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The Ohio State University, Ph.D., 1970
FIELD DEPENDENCE-INDEPENDENCE IN CHILDREN
AND THEIR RESPONSE TO MUSICAL TASKS
EMBODYING PIAGET'S PRINCIPLE OF CONSERVATION

DISSERTATION

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

By
David Lee Matson, B.A., M.A.

*****

The Ohio State University
1978

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To Becky, Jim, Scott,
Steve, Shari and Sandi
ACKNOWLEDGEMENTS

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# TABLE OF CONTENTS

ACKNOWLEDGEMENTS ........................................ iii

VITA ............................................................... v

LIST OF TABLES ................................................ viii

LIST OF FIGURES ................................................ x

Chapter

I. INTRODUCTION ............................................. 1

Need for the Study ........................................ 1

Field Dependence-Independence ............................... 4

Piaget's Theory and Principle of Conservation .............. 5

The Period of Sensorimotor Intelligence ...................... 8

The Period of Preoperational Representations ............... 11

The Period of Concrete Operations ......................... 16

The Period of Formal Operations ............................ 20

Purpose of the Study ........................................ 21

Hypotheses .................................................... 21

Null Hypotheses ............................................... 23

Assumptions ................................................... 24

Limitations .................................................... 25

Organization of Chapters .................................... 26

II. REVIEW OF LITERATURE .................................... 27

Cognitive Style ................................................. 27

Field Dependence-Independence ................................ 30

Sex Differences ................................................. 40

Piagetian Conservation ........................................ 44

Musical Development .......................................... 48

Summary .......................................................... 55
III. METHODOLOGY ..................................... 56

Subjects of the Study ........................ 56
Instruments ....................................... 57

Children's Embedded Figures Test ....... 57

Zimmerman Test of Musical
Conservation ............................... 60

Procedures ...................................... 62
Statistical Design ............................. 65

IV. ANALYSIS OF DATA .............................. 67
Summary ......................................... 79

V. SUMMARY AND CONCLUSIONS ..................... 80
Summary ......................................... 80

The Purpose of the Study ................. 80
Need for the Study ....................... 82
Methods and Procedures ............... 82
Summary of the Findings .............. 84

Conclusions, Implications and
Recommendations ............................. 87

Conclusions ............................... 87
Implications for Music Education ...... 88
Recommendations for Further
Research .................................... 89

APPENDIXES

A. Test Scores and Analysis of CEFT .... 92
The Children's Embedded Figures Test .... 93

B. Sample Test Scoring Sheets ........ 104

C. Zimmerman Test of Musical Conservation .. 108

BIBLIOGRAPHY ................................. 137

vii
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Summary of Student Population Grades K, 1 and 3</td>
<td>56</td>
</tr>
<tr>
<td>2.</td>
<td>Summary of Average Student Age Grades K, 1 and 3</td>
<td>57</td>
</tr>
<tr>
<td>3.</td>
<td>Summary of Field Dependence-Independence</td>
<td>64</td>
</tr>
<tr>
<td>4.</td>
<td>Analysis of Variance: Conservation Scores: Total Group</td>
<td>68</td>
</tr>
<tr>
<td>5.</td>
<td>Analysis of Variance: Conservation Scores: Field Dependence</td>
<td>69</td>
</tr>
<tr>
<td>6.</td>
<td>Cell Means and Sums of Scores for the 12 cells of the Analysis of Variance</td>
<td>70</td>
</tr>
<tr>
<td>7.</td>
<td>Grade X Item Interaction</td>
<td>71</td>
</tr>
<tr>
<td>8.</td>
<td>A Comparison of Cell Means of FI Subjects with Means of FD Subjects for Grades K, 1, 3</td>
<td>74</td>
</tr>
<tr>
<td>10.</td>
<td>A Comparison of Cell Means of FI Boys with Means of FD Boys -- Total Group</td>
<td>76</td>
</tr>
<tr>
<td>11.</td>
<td>A Comparison of Cell Means for FI Subjects with Means of FD Subjects on the ZTMC -- Total Group</td>
<td>78</td>
</tr>
<tr>
<td>12.</td>
<td>Ranges, Means and Standard Deviations for Total Group on the Children's Embedded Figures Test</td>
<td>94</td>
</tr>
<tr>
<td>13.</td>
<td>N's and Means for Males and Females on the CEFT</td>
<td>95</td>
</tr>
<tr>
<td>14.</td>
<td>Summary of Field Dependence-Independence</td>
<td>96</td>
</tr>
<tr>
<td>Table</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>15. Comparison of Means and Standard Deviations by Grade and Cognitive Style on the CEFT</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>16. Raw Score Test Data -- Kindergarten</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>17. Raw Score Test Data -- First Grade</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>18. Raw Score Test Data -- Third Grade</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td>19. The Musical Tasks</td>
<td>136</td>
<td></td>
</tr>
</tbody>
</table>
# List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Statistical Design for the Study CEFT</td>
<td>Data Sheet 105</td>
</tr>
<tr>
<td>2.</td>
<td>CEFT Score Sheet</td>
<td>Data Sheet 106</td>
</tr>
<tr>
<td>3.</td>
<td>ZTMC Score Sheet</td>
<td>Data Sheet 107</td>
</tr>
<tr>
<td>4.</td>
<td>CEFT/ZTMC Data Sheet</td>
<td>Data Sheet 107</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

NEED FOR THE STUDY

One of the basic goals of education has become the cultivation of the ability to think.

Thinking is a process rather than a fixed state. It involves a sequence of ideas moving from some beginning through some sort of relationships to some goal or conclusion (Russell, 1956, p. 27).

Thinking procedures vary from fantasy and pure enjoyment to critical and creative problem-solving (Crabtree and Shaftel, 1963). Ways of thinking may include such procedures as perception, association and conceptualization.

At the perception level of thinking, the child looks at a new toy. He may then feel it, attempt to taste it, and in other ways experiment with and investigate the object. He may form a mental image, i.e. percept, of the toy to be later retrieved from his mind.

At the associative stage of learning, there are two levels: first, the cognitive-memory level during which time the child is involved with the simple reproduction of facts through recognition, rote memory, or recall. At the second level, the child participates in a more complex learning process which may be described as convergent or deductive thinking. The child will begin to analyze and organize various types of data and information.
The third stage of thinking is that of conceptualization.

To think conceptually one progresses from the level of perception . . . to making associations . . . to formulating concepts, to grouping two or more concepts to form his own generalization, to applying the generalization in solving related problems. In thinking inductively the learner begins with a problem, collects and analyzes his data, and then formulates concepts which in turn are combined and summarized as generalizations (Nye and Nye, 1970, p. 55).

Insights into the development of children's thought patterns have been provided by the work of Piaget. He views concept development in terms of "conservation", which refers to an individual's ability to retain invariant qualities of a particular stimulus when the stimulus field has been changed.

For Piaget, conservation can be traced through a successive growth from the child's perceptually-dominated view of reality to a conceptual view. The use of conservation principles allows the child to think away visual qualities and concentrate on the logical relationships involved (Pflederer, 1970). It is a "signal for the transition from a prelogical to a logical mode of thought" (Fleck, 1970, p. 15).

In Piaget's developmental theory, he postulates that young children have a tendency to fixate their perception on a dominant or biasing aspect. He refers to this perceptual fixation as "centration". Pflederer (1970)
notes that this same tendency toward a perceptual fixation is observable in young children and older beginners in music.

Perceptual thought suffers from instabilities which conceptual thought is later able to overcome because the tendency to 'center' upon the dominant, to overestimate the immediate, makes one ignore other facets of the stimulus situation, and systematic distortions in perception result (Pflederer, 1970, p. 49).

For the young child engaged in the musical learning process attached to a music curriculum

'centration' can result in an inaccurate and incomplete survey of the total musical configuration, be it vocal or instrumental (Pflederer, 1967, p. 216).

"Musical understanding results from learning . . . ." (Schwadron, 1967, p. 95). Pflederer (1963; 1967; 1970) has taken the position that if a child's musical learning is inseparable from other learnings and follows the same pattern of development, then music education might benefit from an application of Piaget's theory to musical development. Indeed, she has integrated the Piagetian theory of intelligence with its essential principle of conservation in such a manner as to demonstrate that it can provide both a framework and a focus for the development of musical concepts which may lead to musical literacy and independence.

Zimmerman and Sechrest (1968) cite Professor Joachim Wohlwill who as early as 1964 suggested that "a profitable
approach to music concept formation might be found in the embedded figures studies that deal with the development of visual perception" (p. 40).

Other non-music studies have related certain cognitive controls to information processing, problem solving and categorizing. Only one study (Fleck, 1970) was found which has made an attempt to demonstrate what influence certain cognitive controls had upon Piagetian conservation tasks.

This study will attempt to relate children's performance of musical tasks embodying Piaget's principle of conservation to the presence of a single cognitive control -- field dependence-independence.

FIELD DEPENDENCE-INDEPENDENCE

This present study is concerned with a single cognitive control -- field dependence-independence. Individual differences in analytical functioning in perception have been investigated in numerous works as part of the study of the field dependence-independence dimension (Witkin, 1949, 1950, 1952: Witkin and Asch, 1948).

Field dependence-independence is defined as the ability to separate an item from the field or context of which it is a part; it is to "break-up" a field or configuration (Witkin, Dyk, Paterson, Goodenough and Karp, 1962). Kogan (1976) states that while field dependence-independence has assumed many labels (e.g. analytic versus global, field articulation, psychological differentiation) it is
essentially the capacity to overcome embedding contexts in perception, i.e. to separate a part from an organized whole.

In their two major published studies, Witkin et al. (1954, 1962) hypothesized that a field-dependent or field-independent way of thinking was one of several interrelated characteristics which together reflect an individual's level of differentiation.

There is a broad dimension of self-consistency in forms of cognitive functioning -- the articulated-global dimension -- which runs through the perceptual and intellectual domains, as well as the domains commonly conceived of as "personality" -- social behavior, body concept, and defenses (Witkin et al., 1976, p. 14).

PIAGET'S THEORY AND PRINCIPLE OF CONSERVATION

Jean Piaget is without a doubt the most prolific writer and theorist of the twentieth century with regard to the study of the development of the child (Baldwin, 1967). Early in his career, he became interested in children's intellectual development, publishing the results of his first psychological experiments in a series of four articles by 1921 (Flavell, 1963).

While considered primarily as a child psychologist and educator, Piaget prefers to be classified as a genetic epistemologist (Wadsworth, 1971). His work is fundamentally concerned with describing and explaining in a very systematic manner, the growth and development of intellectual structures and knowledge in individuals.
Piaget may be categorized as a developmental psychologist in that he is concerned with uncovering the ontogenetic changes in cognitive functioning from birth through adolescence (Flavell, 1963; Baldwin, 1967).

The consideration of the genetic dimension makes possible, according to Piaget, the tentative solutions to questions posed in the domain of genetic epistemology (Inhelder, 1970).

Piaget, through his research studies in the area of genetic epistemology has sought to formulate theories with regard to intellectual development -- from infancy to adulthood -- by studying the concepts of space, causality, number and logical classes as they develop in the life of the child (Inhelder, 1970). In Piaget's system, the panorama of changing structures in the course of development is conceptually partitioned into stages or periods.

For purposes of conceptualizing cognitive growth, intellectual development can be divided into either three or four main periods (Flavell, 1963; Brown, 1965; Piaget, 1966; Baldwin, 1967; Lefrancois, 1972). Wadsworth (1971) concludes that the number of stages into which one divides development is at best arbitrary. He supports his contention by stating that

Piaget has on different occasions divided development into three, four or six major stages, each time with a number of substages (Wadsworth, 1971, p. 26 note).
Piaget's taxonomy of developmental periods includes: the Period of Sensorimotor Intelligence (0-2 years); the Period of Preoperational Representations (2-7 years); the Period of Concrete Operations (7-11 years); and, the Period of Formal Operations (11-15 years and beyond). Writers such as Inhelder (1962) and Flavell (1963) do not separate the second and third stages of development, choosing rather to discuss one long period (2-11 years) by means of two subperiods.

Piaget's organization of intellectual development assumes: 1) Children do not move from discrete stage to discrete stage in development, "as one moves from one step to another" (Wadsworth, 1971, p. 26); 2) Cognitive development flows in a cumulative manner, with each new stage of development becoming integrated with previous steps (Piaget, 1952); 3) The age spans are normative and can only suggest the times during which most children may be expected to display the intellectual behaviors which are characteristic of a particular stage or period; 4) "The period a child is said to be in is defined by the most advanced performances of which he is capable" (Fleck, 1970, p. 9); 5) Every child must pass through the stages of cognitive development in the same order; 6) Children will pass through the periods at rates which are not necessarily identical; 7) The range of intellectual behaviors within a particular stage is quite large.
Piaget's general hypothesis is that

Cognitive development is a coherent process of successive qualitative changes of cognitive structures (schemata, each structure and its concommitant change deriving logically and inevitably from the preceding one. Successive schemata do not replace prior ones; they incorporate them, resulting in a qualitative change (Wadsworth, 1971, p. 25; emphasis mine).

**The Period of Sensorimotor Intelligence**

Within the domain of child development, the period of sensorimotor intelligence corresponds in time to the commonly defined limits of infancy, the first two years of an individual's life (Piaget, 1952). The important feature, both underlying and unifying this period, as Piaget observes it, is that the child is acquiring skills and adaptations of a behavioral kind (ibid.). The schemas of this earliest period are sensorimotor schemas; they organize sensory information and result in adaptive behavior, but are not accompanied by any cognitive or conceptual representation of the behavior of the external environment. Baldwin (1967) states that the behavior exhibited during infancy is, however, genuinely adaptive and intelligent and that according to Piaget (1952), the sensorimotor schemas are the historical roots out of which later conceptual schemas develop.

It is during this period, (1-4 months) that the child, through sensory perception, becomes able to coordinate information and integrate it. Implicit in this acquisition, is that rather than exhibiting a behavior which is entirely
reflexive, as in the first month of life, the child is now able to look at what he is listening to; he is able to hold his hand still so that he may look at an object which he is holding; the two hands of the child are integrated by the child so that they function cooperatively. Piaget calls this stage of primary circular reaction. In the words of Ginsburg and Opper (1969), the behavior of the infant leads to an advantageous or interesting result; he immediately attempts to reinstate or rediscover the effective behavior; after a process of trial and error he succeeds in doing so. Thereafter, the behavior and the result may be repeated; they have become habits (Ginsburg and Opper, 1969, p. 34).

From four to eight months of age, the behavior of the child is characterized by both the grasping and manipulation of everything he sees in his immediate vicinity. Observation has caused Piaget and Inhelder (1969) to conclude that it is toward the end of this stage that the child "indicates that he is on the threshold of intelligence" (Piaget and Inhelder, 1969, p. 10).

In stages four (8-12 months) and five (12-18 months) more complete acts of practical intelligence may be observed. The subject sets out to obtain a certain result, independent of the means he is going to employ (Flavell, 1963). During the fourth stage the coordination of means and end is new and invented differently by the child in each unforeseen situation, but "the means employed are derived only from known schemes of assimilation" (Piaget
and Inhelder, 1969, p. 11). By the twelfth month, the child is beginning to "search for new means by differentiation from schemes already known" (ibid.).

The final stage observed by Piaget (1952) in the period of sensorimotor intelligence takes place between the age of eighteen months and two years. It is during this stage of development that the child moves from the sensorimotor level of intelligence to that of representational intelligence.

Through this stage of transition

the child becomes capable of finding new means not only by external or physical groping, but also by internalized combinations that culminate in sudden comprehension or insight (ibid., p. 12).

The child, therefore, can discover solutions to problems without overt trial and error and can participate in deferred imitation (Baldwin, 1967).

As the infant develops cognitively, there is a concurrent and related development of concepts. Upon completing the development of the sensorimotor intelligence period, the child has reached a point of conceptual development that is necessary for the development of language and other cognitive skills.

