. Group participation had little or no effect on the ability to perform Tasks 1, 3, and 6,* which were the easiest tasks on the evaluation. Tasks 5, 9, and 10 ($p<.05$) are within the lower limits of probability that the relationship is not a chance occurrence.

*Cannot be differentiated from chance.

TABLE 29.--Correlation of each task and numbers of years with private lessons

Main Variable	Task	r p<	χ^2 p<
	1	.05	.50*
	2	.01	.01
	3	.10*	.80*
Number of years	4	.01	.01
with private	5	.05	.20*
lessons	6	.10*	.20*
	7	.01	.001
	8	.01	.001
	9	.05	.05
	10	.05	.20*

This table shows that the number of years with private lessons is highly correlated with the most difficult tasks, which are 2, 4, 7 and 8. Number of years had very little or no effect on the ability to perform the easier tasks, which are 1, 3, 5, 6 and 10.

*Cannot be differentiated from chance.

TABLE 30.--Correlation of each task and type of private lessons

Mean Variable	Task	r $p<$	χ^2 $p<$
Type of private lessons	1	.05	.10*
	2	.01	.001
	3	.35*	.80*
	4	.01	.001
	5	.01	.05
	6	.10*	.20*
	7	.01	.001
	8	.01	.001
	9	.05	.20*
	10	.01	.01

Type of private music lessons are highly correlated with the ability to perform Tasks 2, 4, 7, 8 and 10. There is very little or no correlation between the type of lessons and the ability to perform Tasks 1, 3, 6, and 9.

While age had the most significant effect on the ability to perform all ten tasks, the experience variables had a significant effect on the ability to perform the most difficult tasks.

*Cannot be differentiated from chance.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to investigate Piaget's conservation theory and its implications for teaching and developing melodic and rhythmic concepts. Specifically the following points were investigated:

1. At what age does the conservation of melodic and rhythmic concepts appear in a child's normal development?
2. Is the conservation of melodic and rhythmic concepts a result of growth and development (age), or is it a result of specialized musical experiences? Do experiences in music groups and private lessons effect the conservation of melodic and rhythmic concepts?
3. Does the development of the conservation of melodic and rhythmic concepts follow a sequential pattern similar to that advanced by Piaget in his conservation experiments with weight, number, volume, quantity, length and area?

4. What are the implications of Piaget's conservation theory for teaching and developing melodic and rhythmic concepts to elementary school children?
5. Can the sequence of musical experiences be related to the cognitive processes that are basic to Piaget's developmental theories, especially the conservation theory?

The need for the study was based on three areas of investigation that were pertinent to the research. Firstly, Zimmerman conducted a series of five experimental studies concerned with Piaget's conservation theory. The research was concerned with the relationship of age to conservation, the efficacy of instructing children for conservation and identifying primary categories of verbal description in non-conserving and conserving children.[76] This writer believed that the results from the Zimmerman studies needed to be verified through other research and that the sequence of the stages in the development of concepts needed to be correlated with the child's ability to perform conservation tasks in music.

Secondly, the need for the study expressed concern regarding the importance of teaching basic principles and fundamentals for the development of musical concepts. The

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[76]Zimmerman and Sechrest, "How Children Conceptually Organize Musical Sounds."

consensus of the authors cited was that the best way to teach children music is to teach music's basic structure.

Thirdly, the need for the study considered three current music teaching methods. All three were concerned with teaching musical concepts. This writer believed that a method of evaluation is needed to determine the outcomes of such teaching procedures.

The study was limited to (1) the musical concepts of melody and rhythm, (2) Piaget's conservation theory, and (3) the evaluation of children between the ages of seven and thirteen.

The research procedure was two-fold. A review of Piaget's theories that are related to conservation and a survey of literature that is related to Piaget's conservation theory was completed. Related literature also included research studies in conceptual learning. The second portion of the research design included originally constructed conservation tasks which were administered to 120 children, ages seven through thirteen.

The first area of the research was concerned with a review of Piaget's conservation theory and literature that is related to the theory. The conservation concept is basic to Piaget's developmental theories. Conservation refers to the fact that, despite alterations in the perceivable features of an object, the object has not been essentially changed.

Piaget considers conservation "a necessary condition for all rational activity."[77]

Piaget concludes that there are three stages in the development of conservation: an initial stage in which perceptual factors exclusively determine the judgement of the child, an intermediate stage of transition when perceptual as well as conservation considerations influence judgement and, a final stage of complete conservation. These stages represent one manifestation of a general trend from a perceptual-intuitive to an operational orientation.[78]

Piaget, in analyzing the nature of conceptual development, concludes that intellectual structures develop in the individual to support adjustments to his environmental demands. The individual's adaptation is partly achieved by the process of assimilation and partly by the complementary process of accommodation.

Development is influenced by four factors: maturation, experience, social transmission and equilibration. Intellectual structures continually move toward a state of equilibrium, which is brought about by the dual processes of assimilation and accommodation. This equilibration process results in the acquisition of a new structure of mental operations.

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[77]Piaget and Szeminska, The Child's Conception of Number, p. 3.

[78]Zimiles, "A Note On Piaget's Concept of Conservation," pp. 691-695.

Piaget formulated a "stage" theory of conceptual development. As a child passes from one stage to another, the cognitive structure is strengthened by the addition and integration of more complex schema. The successive order of the stages of development does not vary; the attainment age of a particular stage, however, will vary among individual children.

Four categories of selected literature were considered for this study. The most important treatises were authored by Piaget and Barbel Inhelder or Alina Szeminska. The second category included books and articles that were written about Piaget's theories. The third category included descriptions of research in the use of Piaget's theories. These particular research writings were chosen to review as examples of what is being done, limiting the field to those concerned with conservation and related points in Piaget's work. Finally, research articles in the area of conceptual learning were reviewed.

The second concern of the research procedure involved the construction of an evaluation instrument with ten rhythmic and melodic tasks based on Piaget's original conservation tasks. The tasks were designed with three degrees of difficulty in order to identify the three stages in the transition from non-conservation to conservation.

Hypotheses were formulated in the null form which stated that age, participation in a musical group, type of

private music lessons, and the accumulated number of years of private music lessons had no effect on the conservation of rhythmic and melodic concepts.

The subjects for the study were 120 children, seven to thirteen years of age, selected by random procedure from five elementary and two junior high schools in Norman, Oklahoma. The evaluation was administered to each subject by this examiner. Two tape recorders were used in the administration of the tasks, one to play the examples and one to record the individual responses of each subject. The responses were transcribed onto individual score sheets and tabulated at a later date.

The raw data were treated by the use of two statistical measures. The product moment correlation coefficient was used to disclose the relationships between conservation scores and age, participation in a musical group, type of private lessons, and number of years with private lessons. The correlation coefficient hypothesis test was employed to determine whether or not these disclosed relationships existed in the population from which the sample was drawn.

The chi square statistic was employed in order to determine whether or not the conservation scores were dependent or independent of the main variables.

Conclusions were based on the first three points set forth in the statement of the problem, the responses of the

children, the investigation of Piaget's theory of intellectual development and the results from the statistical treatment. Observations and conclusions concerning the individual tasks were made, followed by implications of Piaget's conservation theory for developing and teaching a sequence of musical experiences for elementary school children. These musical experiences were related to the cognitive processes that are basic to Piaget's developmental theories.

Conclusions for the Study

At what age does the conservation of rhythmic and melodic concepts appear in the child's normal development? As a result of the musical conservation evaluation it is concluded that the conservation of melodic and rhythmic concepts begins about age seven. The investigation of Piaget's conservation theory revealed that conservation begins to appear in the child near the end of the preoperational substage about age seven or eight. This finding agrees with the results of the Zimmerman research.

The first Zimmerman study, although limited somewhat, indicated that five year old children did not conserve and eight year old children did conserve. The second Zimmerman study was a replication of her pilot study, with the evaluation of eighty children ages five, seven, nine and thirteen. In this study Zimmerman again found that five year old children did not conserve, but seven year old children

conserved fifteen percent of the tasks. Zimmerman's two studies agree, therefore, with the results of this writer's research and tend to substantiate the writer's conclusions.

Rhythmic Tasks 1 and 3 and melodic Tasks 6 and 10 represent the beginning of conservation. In the first grade (mean age--7.3), 73 percent of the pupils conserved Task 1; 66 percent conserved Task 3; 46 percent conserved Task 6; and, 20 percent conserved Task 10.

Is conservation of melodic and rhythmic concepts a result of growth and development, or a result of specialized musical experiences? It is concluded that, while music group participation and type of private lessons has a significant effect on the child's ability to conserve melodic and rhythmic concepts, age has the most significant effect. The results of the statistical analyses substantiate the relationships between these three variables and the conservation scores. The accumulated number of years variable has very little or no effect on the conservation of melodic and rhythmic concepts.

