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AN EXPLORATORY STUDY OF THE METER DISCRIMINATION ABILITIES OF GRADE ONE, THREE AND FIVE CHILDREN.

by

© SUSAN KAY WRIGHT

A THESIS

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "An Exploratory Study of the Meter Discrimination Abilities of Grade One, Three and Five Children" submitted by Susan Kay Wright in partial fulfilment of the requirements for the degree of Master of Education.

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Date Sept. 19/78 . . . . . .

ABSTRACT

The ability of young children to discriminate duple, triple and combined meters was examined in this study. The nature of the study was experimental and the problem around which it centered was divided into four major questions:

1. Are the three meter types discriminated with the same ease?

2. Does a change in melodic rhythm effect the child's perception of the meter types?

3. Are certain meters more easily discriminated at different grade levels?

4. Will a particular instructional approach facilitate children's abilities to understand and identify meter in music?

A meter discrimination pretest was administered to a total sample size of 140 subjects containing approximately 46 subjects in each of grades one, three and five samples. On the basis of pretest score results of this test, subjects were matched and divided approximately by half based on sex and classroom and assigned to an experimental group (receiving intervention) or a control group (receiving no intervention). Experimental group subjects received four half-hour sessions of training in: discriminating strong and weak beats; identifying and moving to music with beat groupings of 2, 3 and 5; labeling these beats as strong and weak and recognizing how these beats may be symbolized, with large and small pictures representing strong and weak beats respectively. The teaching of these intellectual skills focussed on leading the children to both unconscious and conscious awareness of several musical concepts in meter discrimination.

At the conclusion of the intervention period, both experimental and control subjects were administered a meter discrimination posttest. A series of test item analyses, a correlation to ascertain test consistency and three-way analyses of variance were performed in order to answer the four research questions. Results of these analyses showed ~~that~~ the three meter types were discriminated by the total sample in a ranking of difficulty as $\frac{5}{4}$ easiest followed by $\frac{3}{4}$ and lastly $\frac{2}{4}$. Melodic rhythm was ranked by the subjects as half-notes easiest followed by quarter-notes and lastly eighth-notes. Ranking of meters by grade level produced the following results (first listing easiest, last listing hardest): grade one - $\frac{5}{4}$, $\frac{3}{4}$, $\frac{2}{4}$, grade three - $\frac{3}{4}$, $\frac{5}{4}$, $\frac{2}{4}$ and grade five - $\frac{5}{4}$, $\frac{3}{4}$, $\frac{2}{4}$. Analysis of variance for experimental and control group pre- and posttest scores showed non-significant results, indicating that the intervention used in this study had minimal effect.

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CHAPTER I

INTRODUCTION

In recent years, considerable discussion has centered around the identification and definition of the elements of music and the decision of which concepts are to be subsumed under each of the elements. Questions such as: "What are the elements of music?"; "How can such terms as rhythm, meter, melody, pulse, harmony and tex ure best be defined?" and "What is the interaction between the elements of music?" have not always led to complete agreement between writers in the area.

Melody, rhythm, harmony and form appear to be regarded as the four most basic elements, but others have been considered as well. Gary (1967) adds tempo, dynamics and tone color, while Hughes (1973) excludes harmony and in its place adds texture - homophonic/polyphonic, consonant/dissonant. Aronoff (1969) refers to tempo and changing rate as Agogics, repetition and contrast as Design, and single line and combination as Texture. Greenberg and MacGregor (1972) subsume tempo under rhythm and add the elements of "Style of composers, cultures and historical periods" (p. ix). Bergethon and Boardman (1976) consider the elements of music to be melody, rhythm and harmony and "their formal, expressive and stylistic organization" (p. 6).

The question of the interplay between the musical elements has produced interesting perspectives. Compare, for example, these two statements:

> ...rhythm is an essential part of melody, for every melody must have its own rhythm. Rhythm, however, can exist independently of melody, or even of music (Gary, 1967, p. 5).

and

> The classifications of the elements ... are somewhat arbitrary, for there is constant interplay and overlap; no element of music operates alone (Aronoff, 1969, p. 22).

Although music consists of the interactions which exist among its constituent elements, for the purposes of this study, it is necessary to consider separately the element of rhythm so that it may be investigated thoroughly. Therefore, it may be useful to define terminology which is generally associated with rhythm.

Rhythm and its component parts

Definitions of rhythm vary according to the philosophical, psychological or curricular position and/or professional needs of a particular writer. Greenberg and MacGregor (1972, Lundin (1967), Spohn (1977) and Bergethon and Boardman (1975) are basically in agreement but differ in emphasis, thus giving rise to possible controversy.

The differences in emphasis may be exemplified by the classification of the component parts which are subsumed under the element of rhythm. Opinions vary, but most often identification of the component parts include such terms as beat, pulse, tempo, accent, meter, duration, melodic rhythm, rhythmic pattern, rhythmic relationships, repetition, even rhythm, uneven rhythm, syncopation, diminution and augmentation. This lack of consensus in the definition of rhythm and its component parts is substantiated by Spohn (1977),

> One would think that the elemental concept of rhythm would be well defined and thoroughly organized; however, a survey of the research about rhythm does not reveal an organized concept of rhythm (p. 62).