The child is now prepared for increased conceptual-symbolic development. This does not imply the termination of sensorimotor progress, only that intellectual development is to be dominated by representational and symbolic activity rather than motor activity.
The Period of Preoperational Representations

Piaget pointed out that sensorimotor mechanisms are pre-representational. During the ages of two to seven years the child develops from one who functions primarily in a sensorimotor (pre-representational) mode to one who functions primarily in a conceptual-symbolic (representational) mode.

. . . (continuing from stage 6 of infancy) . . .
certain behavior patterns appear which imply the representative evocation of an object or event not present and which consequently presuppose the formation or use of differentiated signifiers, since they must be able to refer to elements not perceptible at the time as well as to those which are present (Piaget and Inhelder, 1969, p. 53).

This is further supported by Phillips (1969, p. 54) when he says

The essential difference between a child in the sensorimotor period and one in the preoperational period is that the former is relatively restricted to direct interactions with the environment, whereas the latter is capable of manipulating symbols that represent the environment.

Two phases -- the preconceptual phase from eighteen months to four years and the intuitive phase from age four to age seven or eight -- have been identified as constituting the totality of the period of preoperational activity (Pfleiderer, 1963; 1964).

Piaget and Inhelder (1969) have suggested that the appearance of semiotic function is distinguished through several discernable behavior patterns including: deferred imitation, symbolic play, graphic image, mental image, and verbal evocation. Of these behaviors, perhaps the single
most important emerging ability of the child is the development of symbolic representation (i.e. verbal evocation), for Piaget concludes that this acquisition of language profoundly affects intellectual stimulation and development for he writes:

>This Language has three consequences essential to mental development: (1) the possibility of verbal exchange with other persons, which heralds the onset of the socialization of action; (2) the internalization of words, i.e., the appearance of thought itself, supported by internal language and a system of signs; (3) last and most important, the internalization of action of such which from now on, rather than being purely perceptual and motor as it has been heretofore, can represent itself intuitively by means of pictures and "mental experiments" (Piaget, 1968, p. 17).

Although the child in the period of preoperational representations is progressing on a continuum from sensorimotor activity to the stage of logical operations, his cognitive behavior is still influenced by perceptual activities.

Although it [the period of preoperational activity] obviously represents an advance over direct action, in that actions are internalized by means of the semiotic function, it is also characterized by new and serious obstacles (Piaget and Inhelder, 1969, p. 93).

These obstacles (or characteristics) impede thought being liberated from perception. Discernable obstacles to logical thought include egocentrism, transformation, centration, reversibility and the ability to classify.
Egocentrism may be defined as "a way of functioning that is characterized by an inability to assume the point of view of others" (Lefrancois, 1975, p. 352). Lefrancois (1975, p. 214) cites a simple problem used by Piaget to demonstrate the role of egocentrism in a child's ability to solve problems:

Two dolls are placed side by side on a string. One is a girl doll, and the other is a boy (naturally). A screen is placed between the child and the experimenter, who are facing one another. The experimenter holds one end of the string in each hand. He hides the dolls behind the screen and asks the child to predict which doll will come out first if he moves the string to the right. Whether or not the child is correct, the doll is moved out, and then hidden again. The question is repeated -- again the doll will come out on the same side. This time, or perhaps next time, but almost certainly before very many more trials, the subject will predict that the other doll will come out. If asked why, he might say, "Because it's her turn. It isn't fair."

The role of egocentrism in the above experiment has caused the child to interpret the problem only from his point of view.

The child exhibiting egocentric behavior believes that everyone thinks the same way he does. As a result, the child never questions his own thoughts because they are, as far as he is concerned, the only thoughts possible and therefore must be correct. A further consequence of egocentrism is noted by Brown (1965, p. 220) as an "inability to explain something clearly to another person" (cf. Fleck, 1970, p. 11).
The second characteristic of the preoperational child's thinking is his inability to attend to transformations. A transformation is the integration of a series of states, conditions or elements into a final state or coherent whole (Phillips, 1969). Wadsworth (1971) cites the following example:

If a pencil is held upright and allowed to fall, it passes from an original state (vertical) to a final state (horizontal), and through a series of successive states. Preoperational children, after viewing the pencil fall, typically cannot draw or otherwise reproduce the successive steps (p. 73).

A third obstacle to logical thinking is centration. Centering or centration causes a child to tend to place attention on a single, striking feature of the object of his reasoning to the neglect of other important aspects (Piaget, 1950; Flavell, 1963; Fleck, 1970). For example, the preoperational child, while admitting that two identical, thin containers are holding identical quantities of liquid, will tend to deny this equivalency if the contents of one container are poured into a shorter, wider container and compared with the other original volume of liquid. "He will not relate different aspects or dimensions of a situation to one another" (Fleck, 1970, p. 12). He does not decenter. Any cognitive activity appears dominated by perceptual aspects. Decentering will only take place with time and experience.
A fourth characteristic exhibited by the child between the age of two and seven years is the inability to practice reversibility. Flavell (1963, p. 159) says that

a cognitive organization is reversible, as opposed to irreversible, if it is able to travel along a cognitive route ... and then reverse direction, in thought, to find again an unchanged point of departure.

More succinctly, Piaget (1963) considers a thought to be reversible if it can follow the line of reasoning back to where it started. If \( a + b = c \), then to demonstrate the principle of reversibility, the child must perform a logical operation, \( c - a = b \). While all mathematical and logical operations are reversible, motor acts are not. Similarly considered, perceptions are irreversible.

Thus representational acts, which are based on prior sensorimotor patterns and perceptions, must develop reversibility without any prior patterns to follow (Piaget, 1963, p. 41).

Lefrancois (1975) identifies the final obstacle -- the inability to classify -- as a process which "involves incorporating subclasses into more general classes, all the while maintaining the identity of the subclasses" (p. 219). An illustration of this characteristic may be found in a classic experiment conducted by Piaget:

A five-year old child is shown a collection of wooden beads, of which ten are brown and five are yellow. He admits that all of the beads are wooden, but when asked whether there are as many, fewer, or the same number of brown beads as wooden beads, he says there are more (Lefrancois, 1975, p. 215).
Being asked to consider the subclass (brown beads) causes the child to forget the larger class (wooden beads). Piaget postulates that "once the child has divided a whole into two sub-groupings, he cannot then think simultaneously in terms of the larger collection and the sub-divisions which he has constructed for it" (Ginsburg and Opper, 1969, p. 126).

Lefrancois (1975) summarizes the period of preoperational representation as one which is both preconceptual and intuitive.

During the preconceptual period, the child's reasoning is characteristically transductive -- that is, it proceeds from particular to particular. An intuitive stage child's reasoning is egocentric, perception-dominated and irreversible (p. 227).

The Period of Concrete Operations

The concrete-operational child behaves in a wide variety of tasks as though a rich and integrated assimilatory organization were functioning in equilibrium or balance with a finely tuned, discriminative, accommodatory mechanism. This is the essence of the difference between the preoperational period and the concrete operational period (Flavell, 1963, p. 165).

Piaget (1950) defines cognitive operations as cognitive actions which are organized into close-knit totalities with a definite, strong structure (Flavell, 1963; Pulaski, 1971).

The actions that were originally overt, and then internalized, now begin to form tightly organized systems of actions. Any internal act that forms an integral part of one of these systems Piaget calls an "operation" (Phillips, 1969, p. 68).
Earlier in this study it was stated that the preoperational child could be characterized by egocentrism, inability to attend to transformations, centration, and the inability both to practice reversibility and to classify (supra. p. 12). These obstacles to logical thought are reflected in the preoperational child's inability to solve conservation problems. In contrast, the child engaged in concrete operations does not exhibit the characteristics which dominated preoperational thought. He is freed from the pull of immediate perception. He is also able to range backward and forward in time and space on the mental level. The result is that for the operational child, the speed of the logical thought process has increased and the thinking process will also display greater freedom and mobility. This allows the child to demonstrate one of the most important processes of the period of concrete operations -- reversibility.

The concept of reversibility is the most clearly defined characteristic of intelligence for Piaget (1963, p. 41). Thought, for the preoperational child, lacks reversibility. In contrast, concrete operational thought is reversible. The difference is clearly demonstrated by citing an exercise performed by Piaget (1967, p. 31):

A child is shown three balls of the same size, each of a different color (A, B, C). The balls are placed in a cylinder in the order A, B, C. The preoperational child correctly predicts
that they will exit from the bottom of the
cylinder in the same order A, B, C. Once more
the balls are in the cylinder in the same order.
Then the cylinder is rotated 180 degrees. The
preoperational child continues to predict that
the balls will exit from the bottom of the tube in
the same order as before, A, B, C. He is surprised
when they exit in the order C, B, A.

While the preoperational child has been unable to perform
the reverse operation, the concrete operational child will
have no difficulty in the same problem. He can reverse the
inversion and make the appropriate deduction, i.e. concrete
thought is reversible.

The concrete operational child does not display the
egocentrism of thought which characterized the preopera­
tional child. At least two matters are significant during
this transition: 1) the child is aware that others can come
to conclusions that are different from his; and, 2) the
language of the child becomes communicative in function.

Piaget (1928) believes that freedom from an egocentric
thought process comes primarily through social interaction
with others, particularly peers. Piaget and Inhelder (1969,
p. 117) further postulate that "the process of socialization
is progressive rather than regressive."

While the preoperational child was unable to coordinate
and isolate the successive steps in a transformation (supra,
p. 14), the concrete operational child attains a functional
problem noted earlier, the concrete operational child would
be able to describe or draw the various states between the
original vertical state of the pencil and the final fallen, horizontal position of the pencil.

Wadsworth (1971) considers the emerging ability to solve conservation problems as the "hallmark" of the period of concrete operations. Goldschmid (1967, p. 1229) believes that "in Piaget's theory the 'Schema of Conservation' represents a pivotal construct in the child's cognitive transition from the 'preoperational' stage to 'concrete operations' (cf. Fleck, 1970, p. 13)."

Conservation is defined as "the realization that quantity or amount remains invariant when nothing has been added to or taken away from an object or a collection of objects, despite changes in form or spatial arrangement" (Lefrancois, 1966, p. 4; 1975, p. 216).

An awareness of the conservation of number could be illustrated by the fact that

if we have a row of eight pennies, and we move the pennies farther apart in the row, we still have eight pennies. That is, the number of pennies does not change when a change is made in another, irrelevant, dimension (Wadsworth, 1971, p. 77).

The transition from non-conservation to conservation is a slow one (ibid.) and "signals the transition from a prelogical to a logical mode of thought" (Fleck, 1970, p. 13).

The preoperational child is one characterized by perception which tends to center on a single perceptual characteristic of a stimulus. "The general principle that Piaget
believes describes all of the changes . . . which culminate in the period of concrete operation is decentering" (Baldwin, 1967, p. 247). The child is now able to take into account features which could balance and compensate for the distorting, biasing effects of the single centration.

It is only when the schema becomes genuinely conceptual and operational that all of the effects of various kinds of change of perspective and transformations over time are simultaneously represented in the thought process. Then thinking can become truly decentered and truly logical (Baldwin, 1967, p. 248).

Cognitively, the most important development of the concrete operational period is the attainment of logical operations. Such actions are directed by cognitive activity, rather than being dominated by perceptions. They are internalized, reversible and suppose some conservation, some invariance. The cognitive operation never exists alone, but is always related to a system of operations (Piaget, 1970, pp. 21-22).

The Period of Formal Operations

The adolescent begins where the Concrete Operations child left off -- with concrete operations. He then operates on those operations by casting them into the form of propositions. These propositions then become a part of a cognitive structure that owes its existence to past experience but makes possible hypotheses that do not correspond to any particular experience (Phillips, 1969, p. 104).

During the period of formal operations, approximately ages eleven to fifteen years, the child develops the ability
to solve all classes of problems that can be solved through logical operations (Flavell, 1963; Baldwin, 1967). Major themes which characterize the child during this period include: 1) he can deal with the complex problems of reasoning, e.g., complex verbal problems, 2) he can operate on the logic of an argument independently of its content, 3) he can compensate mentally for transformations in reality, and 4) he can organize operational thoughts into interrelated systems.

Formal thought for Piaget is not so much a specific behavior as it is a generalized orientation (Flavell, 1963).

The most important general property of formal-operational thought, the one from which Piaget derives all others (Inhelder and Piaget, 1958, pp. 254-255), concerns the real versus the possible (Flavell, 1963, p. 204).

PURPOSE OF THE STUDY

The purpose of this research study is to investigate the relationship between a particular cognitive control in kindergarten, first and third grade children and response to musical tasks embodying Jean Piaget's concept of conservation. The cognitive control to be studied is field dependence-independence.

HYPOTHESES

The following hypotheses are projected:

1. Achievement on the performance of musical conservation tasks will be greater for third grade
children than first grade children and kindergarten children and, greater for first grade children than for kindergarten children.

2. Within each of the grade levels (i.e. K, 1, 3) achievement on the performance of musical conservation tasks will be greater for field independent males than for field dependent males.

3. Within each grade level (i.e. K, 1, 3) achievement on the performance of musical conservation tasks will be greater for field independent females than for field dependent females.

4. Within each of the grade levels (i.e. K, 1, 3) achievement on the performance of musical conservation tasks will be greater for field independent children than for field dependent children, regardless of sex.

5. Field independent girls will demonstrate the principle of conservation in the performance of musical tasks to a greater degree than field dependent girls.

6. Field independent boys will demonstrate the principle of conservation in the performance
of musical tasks to a greater degree than field dependent boys.

7. Field independent girls will demonstrate the principle of conservation in the performance of musical tasks to a greater degree than field independent boys.

8. Field independent children -- male and female -- will demonstrate the principle of conservation in the performance of musical tasks to a greater degree than children of any other group.

NULL HYPOTHESES

In order to either retain or reject the foregoing hypotheses, the following null hypotheses will be tested in this study.

$H_{01}$ The observed difference between grade level and the scores on the performance of musical conservation tasks will not be significant (p .05).

$H_{02}$ There will be no significant difference (p .05) in achievement between field independent males and field dependent males within each of the grade levels (i.e. K, 1, 3) on the performance of musical conservation tasks.

$H_{03}$ There will be no significant difference (p .05) in achievement between field independent females and field dependent females within each of the grade levels (i.e. K, 1, 3) on the performance of musical
H₀⁴ There will be no significant difference (p < .05) in achievement between field independent children and field dependent children, regardless of sex, within each of the grade levels (i.e. K, 1, 3) on the performance of musical conservation tasks.

H₀⁵ There will be no significant difference (p < .05) in the scores of field independent girls and field dependent girls in the performance of musical conservation tasks.

H₀⁶ There will be no significant difference (p < .05) in the scores of field independent boys and field dependent boys in the performance of musical conservation tasks.

H₀⁷ There will be no significant difference (p < .05) in the scores of field independent girls and field independent boys in the performance of musical conservation tasks.

H₀⁸ There will be no significant difference (p < .05) in the scores of field independent children -- male and female -- and field dependent children -- male and female -- in the performance of musical conservation tasks.

ASSUMPTIONS

The following assumptions are being made in this study:
1. The subjects possess mental ability at an educable level.

2. The subjects have had the normal experiences of students their age.

3. The subjects have had a normal academic experience of students their age, i.e. where applicable, no student has been detained in any previous grade.

4. Musical learning is inseparable from other learnings and follows the same pattern of development.

5. There is a relationship between the cognitive control of field dependence-independence and Piaget's concept of centering-decentering.

6. The Zimmerman Test of Musical Conservation is a reliable and valid instrument of musical conservation embodying Piaget's principles.