A discrepancy exists in the conclusions concerning the effects of specialized experiences. One would expect that if music group participation and private lessons effect the conservation of rhythmic and melodic concepts, then more years of experience should increase the child's understanding of musical concepts. This writer believes that if one considers the four factors which Piaget believes to influence

learning and development, the discrepancy is explained.[79] The first factor, maturation, equips the child with the physical and mental capacity for learning. Maturation concerns physical structure, motor coordination, central nervous system, and cognitive functioning, all of which take time to reach their highest level of development.

The second factor, experience, involves gaining knowledge of objects (or ideas) by directly observing or manipulating them. In elementary school music this experiential factor is accomplished through singing, playing instruments, listening to music and creating music. The experiences might be either group or private. However, these experiences depend heavily on the level of the child's physical and mental capacities.

The third factor, social transmission, refers to the acquiring of knowledge through reading, instruction and peer interaction. Social transmission takes place through music reading, teacher's example and instruction and playing instruments or singing as part of a group. The social transmission takes place on a one-to-one basis with a band teacher and is also reinforced by peer interaction and the desire to be "first chair." Social transmission is further reinforced in band classes when the child has concrete experiences daily in the classroom.

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[79]Ginsberg and Opper, Piaget's Theory, pp. 168-179.

The fourth factor, equilibration, causes the child to regulate himself because of pre-existing mental structures. Equilibration is the result of both assimilation and accommodation. For example, a child is presented with a new idea or situation. He assimilates that idea into his pre-existing mental structure. He then accommodates his actions to the new structure and that structure is on a more refined and higher level than before. If the pre-existing structure is not in a state of equilibrium, the new idea is not assimilated.[80]

In exploring the equilibration theory and its relation to the conservation of melodic and rhythmic concepts, the writer reexamined the scores of the evaluation, the type of private lessons and the accumulated number of years with private lessons of the seventh grade children.

1. Instrument other than piano

   Number of subjects--4

   Mean score--8.5

   Mean number of years--1.25

2. Piano only

   Number of subjects--13

   Mean score--7.15

   Mean number of years--3.84

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[80] Ibid., pp. 18-19.

3. Piano plus another instrument

Number of subjects--10

Mean score--7.50

Mean number of years--3.70

The above data indicate that children who studied band instruments conserved melodic and rhythmic concepts to a higher degree than children who studied piano only. The data indicate that although band students had a mean number of years of 1.25 with a mean score of 8.5, piano students had a mean number of years of 3.84 with a mean score of 7.15. The writer expected the larger number of years of experience to result in higher scores, which was not true. The writer believes that the above results indicate that the stage of complete conservation is reflected in the band students' scores. Band instruments are usually begun in sixth or seventh grade, while piano is often begun in the first grade or earlier. Therefore, some of the piano students who were evaluated had not reached the age when complete conservation is attained.

The writer believes that the above data justify two conclusions. First, peer interaction is a highly significant factor with band students. Second, the four factors in learning and development must be considered in teaching music concepts. Maturation, experience and social transmission are important, but equilibration must be considered in deciding what and how musical concepts should be taught. If the

child's pre-existing mental structures concerning the most basic concepts in music are not in a state of equilibrium, he will not be able to assimilate and accommodate the more complex aspects of the concept.

For example, one student in the fifth grade studied privately for eight years; piano, organ, violin, guitar, accordion and dancing. Investigation indicated that his private instruction had been by rote. With eight years of instruction, one might expect him to conserve 100 percent of the musical tasks. However, his responses were primarily perceptual and he had no conception of melodic and rhythmic relationships. He said, "Nobody ever told me about that."

Another fifth grade student studied dancing for four years and conserved 90 percent of the musical tasks. Although she could not read music very well, her concept of musical pattern was highly developed. This writer believes that this student discovered conservation of musical pattern as a transfer from concrete experiences in dancing.

Does the development of conservation of melodic and rhythmic concepts follow a sequential pattern similar to that advocated by Piaget's experiments in conservation? The writer's research indicates that the conservation of melodic and rhythmic concepts follows a sequential pattern similar to that in Piaget's conservation tasks. The child acquires the conservation of number at seven or eight; the conservation of weight at nine or ten; and the conservation of length and area at eleven or twelve.

Rhythmic Tasks 1 and 3 and melodic Tasks 6 and 10 represent the beginning of conservation near the end of the preoperational subperiod. Prior to this initial stage perceptual factors exclusively determine the judgement of the child.

Task 5, rhythm, and Task 9, melody, represent the transitional stage of the development of conservation when perceptual factors as well as conservation considerations influence the thinking of the child. This stage was evidenced by the children's responses to these two tasks. The reasons the children gave for making their judgements vacillated between perceptual and conservational ways of solving a problem.

Rhythmic Tasks 2 and 4 and Melodic Tasks 7 and 8 represent the final stage of full conservation. In the seventh grade (mean ages--twelve years and eleven months) 53 percent of the students conserved Task 2; 40 percent conserved Task 4; 73 percent conserved Task 7; and 73 percent conserved Task 8.

It should be noted that the precise age at which a child attains a specific stage is a generality. With children of any age one can usually find manifestations of more than one stage or period. The important point is that the same sequence of development of concepts occurs in every child. Piaget emphasizes this sequence in the following manner:

> The integration of successive structures, each of which leads to the emergence of the subsequent one, makes it possible to divide the child's development into periods or stages . . . can be characterized as follows: (1) Their order of succession is constant, although the average ages at which they occur vary with the individual. . . . Thus, the unfolding of the stages may give rise to accelerations or retardations, but their sequence remains constant. . . . (2) Each stage is characterized by an overall structure in terms of which the main behavior patterns can be explained. . . . (3) These overall structures are integrative and non-interchangeable. Each results from the preceding one, integrating it as a subordinate structure, and prepares for the subsequent one, into which it is sooner or later itself integrated.[81]

There are, according to Zimmerman's Experiment I results, two distinct groups of curves showing the progressive abilities of children to conserve tasks. The first group, the three lower curves, showed relatively little delineation between age groups. These three lower curves involved scores for three tasks which did not provide for a very sharp separation of age groups. On the other hand, the second group, the three upper curves, separated the age groups very well. Zimmerman tested the reliabilities of the six tasks and found the three tasks of the second group that separated the age groups had higher reliabilities than the three tasks that resulted in lower curves.

Zimmerman concluded that, although there was a progressively better performance from younger to older age groups, there was no evidence for any "stages" in the development of the musical concepts tapped in the study. This

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[81]Piaget and Inhelder, The Psychology of the Child, p. 153.

writer believes that there is considerable evidence of "stages" in the Zimmerman results, if one considers the mean scores for the three most reliable tasks.

	Tasks		
Age group	III	V	VI
5 years	5.20	5.85	6.15
7 years	9.80	12.40	12.35
9 years	12.75	14.60	15.10
13 years	15.40	15.25	15.75

Zimmerman stated that the "asymtotic trend between nine and thirteen years on Tasks V and VI may be partly attributable to the ceiling provided by the limited difficulty of the tasks, but evidently improvement in conservation of tonal pattern (Tasks V and VI) precedes improvement in conservation of Meter (Task II)."[82]

The results of the present study indicate that full conservation occurs near the end of the concrete operational stage, around the age of eleven or twelve. This finding suggests that melody and rhythm are fairly complex concepts on the level of Piaget's conservation tasks for length and area. These concepts involve operations including multiple relationality and operations on operations. For example, in Task 4 (rhythm) the child must be able to see the relationships between the notes in one example, seriate those notes

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[82]Zimmerman and Sechrest, "How Children Conceptually Organize Musical Sounds," p. 42.

into a series of events and perform the same operations on the second example. Then he must be able to see the relationships between the two complete examples.

This writer believes that conservation tasks concerning the basic concepts of pitch, duration, beat and loudness would result in 100 percent conservation scores with seven or eight year old children. Andrews and Diehl indicated that the importance of teaching children an understanding of the organization and interaction of music's structural elements is generally accepted. Andrews and Diehl, however, do not find general agreement relative to the exact musical elements needing emphasis in concept learning. However, they find agreement that a tone has properties of pitch, duration, loudness and timbre. Therefore, Andrews and Diehl developed a technique for identifying children's concepts of pitch, duration and loudness.[83]

This writer believes that the musical conservation evaluation would benefit considerably by including tasks involving these more basic concepts. There was some evidence of confusion in the children's responses concerning highness and lowness, which also was demonstrated in the results of the Andrews and Diehl study.