A number of the terms used in this study will require clarification. The relationship between pulse (or beat), meter, and melodic rhythm has been mainly derived from Cooper and Meyer 1960) and Zückerkandl (1959).

The pulse is a beat that is regular or rhythmic which generally underlies and reinforces the rhythmic flow of a musical work. Meter is comprised of both the regular time divisions of the beat and the organization of beats into groups. In order to perceive these groupings, some beats in a series must be marked relative to others. Tones and rests of varying duration may be organized into groups of time patterns related to the beat, which are called melodic rhythm. In order to perceive the sense of the rhythmic pattern, the listener must also perceive the sense of the beat. A relationship, therefore, exists between the musical work's melodic rhythm, its beats, and consequently, its meter.

A quarter note (♩) as a basic unit may serve as a reference point for the general understanding of this relationship. Melodic rhythm patterns constructed with the beat representing the unit may be altered by elongation or division of the notational value of the basic beat (Spohn, 1977), and all durations are either simple multiples or fractions of this unit (Zuckerkandl, 1959). Examples of these multiples or fractions of beats in various metric contexts are numerous. Those used herein are very basic and illustrated in Figure 1.

There are two basic types of group organizations: 1. duple meter, with two beats to the bar, and 2. triple meter, with three beats to the bar. Compound meters comprise larger bars, formed by combining these basic types of groupings: 4 beat groupings ($\frac{4}{4}$ meter) are 2-x-2; 6 beat groupings ($\frac{6}{8}$ meter) are 2-x-3 or 3-x-2, and occasionally 8, 9, or 12 beat groupings. Five and seven beat groupings are frequently found in 20th century music and are comprised of both duple and triple meter organizations.

With each type of grouping, there is an accent pattern which corresponds to its metric organization. For example, duple is "strong-weak", triple is "strong-weak-weak", combined ($\frac{5}{4}$) is "strong-weak-weak-halfstrong-weak" or "strong-weak-halfstrong-weak-weak", and so on.

The metric organization of a given piece is notated by a meter signature, where beats are grouped and separated by bar lines, and designated such as $\frac{2}{4}$, $\frac{3}{4}$ or $\frac{5}{4}$. Traditionally, the top numeral of the meter signature indicates the number of beats per measure (i.e. 2, 3 or 5); the lower numeral indicates the time unit or the single beat [4 = quarter note (♩)]. Figure 1 illustrates the relationship between beat and melodic rhythm in meters of the three types used in this study.

Figure 1

The Relationship Between Beat and Melodic Rhythm
in Meters of Three Types.

METER	DUPLE - $\frac{2}{4}$	TRIPLE - $\frac{3}{4}$	COMBINED - $\frac{5}{4}$
BEAT	♩ ♩	♩ ♩ ♩	♩ ♩ ♩ ♩ ♩
MELODIC RHYTHM			
Elongation	𝅗𝅥	𝅗𝅥.	𝅗𝅥. 𝅗𝅥
Division	♫ ♫	♫ ♫ ♫	♫ ♫ ♫ ♫ ♫

A major focus of this study deals with the way in which meter is perceived. Therefore, a discussion of how time divisions of the beat are organized into beat groupings will clarify perception of meter.

<u>The forming of groups</u>

Mursell (1927) and Zuckerkandl (1959) studied a phenomenon referred to as subjective rhythm, or observation of identical stimuli in regular succession. Sounds such as the clicks of a metronome, the ticks of a watch, the sound of a railroad car running over the ends of rails produce a series of sounds that are of equal intensity and regular succession. These are generally not experienced as a series of single events, but are perceived as groups of two, three or four, and sometimes as six. They irresistibly arrange themselves in such groups, although nothing can be found in the sounds themselves that would cause such groupings. Generally, there is an inclination towards the formation of binary groups (2 or 2-x-2 beats to the measure) (Zuckerkandl, 1959).

The formation of groupings of identical stimuli in regular succession may be explained by a personal attentional set (Mursell, 1927), that is, the way in which the listener allows these stimuli to be perceived. When beats are presented in music, combined with melodic rhythm and harmony, the arrangement of their groupings becomes another matter. Generalizations of how beats are organized, such as "Groups are produced by strong and weak accents that form the different bars", are not entirely true since many composers deliberately strive for independence of group from accent. Yet measure groupings are still communicated and perceived, no matter how the tones coordinate with accent. There are many sources of accent in music: dynamic stress (accented-unaccented, strong-weak); duration (long-short); pitch (high-low) and phrase (units of tonal contexts comparable to word groups in language) (Zuckerkandl, 1959). These sources may duplicate the accent pattern of the measure or produce their own accent patterns. Zuckerkandl's (1959) theory of how accent patterns are formed will be discussed later.