LIMITATIONS

There are at least four limitations concerning this study. The most obvious limitation is that the population sample is taken from a population of convenience. Other limitations of this study include the inability to control the independent variables, the risk of improper interpretation of statistical data, and the fact that since the study is limited to a small population sample, ability to generalize will be impaired.
ORGANIZATION OF CHAPTERS

The basic purposes of Chapter I were to put forth the need for the study and to define the research problem. The two main variables of the study were introduced and the hypothesized relationships between the variable of field dependence-independence and the variable of Piagetian conservation were stated. The assumptions and limitations of the study were stated. Finally, a basic description of the organization of the five chapters is given.

Chapter II deals with the related literature and the theoretical basis underlying the problem.

Chapter III deals with the procedures followed in the study. It includes a description of the subjects, test instruments, research procedures and the statistical design.

Chapter IV discusses the results of the experimentation together with an analysis of those results.

Chapter V contains the summary of the study and also includes conclusions, implications of the study and recommendations for further research.
CHAPTER II

REVIEW OF LITERATURE

This chapter contains a review of the literature related to the proposed study. It reviews studies in cognitive style (i.e. field dependence-independence), sex difference, Piagetian conservation and musical development in children. Integrated with the related literature is the theoretical basis underlying the research problem.

COGNITIVE STYLE

The construct of cognitive style has been investigated for approximately a quarter of a century, and it continues to preoccupy psychologists working in the interface between cognition and personality. There are individual differences in styles of perceiving, remembering, thinking and judging, and these individual variations, if not directly a part of the personality, are at least very intimately associated with various noncognitive dimensions of personality. It has also been demonstrated that cognitive styles can have an impact on intellectual and academic achievements, a practical aspect that has unquestionably contributed to the massive volume of cognitive-style studies now in print.

The historical roots of cognitive styles have been traced in a definitive manner by Vernon (1973) in early twentieth century German typological theories. It has, however, been more recently -- during the third quarter of

Fleck, (1970, p. 1) states that

These dimensions have been conceived of as cognitive styles of cognitive controls which are regulatory tendencies manifested by consistencies in a person's typical mode of perceiving, thinking, remembering and problem-solving. Control is favored as the label for these stylistic dimensions because it clearly reflects the intended emphasis upon regulatory structures.

Much research in the area of cognitive style and control, prior to 1970, had focused on the mapping of developmental sequences, the identification of some of the origins of the differences in level of functioning, and the isolation of other psychological correlates (Fleck, 1970, p. 1).

Within a discussion of cognitive controls in general or global terms are to be found diverse kinds of cognitive styles which have been subjected to empirical study. Messick (1970) defines nine cognitive styles. Kogan (1973) offers a three-fold classification based on the distance of the style in question from the domain of the abilities.

Regardless of the taxonomy utilized, when considering the area of cognitive controls, three main streams of
activity may be delineated: field dependence-independence or psychological differentiation (Witkin, 1949, 1950, 1952; Witkin and Asch, 1948; Witkin and Berry, 1975; Witkin, Birnbaum, Lomanaco, Lehr and Herman, 1968; Witkin, Faterson, Goodenough and Birnbaum, 1966); analytic style or analytic attitude (Kagen, Rosman, Day, Albert and Phillips, 1964); and research on cognitive control principles such as leveling-sharpening, tolerance for unrealistic experiences, equivalence range, focusing, and constricted-flexible control (Gardner, Holzman, Klein, Linton and Spence, 1959).

The concepts and methods derived from work on cognitive styles over the past two-and-a-half decades are being applied at an ever increasing rate to research on problems of education. Among the cognitive styles identified to date, the field dependence-independence dimension has been the most extensively studied and has had the widest application to educational problems (Witkin, Dyk, Faterson, Goodenough, and Karp, 1962, 1975; Witkin, Lewis, Hertzman, Machover, Meissner, and Wapner, 1954, 1972; Witkin, 1976).

While research on educational applications is still in its early stages, the evidence that research has already produced suggests that a cognitive-style approach may be applied appropriately to a variety of educational issues.

Cognitive styles or controls are characterized by Witkin et al. (1976) as stable, pervasive dimensions which
are concerned with the form rather than the content of cognitive activity. They refer to individual differences in how we perceive, think, solve problem, learn and relate to others.

FIELD DEPENDENCE-INDEPENDENCE

The earliest work in the dimension of the cognitive style of field dependence-independence was concerned with how people locate the upright in space (Witkin and Asch, 1948a, 1948b; Witkin 1949, 1950a, 1950b; Witkin and Wapner, 1950; Witkin, 1952). Witkin et al. (1977) have noted the "marked individual differences among people" (p. 3) in orienting themselves in space. This is supported by early studies, such as those cited above, which utilize the RAT (room-adjustment test), the BAT (body-adjustment test) and the RFT (rod-and-frame test). These studies "demonstrated striking individual differences in the extent to which location of the perceived upright is determined with reference to the axes of the prevailing visual field" (Witkin et al., 1962, p. 41). The studies also demonstrated that "an individual tends to be consistent in his perceptual functioning from test to test" (ibid.; Faterson and Witkin, 1970).

Measures of field dependence-independence provide a quantitative indicator of the extent to which the surrounding organized field has influenced the person's perception of an item within it (Witkin et al., 1977). A corollary
definition is provided in Fleck's (1970) study when he summarized Witkin et al. (1962) with the statement:

*"Measures of field dependence-independence define a continuum ranging from an analytic, articulate or differentiated to a global way of experiencing which characterizes a person's problem-solving activities and his perceptions (Fleck, 1970, p. 2)."

Of the three primary indices of field dependence-independence developed by Witkin and his colleagues -- the Rod-and-Frame Test (RFT), the Body Adjustment Test (BAT) and the Embedded Figures Test (EFT) -- the latter two (largely because of simplicity of the apparatus and the ease of administration) have clearly become the principal procedures for assessing the construct under consideration. These three means of measuring the dimension of field dependence-independence developed from the efforts of Witkin (1948, 1950, 1952) and Witkin and Asch (1948) to determine how individuals locate the upright in space.

The Rod-and-Frame Test (RFT). In this test, the substitute visual framework is a luminous square frame presented to the subject in a completely darkened room.

The frame can be rotated about its center clockwise or counterclockwise. Pivoted at the same center is a luminous rod which can also be tilted clockwise or counterclockwise, independently of the frame. Frame and rod, presented in tilted positions, are all the subject can see in the dark room. The subject's task is to adjust the rod to a position where he perceives it as upright, while the frame around it remains in its initial position of tilt (Witkin et al., 1977, pp. 2-3).
In an earlier writing, it was stated that

for successful performance of this task the subject must "extract" the rod from the tilted frame through reference to body position. The subject is tested on some trials while sitting erect, so that it is relatively easy to refer to the body in establishing rod position, and on other trials while tilted, so that is is more difficult to refer to the body (Witkin et al., 1962, p. 36).

For some subjects, in order for the rod to be apprehended as properly upright, it must be fully aligned with the surrounding frame, whatever the position of the frame. For others, adjustment of the rod more or less close to the upright in making it straight is easier, regardless of the position of the surrounding frame. The latter group evidently is able to apprehend the rod as an entity discrete from the prevailing visual frame of reference and determine the uprightness of the rod according to the felt position of the body rather than according to the visual frame immediately surrounding it (Witkin et al., 1962, 1977).

The Body Adjustment Test (BAT). In this situation, the object of perception is the body, rather than an external object, such as a rod, and the issue is how people determine the position of the body itself in space (Witkin et al., 1962).

The subject is seated in the chair, which can be tilted clockwise or counterclockwise; the chair is projected into the small room which can also be tilted clockwise or counterclockwise, independently of the room. After the subject is seated, the chair and room are brought to prepared tilted settings, and the subject is then asked to adjust
the chair to a position where he experiences it as upright (Witkin, et al., 1977, p. 4).

For a successful performance of the task required, the subject must

Regardless of the position of the surrounding room bring the body more or less to the upright (Witkin et al., 1977, p. 5)

If the subject is able to apprehend the body as an entity discrete from the surrounding field (i.e. to "extract" it) he is considered to be closer to the dimension of field independence (Witkin et al., 1962, 1977).

The Embedded Figures Test (EFT). The final primary index for measuring and evaluating the dimension of field dependence-independence introduces a situation which, while not involving perception of the upright or the body, is actually quite similar to both the RFT and the BAT in its essential perceptual structure. By means of a printed instrument,

the subject is shown the simple figure . . . it is then removed and he is shown the complex figure . . . with the directive to locate the simple figure within it. What has been done in composing the complex figure is to "use up" the lines of the simple figure in various subwholes of the complex figure, so that perceptually, the simple figure no longer appears to be there (Witkin et al., 1977, p. 6).

For people at one extreme, the sought after simple figure emerges quickly from the complex design. Their perception tends to be more field independent (Witkin et al., 1977).
While it remains that the indices of field dependence-independence considered in this discussion were formulated for the earliest studies (Witkin, 1949, 1950, 1952; Witkin and Asch, 1948) and remain the primary instruments of measure, it should be pointed out that other indices have been utilized for evaluating field dependence-independence. Some of these closely associated instruments are the Tilt-Room-Tilting-Chair Test (TRTC) (Witkin, 1948; Witkin et al., 1954); The Children's Embedded Figures Test (CEFT) (Karp and Konstadt, 1963); the Preschool Embedded Figures Test (PEFT) (Coates, 1972); and the Early Childhood Embedded Figures Test (EC-EFT) (Banta, 1970).

In consideration of any of the above instruments, Witkin et al., (1977) have stated that important to the issue of cognitive styles or controls is the evidence of consistency in performance across tasks. In other words,

if the same person is tested in the several situations . . . it is found that the person who tilts the rod far toward the tilted frame in making it straight is likely to be the person who tilts his body far toward the tilted room to perceive the body as upright, and he is also likely to be the person who takes a long time to find the simple figure in the complex design (Witkin et al., 1977, p. 6).

The results of Witkin's research may be summarized in the following statements:

1. Central to individual differences in performance in perceptual tests is the extent to which the person is able to keep an item apart from a context (Witkin et al., 1962, p. 388).
2. Implicit . . . is the idea that differences in extent of articulation of experience may be related to identifiable differences in neural functioning (Witkin et al., 1962, p. 388).

3. The concept of cognitive styles in general and the work of field dependence-independence in particular . . . have the clearest implications for educational issues (Witkin et al., 1977, p. 2).

The early works by Witkin et al. (1962) centering upon the concept of field dependence-independence called for a consideration of three hypotheses in an attempt to account for the observed, consistent individual differences in perception.

One hypothesis "interpreted the individual differences in terms of 'accuracy' in perception of the upright" (Witkin et al., 1962, p. 42). Performances on tests conducted by Witkin (1962a, 1952) demonstrated that this hypothesis was untenable.

The second hypothesis considered that "individual differences in the orientation tests reflect differences in extent of body sensitivity" (Witkin et al., 1962, p. 42). Tests conducted early in the work with cognitive styles demonstrated this hypothesis to be as untenable as the first one (Wapner and Witkin, 1952; Witkin and Wapner, 1950).

The third hypothesis accounted for "the consistent individual differences in perception in terms of differences in ability to overcome an embedding context" (Witkin
et al., 1962, p. 43). This hypothesis "provided the most reasonable basis for interpreting the findings" (ibid.), and remains "as the core concept in the research on field (dependence)-independence" (Fleck, 1970, p. 18).

The Embedded Figures Test (EFT) was developed to check the third hypothesis (Witkin et al., 1962). The test features the ability to perceive an item independent of its context. This ability to overcome an embedding context is central to the dimension of field dependence-independence. Evidence to support the hypothesis is cited by Witkin et al. (1962, pp. 44, 45) through the presentation of intercorrelations among perceptual test scores (EFT, RFT, and BAT) for age levels from eight to seventeen years and for adults. Eight of the ten correlation coefficients are significant (six at p .01; two at p .05 level) for ages eight to seventeen (Witkin, Goodenough and Karp 1959). For the adult groups, similar results were reported (Linton, 1952; Gruen, 1955; Bound, 1957; Epstein, 1957; Gardner et al., 1959; Young, 1959; Gardner et al, 1960). The correlation coefficients ranged from .26 to .55 with the lowest significant correlation being .31.

It is also impressive that a given level of competency at disembedding shows itself in tasks involving different sense modalities and combinations of modalities. Thus, extremely high correlations have been found between the (visual) EFT situation . . . and auditory disembedding tasks (Axelrod and Cohen, 1961; White, 1954; Witkin, Kononace, Birnbaum and Herman, 1968 as cited in Witkin, Oltman, Raskin and Karp, 1971.
Very early in their studies, Witkin et al. (1954) considered the possibility that the individual differences identified in the area of perception might have their counterpart in intellectual functioning.

The stylistic tendencies first observed in perception clearly extend into the intellectual domain. After such a relationship was demonstrated, these tendencies were designated "cognitive styles." The designation "field dependence-independence" has a very specific perceptual connotation and is therefore too limited a label for the broader cognitive style. What is basically at issue in this cognitive style is extent of ability to overcome an embedding context. This ability, when developed, makes possible an analytical way of experiencing. The dimension of individual differences ... represents, at its extremes, contrasting ways of approaching a field, whether the field is immediately present or represented symbolically. It may therefore be designated as a global-vs.-analytical dimension of cognitive functioning (ibid., p. 7).

The individual who performs in relatively field-dependent fashion follows the organization of the field as presented, whereas the relatively field-independent person is able to overcome the organization of the field, to break it up in order to locate its component parts.

The increasing discreteness of objects and the use of more varied and complex principles of field integration on the part of an individual may be referred to as an increase in articulation of experience. Witkin, Oltman, Raskin and Karp (1971) state that

one who experiences in articulated fashion can perceive items as discrete from their backgrounds; or reorganize a field when the field is organized; or impose structure on a field, and so perceive it as organized, when the field has relatively
little inherent structure. Thus, the ability to analyze . . . and to structure . . . are both aspects of increasing articulation (p. 7).

The opposite poles of cognitive functioning may be referred to as "global" and "articulated". Evidence does not show these terms to be mutually exclusive. To the contrary, evidence seems to support the theory that the world is not peopled by two distinct kinds of human beings (i.e. global or articulated) but rather, the measurement of any large population of subjects will produce a continuous distribution (ibid.).

"It is not difficult to see the great similarity between Piaget's concept of decentering and Witkin's concept of field independence" (Fleck, 1970, p. 23). Both theories involve a differentiated, analytic approach rather than a global approach. In order to successfully perform a Piagetian conservation task, the child must replace the process of centration (i.e. the practice of focusing on just one aspect of the problem) with the process of decenteration in which he tends to focus on several dimensions of a problem simultaneously and to relate these dimensions. This means the child must utilize an analytic approach. Similar processes are required in exercising the ability to overcome an embedding context and to experience items as discrete from the field in which they are contained.

While Witkin, Oltman, Raskin and Karp (1971) state that superior performance in cognitive tasks which require
disembedding carries no implication about competence in other classes of cognitive tasks, there is enough similarity between overcoming an embedding context and the concept of decenteration postulated by Piaget to cause Sigel and Hooper (1968) to state that "cognitive style may influence quality of performance since it is a reflection of those cognitive qualities required in the solving of conservation problems (i.e. attention to detail)" (p. 516).

The person with a more field-dependent way of perceiving tends to experience his surroundings in a relatively global manner, passively conforming to the influence of the prevailing field or context, while the more field-independent person tends to experience his surrounding analytically to exercise increased articulation and to use more varied and complex principles of field integration. Therefore, the principle of conservation may be expected to have been grasped by field-independent children to a significantly greater degree than by field-dependent children. Evidence to support this hypothesis is offered by Fleck (1970). In a study involving performance of non-musical conservation tasks he investigated the relationship of field independence-dependence and verbal mediation-nonmediation in kindergarten-first and second grade boys.