> Although the data was not conclusive, it appears that some children mistakenly interchange the three terms high, loud, and fast and the three terms low, soft,

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[83]Andrews and Diehl, "Development of a Technique," pp. 214-222.

> and slow. This may be due to the frequent association of these phenomena in music, or to a general confusion of labels.[84]

This writer believes that this confusion on the part of the children is probably due to the lack of musical experiences in discriminating between highness and lowness.

One interesting but inconclusive observation regarding the musical evaluation is an apparent deviation from gradually increasing scores in the successive grade levels. This deviation appears in every task. Reviewing Table 11 (page 94), the deviation is found on the following grade levels for each task:

Task 1	Grade 3
Task 2	Grade 3
Task 3	Grade 3
Task 4	Grade 6
Task 5	Grade 5
Task 6	Grade 2
Task 7	Grade 4
Task 8	Grade 5
Task 9	Grade 5
Task 10	Grade 6

Reasons for this apparent deviation in the gradual increase in the scores, are not conclusive at this point. It can be assumed that at these stages the subjects become

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[84] Ibid., p. 221.

disequilibrated for some reason.[85] This writer attempted to make some assumptions about the reasons for the deviation based on Piaget's equilibration theory. The scores from Task 1 and 3, in which the deviation occurred at the third grade level, are used to illustrate the assumption.

Grade	Percentage of Correct Responses to Task 1	Percentage of Correct Responses to Task 3
7	93	90
6	93	100
5	93	90
4	93	80
3	60*	73*
2	73	93
1	73	66

In the first grade, when children are just beginning to read language, symbols do not have as much meaning as sound (in music as well as language). The writer believes that the data obtained indicates first grade children <u>can</u> hear and retain a rhythmic pattern, as in Task 1. In the second grade, there is an interesting difference in the scores for the two tasks. The second grade scores for Task 1 are no higher than in the first grade. However, 93% in the second grade gave correct responses to Task 3, as opposed to 66% of the first grade. In the third grade the scores are lower for Task 1 than in the second or first grade, and the

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[85]Phillips, <u>The Origins of Intellect</u>, p. 10.

scores for Task 3 are lower than in the second grade. As a result of the responses to these two tasks and the nature of the tasks (Task 1 is aural and Task 3 is visual), it would appear that aural perception is stronger in the first grade than visual perception, and that visual perception increases a great deal in the second grade. Piaget calls visual perception the

> . . . visual field of equilibrium, that is, the objects which a person can apprehend at a glance. In the case of classificatory operations, the field of equilibrium is considerably wider. The greater the field of application, the more powerful is the equilibrium.[86]

The visual field of equilibrium in music grows wider as a result of the beginning of music reading in the second grade. This is the traditional time to begin these activities. Many teachers do not begin with the technical terms and symbols but have children make up their own symbols to represent the sounds. Some teachers use horizontal lines of different length to show the duration of sounds. One teacher who was observed used vertical lines for quarter notes (for eighth notes she merely added a flag to the top of the vertical line thus paving the way for the actual note). As a result of these new experiences with visual activities, less emphasis is placed on aural perception. The child progresses very little aurally in the early grades. The data from Task 3 indicates that the deviation in the third grade is a result of teachers failing to place equal emphasis on

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[86]Ginsberg and Opper, p. 173.

both visual and aural aspects of music. As might be expected, the child becomes disequilibrated.

In Task 4, the most difficult task in the evaluation, the deviation occurred at the sixth grade level. This task was entirely visual, and involves several different classificatory operations. The child has become somewhat more visually knowledgeable with the separate classifications, but since there is little relationship (in his thinking) between "how the example sounds" and "how the example looks," he becomes disequilibrated.

This proposed theory can be traced through each task on the evaluation, but it is purely an assumption at this point. This writer believes that further research is definitely indicated.

There is some evidence of this deviation in the Petzold research on auditory perception of children. Although the stimulus-response pattern was not similar to the traditional Piagetian-type conservation tasks, Petzold did discover that a "plateau" was reached at about grade three, and that the greatest gains were usually noted between grades one and two. He also concluded that the ability to imitate the aural presentation of certain kinds of musical ideas is not a measure of the understanding children have of such ideas.[87]

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[87]Petzold, "Auditory Perceptions," pp. 82-87.

The writer of the present study believes that this is substantial evidence of the fact that children in grades four through six are still somewhat perception-bound and have not reached the stage of complete conservation. Perception should be an aid to cognition, not its governing factor.

In examining the related literature, the writer noted with interest that Carlsen believes that the perceptual process involves the existence of a perceptual field, selective focusing, and the internal operation of labeling and organizing. He contends that the third level of this perceptual process is when concept formation takes place.[88]

When a child is perception-bound, he focuses on the properties that are immediately perceived rather than looking at all the perceptual features and selecting those that are relevant in order to make a judgement. This involves Piaget's concept of class inclusion, but it also involves the ability to consider all perceptual aspects and disregard those that are not relevant to the problem situation.

Observations Based on the Individual Tasks

The evaluation instrument was designed with tasks of different degrees of difficulty in order to determine if the stages of development of musical concepts fall into a pattern or sequence similar to that in Piaget's investigations. Therefore, all of the subjects were not expected to be able to perform all the tasks.

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[88]Carlsen, "Some Problems," p. 48.

Tasks 1 and 3 (rhythm) were the easiest of the evaluation. Task 1 requires the student to clap the rhythmic pattern and then listen to the pattern in a melodic context. Ninety-three percent of the subjects in grades 4--7 and seventy-three percent in grade 1 successfully performed this task. In Task 3 the examiner clapped a rhythmic pattern while the subject looked at the pattern in a melodic context. The scores for Task 3 are similar to those for Task 1. These percentages indicate that the conservation of melodic and rhythmic concepts begins around the age of seven or eight.

The students' responses indicated that most of them, even in the lower grades, had experienced note relationships and the symbolic representation of long and short sounds. This was true although the younger children did not know the technical terms of the different kinds of notes. In order to understand their responses the examiner found it necessary to question the younger children on the methods used by their music teachers to represent the duration of notes.

In administering the tasks, generally speaking, the examiner learned that if the subject could correctly clap the rhythmic pattern he could also recognize it visually and aurally. One interesting observation of the older and more musically experienced students was that they expected Tasks 1 and 3 to have some hidden problem or trick. This expectation interfered with their being able to think clearly and resulted in some incorrect responses.

Tasks 2 and 4 were designed as the most difficult rhythmic portion of the evaluation. Although the scores are comparatively less than those scores for Tasks 1 and 3, the pattern of development is fairly stable. In general, the examiner learned that if a child successfully performed Tasks 2 and 4, he could perform Tasks 1, 3, and 5. This suggests a parallel to Piaget's "stage" theory of conceptual development. As a child passes from one stage to another, the cognitive structure is strengthened by the addition and integration of more complex schema.

Piaget uses the term "horizontal décalage" to explain the degrees of difficulty of the various original conservation tasks and the various ages at which a child can successfully perform them. "Horizontal décalage refers to a repetition which takes place within a single period of development."[89] The repetition which takes place can be described as: A cognitive structure, characteristic of that level, can be successfully applied to one task but not another task. At some time later, in the same period, operations applied to the first task can be successfully applied to the second task.

Task 2 is a rhythmic pattern used in two different melodies. Some of the subjects could not explain why they believed the two examples were different. Many of the

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[89]Flavell, The Developmental Psychology of Jean Piaget, p. 22.

students believed that the different tune made a different rhythmic pattern. All of the subjects who gave incorrect responses to this task heard the examples at least two or three times. The repetition of the task does not effect the results of the evaluation. The main obstacle to successfully performing this task is the child's "centering" on the melody, instead of analyzing the problem in a logical way.

As can be seen in Table 4 (page 83), Task 4 was not very successful, although the ability to perform the task did increase with age. This is a very sophisticated task involving operations that younger children are not capable of performing, such as multiple relationships, class inclusions, coordinations of space and time, and forming lattices and groupings.

Task 5 consists of a Bach Invention melody played alone and with a contrapuntal accompaniment. The results of this task are interesting, because it is a fairly common belief among music educators that counterpoint is confusing to children. After the task was completed, the examiner questioned each child about counterpoint. Only two students of the piano professed familiarity with the term, because they had played selected Bach pieces. Other students did not recognize the term counterpoint: however, many of them could describe what happened in the music. Task 5 results demonstrate that contrapuntal accompaniment caused less conflict than the chordal accompaniment in Task 6.