Choice of meter in this study

Several authors (Mursell, 1958; Mainwaring, 1951 and Moorhead and

Pond, 1941-1942) have suggested that the natural, basic feeling for pulse is duple. This may explain why duple meter is generally the first to be taught in pre- and elementary school music. Meters of $\frac{3}{4}$, $\frac{4}{4}$ and $\frac{6}{8}$ are often introduced to children after $\frac{2}{4}$, as much of North America's musical heritage lies in music of these meter types (Choksy, 1974; Nye, 1977 and Hood, 1970). The learning of compound meters, in addition to $\frac{6}{8}$, such as $\frac{9}{8}$ and $\frac{12}{8}$, generally precedes the next stage of meter learning, namely, the alternating or combining of common meters, such as $\frac{2}{4} + \frac{3}{4}$ (Nye, 1977).

Meters which are considered to be "uncommon" by North American standards, such as $\frac{5}{4}$ and $\frac{7}{8}$, are frequently used in the musics of Africa and Asia (Nye, 1977). While the occasional use of uneven or composite meters may be noted in some of the traditional repertoire, such as Mussorgsky's Pictures at an Exhibition, Tchaikovsky's Sumphony No. 6 and Glinka's Life for the Tsar, they are characteristic of contemporary art music and jazz.

Mursell (1927) stated that observation of identical stimuli in regular succession are rarely grasped as groupings of five or seven units because all previous rhythmic training is against such a result. Even today, training in meter with 5 or 7 beats to the bar is frequently avoided. DeYarman (1972) attributes this avoidance to the music educator's uneasiness with uncommon meters due to lack of initial training in perceiving and performing them.

In a 1972 summary of elementary music songbooks, DeYarman (1972) found that the rhythmic content of songs of kindergarten and first grade was limited mostly to duple meter. He concluded that it is unfortunate that editors of school music series do not make provisions for children to learn to understand broad aspects of rhythm. Because music of today reflects a desire for some contrasts to the more commonplace meters and rhythms, many authors (Gary, 1967; Dittemore, 1970; Nye, 1977, and DeYarman, 1972) believe that children should be exposed to music in usual, unusual and mixed meters, once the common ones have been mastered.

According to Hood (1970), students will have no difficulty with unusual meters if they understand and can use the basic, familiar types of meters. DeYarman (1972) found that instruction in mixed and unusual meters seemed to enhance kindergarten children's performance of usual meter.

The present study investigates grade one, three and five children's abilities to perceive meter of three types, namely, duple ($\frac{2}{4}$), triple ($\frac{3}{4}$) and combined ($\frac{5}{4}$). It is organized as follows: Chapter II provides an instructional approach to meter discrimination; Chapter III states the rationale and research questions to be investigated; Chapter IV gives the methods and procedures for doing this; Chapter V examines these results, and Chapter VI is a discussion of the research questions, methods, procedures and results.

CHAPTER II

AN INSTRUCTIONAL APPROACH TO METER DISCRIMINATION

Introduction

The purpose of this chapter is to examine a number of issues which relate to the teaching of the musical concept of meter. Specifically, this study examines issues related to the instruction of common ($\frac{2}{4}$ and $\frac{3}{4}$) and uncommon ($\frac{5}{4}$) meters and students' abilities to comprehend and transfer learning in this area. One way of approaching this topic is by an examination of the processes which are involved in learning, and the method in which information is presented. These are two areas which ideally overlap as a result of constant interaction.

The first part of this chapter deals with the aspects of learning theory which relate to the teaching of meter. This section provides a foundation for the development of efficient teaching strategies appropriate for students' abilities.

One important aspect of learning theory is concept development as it may be applied specifically to the elements of music. Through the understanding of conceptual development, learning may be programmed so that it involves a transition from perceptual dependence to inference. The second part of this chapter, therefore, deals with the attributes and development of concepts, providing a rationale for the choice of rhythmic concepts used in this study.

The third section of this chapter deals with the cognitive development of young children from a Piagetian perspective. Researchers have attempted to apply Piaget's conservation tasks to the development of the conservation of particular musical elements. There is some question whether subjects actually acquired the necessary prerequisite skills in many of those studies, and this will be discussed at some length, since it relates to the research questions approached herein.

The Processes of Learning

An understanding of learning theory may facilitate instructional programming so that it is consistent with learning processes and performances and help arrange the events of learning so that maximum growth is promoted. The events that make up a learning incident may be either external or internal to the learner. The external events are those which are readily observable, i.e. the stimulation that reaches the learner and the products that result from a response. Internal activities (which take place in the learner's central nervous system) are called processes of learning and are inferred from the observations made externally. These processes are implied by the transition points between each set of structures of Gagné's (1974) basic learning model illustrated in Figure 2 below.

Figure 2

Gagné's phases of an act of learning.