Using eighty-eight male subjects, Fleck administered the Children's Embedded Figures Test, the Kendler Reversal-non-reversal shift task and the Concept Assessment Kit-Conservation to each one.
A three-way irregular analysis of variance, due to unequal cell sizes, demonstrated that Field Independence was significant as hypothesized \((p \leq 0.01)\). Grade was also significant at the .01 level, but the Verbal Mediation main effect was not significant.

The findings raise some questions and give cause for further investigation in view of the fact that all subjects were of the same sex, random procedures were not used in the selection of subjects and, finally, the construct validity of the Concept Assessment Kit-Conservation had not been fully established.

**SEX DIFFERENCES**

Sex may be defined as the property by which organisms are classified according to their reproductive function. Sex differences are the factors in which the sexes differ. Sex differences consist of biological or physical sex differences and psychological sex differences.

Maccoby and Jacklin (1974) point out that psychological sex differentiation occurs through three hypothesized processes: 1) imitation, 2) reinforcement, and 3) self-socialization. Imitation of same-sex models by the child is one way in which sex identity and sex patterned behavior is learned. This may or may not be a conscious or deliberate selective modelling of the child for the patterning of behavior.
The second hypothesis accounts for the positive reinforcement and punishment of behavior by parents and other individuals overtly or covertly significant in the life of the child. The male is rewarded for what parents and others perceive to be proper masculine behavior. Girls are similarly, but oppositely, reinforced for feminine behavior. Boys may feel more pressure to conform to a masculine role than girls feel in conforming to a feminine role (Hartup and Moore, 1963; Ross, 1972; Nadelman, 1973; Maccoby and Jacklin, 1974).

The third process postulated to explain psychological sex differences involves the child's cognition and development patterns. Through self-socialization the child develops a concept of what it is to be a boy or girl and to which sex type he or she belongs. Through modeling, imitation and differential reinforcement the child behaves in a manner which is consistent with this self-concept of sex-appropriate behavior.

Kohlberg (1966) outlines three basic theories of sex-role concepts and attitudes in which the foregoing processes play a significant role: the Freudian theory (also known as the psychoanalytic theory), the social learning theory, and the cognitive-developmental theory.

Whichever theoretical framework is adopted, theorists tend to agree that the biological-genetic factors involved
interact with the cultural-environmental factors in the
development of the child's sex-role concepts and attitudes
(Maccoby and Jacklin, 1974).

Moglia and Abraham (1973) report much of the research
on the relationship of sex-role identity to school achieve­
ment and state that "findings have great significance for
educators because of indications that strong sex-role
development is related to many forms of successful
achievement in school" (p. 115).

In the most recent National Assessment of Educational
Progress Report (1975), females of all ages generally
attained higher percentages of acceptable scores on the
music performance items than did their male counterparts.
Only four age levels were measured (i.e. 9, 13, 17, adult).
It should also be noted that while "the numbers do corrobor­
ate certain suppositions held . . . there are background
variables that color and slightly alter the results"
(Herman (comp.), 1975, p. 57).

Early studies have demonstrated that field-independent
responses tend to occur more frequently with males than with
females (Witkin, 1949; Witt, 1955; Corah, 1965). Several
studies utilizing the RFT and/or EFT confirm, for both
adults and children, sex differences in perception (Young,
1957; Gross, 1959; Fink, 1959). Witkin, Goodenough and Karp
(1959) were able to demonstrate sex differences down to the
eight-year level.
Cruden (1941) using perceptual tests similar to the EFT and RFT suggested that there may be no significant sex differences in field dependence in the five-to-eight year range.

Using the BAT, Witkin et al. (1954) concluded that women of young adulthood were more field dependent than men of similar age level. Further studies by Witkin, Goodenough and Karp (1959) showed no significant sex differences at earlier ages.

Coates (1974) has reviewed almost all of the evidence bearing on mean sex differences. She cites nine studies, eight of which yielded higher levels of field independence on the Pre-School Embedded Figures Test (PEFT) for females than males. For six of the eight, the difference was statistically significant. Coates (1974b) found that sex differences favoring females was most pronounced at five years of age and was beginning to reverse during the sixth year. Karp and Konstadt (1963) reached a similar conclusion during the CEFT standardization analysis.

The sex differences that have been observed are clear cut and pervasive, but they are relatively slight, compared to the range of individual differences within each sex (Witkin et al., 1962, p. 221).

Most of the data regarding sex differences has been based on sex-role stereotypes. The possibility needs to be considered that the trend away from traditional sex-role stereotypes may diminish sex differences in differentiation.
PIAGETIAN CONSERVATION

According to Piaget, one of the most important components of the transition from preoperational to concrete-operational thought is the acquisition of various conservations (Flavell, 1963).

Conservation is defined as the realization that quantity or amount remains invariant when nothing has been added to or taken away from an object or a collection of objects, despite changes in form or spatial arrangement (Lefrancois, 1966, p. 4).

The preoperational child centers on only a limited amount of the information available. By contrast, the concrete-operational child decenters his attention. Ginsburg and Opper (1969) state that the child attends to all relevant dimensions and uses his information in at least three ways: 1) reversability, 2) negation, and 3) identity.

With the attainment of concrete operations, the ability to solve conservation problems emerges. The related abilities to decenter, to follow transformations, and to reverse operations are all instrumental in developing conservation skills. The child becomes able to solve the conservation of number problems around age 6 or 7. Conservation of area and mass problems (measurement of displaced water when an object is immersed) are not solved correctly until age 11 or 12 (Wadsworth, 1971, p. 94).

Piaget asserts that the evolution of conservation is a process of equilibration of cognitive actions which contains four major steps, each step comprising in itself an equilibrium state — an isolable "moment" in the
continuous equilibration process (Flavell, 1963). Step two represents a beginning decentration which culminates in semireversible regulations in step three. This leads to the complete and permanent reversible compensations in step four.

Suppose the subject is shown a succession of change-of-shape transformations of a ball of clay (e.g. into successively longer and thinner sausage shapes) and each time he is queried as to conservation versus non conservation of mass. Let us call the width of the sausage \( A \) and the length \( B \); length and width will take various successive values \( A_1, A_2, \ldots \) and \( B_1, B_2, \ldots \), etc. across successive modifications of the sausage. What could the subject's field of application include? He might notice only the width \( (A_1, A_2, \ldots) \) or only the length \( (B_1, B_2, \ldots) \); we can call this the field \( (A \text{ or } B) \). On the other hand, he could extend his field to include the simultaneous cognition of \( A_1 \) and \( B_1 \), \( A_2 \) and \( B_2 \), etc.; i.e. he notices both width and length and compares them for a given sausage. We shall call this field \( (A \text{ and } B) \). Finally, he could make comparisons among the various \( A-B \) relations which the successive transformations of the sausage yield, thus the field \( (A_1 \text{ and } B_1) \) and \( (A_2 \text{ and } B_2) \) and \( A_3 \text{ and } B_3) \) etc. . . .

In Step One, the subject attends only to the width or only to the length, not both, and his field of application can be described within the \( (A \text{ or } B) \) paradigm given above. In step two after a series of repeated centrations on one property the subject comes eventually to substitute for it a centration on the other property. Step three will include a somewhat heterogeneous set of behaviors which are not clear cases of either. "The common denominator in this heterogeneity, however, is the joint apprehension of both properties within a single cognitive act, and hence an
(A and B) field of application" (Flavell, 1963, p. 246). What is begun in step three is continued and extended in step four. In this case, the subject notices that the successive conjuncts (e.g. \(A_1\) and \(B_1\), \(A_2\) and \(B_2\), etc.), which result from the succession of sausage changes, form a meaningful pattern.

Piaget's conceptualizations indicate that conservation concepts are acquired in a sequence. Research on the sequential development of conservation concepts is also found in the literature and these studies generally confirm Piaget's findings. Urgiris (1968) found that of 120 subjects between the ages of 7 and 11, 112 evidenced conservation of substance, weight and volume in the order Piaget describes. Elkind (1961) tested 1974 children in kindergarten to grade six on conservation of mass, weight, and volume. The results of the study confirmed Piaget's findings both with respect to age at which conservation was attained and sequence. In another study, Elkind (1961a) verified similar findings for junior and senior high students.

A second set of studies dealt with the effects of schooling, direct instruction, and reinforcement techniques on the acquisition of conservation skills. Most of these studies suggest that direct teaching does not produce permanent conservation learning in preoperational children (Gruen, 1965; Wohlwill and Lowe, 1962; Wallach, Wall and Anderson, 1967). Kohlberg (1968) found that a special
Montessori schooling program for children over a nine-month period raised I.Q. test scores but did not significantly affect performance on conservation tasks. These studies all tend to lend credence to the theory postulated by Piaget that cognitive structures (schemata) cannot be induced directly as a substitute for general experiences (Lefrancois, 1975).

Similarly, several studies have been conducted concerning the conservation ability of children who have not had formal schooling. The findings would tend to demonstrate that unschooled children typically evolve conservation concepts at about the same age as schooled children in most cultures (Mermelstein and Schulman, 1967; Goodnow and Bethon, 1966). One notable exception would be the study by Greenfield (1966) in which he found that unschooled Senegalese children from bush areas were significantly retarded in conservation ability when compared with city and bush children that had schooling.

The interpretation of these findings according to Piagetian theory is that conservation abilities will not emerge until cognitive structures (schemata) evolve that make true conservation responses possible. The child must attain reversibility, learn to decenter perceptions and follow transformations. He must become less egocentric and learn to question his thinking. These changes will be gradual, largely contingent upon experience, and essential
to the development of the schemata permitting conservation.

MUSICAL DEVELOPMENT

Zimmerman (1971) included both perceptual and conceptual development among the essential components of a child's total musical development.

Considerable research has been designed to measure pitch discrimination by children. Hitchcock (1942), using both a visual test and a pitch test, noted that three-year-old children selected the picture of a small airplane high in the sky to correspond with the idea of low pitch.

In research designed to study some factors basic to early discrimination learning in children, Jeffrey (1958) concluded that children of kindergarten age have difficulty responding differentially to the pitch dimensions and that terms such as "high" and "low" have no significance for them when applied to musical sounds.

Williams, Sievers and Hattwick (1952), in a study with kindergarten subjects augmented the totally verbal method by introducing an overt behavioral task. The findings demonstrated that children were able to learn the initial task better with these training methods, but were unable to utilize the training to transfer to new pitches.

In a significant five-year study, Petzold (1966) investigated the development of auditory perception in the areas of melodic perception, phrase learning, melodic reproduction with varying harmonies and timbres, and
rhythmic ability. His major hypothesis that age is a factor in the development of auditory perception was retained. Related studies which studied the relationship between pitch discrimination and ability to sing were done earlier by Smith (1914) as well as Wolner and Pyle (1933).

A positive relationship between age and pitch discrimination ability was found by Shuter (1968).

Bentley (1966) and Shuter (1968) found a significant relationship between tonal memory and pitch discrimination.

Pitch discrimination and pitch matching as trainable behaviors have been studied by Lundin (1967, Collman (1972) and Norwood (1972).

Porter (1977) has studied the effect of multiple discrimination training on pitch-matching behaviors. A sample of 263 fourth and fifth grade subjects were placed into a five-group, pretest-posttest, experimental control design. Multiple discrimination subjects were found to perform better on pitch-matching tasks than successive approximation only groups.

Other objects of auditory perception have been studied such as rhythm (Williams, Sievers and Hattwick, 1952); (Petzold, 1966), tonality (Taylor, 1972; 1973; 1976); dynamics (Riley and McKee, 1963) and (Williams, Sievers and Hattwick, 1952).

Zimmerman (1971) concludes that "the perception of
musical stimuli follows a developmental sequence" (p. 10). This is further supported in a study of listening ability by Hufstader (1977).

Literature with regard to music conceptual development has been particularly prominent since the 1960's. In one of the more monumental studies, Andrews and Diehl (1967) investigated the conceptual understanding of pitch, duration, and loudness. Their findings concluded that conceptual learning is sequential with the concept of loudness most highly developed followed by duration, then pitch. Zimmerman and Sechrest (1968) reported that while nine-and thirteen-year-old subjects were aided by notation in making cognitive judgements about music, five-and seven-year-old children were not.

Simon (1965) investigated the perceptual and conceptual functioning of young children. She concluded that it was difficult to assess the individual roles of perception and conception in the musical tasks utilized in the study.

Romanek (1974) investigated musical concept development, but limited her study to pre-school children. Larsen (1972) tested for levels of conceptual development with regard to melody. His subjects were taken from grades three, five and seven. He found that older children performed better and with fewer repetitions. His findings supported Piaget's learning theory.
Mode of instruction and the role of the instructor and their relationship to concept development have been investigated by Romanek (1974), Asselin (1972), Taebel (1972), Jetter (1977 & 1978), and Michalski (1971).

The relationship of age to music concept development has been investigated by Zimmerman and Sechrest (1970). They report age as significant at the .01 level. Older children were superior in every facet of the task. Subjects were 198 children ages five, seven, nine and thirteen. Observations and scoring were performed by the investigators with a judge reliability ranging from .74 to .97.

Studies by McDonald (1970) and Walls (1973) examined concept identification as a function of environment and ethnic background.

While numerous studies have related Piagetian concepts to various disciplines, it was an investigation by Pflederer/Zimmerman (1963) which served as the pioneer study in relating Piagetian learning theory to music education. In the study, Pflederer sought to devise several musical tasks which would embody Piaget's principle of conservation with respect to meter, tone and rhythm. From a total of nine tasks, devised by the investigator, six were selected to be administered to sixteen subjects (eight kindergarteners and eight third grade children). These six tasks were designed to trace the stages of conservation in musical thought.

Findings are based on the verbal and musical responses
to each of the tasks. The findings, as summarized by the

author, were as follows:

The eight-year-old children were better able to

conserv meter in Task IA and B and the tonal and

rhythmic patterns of Task IIIA and B, IV, VI and

VII than were the five-year-olds. Only Task VIII

failed to show a differentiation between the two

groups. Task IA and Task IV indicated differences

in the kind of explanations given by the five-and

eight-year-old children. The intuitive answers of

the kindergarten children showed a lack of conserva-

tion and were indicative of preoperational thought.

The answers of the eight-year-old children reflected

the intermediate stage of conservation. Adumbras-

tions of operational thought were indicated by

answers of two children, A8 and C8 to Task IA, and

by C8 and H8 to Task IV. Tasks IA and B and IV,

dealing with durational values, seemed to present

a better opportunity for operational thinking than

did the tasks involving the conservation of tonal


Experiments designed by Pflederer /Zimmerman/ and

Sechrest (1968) demonstrated that conservation of meter

and rhythm was more difficult than conservation of tonal

pattern.

A study by Simon (1965) based upon Pflederer's original

study concluded that visual Piagetian tasks are much easier

than their musical analogues and further, that only in the

metric conservation tasks did any process of logical

inference seem to be involved.

Jones (1971) developed an instrument to measure the

development of a child's conception of meter in music. The

eleven musical tasks of this instrument were oriented

toward the developmental theory of Piaget. Sixty-six

children, ages five through twelve, were administered the
tasks. Based on Green's index of consistency, the instrument had a reliability coefficient of .854. The findings supported Piaget's theory that a child's conception of time develops through three invariant stages, with the meter concept appearing to develop after age nine and one-half.

Using tasks from Jones' 1971 study, Perney (1976) concluded that performance on the musical tasks were not determined by age of the student alone. Performance on the tasks appeared to be more closely related to verbal ability than age. The findings also contradicted Piaget's hypothesis of an invariant sequence of development.

Thorn (1973) using 120 children, ages 7-13, investigated Piagetian conservation principles and melodic and rhythmic concept development. The findings supported Piaget's theory of three stages from nonconservation to conservation. Age was also found to have the most significant effect on the conservation of melodic and rhythmic concepts.