Task 6 marks the beginning of the melodic portion of the evaluation. It consists of a simple melody played alone then with four-part harmony. The responses to this task are good examples of what children hear and how they express what they hear. Most of the incorrect responses were from children who heard the second example as being higher or lower than the first. Some of the subjects believed that the whole example was higher or lower, and others thought that only some notes were different. This misconception is probably caused by children's lack of discrimination between high and low pitches, or between two or more simultaneous pitches. The writer has learned through experience, and from the responses to Task 6, that many children do not have a concept of highness or lowness. This writer believes that pupils should be taught these two basic concepts and encourages other music teachers to teach them also.

Task 7 consists of a melody first played in the major mode and repeated in the minor mode. During the evaluation it was necessary to ask the subject questions other than "Is it the same or different?" in order to determine what he was hearing. The responses to this task confirm that students have difficulty discriminating between pitches. For example, the examiner learned that some used the word "sad" to describe the minor mode. This is believed to be an invalid practice since a great deal of minor music is not

necessarily sad, nor can one claim that all music in the major mode is "happy."

Task 7 is one of the most difficult melodic tasks. The children's inability to verbalize about matching the intervals seemed to be an obstacle. The verbal problem existed with the older children as well as the younger, and the examiner believes that more research is indicated to discover the possible causes for this problem.

Task 8 consists of a folk melody in two different keys. The examiner believes that if a child understands intervallic structure, he will have no difficulty in recognizing a melody in different keys. The writer has learned through experience that this is a crucial problem with adolescent boys when their changing voices require them to read music in a different range. If the students have developed the concept of intervallic structure at an earlier age, the shift will not be so traumatic.

The examiner did not expect young children to conserve Task 8 because they had not reached the music reading level that is required to perform the task. This assumption was verified except for two children, one in the first grade and one in the third grade. Neither one of the children had private music lessons. The examiner interviewed the classroom teachers and was informed that these two children have extremely high IQ's and scholastic achievement. The results of their responses to this difficult task and the concrete

facts about their mental abilities suggest that these two children had reached the stage of complete conservation considerably earlier than their peers.

Task 9 consists of a melodic pattern written in 3/4 meter and is repeated in 4/4 meter. The subjects' responses to this task also resulted in a great deal of discussion. Sometimes a student was correct, while at other times he used a term that had a different connotation from that which he intended. No effort was made to correct the child's use of terms. This writer believes that children should be taught the correct labels for all musical elements whenever they are taught. The labels should be accompanied by concrete experiences with those elements so that a child will not have misconceptions about them.

Some of the older children had difficulty focusing on pitches and intervals. Their responses indicated that they were absolutely sure that changing the placement of the measure bars changed the melodic pattern. It is the writer's belief that meter, beat, accent, pitches and duration of notes, and measure are taught in isolation rather than as integral parts of melodic and rhythmic pattern, and as a result it is difficult for a student to think about a melodic or rhythmic phrase as an entity. Another observation resulting from the responses to Task 9 is that students have difficulty separating the two concepts of melody and rhythm.

Task 10 consists of a melody sung by a soprano voice;

then repeated by a baritone, with orchestral accompaniment. Many music educators believe that children have difficulty matching voices with the male voice. Reasons given for the difficulty are that the male voice is a different quality and range. The examiner believes that the responses to this task indicate that such a belief is unwarranted and that it is possible that factors other than quality and range are involved. It is possible that children are not as well acquainted with the male voice as they are with the female voice. In the discussions about their responses the subjects seemed to have more difficulty with instrumental timbre than with voice quality. The problem might be related to the thicker texture which supports the results from Task 6, in which adding harmony caused difficulty.

The writer believes that the evaluation needs to be revised. The sequence in the administration of the tasks should be changed to group together the similar level tasks. One more rhythmic task and one more melodic task of medium difficulty should be added. These revisions would make the levels more definitive. Tasks 1 and 3 (rhythm) are similar in that they involve similar operations in order to complete them. Task 1 is aural and Task 3 is aural and visual. The conservation responses to these two tasks were also similar. Task 5 (rhythm) consists of a rhythmic pattern in a melodic context which has contrapuntal accompaniment added in the second example. It is aural. Another rhythmic task should

present a similar problem visually in order to investigate further the distortion of adding an accompaniment. At this point, this writer is not making a judgement concerning whether the aural or visual aspect is more important, but believes that aural and visual perception parallel and complement each other.

An additional step is believed to be necessary in Task 2. The subject should be asked to clap the rhythmic pattern after hearing each example to aid him in centering on the rhythm. It is not certain that this additional step would alter the responses, but it is possible that it might. It is not assumed, at this point, that other tasks need altering.

Implications

Implications for this study are based on the investigation of Piaget's theories, responses of the children who were evaluated for the conservation of melodic and rhythmic concepts, and supportative results of the statistical analyses.

Advocates of Piagetian theory assume some implications for education in his principle of internalization which is generally used to describe the trend of cognitive development from early life to adulthood. The principle is that cognition at all developmental levels consists of actions performed by the person. At early levels of development the actions or operations are overt and physical. As

the child matures, action becomes internalized until covert actions (verbal, symbolic and formal operations) dominate his processes of cognition. For example, Flavell suggests that "the best way to teach a child a general principle or rule is to begin with action."[90]

This writer believes that, although Piaget's work was not concerned primarily with education, Piaget's findings have certain definite implications for teaching and developing musical concepts. Piaget's work indicates that the child begins to develop intelligent responses at a very early age. As he matures, the child begins to develop cognitive schemata which enable him to manipulate objects and use them for the attainment of his goals. This development is followed by the appearance of the symbolic function, when mental symbols begin to represent something not immediately present. These cognitive schemata continue to grow in complexity as the child interacts with his environment. Step-by-step the child begins to organize the schemata into logical systems of thought. In the early stages he is unable to integrate these systems and depends heavily on operations on the concrete level. Still later, near the end of the concrete operational period, he is able to generalize these systems of thought to more abstract ideas.

The writer concludes that music teachers need to

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[90]Flavell, The Developmental Psychology of Jean Piaget, p. 100.

understand the child's present level of perception, experience and mental schemata in order to present experiences that will be assimilated into the pre-existing mental structures. Much of what is taught may be lost because it is not comprehensible to small children. The writer is confident that in the primary grades, music symbols should be taught in direct relationship with sounds. The child should be encouraged to explore, discover and learn to control different ways of producing sounds. Creative individual explorations can result in the child's own expression (both aural and visual) for communicating loud--soft, fast--slow, long--short and high--low. The desire to communicate these concepts will lead to learning the symbols.

The writer believes that musical experiences should be on the concrete level in the early grades. This is not a new idea since many music educators have already confirmed that concrete experiences are the best way to teach musical concepts. In order to express himself and to understand what others are expressing in music, the child needs to learn the basic fundamentals and ideas of music. This statement is based on both the writer's research and that of the authors cited in related literature (Reimer, Bruner, Richards, Zimmerman, and Andrews).[91] The consensus of these authors is that in order for children to develop and retain musical concepts it is necessary to teach the basic structure

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[91] Supra, pp. 4-12, and pp. 41-43.

of music. As a result of learning basic principles and fundamentals of music, the child will be able to generalize his concrete experiences to other similar but less concrete areas.

However, musical experiences should be based on the child's level of understanding and capabilities. They also should be based on the sequence of development of mental structures described in Piaget's theories. For example, a step-by-step sequence for rhythm should be constructed. Since rhythm includes a number of sub-systems, such as beat, duration of notes, accent, meter, tempo and pattern, experiences in these sub-systems are indicated. Exploration, discovery, analysis and discussion of the properties, identity and relationships involved in each sub-system are ways that the child can build mental structures concerning these concepts.

While it is doubtful that conservation in music can or should be taught, experiences with the operations involved in understanding melody and rhythm might encourage conservation. The notion of conservation is used to indicate a specific stage in a child's intellectual growth. After attaining conservation of a particular concept, the child is better able to move into a more complex functioning in the area of that concept. The child's ability to conserve will indicate to a teacher the optimal time to present the child with more complex experiences. Zimmerman's study about the teaching

of conservation of certain concepts demonstrated that experiences in discussing, comparing and exploring the concepts might encourage conservation.[92] This writer believes that these experiences are actually concerned with the operations involved rather than conservation itself.

Music teachers need to understand how a child thinks and how he expresses his thoughts. This writer believes that the misconceptions of children concerning pitch are caused primarily by semantic problems. For instance, children think of the term high as meaning physical height. If a teacher is aware of the child's thought, concrete experiences demonstrating the meaning of the term high in music will be indicated.