Motivation Phase
EXPECTANCY

Apprehending Phase
ATTENTION; SELECTIVE PERCEPTION

Acquisition Phase
CODING; STORAGE ENTRY

Retention Phase
MEMORY STORAGE

Recall Phase
RETRIEVAL

Generalization Phase
TRANSFER

Performance Phase
RESPONDING

Feedback Phase
REINFORCEMENT

It is possible to relate these internal processes (phases) to the external events that constitute learning. The moment when the learner's internal state changes from not-learned to learned is called the *essential incident* of learning. This incident is followed by other events that have to do with the execution of the performance. Gagné's approach typifies the series of events that constitute a single act of learning and outlines eight phases into which this single act may be analyzed. Each phase involves a principal process considered operative during that phase. These are summarized below.

I. Motivation phase

Incentive motivation is important for the promotion of learning and is concerned with an achievable goal that is in some sense rewarded. Often a person may not be initially motivated by the incentive for achievement, in which case the motivation must be established. One way of doing this is by generating within the learner an anticipation of a reward, or *expectancy*, obtainable after the goal has been achieved. An expectancy can be established either by: 1. communicating long-range goals, for example "When the learning is completed, the student will be able to distinguish $\frac{2}{4}$ meter from $\frac{3}{4}$ or $\frac{5}{4}$ meter", or by 2. having the student achieve short-range goals, or acquire an expectancy when the attainment of a goal is rewarded. For example, the learner may be guided through the steps which help in the recognition of a particular meter and then be shown that the meter of that piece of music has been identified. The acquiring of expectancies is a preparatory phase for learning.

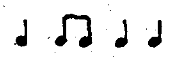
II. Apprehending phase

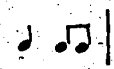
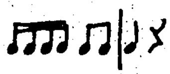
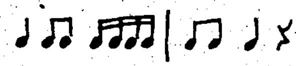
The student must *attend* to the parts of the total stimulation that are relevant to the learning purpose. For example, when listening to music with the intention of recognizing its meter, the learner must attend to those aspects which will give meaning to the meter of the music rather than incidental aspects such as the instrument on which the music is played. This process of attention, or temporary internal state, is called a set.

A *set* to attend may be activated by external stimulation (such as a verbal command), alerting the learner to receive certain kinds of stimulation. For example, "Listen to these two musical examples and tell me if they are in the same meter" serves to establish an attentional set. However, if the child has not yet learned to discriminate (selectively perceive) strong from weak beats, this must be established before learning can occur (Gagne, 1974; Woodruff, 1966).

III. Acquisition phase

Learning proceeds once the external situation has been attended to and perceived. This phase includes the essential incident - the moment when some newly formed learning is entered in the short-term memory, later to be further transformed in the long-term memory. The process in which this learning is transformed for memory storage is very important in the act of learning.

In the process of *coding*, the perceived entity is transformed into a form which is most readily storable, i.e. the original material is apparently not an exact representation of what was seen or heard but is sometimes either simplified or embellished. For example, a measure of music, such as , might be stored as a simplification, or embellishment of the original as , or  respectively.

Other types of transformation of material occur, in order to make the material more highly memorable, when the information enters long-term memory. Retention may be more successful when stimuli are classified under previously learned concepts, simplified as principles, or grouped in certain ways. To give an example of the latter, a rhythmic excerpt such as  may be more easily retained if grouped in two's   or three's . Although it is possible for coding procedures to be suggested externally, the learner should be encouraged to encode (use a coding scheme) by a method which is most personally effective.

IV. Retention phase

The coded material enters into the memory storage of long-term memory, a phase which is least accessible to investigation and about which least is known. Some psychological theorists (e.g. Adams, 1967) suggest that memory storage may have the fundamental characteristic of permanence; others believe that this property may apply to only some kinds of memories and not to others (Gagné, 1974). One point is well supported: the capacity of long-term memory is very great and cannot be "over-loaded".

V. Recall phase

When learned material is recalled so that it can be exhibited as a performance, the process at work is called *retrieval*, i.e. what has been stored becomes "accessible". Woodruff (1966) refers to this phase as a "conceptual phase", where perceptions are recalled, re-examined, mentally explored, and synthesized until they agree with what has been perceived.

Like most other learning processes, retrieval may be effected by external stimulation. For example, a student having difficulty recalling the meaning of "meter", might be asked, "Do you remember what 'pulses' are?" As in coding, it is important for the student to acquire strategies which enable the internal activation of the retrieval process in order to develop learning independence.

VI. Generalization phase

Retrieval of learned material will not always occur within the same situation or context as the original learning. It is hoped that the student will be able to recall what has been learned and apply this knowledge to new and different contexts, in other words, to *transfer*. For example, if the student is aware of the principles involved in the conceptualization of one meter, learning new meters will be less of a problem.

VII. Performance phase

This phase consists of acting in a manner which puts new concepts to practice (Woodruff, 1966). A person who has learned to notate music in $\frac{3}{4}$ meter may apply this knowledge by composing a melody line in this meter.

VIII. Feedback phase

Once the learner has exhibited the newly learned performance, it becomes apparent that the anticipated goal has been achieved. The expectancy established during the motivational phase of learning becomes confirmed through information feedback or reinforcement.