Bettinson (1976) and Botvin (1974) have investigated the principle of Piagetian conservation with respect to various aspects of melody. The latter examined 100 first grade children who were predominantly black and from a lower socio-economic environment. Six tasks were designed to be administered by means of a pretest-posttest experimental control design. Results of the study led to the formulation of the conclusion that "transfer data strongly suggest that both musical and non-musical conservation are mediated by
the same cognitive structure" (p. 233) and further, that the "data seems to indicate a kinship between cognitive development and musical development" (ibid.). The final conclusion of the study indicated that conservation of melody may be taught by successive approximation.

A study by King (1972) reported significant relationships between the ability of children at the first, fifth and ninth grade levels and from differing social class and social environment to conserve melodic patterns in ancient Chinese music under deformation of pitch, duration and timbre. There was also significant differences in the ability to conserve those melodic patterns between children in the three grade levels, three social classes, and two environments.

Nelson (1977) found after testing ten kindergarten children and ten third grade children who were beginning violin students, that responses of beginning violin students to musical tasks embodying the concept of meter can be explained in terms of Piaget's principle of conservation reveals differences in beginning violin students' conservation of meter.

Norton (1977), after examining thirty-four kindergarten children that there was no significant relation between auditory conservation and visual conservation. Her study implies that educators cannot assume that visual conservers are auditory conservers, or that visual nonconservers are auditory nonconservers.
Numerous studies involving Piagetian theory and cognitive style have been conducted (Witkin et al., 1973, 1976). To date, no studies have emerged which integrate cognitive style, Piagetian conservation and musical task performance.

SUMMARY

The review of literature had explored research done on the cognitive style identified as field dependence-independence. It also has dealt with sex differences, its development and relationship to achievement in school. Work involving Piagetian conservation was reviewed as well as musical development in children. Relatively little work has been undertaken in the area of musical concept learning per se and few researchers have attempted to interpret their findings in terms of a current psychological theory of learning.

Similarity between Witkin's concept of field independence and Piaget's concept of decentering has been demonstrated.

The foregoing concepts, which have been shown to have relationships to each other and a firm basis in research, are the framework for the proposed study.
CHAPTER III

METHODOLOGY

This chapter contains a description of the subjects used in the study, an explanation of the experimental procedures followed, a description of the two instruments utilized, and a discussion of the statistical design.

SUBJECTS OF THE STUDY

The experimenter used subjects enrolled in the kindergarten, first and third grades at the Cedar-Cliff Elementary School, Cedarville, Ohio. For the 1977-78 academic year, there were 144 children enrolled in the grades involved in the study. A summary of this enrollment appears in Table 1.

Table 1

Summary of Student Population

Grades K, 1 and 3

<table>
<thead>
<tr>
<th>Grade</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>22</td>
<td>13</td>
<td>35</td>
</tr>
<tr>
<td>1</td>
<td>18</td>
<td>29</td>
<td>47</td>
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<tr>
<td>3</td>
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<td>31</td>
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</tr>
<tr>
<td></td>
<td>71</td>
<td>73</td>
<td>144</td>
</tr>
</tbody>
</table>

Average ages for the children enrolled in kindergarten, first and third grades is summarized in Table 2.
Table 2
Summary of Average Student Age
Grades K, 1 and 3

<table>
<thead>
<tr>
<th>Grade</th>
<th>Male</th>
<th>Female</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>5.9</td>
<td>5.8</td>
<td>5.9</td>
</tr>
<tr>
<td>1</td>
<td>6.8</td>
<td>6.9</td>
<td>6.9</td>
</tr>
<tr>
<td>3</td>
<td>9.1</td>
<td>8.9</td>
<td>9.0</td>
</tr>
</tbody>
</table>

INSTRUMENTS

CHILDREN'S EMBEDDED FIGURES TEST

The Children's Embedded Figures Test (CEFT) was developed by Stephen A. Karp and Norma Konstadt (1963) to measure individual differences in psychological differentiation.

As early as 1950, Herman A. Witkin developed an Embedded Figures Test (EFT) by means of modifications of figures selected from those used by Gottscholdt (1926) in his classical studies of the relative roles of field factors and perception.

A revision of the EFT, the Children's Embedded Figures Test (CHEF) by Goodenough and Eagle (1963), was developed when experience with the EFT demonstrated that this test was too difficult for young children. While the CHEF proved to have good reliability and validity for children five to nine years of age, such disadvantages as bulkiness, expense of construction, lack of portability and complexity of
administration made it impractical for wide use (Witkin et al., 1971).

The CEFT was modeled after Witkin's original Embedded Figures Test and the revision by Goodenough and Eagle (Fleck, 1970, p. 33). The design of the CEFT eliminated some of the practical disadvantages of the CHEF. The present instrument, though administered individually like the CHEF, has greater portability, was designed and produced with less expense, and is more easily administered. The CEFT has twenty-five test items involving two simple forms (i.e. a TENT and a HOUSE) embedded in complex realistic figures (e.g. boat, train, umbrella). Responses are scored 1 or 0 making possible a range of scores from 0 to 25. In addition to the twenty-five items of the actual test, there are materials for discriminations and practice trials.

Standardization of the CEFT has been based on 160 children, ranging in age from five to twelve years, randomly selected from the same two elementary public schools in Brooklyn, New York, as were the children to whom initial tests were administered during the development of the CEFT (Witkin et al., 1971, p. 23).

Internal reliability estimates for the seven-to-eight, nine-to-ten, and eleven-to-twelve age levels range from .83 to .90. This is based on a randomized population of 160 children with forty children representing each of the four levels. The subjects of each level were evenly divided by sex (i.e., twenty girls and twenty boys).
Internal reliability estimates for the five to six year age group could not be determined since a sizeable number of the subjects in this category were not administered all of the items (ibid., p. 24). Fleck cites Karp and Konstadt in reporting that within the five to six year age group only "24 of 40 children completed all items" (1970, p. 33).

Data on CEFT reliability at the five to six year age level are available from a study by Dreyer, Nebelkopf and Dreyer (1969). The test-retest correlation for reliability was reported to be .87.

A study by Bowd (1974) utilizing the CEFT with fifty-three kindergarten children cites a test-retest reliability correlation of .80 (p < .01). The fact that this reliability coefficient is lower than the .87 cited by Dreyer, Nebelkopf and Dreyer, (1969) may in part be attributed to the fact that Dreyer, Nebelkopf and Dreyer waited only six months before administering the retest while Bowd waited ten months.

Klein et al. (1976) examined young children ages seven, eight and nine using perception tests, language tests and memory tests and found the test-retest reliability range for all instruments to be .70 to .80.

Reliability estimates appear consistent with data obtained for the EFT. These data, together with that collected by Dreyer, Nebelkopf and Dreyer (1969), suggest
that the CEFT is a reliable instrument for use with children in the age range examined.

Two problems have been recognized in attempts to determine validity of the CEFT. First, the fact that since "many test figures are common in both tests, the CHEF could not be used as a criterion measure for validation of CEFT" (Karp and Konstadt, 1963, p. 3). Secondly, the difficulty experienced by young children taking the EFT "precludes the use of direct validation procedures which involve correlating CEFT scores with EFT scores" (Witkin et al., 1971, p. 25).

Karp and Konstadt have supplied validity coefficients between CEFT and EFT for only the nine-to-ten and eleven-to-twelve age levels.

For 11-year olds, the magnitude of these correlations (.83 to .86) suggests that almost all of the CEFT may be accounted for by common variance with the EFT. Validity coefficients are lower (.70 to .73) at age 9. This drop appears to be the result of lowered reliability of the EFT at age 9 (.73 as compared with .90 at age 11). When the 9-year-olds' validity coefficients are corrected for attenuation, due to low reliability of the EFT, they reach .8 and are thus comparable to those obtained for the 11-year-olds (Karp and Konstadt, 1963, p. 5; Witkin et al., 1971, p. 25).

ZIMMERMAN TEST OF MUSICAL CONSERVATION

The Zimmerman Test of Musical Conservation (ZTMC) is the result of a design for an original study to apply Piaget's theory of intellectual growth to the field of music learning (Pflederer, 1964).
In 1963, Marilyn Pflederer (Zimmerman) devised nine musical tasks to study "rational aspects of musical development as evidenced by the ability to conserve meter, tone and rhythm" (1963, p. 61). While all nine tasks were considered essential to the 1963 study, not all were investigated.

Six of the musical tasks were selected by Pflederer for the study. These were as follows: Task IA and B, Conservation of Meter; IIIA and B, Conservation of Rhythm Pattern under Deformation of Tone; Task IV, Conservation of Melody under Deformation of Durational Values; Task VI, Conservation of Tonal Pattern under Deformation of Pitch; Task VII, Conservation of Tonal Pattern under Deformation of Rhythm; and Task VIII, Conservation of Melody under Deformation of Accompaniment (Pflederer, 1963; for a complete description of the tasks, property conserved and foils utilized; see Appendix C).

Pflederer chose these six tasks as begin representative of the nine tasks based on the rationale that

Task IIA and B, Conservation of Meter with One-to-One Correspondence, needed to be more tightly structured before its administration. Task IA and B, Seriation of Tones by Pitch was unwieldy for the length of time allotted to the individual testing of each child; and Task IX, Conservation of Tonality, was much akin to the research conducted by Reimers and Rupp . . . (1963, p. 62).

Since one of the purposes of this study was to replicate the Pflederer study for further validation, the experimenter
utilized only the tasks incorporated in the original 1963 study.

The original study contained no data on the reliability and validity of the instrument. A later study was performed by Zimmerman and Sechrest (1968) in which 679 children ages five, seven, nine and thirteen were tested by means of five experiments does include important data and information about the reliability and validity of the experiments.

Experiment I of the study was based upon the original Pflederer (1963) conservation tasks. Using eight randomly assigned subjects from all four age levels, Tasks III, V and VI produced split-half reliabilities of .74 to .81. The split-half reliability coefficients for Tasks I, II and IV ranged from .02 to .57.

With regard to the construct validity, the authors report that

Task I is probably poorly constructed. There is no improvement with age . . . The total protocols of all children were examined for those which gave evidence of some consistency in conservation across Tasks II-VI. Consistency was taken to be at least two conservation-type responses on any given task and conservation-type responses on at least two of the five tasks. Viewed in such a manner, the data show a clear progression in conservation from the younger to the older age groups (Zimmerman and Sechrest, 1968, p. 59).

PROCEDURES

Each of the subjects was tested individually during the first sessions using the Children's Embedded Figures Test. The school administrators made available a quiet
area, relatively free from distractions. During the initial sessions, which averaged forty-five minutes per subject, the experimenter tested thirty-four kindergarten children, forty-four first grade children and forty-nine third grade children. These testing sessions took place during the weeks of April 28 to May 26.

From an original N of 144 children, the experimenter tested 127. Of the seventeen children dropped from the original population, one kindergarten boy did not want to be tested, two first-grade girls were absent because of illness during the testing sessions, one first-grade girl moved from the school district and thirteen third-grade children did not return parental consent forms, even after repeated efforts to get them to do so. The remaining 127 subjects were all grouped on three dimensions: field dependence-independence, sex and grade (i.e. K, 1 and 3).

The field-dependent (FD) and field-independent (FI) groups were determined after completion of the Children's Embedded Figures Test (CEFT). The field-dependent (FD) group consisted of subjects scoring between 1 and 11 on the CEFT, while the field-independent (FI) group consisted of children who scored between 12 and 22 on the CEFT. Fifty-five subjects were considered to be field dependent, while seventy-two were considered field independent. Of the fifty-five subjects classified as field dependent (FD), twenty-six were boys and twenty-nine were girls. The field
independent (FI) group consisted of thirty-nine boys and thirty-three girls. A summary of field dependent-independent subjects by grade and sex appears in Table 3.

Table 3
Summary of Field Dependence-Independence

<table>
<thead>
<tr>
<th>Grade</th>
<th>FDm</th>
<th>FDF</th>
<th>FIm</th>
<th>FIf</th>
</tr>
</thead>
<tbody>
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<td>12</td>
<td>9</td>
<td>9</td>
<td>4</td>
</tr>
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<tr>
<td>3</td>
<td>5</td>
<td>5</td>
<td>21</td>
<td>18</td>
</tr>
<tr>
<td>Totals</td>
<td>26</td>
<td>29</td>
<td>39</td>
<td>33</td>
</tr>
</tbody>
</table>

Randomization procedures were implemented to select both field dependent (FD) and field independent (FI) conservation task participants from both sexes (M and F). As a result of randomization, forty-eight subjects were selected for the Zimmerman Test of Musical Conservation (ZTMC). Of the forty-eight subjects, sixteen each were taken from kindergarten, first and third grades. Eight from each grade level (four male and four female) had been classified as field dependent (FD) while eight others (four male and four female) from each grade had been classified as field independent (FI). From the final group of subjects tested, all possible combinations of the three main variables amount to twelve sub-groups (e.g. FI-F-K, FD-F-K, FD-M-K, etc.).

For administration of the ZTMC, each child met
individually with the investigator in sessions ranging from forty minutes to one hour. A story told to the child by the investigator introduced each task. Task IA was preceded by a practice session with material comparable to that used in the task. Practice sessions for the remaining tasks are described in the stories (see Appendix C). Each tonal and/or rhythmic example was presented to the child by means of a previously recorded magnetic tape. The material was both recorded and played back using Memorex MRX2 Oxide tape (60 minute duration) and a Wollensak 2620AV monaural tape recorder/player. The responses of each child were recorded by means of a second recorder of the same type and equipped with the same type of magnetic tape. These recorded results were transferred to a score sheet, designed by the investigator, after each session and the tape reused (see Appendix B).

STATISTICAL DESIGN

In view of the fact that 127 children in the kindergarten, first and third grades were tested and classified according to field dependent (FD) and field independence (FI) with randomization procedures implemented, the experimenter assumed equality in the number of boys and girls in each of the twelve sub-groups of the design. An equal number of observations in each cell of the design may be assumed also, permitting a regular analysis of variance for the three by two design with nested samples.
(Baumann, 1978; see Figure 1). The three main effects in the study are field dependence (FD) - independence (FI), grade (G) and sex (m and f).

<table>
<thead>
<tr>
<th></th>
<th>FI</th>
<th></th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f</td>
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</tr>
<tr>
<td>K</td>
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<td></td>
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<tr>
<td>3</td>
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<td></td>
</tr>
</tbody>
</table>

**Figure 1**

Statistical Design for

The Study

CEFT
This chapter presents the results of the data obtained from the Zimmerman Test of Musical Conservation together with the analysis of that data. A statement of results follows each statement of the hypothesis. Next, indication is given concerning whether the hypothesis is retained or rejected and is followed by a brief explanatory discussion.

Null Hypothesis 1. The observed difference between grade level and the scores on the performance of musical conservation tasks will not be significant \( p < .05 \). The main effect of grade was not significant (see Table 4). Table 6, showing the cell means and sums of scores for the kindergarten, first and third grade children does not illustrate a progressive increase in competence on the ZTMC.

The Grade by Item interaction was significant at the .05 level. This interaction shows that the kindergarten children scored lowest on Tasks IIIA, IV and VII, while scoring highest on Tasks IA, IIIB, and VIII. First grade children scored highest on Tasks IB and VI. Third grade children scores lowest on Tasks IA, IB and IIIB, while scoring highest on Tasks IIIA, IV and VII.