The music educator needs to place himself in perspective with the child for, according to Piaget, the child does not see the world as an adult sees it. What has meaning for the adult may not have meaning for the child. The adult must try to understand the child's world by observing his actions. By placing himself on the child's level of development and unique way of organizing concepts, the music educator can begin to understand the child and can plan educational experiences for the child's needs. A teacher can discover a great deal concerning the child's way of organizing and understanding concepts by listening to the way the

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[92]Zimmerman, "How Children Conceptually Organize Musical Sounds; Experiment II," p. 43.

child verbalizes about the concept.

In summary, Piaget, in his generalizations on the learning processes, says that a child must first begin learning by acting on objects, or manipulating them. After a time, the overt schemes become internalized in a form of thought. Still later, the child may be able to express on a verbal level the ideas he has formulated from interaction with the object. If this process is bypassed and teaching is strictly on the verbal level, learning may be superficial. The writer concludes that these generalizations can be applied to teaching basic musical concepts.

Recommendations for Further Research

1. The design and procedure of this study should be replicated with the same population and with other populations in order to verify or challenge results obtained in the present study.

2. The evaluation instrument should be administered to a wider range of subjects, possibly to children four through fifteen years of age. This expanded population would better define the preoperational substage, and the movement of the upper level of the concrete operational stage into the formal operational stage.

3. A more thorough study of the operations that are involved in the various musical concepts needs to be made.

4. A conservation evaluation for other basic musical concepts including beat, accent, duration, pitch, dynamics and

intervals needs to be attempted.

5. Additional research needs to be undertaken to determine the cause for the deviations in the gradual increase in scores of the evaluation from grade to grade.

6. Research needs to be done in the area of private music lessons to verify or challenge the conclusions of this study.

7. A study needs to be made on the seventh grade level by administering the evaluation to an equal number of music group students and non-music group students.

8. An in-depth study should be made concerning the role of perception in the conservation of musical concepts.

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APPENDIX

PRE-EVALUATION INTERVIEW

During the pre-evaluation interview, the investigator will make every effort to put the child at ease. A file-card will be used to record the child's name, age (year and month), grade, sex, and years and type of musical experience. The same card will be used to tabulate the results of the test.

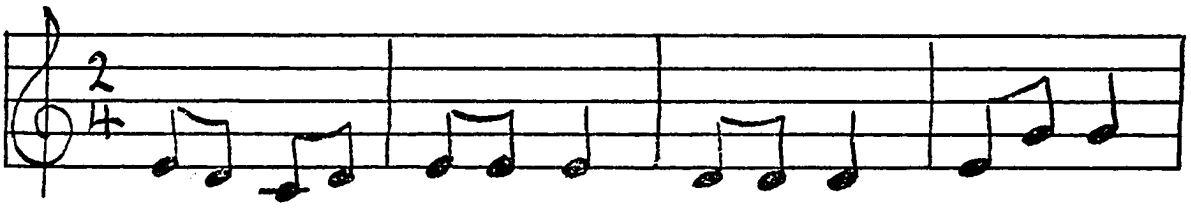
The examiner will explain the purpose and nature of the test to the child. The conversation technique will be used to determine whether or not the child can conserve rhythm and melody.

To make certain that the child understands what elements in music to listen for the following mini-lesson will be taught:

Examiner: To be sure that we understand each other we will talk for a moment about rhythm and melody.

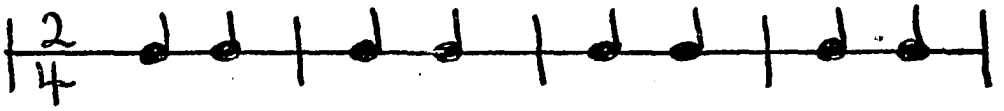
In rhythm we think about meter, pulsation (or beat), duration of notes and rhythmic patterns. Meter decides the beat of the song and the duration of the notes. For example, in the simple tune "Mary Had A Little Lamb" the meter is 2/4. Listen while I sing it.

Examiner sings the first phrase of the song.



Examiner: Show the pulsation or beat of the song by clapping it.

Child: Responds by clapping



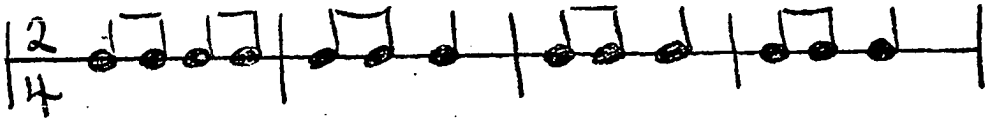
Examiner: Good! Tell about the duration of the notes in this song. Are they all the same or some notes longer than the others?

Child: Responds with a description such as, "Mostly short but there are three places that have a longer one."

At this point the examiner will help the child reach a correct explanation, if possible. A correct definition of the characteristics of rhythm and melody will not affect the results of the test.

Examiner: Yes. Now, the duration of the different notes form the rhythmic pattern. Clap the rhythmic pattern of "Mary Had A Little Lamb."

Child: Responds by clapping the following--



Examiner: Very Good! Now, when I sang the song what else did I do?

Child: You added the melody.

Examiner: That is right. In adding the melody, I sang the rhythmic pattern on pitches. We also have melodic patterns that move up or down at certain places to make a song different from other songs.

The examiner may need to go into more detail on this definition also.

Examiner: We will now continue with the test. Do you have any questions before we begin?

MUSIC CONSERVATION EVALUATION

RHYTHM

Task 1

Aural

Task Clapped rhythmic pattern

Foil Taped melody with the same rhythmic pattern

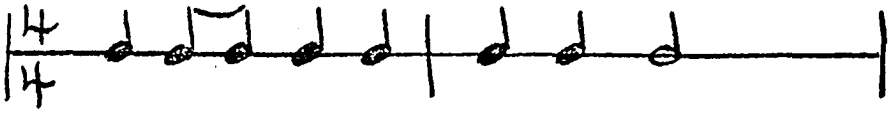
Objective To conserve a clapped rhythmic pattern when it is heard in a melodic context

Source "Carol Of The Birds," an old French carol*

Procedure

1. Examiner: Do what I do.

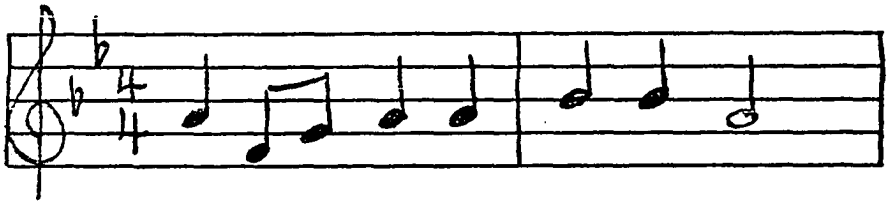
   (Examiner claps the following pattern.)



   (Child responds)

2. Examiner: Listen to this example and tell me whether the rhythm is the same or different than the one you just clapped.

   (Examiner plays the tape of the example for Rhythm Task 1)



   (Child responds with same or different)

*"Carol of the Birds, an old French carol, arr. by Per Peterson, Making Music Your Own--7 (New Jersey: Silver Burdett Company, 1968), p. 224.

3. Examiner: Why do you think it is the same (or different)?

(This question is asked in order for the examiner to determine whether the child is actually conserving or simply guessing. If there is any doubt, further questions should be asked.)

(Child responds)

4. (Further questions are patterned from the following possible answers given by the child.)

A. Child: It just sounds the same.

Examiner: Can you tell me exactly what you hear that sounds the same?

B. Child: It just sounds different.

Examiner: Can you tell me exactly what you hear that sounds different?

C. Child: I am not sure.

Examiner: Would you like to clap the rhythm and hear the example again?

The entire task may be repeated if the examiner feels it is necessary.

D. Child: It is almost the same but you added something.

Examiner: Can you describe the something that I added?

(If the child says that you added a tune but the rhythm was the same, he is conserving.)

5. The examiner must use some judgement in evaluating the child's answers. If necessary, the child may be questioned in still more detail, since he may be conserving the concept of rhythm but may not be able to verbalize successfully.