Summary

The general characteristics of an act of learning may be conceived as a series of events or phases which begin with the establishment of motivation, and proceed until the feedback phase is reached. For each of these phases of learning, one or more of the learner's internal processes transform the information from one form to another until the student responds in a performance.

These internal processes of learning may be influenced by external events (i.e. stimuli from the learner's environment) which, when planned for the purpose of supporting learning, are called instruction. It is the teacher's responsibility to design, plan, select and supervise the arrangement of these external events, with the intention of activating the learning processes. When dealing with meter discrimination, this would include choosing appropriate musical examples and planning the methods of preparing, presenting and reinforcing the learning of specific musical concepts which lead to the identification of meter.

The Outcomes of Learning

Stimulation from the learner's environment is the *input* to the processes of learning; the *output* is the behavior or performance that results from learning. It is possible to classify performances so that useful implications from them may improve the understanding of the learning processes. The outcomes of learning are human capabilities which make possible a variety of performances, types of which are summarized below.

Types of learned capabilities

According to Gagne (1974), there are five major categories or classes of learned human capabilities (i.e. verbal information, intellectual skills, cognitive strategies, attitudes and motor skills) which represent the learning processes, thus permitting one to draw implications for the design of instruction. A review of the main points in the description of these learned human capabilities and the differences between categories are given below.

I. Verbal information

When information is presented verbally, it must be coded into a more comprehensive, meaningful complex which already exists in memory. As a capability, verbal information allows the individual to say, or write, or otherwise represent the information as a sentence (or proposition). This verbal vehicle for thought is a necessary prerequisite for further learning as it allows information to be later consolidated into more complex rules.

II. Intellectual skills

Intellectual skills constitute the *knowing how* (as contrasted with the *knowing that*) of information and enable a student to respond adequately to entire classes of natural phenomena (Gagne, 1974). As a result of growing competence in the aural perception of musical sounds and the development of a "sound vocabulary", the child may more effectively proceed to the visual perception of symbols in music reading (Petzold, 1963).

Intellectual skills may be divided into several subcategories which are ordered according to their cognitive complexity. They are discriminations, concepts, rules and higher-order rules. Each subcategory is related to the next so that the more complex skills require prerequisite skills. For example, concepts require discriminations as a prerequisite and so on.

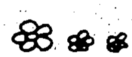
A learned discrimination makes it possible for the learner only to tell the difference among stimuli though not necessarily to name them or use them in some other way. For example, one may discriminate a "strong" from a "weak" beat. Kodály, a well known Hungarian music educator, applies learning discrimination in his teaching method. He places major emphasis on exposure to numerous songs, musical games and activities, thus applying musical concepts at an unconscious level before teaching the associated musical symbols or terminology (Choksy, 1974). Zimmerman (1974) used a hierarchical system similar to Gagné's when she discussed the development of musical abilities. These are summarized as follows:

> Loudness discrimination develops first.
>
> Melodic and rhythmic discrimination develop somewhat concurrently and improve with the increasing attention span and improvement of the memory function.
>
> Perception of simultaneous sounds or harmony seems to be the last to develop... (pp. 16-17).

After the prerequisite discriminations are available, development of concepts occurs. This involves classifying or categorizing events or objects into smaller numbers of categories so that the environment is simplified to some degree (Bourne, 1971).

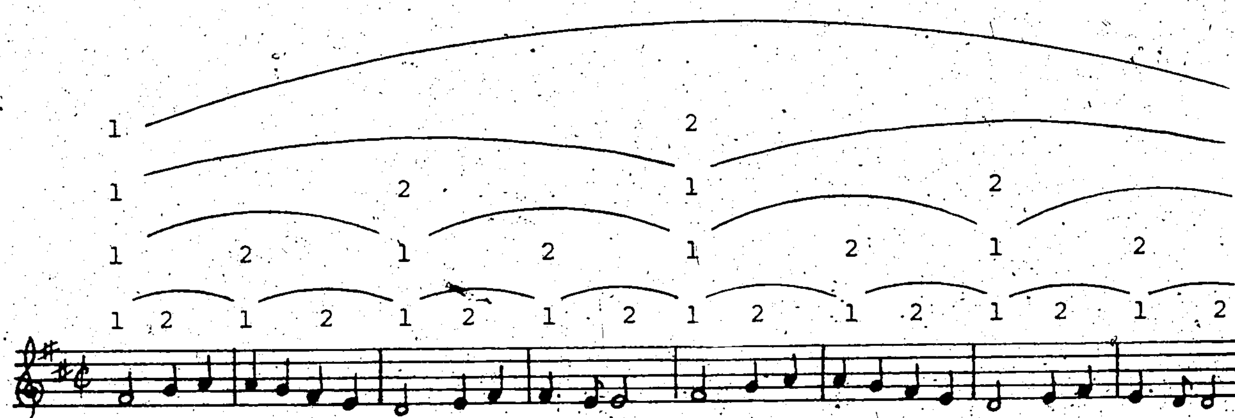
Objects and events may be grouped into concepts using a wide variety of bases. Perhaps the most simple form are concrete concepts which are classes of objects (a piano, chalkboard), object-qualities (smooth, long, fast), and relations (high-low, loud-soft). The learner should be able to identify a class by indicating (pointing to, marking, physically separating instances and non-instances, or whatever) one or more examples of the class (Gagné, 1974), and associating it with a general discriptive label or name (Bourne, 1971).