Table 7 summarized the Grade by Item interaction.
Table 4
Analysis of Variance: Conservation Scores
Total Group

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Independence (FI)</td>
<td>1</td>
<td>182.8776</td>
<td>91.7968 **</td>
</tr>
<tr>
<td>Sex (S)</td>
<td>1</td>
<td>0.0026</td>
<td>0.0013</td>
</tr>
<tr>
<td>Grade (G)</td>
<td>2</td>
<td>1.4401</td>
<td>0.7229</td>
</tr>
<tr>
<td>Item (I)</td>
<td>7</td>
<td>1154.4699</td>
<td>579.4950 **</td>
</tr>
<tr>
<td>FI X S</td>
<td>1</td>
<td>1.6276</td>
<td>0.8170</td>
</tr>
<tr>
<td>FI X I</td>
<td>7</td>
<td>15.6455</td>
<td>7.8534 **</td>
</tr>
<tr>
<td>S X I</td>
<td>7</td>
<td>1.4966</td>
<td>0.7512</td>
</tr>
<tr>
<td>G X FI</td>
<td>2</td>
<td>1.8464</td>
<td>0.9268</td>
</tr>
<tr>
<td>G X S</td>
<td>2</td>
<td>1.0495</td>
<td>0.5268</td>
</tr>
<tr>
<td>G X I</td>
<td>14</td>
<td>4.1752</td>
<td>2.0958 *</td>
</tr>
<tr>
<td>FI X S X I</td>
<td>7</td>
<td>2.2645</td>
<td>1.1367</td>
</tr>
<tr>
<td>G X FI X S</td>
<td>2</td>
<td>15.1120</td>
<td>7.5856 **</td>
</tr>
<tr>
<td>G X FI X I</td>
<td>14</td>
<td>1.4089</td>
<td>0.7072</td>
</tr>
<tr>
<td>G X S X I</td>
<td>14</td>
<td>1.9096</td>
<td>0.9585</td>
</tr>
<tr>
<td>G X FI X S X I</td>
<td>14</td>
<td>2.8471</td>
<td>1.4291</td>
</tr>
<tr>
<td>Error</td>
<td>288</td>
<td>1.9922</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05
** p < .01
Table 5
Analysis of Variance: Conservation Scores
Field Dependence

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (S)</td>
<td>1</td>
<td>0.7500</td>
<td>0.2673</td>
</tr>
<tr>
<td>Grade (G)</td>
<td>2</td>
<td>1.9740</td>
<td>0.7036</td>
</tr>
<tr>
<td>Item (I)</td>
<td>7</td>
<td>451.5804</td>
<td>160.9511 **</td>
</tr>
<tr>
<td>S X I</td>
<td>7</td>
<td>2.2619</td>
<td>0.8062</td>
</tr>
<tr>
<td>G X S</td>
<td>2</td>
<td>9.7656</td>
<td>3.4806 *</td>
</tr>
<tr>
<td>G X I</td>
<td>14</td>
<td>3.9263</td>
<td>1.3994</td>
</tr>
<tr>
<td>G X S X I</td>
<td>14</td>
<td>2.8498</td>
<td>1.0157</td>
</tr>
<tr>
<td>Error</td>
<td>144</td>
<td>2.8057</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05
** p < .01
Table 6

Cell Means and Sums of Scores for the
12 Cells of the Analysis of Variance Design

<table>
<thead>
<tr>
<th>Field Independent</th>
<th>Field Dependent</th>
<th>Grade Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>K</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.22</td>
<td>6.75</td>
</tr>
<tr>
<td>L</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.44</td>
<td>6.91</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.97</td>
<td>7.56</td>
</tr>
<tr>
<td></td>
<td>692</td>
<td>679</td>
</tr>
</tbody>
</table>
Table 7
Grade X Item Interaction

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>4.75</td>
<td>1.31</td>
<td>12.06</td>
<td>11.88</td>
<td>1.13</td>
<td>11.00</td>
<td>6.63</td>
<td>2.06</td>
</tr>
<tr>
<td>1</td>
<td>4.00</td>
<td>1.69</td>
<td>12.81</td>
<td>11.81</td>
<td>1.25</td>
<td>11.88</td>
<td>7.31</td>
<td>1.75</td>
</tr>
<tr>
<td>3</td>
<td>3.81</td>
<td>1.00</td>
<td>12.88</td>
<td>11.19</td>
<td>1.38</td>
<td>11.00</td>
<td>8.50</td>
<td>1.75</td>
</tr>
</tbody>
</table>

Null Hypothesis 1 is retained. While age would appear to be a direct reflection of grade, the non-significant main effect variable of Grade does not corroborate Piaget's and Elkind's findings to the effect that conservation is a developmental concept directly related to age (Elkind, 1961; Flavell, 1963).

Fleck (1970) in making reference to Piaget's original studies and the replication of them by Elkind, reports they suggest that the conservation of substance does not usually appear before the ages of 7-8; the conservation of weight does not usually appear before the ages of 9-10; and, the conservation of volume does not usually appear before the age of 11 (p. 53).

In considering the principle of conservation and its relationship to age (grade), no study examined by this investigator has attempted to relate the qualities of
intellectual development as measured by Piaget through the conservation of substance, weight and volume to those qualities of musical intelligence as measured originally by Pfleiderer (Zimmerman) through the conservation of meter, rhythm and tone in order to arrive at expected ages for differing musical conservation tasks.

Null Hypothesis 2. There will be no significant difference \((p < .05)\) in achievement between field independent males and field dependent males within each of the grade levels \((i.e.\ K, 1, 3)\) on the performance of musical conservation tasks. The main effect variable of field independence was significant. An analysis of variance produced an \(F\) value for kindergarten males of 17.17 \((p < .01)\). The \(F\) values for first grade and third grade males were 12.70 and 9.75 respectively, both of which were significant at the .05 level. An examination of the cell means of the kindergarten, first and third grade boys designated as field independent with those of kindergarten, first and third grade field dependent boys further illustrates this superiority of field independent boys over field dependent boys on the musical conservation tasks. Kindergarten FI boys had cell means of 7.22, while FD boys had a cell mean of 5.66. At the first grade level, FI boys had a cell mean of 7.44 and the FD boys had a cell mean of 5.50. Finally, the cell mean for third grade boys was 6.97, while the cell mean for the FD boys was 5.94 (see Table 6).
An examination of Table 4 reveals no significant interaction of sex and cognitive style on the tasks of the ZTMC.

Null hypothesis 2 is rejected. The highly significant differences between field independent boys and field dependent boys was expected (Witkin et al., 1962; Fleck, 1970).

Null Hypothesis 3. There will be no significant difference (p < .05) in achievement between field independent females and field dependent females within each of the grade levels (i.e. K, 1, 3) on the performance of musical conservation tasks. The main effect variable of Field Independence was significant for only one grade level. An analysis of variance produced F values for kindergarten (4.54) and first grade (2.60) which were not significant, although the kindergarten girls were approaching significance. The F value for third grade was 12.74 which was significant at the .05 level. A comparison of cell means for FI girls and FD girls in each grade level may be observed in Table 6.

Null hypothesis 3 was partially retained. While it was expected that within each grade level FI girls would perform the musical conservation tasks on the ZTMC to a greater degree than FD girls, only the performance of the third grade girls was significant.

Null Hypothesis 4. There will be no significant difference (p < .05) in achievement between field independent children and field dependent children, regardless of sex,
within each of the grade levels (i.e. K, 1, 3) on the performance of musical conservation tasks. The multivariate analysis (see Table 4) for the total group for Cognitive Styles and Musical Conservation Scores reveals a significant difference at the .01 level between the scores of the field independent and field dependent subjects. An examination of Table 8, which compares cell means for FI children in kindergarten, first and third grades and the means for FD children at the same grade levels, further demonstrates the superiority of the FI children in the Musical Conservation Tasks.

### Table 8

A Comparison of Cell Means of FI Subjects with Means of FD Subjects for Grades K, 1, 3

<table>
<thead>
<tr>
<th></th>
<th>FI</th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>6.98</td>
<td>5.72</td>
</tr>
<tr>
<td>1</td>
<td>7.17</td>
<td>5.95</td>
</tr>
<tr>
<td>3</td>
<td>7.27</td>
<td>5.61</td>
</tr>
</tbody>
</table>

Null hypothesis 4 is rejected. The highly significant main effect variable of Field Independence coupled with the lack of interaction of Grade and Field has served to strengthen the conclusion. The rejection of this hypothesis is further supported since hypothesis two and three were also rejected.
Null Hypothesis 5. There will be no significant difference \((p < .05)\) in the scores of field independent girls and field dependent girls in the performance of musical conservation tasks. An examination of Table 4, showing the multivariate analysis for the total group shows Cognitive Style to be significant at the .01 level. This is further demonstrated in Table 6 which gives a comparison of the means for each grade level. Table 9 compares the means of all FI girls and the means of all FD girls. These means are also significant at the .01 level.

Table 9

A Comparison of Cell Means of FI Girls with Means of FD Girls -- Total Group

<table>
<thead>
<tr>
<th></th>
<th>FI</th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7.07</td>
<td>5.82</td>
</tr>
</tbody>
</table>

Null hypothesis 5 is rejected. It was expected that all FI girls would perform better on the ZTMC than girls who were designated as field dependent. The rejection of hypothesis 3 also strengthens this position. It is also supported by the findings by Witkin et al. (1962).

Null Hypothesis 6. There will be no significant difference \((p < .05)\) in the scores of field independent boys and field dependent boys in the performance of musical conservation tasks.
Results from the ZTMC provide means for FI boys of 7.22, 7.44 and 6.97 at the kindergarten, first and third grades respectively, while means for FD boys were 5.66, 5.50 and 5.94 for kindergarten, first and third grades. Table 10 provides a comparison of means for all FI and FD boys in the total group.

Null hypothesis 6 is rejected. The raw test scores (see Appendix A), the significance of Cognitive Style at the .01 level and the lack of interaction of Field and Sex conclusively support the rejection of this hypothesis.

Table 10

A Comparison of Cell Means of FI Boys with Means of FD Boys — Total Group

<table>
<thead>
<tr>
<th></th>
<th>FI</th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7.21</td>
<td>5.70</td>
</tr>
</tbody>
</table>

Null Hypothesis 7. There will be no significant difference \((p < .05)\) in the scores of field independent girls and field independent boys in the performance of musical conservation tasks. An examination of Table 4 reveals that the main effect variable of sex is not significant. There was a significant interaction of Grade, Cognitive Style and Sex at the .01 level. Table 6, the summary of cell means, summarizes this interaction. Kindergarten
and first grade FI females scored lower than kindergarten and first grade FI males. Third grade FI females scored higher than third grade FI males. The opposite result may be observed for field dependent subjects. Kindergarten and first grade FD females scored higher than kindergarten and first grade FD males. Third grade FD females scored lower than third grade FD males.

Null hypothesis 7 is retained. Sex differences have been observed in tests of field dependence, both in the United States and a number of western European countries (Andrieux, 1955; Bennett, 1956; Franks, 1956; Witkin et al., 1962) and in Japan (Kato, 1965) and Africa (Dawson, 1967). Evidence in these studies points to boys and men as being more field independent than girls, and to field independent males achieving to a greater degree than field independent females. While consistent sex differences have repeatedly been found in the field dependence-independence dimension, Witkin, Oltman, Raskin and Karp (1971) point out that "the weight of the present evidence indicates that sex differences may not be present before the age of eight . . . ." (p. 5).

Null Hypothesis 8. There will be no significant difference (p < .05) in the scores of field independent children -- male and female -- and field dependent children -- male and female -- in the performance of musical conservation tasks.
Examination of Table 4, Analysis of Variance: Conservation Scores, reveals a significant difference at the .01 level between FI subjects and FD subjects. Lack of interaction of Cognitive Style and Sex at a significant level supports the concept of the superiority of FI subjects over FD subjects in the performance of musical conservation tasks. Table 11 compares the means for all FI subjects, regardless of sex, and the means of all FD subjects regardless of sex. The main effect variable of Field Independence was significant at the .01 level for all subjects regardless of sex.

Null hypothesis 8 is rejected. The analysis of the data seems to indicate that field independent subjects exhibit greater competence at disembedding in intellectual functioning. This would support earlier findings by Goodenough and Karp (1961) and Witkin et al. (1962). It further suggests that subjects, regardless of age, designated field independent by performance on the CEFT may perform better than field dependent subjects even when tasks require sustained attention.

Table 11

A Comparison of Cell Means for FI Subjects with Means of FD Subjects on the ZTMC

<table>
<thead>
<tr>
<th>Total Group</th>
<th>FI</th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7.14</td>
<td>5.76</td>
</tr>
</tbody>
</table>
Finally, data on the ZTMC reliability was not available from the original study by Pflederer (1963). This investigation has made a reliability estimate based on the Kuder-Richardson formula 21 which yielded a reliability estimate of .71.

SUMMARY

This chapter has presented a statement of the statistical results of the study and a discussion of these results. The discussion centered on the significant main effect of Field Independence. The main effects of Grade and Sex were not significant. Each hypothesis was stated after which, the appropriate data were presented. On the basis of the data analysis, each hypothesis was either retained or rejected. Of eight original hypotheses, six were retained.
CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

This investigation was an attempt to determine the role of field dependence-independence in children's responses to musical tasks embodying Jean Piaget's principle of conservation. The study used two instruments for the measurement and collection of data: the Children's Embedded Figures Test (CEFT) and, the Zimmerman Test of Musical Conservation (ZTMC).

The Purpose of the Study

The main purpose of this study was (a) to reconsider the Pflederer (Zimmerman) study (1963) which concerns children's perception and conservation of melodic and rhythmic patterns, (b) to extend this reconsideration to include the variable of cognitive style (i.e. field dependence-independence), and (c) to determine whether or not significant relationships existed among cognitive style, grade and sex.

The study investigated the following questions:

(1) Is there a significant difference between grade level and the scores on the performance of musical conservation tasks?

(2) Is there a significant difference in achievement between field independent males and field
dependent males within each of the grade levels (i.e. K, 1, 3) on the performance of musical conservation tasks?

(3) Is there a significant difference in achievement between field independent females and field dependent females within each of the grade levels (i.e. K, 1, 3) on the performance of musical conservation tasks?

(4) Is there a significant difference in achievement between field independent children and field dependent children, regardless of sex, within each of the grade levels (i.e. K, 1, 3) on the performance of musical conservation tasks?

(5) Are there significant differences in the scores of field independent girls and field dependent girls in the performance of musical conservation tasks?

(6) Will field independent boys demonstrate the principle of conservation in the performance of musical tasks to a significantly greater degree than field dependent boys?

(7) Will field independent girls demonstrate the principle of conservation in the performance of musical tasks to a significantly greater degree than field independent boys?

(8) Will field independent children -- male and female -- demonstrate the principle of conservation in
the performance of musical tasks to a significantly greater degree than children of any other group?

Need for the Study

Insights into the development of children's thought patterns have been provided by the work of Jean Piaget. He has viewed concept development in terms of "conservation." A considerable amount of current and recent literature in the professional journals and texts indicated a need for curricula based on Piaget's conceptual approach. Such an approach has been emphasized as a means of aiding the development of musical concepts which may lead to musical literacy and independence. Yet, to date, little has been done to demonstrate how music education might benefit from an application of Piaget's theory to musical development.

The role of certain cognitive controls to information processing, problem solving and categorizing has been explored quite extensively. Only one study examined by this writer has made an attempt to demonstrate what influence certain cognitive controls have upon Piagetian conservation tasks and, a search of the literature has revealed no studies which have considered the role of cognitive style upon Piagetian conservation tasks in music education.

Methods and Procedures

Test Instruments. -- Two instruments were utilized in the study for the measurement and collection of data. The first of these was the Children's Embedded Figures Test
The Children's Embedded Figures Test (CEFT) and is designed to measure the cognitive style of field dependence-independence. The second instrument was the Zimmerman Test of Musical Conservation (ZTMC) and was used to measure the principle of Piagetian conservation in the performance of musical tasks. The ZTMC was designed to measure conservation of meter, tone and rhythm.

Main Study. — The Children's Embedded Figures Test (CEFT) was administered individually to 127 children enrolled in the kindergarten, first and third grades. Data collected from this instrument were used to determine if a child was field dependent or field independent.