RHYTHM

Task 2

Aural

Task Rhythmic pattern in melodic context

Foil The same rhythmic pattern with change of melody

Objective To conserve a rhythmic pattern when the melody of the pattern is changed

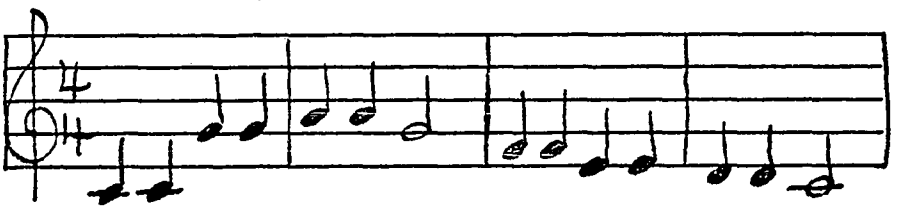
Source "Twinkle Twinkle Little Star,"* traditional song; and "Aura Lee,"* an American folk song

Procedure

1. Examiner: Listen carefully to the rhythmic pattern in this melody.

   (Examiner plays the tape for the first example of Rhythm Task 2)

   Example A



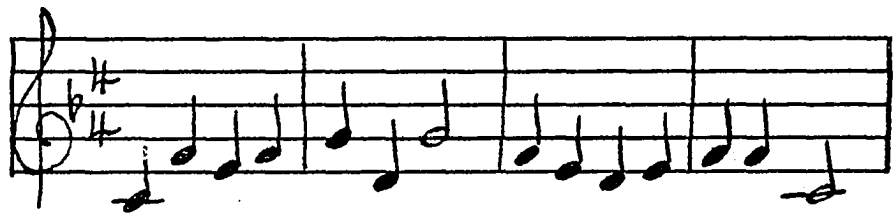
2. Examiner: Now listen to the rhythm in this next melody and tell me whether it is the same or different than the rhythm in the first melody.

   (Examiner plays the tape of the second example of Rhythm Task 2)

*"Twinkle, Twinkle Little Star," Songs for Children (New York: Amsco Music Publishing Co.), p. 21.

*"Aura Lee," Songs for Pickin' and Singin', James F. Teisy, ed. (Greenwich, Conn.: Fawcett Publications, Inc., 1962), p. 140.

Example B



(Child responds with same or different)

3. Examiner: Why do you think it is the same (or different)?

(This question is asked in order for the examiner to determine whether the child is actually conserving or simply guessing. If there is any doubt further questions should be asked)

(Child responds)

4. (Further questions are patterned from the following possible answers given by the child)

A. Child: It is different because it is a different song.

Examiner: Did you listen to the rhythm only or the whole song?

Child: The whole song.

Examiner: Listen to it again and try to listen carefully to the rhythm.

B. Child: I am not sure.

Examiner: Can you tell me what you hear that makes you think it is "kind of" the same?

C. Child: I am not sure.

Examiner: Would you like to hear both parts again and listen to the rhythm?

D. Child: The beat sounds the same but it goes up and down in different places.

Examiner: If the beat sounds the same, does that have to do with rhythm or melody?

Child: With rhythm.

Examiner: Then can you tell me about the rhythm in the two melodies?

E. Child: The tune in the second one jumped around and got me off.

Examiner: Listen to both examples again and try to concentrate on the rhythm.

F. Child: All the notes were held out the same.

Examiner: Were all the notes in both examples the same kind?

RHYTHM

Task 3

Aural-Visual

Task Clapped rhythmic pattern

Foil The same rhythmic pattern in melodic context on a card

Objective To conserve a clapped rhythmic pattern visually

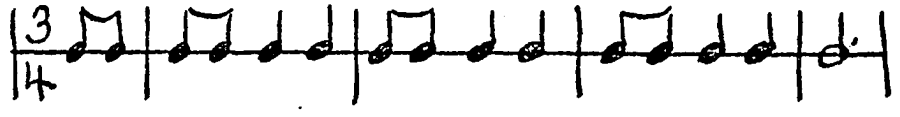
Source "Guten Abend," Johannes Brahms*

Procedure

1. Examiner: Do as I do.

   (Examiner claps the following rhythmic pattern)

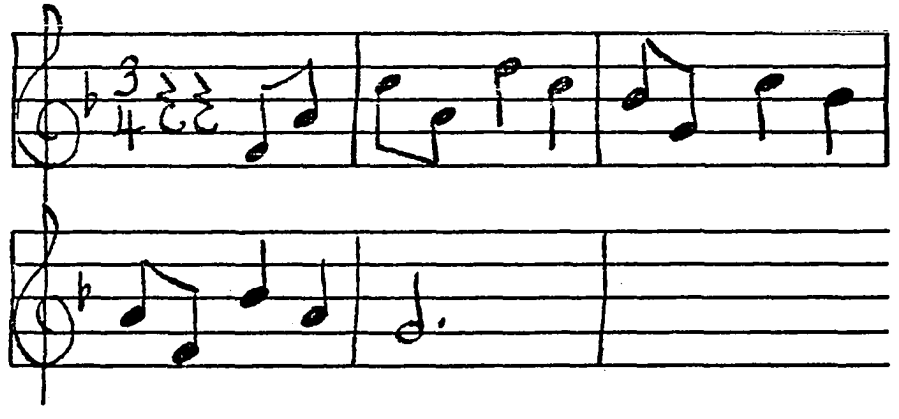
   Example A



   (Child responds)

2. (Examiner places the card with the example of the first four measures of "Guten Abend" in front of the child)

   Example B



*Johannes Brahms, "Guten Abend," Brahms Lieder-Fur Eine Singstimme Mit Klavierbegleitung (New York: C. F. Peters Corporation), p. 92.

Examiner: Is the rhythm you see in this example the same or different than the rhythm we clapped?

(Child responds with same or different)

3. Examiner: Why do you think it is the same (or different)?

(Child responds)

4. Further questions (if needed)

A. Child: You clapped what was on the card.

Examiner: Describe what I clapped that made you think it was the same as that on the card.

B. Child: I am not sure.

Examiner: Listen to it again.

RHYTHM

Task 4

Visual

Task — Visual rhythmic pattern

Foil — The same visual rhythmic pattern with the duration of the notes changed

Objective — To conserve a rhythmic pattern through diminution

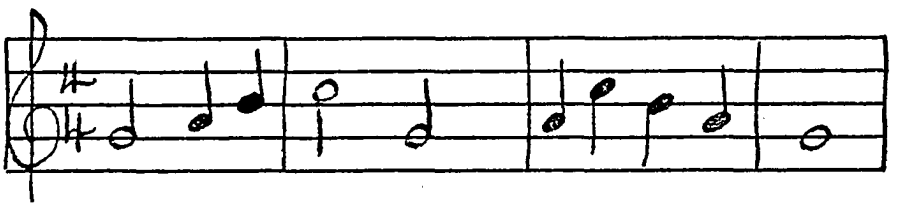
Source — "Chester" from The Continental Harmony by William Billings*

Procedure

1. Examiner: Here are two rhythmic patterns

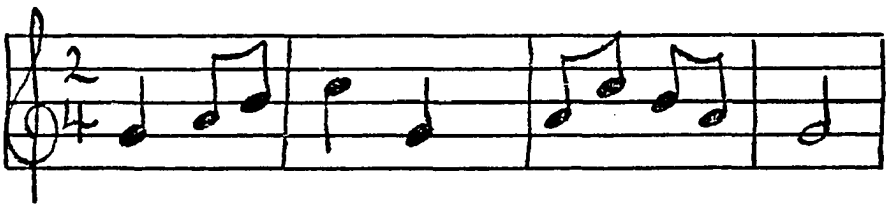
   (Examiner places the two cards with the examples for Rhythm Task 4 in front of the child. The first is four measures of "Chester" in its original form.)

   Example A



   (The second example is of the same four measures of "Chester" with each note changed to the next smaller note in duration.)

   Example B



*William Billings, "Chester," The Continental Harmony, reprinted in Making Music Your Own-7, p. 78.

2. Examiner: Look carefully at both examples and tell me whether the rhythmic pattern is the same or different.

(Child responds with same or different.)

3. Examiner: Why do you think it is the same (or different)?

4. Further questions (if needed):

A. Child: Because the notes are the same.

Examiner: Are you talking about the pitches (letter names)?

Child: Yes, the tune is the same.

Examiner: Remember, I asked you about the rhythm, not the tune. Look again and tell me if the rhythm is the same.

B. Child: They are different because one is 4/4 and one is 2/4. Also, the notes are all longer in the first one.

Examiner: Are you looking at each note and comparing, or are you looking at the whole pattern? If I clapped the two examples would they sound the same or different?

C. Child: They have a different time signature.

Examiner: Can you explain how different time signatures would make the rhythm different?

RHYTHM

Task 5

Aural

Task — Rhythmic pattern in melodic context

Foil — Same rhythmic pattern with the addition of contrapuntal accompaniment

Objective — To conserve the rhythmic pattern of the melody when the contrapuntal accompaniment is added.