When concepts of objects, object-qualities and relations cannot be identified by one of these means, they must be defined (identified by the use of a sentence or proposition) or classified by the instances of the concept. Piaget's work suggests that children who have had opportunities to classify objects on the basis of similar or different properties might arrive at the level of operational thought (represented in conservation) at an earlier age (Almy, Chittenden and Miller, 1966). A defined concept is actually a classifying rule, or a special case of the type of intellectual skill called *rule*.

A rule is a learned capability which goes beyond simply *stating* and makes it possible for the learner to *do* something by using symbols. The symbols represent and interact with the learner's environment in generalized ways, making rule-governed behavior possible by responding to a class of things with a class of performances. Thus, rules may be applied to new situations where specific application has not previously occurred (Gagné, 1974). For example, a repertoire of rules for notation, such as $\frac{2}{4}$ meter =  , will permit rapid acquisition of unfamiliar classifications based on it, such as $\frac{3}{4}$ meter =  . Bourne (1971) has supported this position by stating that conceptual rules increase the range of concepts that can be formed with any particular stimulus population, and enhance the flexibility of the students' general conceptual behavior.

Subordinate rules are prerequisites to attaining higher-order rules and may be illustrated by reference to the process of group formation involved in listening to music. Through the example of a Strauss melody, Zuckerkandl (1959) suggested that the average listener will more likely than not count the bars (as "one-two-three-four") rather than the beats.

The bars appear as units of a higher order that in turn form the larger group which may go on to the formation of super-groups on still higher levels. He believed that the tendency of the units to join into groups (which are almost irrepressible on the "level of the beat") becomes progressively weaker on the higher levels. However, this tendency is lying hidden and undeveloped in a person, and if the music is suitable (as Beethoven's "Hymn to Joy"), the listener will perceive the following:



A summary of Zuckerkandl's levels of metric organizations, based on music grouped in two's, is shown by the following:

bar groups 1 2 1 2

bars 1 2 1 2 1

beats 1 2 1 2 1

subdivisions 1 2 1 2 1

12121

III. Cognitive strategies

Whereas intellectual skills are oriented toward aspects of the learner's external environment, cognitive strategies are internally organized capabilities used in guiding and attending, in processes of learning, retention, and thinking, and are intended to develop learning independence (Gagné, 1974).

IV. Attitudes

Attitudes are acquired internal states which vary in intensity and direction that influence the choice of personal action towards some class of things, persons, or events. As learned capabilities, they are sometimes associated with values and are also referred to as the affective domain (Krathwohl, Bloom and Masia, 1964).

V. Motor skills

Motor skills, learned in connection with common human activities, make possible the precise, smooth and accurately timed execution of muscular performances and should be learned so that they may be utilized when necessary. According to Hood (1970), physical movement is of primary importance in developing in children an understanding and recognition of and feeling for rhythmic swing and pulsations in music.

Summary

Gagné's learned capabilities (verbal information, intellectual skills, cognitive strategies, attitudes and motor skills), which represent the learning processes, are especially relevant to the teaching approach used in this study. Verbal information has particular significance in the presentation of terminology necessary for the intellectual skill of discriminating strong and weak beats. These discriminations were prerequisites to the development of concrete and defined concepts, intellectual skills which will be discussed in greater detail in the next section of this chapter. The remaining two subcategories of intellectual skills, namely rules and higher-order rules, apply to the recognition and association of beats using simplified symbols.

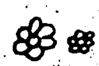
Cognitive strategy, the third human capability, involves internally organized control processes; therefore, the effects of external influences are less direct than with verbal information and intellectual skills. Strategies that govern individual behavior are developed and undergo refinement over long periods of time. The extent to which inherent growth effects the rate of development has not been determined (Gagné, 1974).

Attitide, the fourth type of learned capability, involves the objective of developing a positive attitude towards the three meter types presented in this study. The introduction of musical games was designed to facilitate this attitudinal development. These games were more important, however, as a means for allowing the beats of music to be kinesthetically felt, a motor skill which was implemented to help lead to a cognitive understanding of beat.

Table 1 provides a review of the main points of Gagné's descriptions of the five categories of learned human capabilities along with an example of the kind of performance from which the capability can be inferred. The subcategories of intellectual skills are identified as well, since the distinctions among them are of importance for instruction. The examples of human performances are applicable to the development of the skills of meter discrimination, however, a number of additional examples

Table 1

Gagne's Five Major Categories of Human Capabilities, Representing the Outcomes of Learning with Examples of Each.