After classifying the original 127 subjects according to cognitive style, a random sample of forty-eight subjects was selected. Comprising this sample were sixteen children from each grade level, eight of whom were determined to be field dependent and eight of whom were determined to be field independent. The Zimmerman Test of Musical Conservation was administered to this sample and the scores of the subjects on this instrument were used as the response measure for testing hypotheses.

The data were treated in several ways. Items were analyzed to provide information about the test's internal reliability consistency. A multivariate analysis of variance provided information concerning the main variables of (1) cognitive style, (2) grade, (3) sex. It also provided the investigator with helpful information concerning any
interactions. The Duncan New Multiple Range Test was used
to test the significance of the test items of the ZTMC.

Summary of the Findings

In order to investigate the main purpose of the study,
eight null hypotheses were developed. The findings are
summarized below:

Null Hypothesis 1: There will be no significant
difference in the observed correlation between
grade level and the scores on the performance of
musical conservation tasks.

This null hypothesis was retained. An analysis of
variance produced an F value (0.7229) that was not signifi­
cant. This indicated that children at all grade levels were
performing the conservation tasks to approximately the same
degree

Null Hypothesis 2: There will be no significant
difference in achievement between field independent
males and field dependent males within each of the
grade levels (i.e. K, 1, 3) on the performance of
musical conservation tasks.

This null hypothesis was rejected. An analysis of
variance produced the following F values: K, 17.17,
p < .01; 1, 12.70, p < .05; 3, 9.75, p < .05. These
degrees of significance within the grades indicate that
boys within each grade level who are designated as field
independent performed the tasks of musical conservation to
a greater degree than those boys within each grade level
designated as field dependent.

Null Hypothesis 3: There will be no significant
difference in achievement between field independent

females and field dependent females within each of the grade levels (i.e. K, 1, 3) on the performance of musical tasks.

This null hypothesis was partially retained. An analysis of variance produced the following F values: K, 4.54; 1, 2.69; 3, 12.74, p < .05. These F values indicated that while the kindergarten and first grade female subjects performed better on the ZTMC, they did not perform to a significantly greater degree. The third grade girls did perform to a significantly greater degree.

Null Hypothesis 4: There will be no significant difference in achievement between field independent children and field dependent children, regardless of sex, within each of the grade levels (i.e. K, 1, 3) on the performance of musical conservation tasks.

This null hypothesis was rejected. The multivariate analysis of variance produced an F value (91.7968) significant at the .01 level. Lack of interaction between grade and sex, indicated that those children regardless of sex, within each grade level who were designated as field independent performed the tasks of musical conservation to a greater degree than those children regardless of sex, within each grade level who were designated as field dependent.

Null Hypothesis 5: There will be no significant difference in the scores of field independent girls and field dependent girls in the performance of musical conservation tasks.

This null hypothesis was rejected. The multivariate analysis of variance produced an F value (16.46) significant at the .01 level of confidence indicating that cognitive style was a significant variable and that girls
designated as field independent will perform musical conservation tasks to a greater degree than girls designated as field dependent.

Null Hypothesis 6: There will be no significant difference in the scores of field independent boys and field dependent boys in the performance of musical conservation tasks.

This null hypothesis was rejected. The multivariate analysis of variance produced an F value (39.40) significant at the .01 level of confidence indicating that male subjects designated as field independent would score significantly higher than male subjects designated as field dependent when performing musical conservation tasks.

Null Hypothesis 7: There will be no significant difference in the scores of field independent girls and field independent boys in the performance of musical conservation tasks.

This null hypothesis was retained. While it had been expected that sex would be a significant variable, the multivariate analysis of variance produced an F value (0.0013) which was not significant. The analysis of the data did reveal interaction among grade, sex and field which produced an F value (7.8534) significant at the .01 level of confidence.

Null Hypothesis 8: There will be no significant difference in the scores of field independent children -- male and female -- and field dependent children -- male and female -- in the performance of musical conservation tasks.

This null hypothesis was rejected. The multivariate analysis of variance produced an F value (91.7968)
significant at the .01 level indicating that field independent subjects exhibit greater competence than field dependent subjects in the performance of musical conservation tasks.

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Conclusions

The following conclusions are formulated on the basis of the findings of this study and in consideration of the limitations of the investigation.

(1) Children in the early years of their education can be identified by cognitive style and in particular with regard to field dependence-independence. This supports the findings of Karp and Konstadt (1963), Banta (1970) and Coates (1972).

(2) The results of the Zimmerman Test of Musical Conservation indicate that children identified as field independent do appear to be more able to perform tasks of musical conservation than do children identified as field dependent.

(3) The results of the ZTMC findings indicate that sex differences is not a significant variable. While Witkin, Goodenough and Karp (1959) have demonstrated sex differences in cognitive style down to the eight-year level, the present study may support the findings of Cruden (1941) who suggested that there may be no significant sex differences in field dependence-independence in the 5-8 year range.
(4) The hypothesized influence of grade on conservation behavior was not borne out by the experimental results. This result is puzzling since the increases in verbal facility, visual perception, auditory acuity and ability to conceptualize that can accompany age (grade) would seem to be more typical of the conserving child than the nonconserving child. Earlier studies (Elkind, 1961; Flavell, 1963; Zimmerman, 1963; Fleck, 1970) indicate that grade does exert a strong influence on conservation behavior. There is no obvious reason for this discrepancy between the present study and the findings of the aforementioned investigators since the present sample seems very typical.

Implications for Music Education

Based on the conclusions obtained from this study, the following implications are made for music education.

(1) The nonsignificant nature of sex difference, at least within the grade levels investigated, suggests that curriculum design for young children may not have to consider the effect of sex difference.

(2) Cognitive styles are identifiable in young children. The teacher may find it to his or her advantage to identify the cognitive style of the students in order to understand them more fully and to aid in diagnosing their problems in the classroom.

Although cognitive style is not the complete answer, it is a step in understanding the learners and opening the
door to progress in the individual.

With the current trend toward individually guided education, knowing the cognitive style of a pupil might aid the teacher in identifying the ones in the classroom who may be much more dependent upon the teacher and fellow classmates for direction in the learning experience as well as those who need little direction to engage in independent intellectual functioning.

(3) Children are characterized by change. They are changing and developing mentally, physically and emotionally. Overt interaction of a pupil with the musical problems to be solved is important. A classroom that provided opportunities for pupils to engage in experimental and investigative activities will be beneficial. Children need to respond physically to rhythm of music through eurhythmics and playing of rhythm instruments.

(4) On the basis of present knowledge of cognitive style and conservation principles, musical experiences provided by the curriculum should stimulate a maximum amount of musical growth and development at each age level.

(5) Music educators need to continue efforts to develop a vocabulary for children which will accurately identify and clarify any musical problem under consideration.

Recommendations for Further Research

The following recommendations are made in recognition of the limitations of the study:
(1) The Zimmerman Test of Musical Conservation used in this study should be further refined and administered to a larger population so that its reliability as a conceptual evaluative measure may be established.

(2) The ZTMC should also be examined and administered to a larger population so that it may be determined if, in fact, the instrument is measuring the conservation of a given property as a principle set forth by Piaget.

(3) The validity of the ZTMC could be established more conclusively if it was demonstrated that success on any one item of a particular conservation content (e.g. meter, rhythm, melody, etc.) is associated with success on all types of conservation problems within that content area.

(4) The nonsignificant nature of the grade main effect suggests that this study might be replicated using a larger sample to learn more about the influence of grade in the five-to-eight year level. Possibly, the testing of kindergarten children could be done in the Fall rather than in the Spring. It is possible that both intuitive and conservation behavior are affected during the school year as the result of perceptual and conceptual stimulation in the classroom.

(5) The nonsignificant nature of the grade main effect suggests that this study might be replicated using a sample which includes kindergarten, first, third and fifth grades.
This might yield more conclusive data concerning the influence of grade (age) upon Piagetian conservation tasks.

(6) Further study seems warranted with regard to the correlation of visual disembedding tasks (e.g. CEFT) and auditory disembedding tasks such as those within an instrument like the ZTMC.
APPENDIX A

TEST SCORES AND ANALYSIS OF CEFT
THE CHILDREN'S EMBEDDED FIGURES TEST

The Children's Embedded Figures Test (CEFT) was administered to 127 children in the kindergarten, first and third grades. The raw score data from this test may be observed in Table 12. The mean score for all subjects was 12.40.

Table 12 gives a comparison of the ranges, means and standard deviations for male subjects, female subjects and the total population within each grade level. Table 13 gives the N's and means for the total of all male subjects and all female subjects in kindergarten, first and third grades.

To allow for randomization procedures, scores of 1-11 were used to classify a subject as Field Dependent (FD), while scores of 12-22 classified subjects as Field Independent (FI). Table 14 gives a summary of the number of subjects by sex, grade and field. Table 15 gives a summary of means and standard deviations by grade and cognitive style.
Table 12

Ranges, Means and Standard Deviations for Total Group on the Children's Embedded Figures Test

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**Summary of Field Dependence-Independence**

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Table 17
Raw Score Test Date
First Grade

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APPENDIX B

SAMPLE TEST SCORING SHEETS
PLEASE NOTE:

Dissertation contains small and indistinct print. Filmed as received.

UNIVERSITY MICROFILMS.
### Score Sheet for Children's Embedded Figures Test

**NAME:**

**CLASS:**

**BIRTH DATE:**

**SEX:** M F _ _

**DATE:**

**EXAMINER:**

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Total Score HOUSE

**CONSULTING PSYCHOLOGISTS PRESS, INC.**
577 College Avenue, Palo Alto, California 94306

Figure 2 CEFT Score Sheet
NAME ________________________________________

GRADE _______ FD _____ FI _____ TOTAL SCORE=________

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IV

1. Little Girl's Tune? A B
   Grandfather's Tune? A B
   2. Is Gf's tune same as LG's? Yes No

VI

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Figure 3 ZTMC Score Sheet
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APPENDIX C

ZIMMERMAN TEST OF MUSICAL CONSERVATION
ZIMMERMAN TEST OF MUSICAL CONSERVATION

Task IA.

The temporal unit of a measure in a specific meter stands as something constant; however, the duration within the measure is subdivided. In our task the length of the musical measure is either of duple or triple meter; the distribution of note values within the measure varies.

Will stages be evident in the child's ability to conserve the meter when the component elements of the musical measure vary in duration? This is the question which our first task is designed to answer. The task was introduced in story form.

"When listening to several tones, we hear them grouped or gathered together around an accent or a 'boom'. That is to say, one tone will stand out because it is stressed or played a little louder than the others. Can you tell me which is the louder or accented tone in these groups?" (Demonstrate with a drum to make certain that the child understands what is meant by accent).

"Now these 'booms' can be evenly spaced in groups of two or three. We could call them 'family groups'.

This test information is taken directly from the original study (Pflederer, 1964). Reprinted here by permission of the author, Dr. Marilyn Pflederer Zimmerman.
may live in a family of three, \[\begin{array}{ccc}
| \text{You} & \text{Dad} & \text{Mom,} \\
\end{array}\] one-two-three. Suppose we say, \[\begin{array}{ccc}
| \text{You} & \text{Daddy} & \text{Mommy,} \\
\end{array}\] one-two'oo-three'ee. Is this still a family group of three? It is because the same amount of time was taken, but some of the notes were shorter and so we could use more in order to take up the time.

"Some families have only two, \[\begin{array}{cc}
| \text{Dad} & \text{Mom,} \\
\end{array}\] one-two. Suppose we say, \[\begin{array}{cc}
| \text{Daddy} & \text{Mommy,} \\
\end{array}\] one'un-two'oo. Again we have a family group of two because the same amount of time was taken, but the notes were shorter and so we had to use more in order to take up the time. Did you hear where the 'booms' or accents came in each of these examples? The 'booms' were evenly spaced in groups of two or three. In music we say that the rhythm of music can move or swing in either two or three.

"Now we will listen to several groups of tones. I want you to tell me if it is a family group of two or three. Does it swing in two or in three? It will help you to answer correctly, if you try to clap or swing with the beat."
The child was asked to discriminate between duple and triple meter. The six examples had been played at a tempo of $\text{MM} \quad \text{\underline{\text{\text{"}}}} \quad \text{= 84}$ on a ten-inch drum manufactured by Peripole products and recorded. Examples 1, 2, and 5 are in duple meter, while Examples 3, 4, and 6 are in triple meter. Each child was directed by the tape to "Listen to Number One," followed by the pattern "Listen to Number Two," and so forth. The child answered verbally as to whether each stimulus pattern was in two or three. He was encouraged to clap, tap, or swing his arm on the accented first beat. In this and subsequent tasks the procedure was varied according to the child's response. Sometimes examples were repeated; at other times we went on to the next example.

Example #1 \begin{equation*} \begin{array}{c} 2 \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \\
\end{array} \end{equation*}

Example #2 \begin{equation*} \begin{array}{c} 2 \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \\
\end{array} \end{equation*}

Example #3 \begin{equation*} \begin{array}{c} 3 \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \\
\end{array} \end{equation*}

Example #4 \begin{equation*} \begin{array}{c} 3 \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \\
\end{array} \end{equation*}

Example #5 \begin{equation*} \begin{array}{c} 2 \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \\
\end{array} \end{equation*}

Example #6 \begin{equation*} \begin{array}{c} 3 \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \quad \text{\underline{\text{\text{"}}}} \\
\end{array} \end{equation*}
Task IB.

The purpose of Task IB is to try to determine whether or not the meter is conserved when the child listens to music. The task was introduced in story form.

"We have discovered how tones can be grouped around an accent or 'boom' in family groups of two and three. In music we can also find groupings of two and three. And we say that the music swings in two or three. Let us listen carefully to two little pieces played on the piano so that you can tell me whether they swing or move in groups of two or three."

A tape recording of two piano pieces -- one in duple meter, the second in triple meter -- was played at a tempo of MM $\frac{\text{J}}{\text{M}} = 112$. The child told the investigator whether each piece was in two or three. He was encouraged to clap or tap with the accent as he listened.

Musical Example #1: 2/4 Halka Had a Rooster Red.$^1$
Musical Example #2: 3/4 Lavender's Blue.$^2$

---


Task IIA.

The child is asked to conserve the meter even though the component elements of the measure vary in duration. The difference is that a one-to-one correspondence with the word pattern has been added. However, the child is not asked to evaluate the length of the word rhythm as against that of the rhythm pattern played by the drum. Rather the two are used together in a one-to-one correspondence in order to enable the child to determine where a measure length is unlike the other measures of the group of which
it is a part. The recorded rhythm patterns are played on a drum; simultaneously the investigator chants the corresponding word rhythms at a tempo of $4\frac{1}{2} = 76$. Will we be able to identify stages in children's ability to conserve the meter in this type of task?

To gain the child's attention the task is presented in story about two children engaged in a conversation. Seven-inch cardboard dolls mounted on plastic stands represent the children. The dolls are dressed in cut-out clothes that are typical of those worn by upper-middle-class children.

"Two children are taking turns talking to each other. They are playing a game with the rule that each child may have the same amount of time in which to talk -- no more, no less. Now one child may say more than the other child during his turn because he will use shorter notes. The first child may say "Hello, Johnny." Johnny will answer, "Hi, Bill," or the children may play an Eskimo game where they say "Ock-ke-toc-key Noon-ga, Ock=ke=toc=key Noon-ga." In each example the children have used the same amount of time, and their talking moves or swings in accented groups of two. Do you remember how we placed the accent or the 'boom' in the family game? Listen again for the place
where the 'boom' comes, and you will be able to hear how the talking moves or swings in two.

"Now let's listen in on some of the children's conversations. One or maybe each of the children will make a mistake when he takes his turn by either using too much time or not enough time for his talking. Have the child who makes a mistake sit down." (Child takes doll off plastic stand).