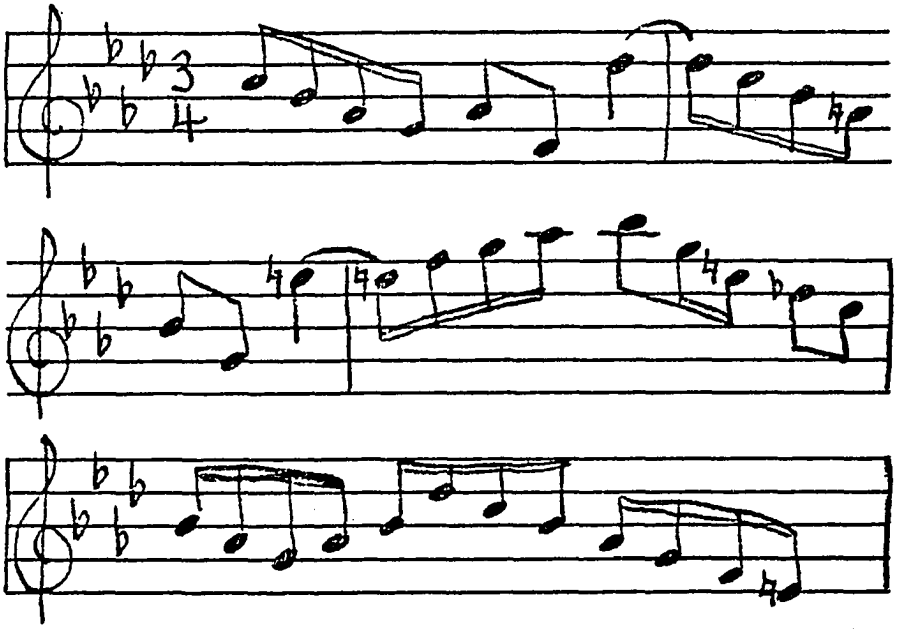
Source — "Two-part Invention No. 9," Johann Sebastian Bach

Procedure:

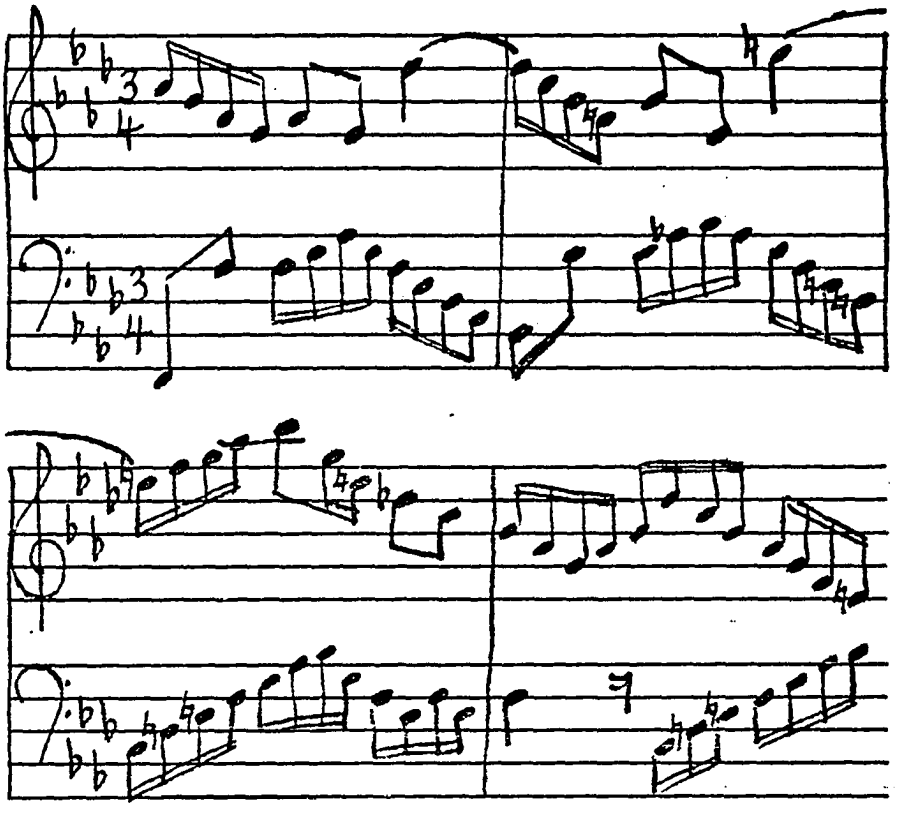
1. Examiner: Listen carefully to the rhythmic pattern of the melody in these two examples.

(Examiner plays the tape of the two examples for Rhythm Task 5.)

Example A



Example B



(Child responds with same or different.)

2. Examiner: Why do you think it is the same (or different)?

(Child responds.)

3. Further questions (if needed).

A. Child: The melody was the same.

Examiner: Yes, but tell me about the rhythm of the two melodies. Was it the same?

B. Child: The second one used both hands.

Examiner: Yes, but the question was-- Is the rhythm of the melody the same or different?

C. Child: They had the same kind of notes.

Examiner: Describe the kind of notes you heard.

D. Child: The second one confused me.

Examiner: Listen to both examples again

MELODY

Task 6

Aural

Task — Melodic pattern

Foil — Same melodic pattern with the addition of chordal harmony

Objective — To conserve a melodic pattern when four-part harmony is added

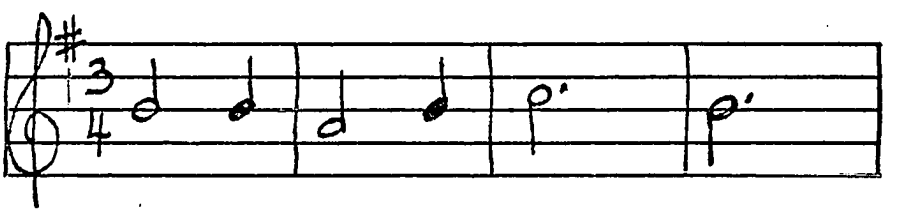
Source — "Sanctus," Franz Schubert*

Procedure

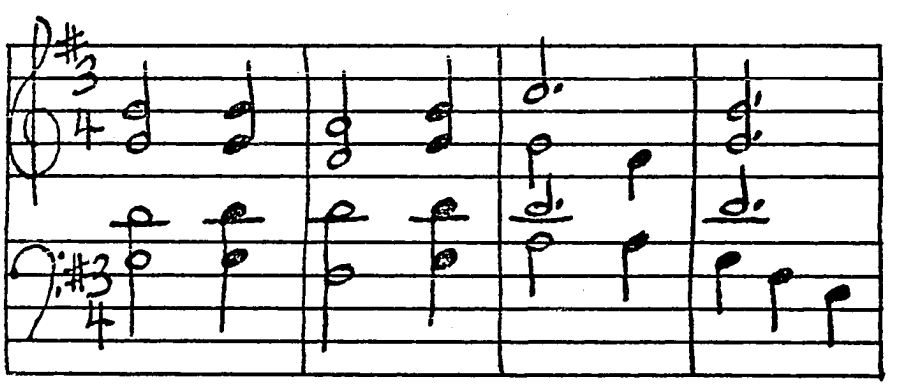
1. Examiner: Listen carefully to the melody in these two examples.

(Examiner plays the tape of the two examples for Melody Task 1.)

Example A



Example B



*Franz Schubert, "Sanctus," arr. by Wayne Hourouth (New York: Belwin, Inc., 1953).

2. Examiner: Is the melodic pattern in the two examples the same or different?

(Child responds with same or different.)

3. Examiner: Why do you think it is the same (or different)?

(Child responds)

4. Further questions (if needed)

A. Child: It sounds kind of the same, only lower.

Examiner: What do you think happened to make one sound lower?

B. Child: There were more notes in the second one.

Examiner: Can you tell me where more notes were?

C. Child: There were a lot more notes added in the second one.

Examiner: Did the adding of more notes change the melody or was it the same as in the first example?

MELODY

Task 7

Aural

Task — Melodic pattern

Foil — Same melodic pattern with a change of mode

Objective — To conserve a melodic pattern when the mode is changed from major to minor

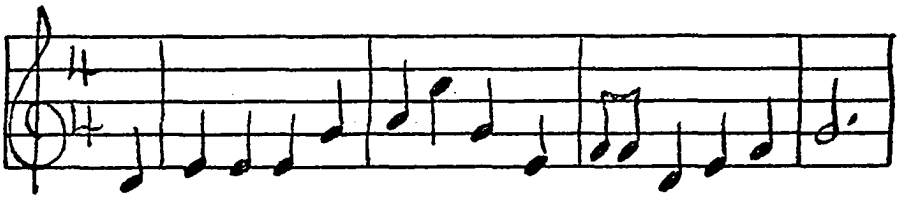
Source — Original

Procedure

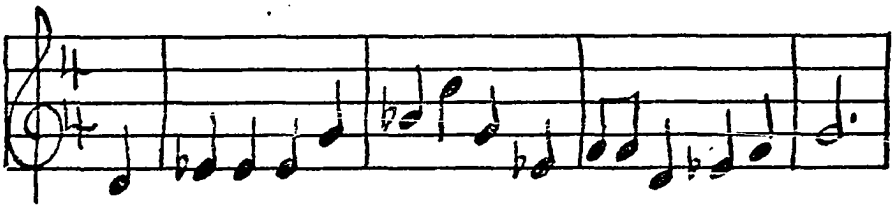
1. Examiner: Listen carefully to the melodic pattern in these two examples.