LEARNING OUTCOME	EXAMPLE OF HUMAN PERFORMANCE MADE POSSIBLE BY THE CAPABILITY
Verbal Information	Stating that "meter is the measurement of the number of pulses between more or less regularly recurring accents"
Intellectual Skill	Showing how to do the following:
Discrimination	Distinguishing "strong" from "weak" beats
Concrete Concept	Identifying "strong" and "weak" beats in music through large and small body movements
Defined Concept	Classifying $\frac{2}{4}$ meter by using a definition, e.g. "there are two beats per measure, the first of which is 'strong'; the second is 'weak'"
Rule	Illustrating "strong" and "weak" beats through simplified symbols, e.g. $\frac{2}{4}$ meter may be 
Higher-Order Rule	Generating a rule for notating the "strong" and "weak" beats of other meters, e.g. "by counting the number of weak beats between the strong beats, one can determine the the meter and appropriately notate it by means of simplified symbols"
Cognitive Strategy	Originating an individually unique method of notating the meter of music, e.g. $\frac{3}{4}$ may be 
Attitude	Choosing live performance concerts as a preferred activity
Motor Skill	Executing physical performance by emphasizing the "strong" beat while moving to music

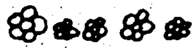
corresponding to each category of learned capability could be supplied for many different aspects of music learning.

Concepts

Gagné's (1974) learning theory has provided an overview of the processes and outcomes of learning and serves as a theoretical foundation for the methodological programming of conceptual learning involved in this study. Since concepts are prerequisite skills to the development of more complex cognitive understandings, an examination of conceptual development will facilitate the efficient transition from perceptual dependence to inference. It will, therefore, be useful to clarify the meaning of "concept" before delving into aspects of how they are developed.

Some authors refer to concepts as mental images of things that have been encountered and retained in the mind (Woodruff, 1966; Gary, 1967). These authors base conceptual learning on covert memories and past encounters, believing that concepts are "forces" within a learner. These forces cause responding to a given situation or object in a manner which is consistent with the way that a situation or object affected the learner in previous interactions (Woodruff, 1970).

Others (Bourne, 1971; Ragan, Wilson and Ragan, 1972 and DeCecco, 1968) define concepts as classes of stimuli, each of which have common characteristics. These stimuli (objects or events) are set apart from others on the basis of some common feature or property characteristic of each and are necessarily abstract because they consist of meanings associated with all members of a class rather than with any particular member.

To understand a concept, it is clear that the learner must recognize most of the attributes which are important in its definition. For example, the learner must be aware of the attributes of both strong and weak beats, beat groupings (e.g. 2's, 3's or 5's) and the way in which these particular beat groupings are, in this case, notated (for example,  ,  respectively). Therefore, some sort of rule for combining and using these relevant attributes is also involved in the definition of a concept. Consider, for example, the concept of "$\frac{5}{4}$ meter". This consists of beat groupings of both 2's and 3's combined. $\frac{6}{8}$ meter and $\frac{4}{4}$ meter do not fit the concept, for both lack one of the two relevant attributes. The rule for combining the attributes in defining this concept is joint presence, or conjunction.

In some cases, concepts involve only a single relevant feature, such as "loudness", which Bourne (1971) labels as a "primitive concept". Other musical concepts are more complicated, as for example, the concept "rhythm". One might say that rhythm refers to the distribution of notes in time and their accentuation (Jacobs, 1976) as in melodic rhythm and/or in harmonic rhythm. This "and/or" rule is called a disjunction of attributes. (Bourne, 1971).

In addition to having many features and attributes, concepts may also include within them several gradations. Most stimulus dimensions, such as dynamics and tempi, are continuously variable. Furthermore, auditory values on such dimensions are infinite and merge imperceptibly from one to the next. The attributes corresponding to an aural dimension are often best thought of as an arbitrary or conventional category scale which musicians have learned to superimpose on the dimension, and this is used for the sake of convenience. Each of these attributes is usually labeled with a distinctive name, for example, dynamics are named pp, mf, fff, etc. and tempi are named largo, allegro, presto, etc. This category scale has a number of distinct gradations which depend on many factors and include the discriminative capacity of both the appropriate sensory system and the learner.

Through the use of wide sensory experiences (using the ears, eyes, and kinesthesis), conceptualization occurs more readily (Bergethon and Boardman, 1975; Zimmerman, 1975). Not only are numerous concrete experiences required for the learning of concepts, but experiences should also be recurrent over a long period of time. Only by such recurrence will the learner have sufficient experience to recognize relevant attributes of the concept so that associated labels or definitions, that is, vocabulary, have personal meaning.

The function of language in conceptual development

One difficulty encountered by researchers in conceptual development is the differentiation between the existence of the concept *per se* and the children's possession of a vocabulary with which to express this concept. Most authors agree that an appropriate vocabulary will facilitate the development of concepts (Bergethon and Boardman, 1975; Gary, 1967; Bourne, 1971; Almy, Chittenden and Miller, 1966; Andrews and Deihl, 1967), while others (for example, Taebel, 1974) suggest that language facilitates the organization of primitive concepts into more complex structures. Bourne (1971) stated that it is difficult even to think about a known concept without its verbal associate(s) or description. Although it is possible for people to learn concepts or stimulus groupings without being able to put them into words, ease of conceptualization seems to depend upon the semantic efficiency of verbal tools.