1. (a) \[
\begin{array}{c}
\text{Johnny?}
\end{array}
\]

3. (a) \[
\begin{array}{c}
\text{Come see me.}
\end{array}
\]

1. (b) \[
\begin{array}{c}
\text{What is it?}
\end{array}
\]

3. (b) \[
\begin{array}{c}
\text{When?}
\end{array}
\]

(a) \[
\begin{array}{c}
\text{Come and play}
\end{array}
\]

(b) \[
\begin{array}{c}
\text{Not right now.}
\end{array}
\]

(a) \[
\begin{array}{c}
\text{Tonight}
\end{array}
\]

(b) \[
\begin{array}{c}
\text{I can't come then}
\end{array}
\]

(a) \[
\begin{array}{c}
\text{(wrong)}
\end{array}
\]

(b) \[
\begin{array}{c}
\text{(wrong)}
\end{array}
\]

(a) \[
\begin{array}{c}
\text{I'm sorry.}
\end{array}
\]
2. (a) \[\text{Where is Tony?}\] 
   [\text{Wrong)]

(b) \[\text{Call him.}\] 

2. (a) \[\text{Where is Tony?}\] 
   [\text{Wrong)}

(b) \[\text{Call him.}\] 

4. (a) \[\text{Have some candy.}\] 

(b) \[\text{No, Thanks.}\] 

4. (a) \[\text{Have some candy.}\] 

(b) \[\text{No, Thanks.}\] 

(a) \[\text{Tony, where are you?}\] 
   [\text{Wrong)]

(b) \[\text{Here I am.}\] 

(a) \[\text{Don't you like candy?}\] 
   [\text{Wrong)}

(b) \[\text{Yes, I do.}\] 

(a) \[\text{Why don't you eat some?}\] 

(b) \[\text{I'm not hungry.}\] 

(b) \[\text{I'm not hungry.}\] 

Task IIB

"In this game the children's conversations will move or swing in accented groups of three. Listen again for the place where the 'boom' comes in these little talks, and you will be able to hear that the talking moves or swings in three. Remember to listen for the accent. One child may say, \[\text{'Bill, play with me.'}\]  

Bill might answer, \[\text{'Not right now.'}\]  

"Now let's listen in on some of the children's conversations. One or maybe each of the children will make a
mistake when he takes his turn by either using too much
time or not enough time for his talking. Have the child
who makes a mistake sit down."

1. (a) \textit{Hi, Johnny.}
   (b) \textit{How are you today?}
     \(\text{(a) I'm fine. (wrong)}\)
     \(\text{(b) Shall we play ball?}\)
     \(\text{(a) Yes, let's do.}\)

2. (a) \textit{Where is Tony?}
     (b) \textit{I'll find him.}
     \(\text{(a) Look in the house.}\)
     \(\text{(b) All right. (wrong)}\)

3. (a) \textit{Tony, come and play.}
     (b) \textit{Just a minute. (wrong)}
     \(\text{(a) Bring your ball.}\)
     \(\text{(b) Do you have a bat?}\)
     \(\text{(a) Bill brought a bat.}\)

"Bill hears the phone ring. He runs to answer it."
4. (a) \[\begin{array}{c} \text{Hello, this is Bill speaking.} \\
\end{array}\] (wrong)

(b) \[\begin{array}{c} \text{Is your Mother home?} \\
\end{array}\] (a) \[\begin{array}{c} \text{She'll be back at four.} \\
\end{array}\]

(a) \[\begin{array}{c} \text{No, she isn't.} \\
\end{array}\] (b) \[\begin{array}{c} \text{Thank you, Bill.} \\
\end{array}\] (wrong)

(b) \[\begin{array}{c} \text{Will she be back later?} \\
\end{array}\] (a) \[\begin{array}{c} \text{You're welcome.} \\
\end{array}\]

**Task IIIA**

In this task the rhythmic pattern is first presented on a single tone bell; then it is embodied in various melodic patterns. Will the child center his aural perception on the melody and so lose the concept of the rhythm pattern? Or will the rhythm pattern be perceived as the same when used in the various melody patterns?

In order to gain the child's attention the task was presented in a story, and the child was asked to make an overt response. The story depicts a classroom. Four seven inch cardboard dolls -- two boys and two girls -- mounted on plastic stands represented the children. The dolls were dressed in cut-out clothes typical of those worn by upper-middle-class children. These dolls were also used in Tasks VI, VII, VIII, and IX.

"Today we are going to visit a make-believe classroom. Four children, John, Mary, Bill, and Sue, are learning
a dance pattern played on a tone bell. The teacher plays the dance pattern for the children three times so they can hear how it sounds. Would you like to practice it with her and the children in her classroom? (Practice twice) Now the teacher asks each child to play the dance pattern for her. Maybe all of the children will play it exactly right. But maybe one will make a mistake. Now listen carefully so that you can have the child who makes a mistake sit down."

(Child takes doll off plastic stand).

The rhythm patterns had been played on a single tone bell and recorded. Perfection Universal Song Bells manufactured by Walberg and Auge were used. Each pattern was preceded by a direction, "John plays the pattern like this," "Mary plays the pattern like this," and so forth.

<table>
<thead>
<tr>
<th>Example #1</th>
<th>JOHN (Item 1)</th>
<th>MARY (Item 2)</th>
<th>BILL (Item 3)</th>
<th>SUE (Item 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>/</td>
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<tr>
<td>Example #2</td>
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<tr>
<td>Example #3</td>
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<tr>
<td>Example #4</td>
<td>/</td>
<td>/</td>
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<td>/</td>
</tr>
</tbody>
</table>

Example #1: [correct]
Example #2: [wrong]
Example #3: [wrong]
Example #4: [wrong]
Task IIIB

"After the four children have played the dance pattern on only one tone bell, the teacher wants to know if they really and truly know the pattern. She asks each child to play the dance pattern for her on different tone bells. Each child then plays a different tune, but uses the same dance pattern. The tunes will not be alike. But the dance patterns will be. Maybe not all of the children will play the dance pattern exactly right. One child might play the wrong dance pattern. This will be a mistake because each child is supposed to play the same dance pattern even though the tunes played by the children will not be the same. Now listen carefully so that you can have the child who makes a mistake sit down."

<table>
<thead>
<tr>
<th>JOHN</th>
<th>MARY</th>
<th>BILL</th>
<th>SUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Item 1)</td>
<td>(Item 2)</td>
<td>(Item 3)</td>
<td>(Item 4)</td>
</tr>
</tbody>
</table>

Example #1

Example #2

Example #3

Example #4

(wrong)

(wrong)

(wrong)

(wrong)
A change of procedure in the administration of Tasks IIIA and B was made after the Tasks had been given to three third grade children, A8, D8, and H8. To these three children all examples of IIIA were given and then those of IIIB. However, this procedure did not allow for a study of the immediate conservation of the rhythmic pattern when varying tonal patterns were added. Therefore, it was decided to follow each rhythm pattern of IIIA with an immediate presentation of that pattern under deformation of tone. This resulted in an interweaving of Task IIIA and B.

Task IV.

This task is designed to determine whether or not the child is able to conserve the melody under deformation of the duration of the component rhythm patterns. A four-measure phrase from Bartok's set of piano pieces, For Children,\(^3\) was played twice. On the repetition of the phrase the tune was augmented, thus using more temporal space. Will the child's aural perception be centered on this phenomenon so that he is unable to perceive that the melody is the same? To gain the child's attention the task was presented in the form of a story.

"A little girl came home from school, breathless with excitement. 'Grandfather,' she cried to her jolly grandfather who was reading his newspaper. 'Tomorrow our class is going to visit the zoo!' In her excitement she began to dance around the room. She grabbed her grandfather's hand, and he put down his newspaper and began to dance with her. Now listen carefully. Can you tell me which dance tune is for the little girl and which is for the jolly grandfather? Is the jolly grandfather's dance tune the same as that of the little girl, or is it different?"

The Bartok phrase had been performed at a tempo of \( \text{MM} \frac{4}{4} = 84 \) and recorded. Phrase A is the dance tune for the little girl. Phrase B for the grandfather.

\[
\begin{align*}
\text{Phrase A} & \quad \text{Bartók} \\
\text{Phrase B} & \\
\end{align*}
\]

**Task VA -- Seriation of Diatonic Tones**

Task V is designed to determine how a child approaches the seriation of diatonic tones by pitch. Perfection Universal Song Bells manufactured by Walberg and Auge are
used in the administration of this task. The child is introduced to the task by the following explanation,

"Some instruments like the piano and tone bells can play little tunes. A tune is made up of musical sounds called tones that move up or down or stay in the same place. (Demonstrate) When the tone moves up or down, it can either move by a step (Demonstrate) or it can move by a skip. (Demonstrate) The skip can be wide (Demonstrate) or it can be narrow. (Demonstrate) A tone can sound high or low. (Demonstrate)

"By playing the tone bells like this, we hear how it would sound to walk up a ladder; (Demonstrate) then we can walk back down the ladder. (Demonstrate) We can skip up the ladder by a wide skip (Demonstrate) or by a narrow skip. (Demonstrate) It is also possible to stay on the same rung of the ladder and balance ourselves. (Demonstrate) In music we call a ladder a 'musical scale.'

"Now can you play the tone bells for me? First walk up the musical ladder or scale; then walk back down. How about skipping up and down? Now we will scramble the tone bells. Here are eight of them. Can you arrange them for me again in a musical scale that moves up by steps?"
After this is accomplished, the bells are scrambled again, and the child is asked to make a musical scale that moves down by steps.

**Task VI - Seriation of Chromatic Tones**

In this task the child is asked to arrange the chromatic scale in ascending order. C, E, G, and B are given to him. From the remaining scrambled set of tone bells he is asked to insert the missing tones — C#, D, D#, F, F#, G#, A, A#, C.

"The next game asks us to find the missing tone bells that we will have to add in order to complete a musical scale. This game uses more tone bells since we are moving by tiny half-steps. Let's practice first by playing up and down the scale. Now listen to these four-tone bells. (Play C, E, G, B) Can you find the missing ones and put them in the scale so that we will have a complete musical ladder that moves up by half-steps?"

**Task VI.**

The next task is designed to investigate the possibility that there are discernible stages in the child's ability to conserve a tonal pattern when it is transposed to different pitches. Ability to perform this task is dependent upon the child's perception of the relationship between the tones of the three-note pattern and not upon
his immediate perception of the contour of the figure. A story depicting a learning situation was again the setting for the task.

"On our visit to the classroom today we shall listen to John, Mary, Bill, and Sue learn a tonal signal or pattern of three tones on the xylophone. First the teacher plays the signal two times for the children. Next they sing the signal, using the hand to indicate the pitch levels. Then the teacher asks each child to play the pattern for her. The child may play the signal or pattern on different pitches, but the signal will still be the same. Maybe all of the children will play it exactly right. But maybe one will make a mistake. Now listen carefully so that you can have the child who makes a mistake sit down."

The stimulus patterns had been performed on a Sonor Xylophone, one of the Orff instruments, and recorded. Each pattern was preceded by a direction, "John plays the pattern like this," "Mary plays the pattern like this," and so forth.
Task VII.

Task VII is designed to determine how much interference with pitch a child can resist and still perceive the tonal pattern as the same. Will the tonal pattern remain invariant when embodied in various rhythmic patterns? Will we be able to discern stages in the child's ability to conserve a tonal pattern even though the rhythmic patterns vary. The task was presented in the following story.

"Now we want to find out how well the children in our make-believe classroom have learned a tonal pattern which the teacher has taught them on the xylophone. We will listen to the tonal patterns and sing them with the children in the classroom. Then the teacher asks each child to play the tune for her but with a
different dance pattern. It is possible for each tune or tonal pattern to have a different rhythm or dance pattern. Some tones may be fast one time and slow another time, but the tones will still be the same. Remember the tunes will all be alike but the dance patterns will be different. Maybe not all of the children will play the little tune exactly right. One child might play the wrong tune. This will be a mistake because each child is supposed to play the same little tune or melody pattern even though the dance patterns played by the children will not be the same. Now listen carefully so that you can have the child who makes a mistake sit down."

The tonal patterns had been performed on a Sonor Xylophone and recorded. Each pattern was preceded by a direction, "John plays the pattern like this," "Mary plays the pattern like this," and so forth.
Example #1

Example #2

Example #3

Task VIII.

Another facet of the melodic component of musical intelligence is the ability to follow a melody in spite of variation in its accompaniment. The next task is designed to ascertain how much interference of extraneous accompanying material the child can bear and still conserve the melody. The task was presented in the following story.

"Next we want to find out how well, John, Mary, Bill, and Sue have learned a melody. We will listen to the teacher teach the melody to the children and try to learn it with them. First the teacher plays it on the piano for the children. Then she sings it for them and asks them to try to hum along with her. And then she plays it on the piano for them again. Now the teacher wants to know if the children have really learned the melody. She asks each child to play it
for her on the piano, adding a second part or an accompaniment to it. Now you will hear each child play for the teacher. Perhaps one child will forget the tune and make up a new one. This will be a mistake because each child is supposed to play the same little tune or melody even though the accompaniments played by the children will not be the same. Listen carefully because some children might dress up their melodies with very fancy accompaniments. But if you can hear the correct melody, it will be right. Have the child who makes a mistake sit down."

The melody of an Italian folksong and four settings of the melody had been performed on the piano at a tempo of \( \text{MM} \frac{\mathbf{J}}{4} = 92 \) and recorded. Both harmonic and rhythmic variation were introduced in the various accompaniments. One of the melodies had been changed. The melody was repeatedly sung by the investigator during the testing session. Each piece was preceded by a direction, "John plays the melody like this," "Mary plays the melody like this," and so forth.
Example #1

John

Italian Folksong

Example #3

Bill

Same accompaniment as John's
Example #2

Mary

J. Harris

---

Example #4

Sue

B.P. Krone

5

loc. cit.
Task IX.

A musically intelligent individual is able to perceive and discriminate among multiple sounds. The last aspect of musical intelligence with which we shall concern ourselves is the ability to conserve a given tonality.

Task IX consists of a little song with four accompaniments: one in the key of the melody; one a whole step below; one a half step above; and for a more subtle discrimination, one in the harmonic form of the parallel minor key. The task is introduced by the following story.

"Four children are learning a song in school. The teacher plays it for them on the piano. After the children have learned the tune of the song, they learn to play it with a second part, or accompaniment added. Each child will play the melody with his own accompaniment for you. Listen carefully. If you do not like the child's song, have that child sit down."

The pieces were played on the piano and recorded. The first piece was performed at a tempo of MM $\textit{J} = 92$; the tempo of the second piece was MM $\textit{J} = 80$. Each piece was preceded by a direction, "John plays the melody like this," "Mary plays the melody like this," and so forth.
Example #1

(1) John

(2) Mary

(3) Bill

(4) Sue. In parallel minor harmonic form.

---

Example #2

English Folksong

(1) John

(2) Mary

(4) Sue

(3) Bill. In parallel minor, harmonic form.

---

Table 19
The Musical Tasks

<table>
<thead>
<tr>
<th>Task</th>
<th>Property Conserved</th>
<th>Foil</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA and B: IIA and B</td>
<td>Meter</td>
<td>Durational Values</td>
</tr>
<tr>
<td>IIIA and B</td>
<td>Rhythm Pattern</td>
<td>Tonal Pattern in IIIB</td>
</tr>
<tr>
<td>IV</td>
<td>Melody</td>
<td>Duration</td>
</tr>
<tr>
<td>VA and B</td>
<td>Tonal Series</td>
<td>Varying pitches</td>
</tr>
<tr>
<td>VI</td>
<td>Tonal Pattern</td>
<td>Pitch level</td>
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<tr>
<td>VII</td>
<td>Tonal Pattern</td>
<td>Rhythm pattern</td>
</tr>
<tr>
<td>VIII</td>
<td>Melody</td>
<td>Rhythmic and harmonic accompaniment</td>
</tr>
<tr>
<td>IX</td>
<td>Tonality</td>
<td>Key of accompaniment</td>
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</tbody>
</table>
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