   (Examiner plays the tape of the two examples for Melody Task 2.)

   Example A



   Example B



2. Examiner: Is the melodic pattern the same or different in these two examples?

   (Child responds with same or different.)

3. Examiner: Why do you think it is the same (or different)?

   (Child responds)

4. (Further questions--to be used at the discretion of the examiner.)

A. Child: The notes just sound the same.

Examiner: Was there anything about one of them that was different?

B. Child: The second one goes down when the first one goes up.

Examiner: Can you tell me exactly where that happened?

C. Child: It was the same except for two or three notes.

Examiner: Can you tell what happened to those two or three notes?

MELODY

Task 8

Visual

Task — Melodic pattern

Foil — Same melodic pattern with a change of key

Objective — To conserve a melodic pattern when the key is changed

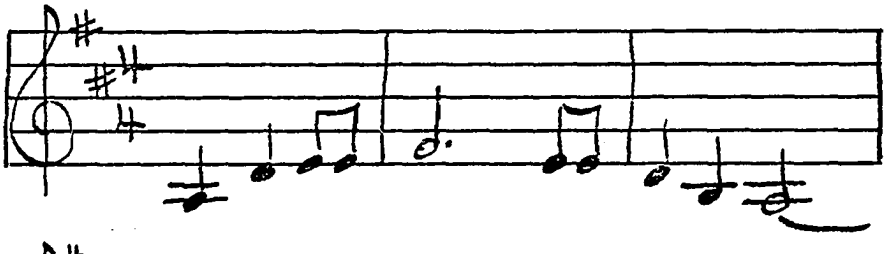
Source — "The Water Is Wide," folk song*

Procedure

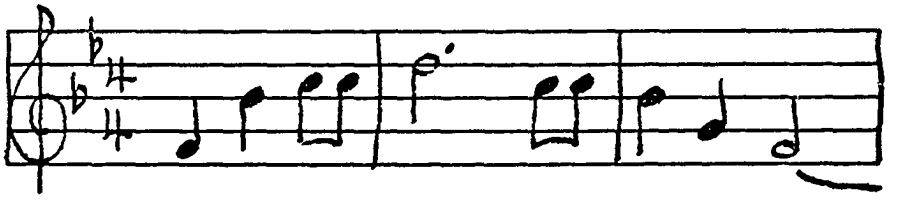
1. Examiner: Look carefully at the melodic patterns in these two examples.

(Examiner places the two cards with the examples for Melody Task 3 in front of the child.)

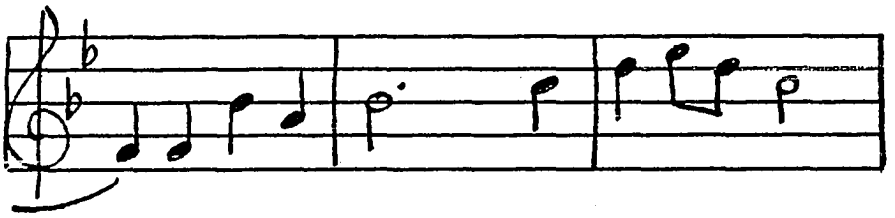
Example A



Example B



*"The Water Is Wide," Folk Songs of England, Ireland, Scotland and Wales; ed. by William Cole, reprinted in Making Music Your Own-7, p. 182.



2. Examiner: Is the melodic pattern the same or different in these two examples?

(Child responds with same or different.)

3. Examiner: Why do you think it is the same (or different)?

(Child responds.)

A. Child: They are different because one is lower than the other.

Examiner: If a low voice sings the lower example and a high voice sings the first one, would it sound like the same melody?

B. Child: They are different because they are in different keys.

Examiner: Think about what makes a melody. If a man sings in a low voice and a woman sings in a high voice, do you think that the key might be different?

C. Child: They are the same because they have the same kind of notes and there are the same number of notes in the measures.

Examiner: Kinds of notes have to do with the rhythm, not the melody. If you think about the pitches and the way the pitches move up and down, will you still think that the two examples are the same melody?

MELODY

Task 9

Visual

Task — Melodic pattern

Foil — Same melodic pattern with a change of meter (Number of beats in a measure)

Objective — To conserve a melodic pattern when the meter is changed from 3/4 to 4/4

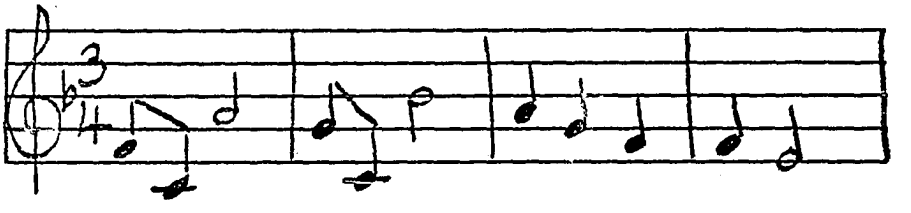
Source — "Dona Nobis Pacem," old traditional round*

Procedure

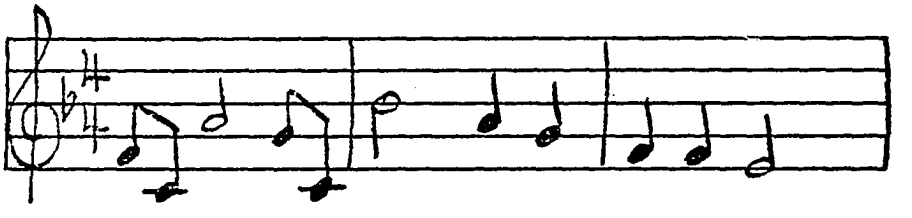
1. Examiner: Look carefully at the melodic patterns in these two examples.

   (Examiner places the two cards with the examples for Melody Task 4 in front of the child.)

   Example A



   Example B



2. Examiner: Is the melodic pattern the same or different in these two examples?

   (Child responds with same or different.)

*"Dona Nobis Pacem," old traditional round, Making Music Your Own-7, p. 225

3. Examiner: Why do you think it is the same (or different)?

(Child responds.)

4. (Further questions--to be used at the discretion of the examiner):

A. Child: The pitches are the same, but the measure bars are in different places.

Examiner: That is right, but do the measure bars have to do with rhythm or melody?

B. Child: The time signature is different.

Examiner: How would the time signature affect the melody?

MELODY

Task 10

Aural

Task Aural melody sung by soprano voice

Foil The same melody sung by a voice of a different timbre (bass)

Objective To conserve a melody when the voice quality is changed

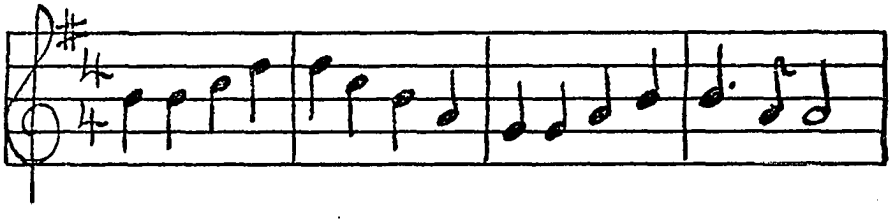
Source "Ode To Joy"--Schiller and an excerpt from Beethoven's Ninth Symphony, Movement IV, Choral Finale*

Procedure

1. Examiner: Listen to these two examples and tell me if the melody in the second one is the same as the melody in the first or is the melody different?

   (Examiner plays the tape of the examples for Melody Task 5.)

   Example A--soprano voice



   Example B--Recording of an excerpt from Beethoven's Ninth Symphony, Movement IV

   (Child responds with same or different.)

2. Examiner: Why do you think it is the same (or different)?

*Ludwig van Beethoven, Ninth Symphony, Movement IV, Boston Symphony Orchestra, cond. by Erich Leinsdorf; Baritone--Sherrill Milnes (RCA: LSC-5010 stereo).

3. Further questions (if needed):

A. Child: The second one is lower.

Examiner: Is it the same melody sung lower or is it a different melody?

B. Child: The second one does not go as high as the first one.

Examiner: Do you mean some of the notes or all of the notes?

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