Gary (1967) recommended that children use musical vocabulary in their own way, at their own level, to discuss their experiences and to become consciously aware of musical meanings. However, children are limited in their abilities to expand and communicate musical knowledge without the expansion of a musical vocabulary.

Bourne (1971) suggested two fundamental uses for words in conceptual behavior: symbols, and cues or signs. This is based on an assumption that language is a learned representation or code for actions, events, objects and relations in reality. As symbols, words are cognitive mediators of behavior. That is, they implement communication and expand the range of human conceptual behavior. The language representations for concepts used in this study (such as "strong", "weak", "beat", and "beat groupings") are necessary for the development of an understanding of meter.

Many authors (Andrews and Deihl, 1967; Zee, 1976, Taebel, 1974, and Stevenson, 1972) have been particularly interested in the function of language when associated with conceptual development. They have devised studies to investigate students' efficiency in combining conceptual understanging with appropriate musical terminology. These studies are of particular relevance to this study, as they substantiate the necessity for numerous concrete experiences in the development of learned discriminations and recognition of relevant concept attributes preceding the learning of a concept. These studies are summarized below.

Research related to the function of language in conceptual development

Andrews and Deihl (1967) devised a Battery of Musical Concept Measures as a technique for identifying grade four children's concepts of pitch, duration, and loudness. They found that students possessed the concept being measured, but were confused about the appropriate label or terminology. Most frequently misused were "high, loud and fast" and "low, soft and slow". The authors suggested a need for increased emphasis on teaching labels.

A study with a similar objective was designed by Zee (1976) to determine kindergarten children's abilities to: 1. hear differences in rhythmic patterns, pitch, melodic contour, and duration of tones, 2. verbally describe these discriminated differences, and 3. display an understanding of the terms commonly associated with these concepts through demonstration on a simple keyboard instrument. She stated that, although kindergarten children are susceptible to training in musical discrimination, they appear to be more efficient in demonstrating understanding of concepts of durations than in verbally describing them. She concluded that it is necessary to teach that musical terminology to which kindergarten children have not previously been exposed, as their ability to deal verbally with properties of musical sounds does not necessarily develop concurrently with their perceptions and understandings of them.

Taebel (1974) investigated the development of kindergarten, first and second grade children's understanding of selected musical concepts, hypothesizing that verbal cues are age dependent. In other words, such cues become effective at a particular stage of concept development. He concluded that a child must have attained a fairly stable concept before a verbal cue can be of use. Before this phase is reached, the verbal cue is meaningless or even detrimental (because of out-of-context associations); after this phase is passed, the verbal cue is redundant (because the child provides his/her own verbal cue).

Stevenson (1972) spoke of verbal communication in terms of perception, and stated that the young child's medium for communication may be strongly determined by the "perceptual characteristics of the stimuli" (p. 253). That of the older child may be more dependent upon his/her ability to transform perceptions into words.

Summary

These cited studies substantiate a necessity for efficient programming for the learning of prerequisite intellectual skills which lead to conceptual development, namely discriminations, concrete concepts and defined concepts. This involves the introduction of numerous concrete experiences, which lead to the recognition of concept attributes, and the implementation of language to facilitate the organization of primitive concepts into more complex structures.

An emphasis of all these studies is on the effect of age, related to the development of concepts. This subject of age-related stages of verbal (and cognitive) development has evinced increasing interest in Jean Piaget's theory of mental growth and development. His work provides a theoretical framework for studying the problem of developmental sequence, and suggests the possibility that children who function at different levels of cognitive development will use different thought processes in the understanding of musical concepts.

Piaget's theory has been adapted by several researchers (Pflederer-Zimmerman, 1964, 1966, 1971, 1975; Pflederer-Zimmerman and Sechrest, 1968a, 1968b; Botvin, 1974; Larsen and Boody, 1971; Foley, 1975; Jones, 1976, and Perney, 1976) to specific areas of music to structure children's musical capacities. Before reviewing this literature, however, it may be useful to state some of the basic principles of Piaget's theory and briefly define terminology.

Piaget's stages of cognitive development

According to Piaget, there are stages of cognitive development, each carrying with them the elements of behavior or intelligence required in succeeding stages (Nye, 1977; Larsen and Boody, 1971). Although the various stages of development have an unchanging order, their time of appearance varies with the experience background, physical development and society or culture of which the child is a product.

Gary (1967) attempted to order the presentation of musical concepts by suggesting sequences for teaching pitch, rhythm and durations. Although the sequence of presentation of these concepts appears to be logical, no empirical evidence supports presenting the concepts at any specific level (Perney, 1976). Since more knowledge is needed of how musical concepts are acquired, many music researchers are turning to Piaget's stages of cognitive development in an attempt to apply them to music conceptual development. These states are: Sensorimotor (birth to 2 years), Preoperational (2 - 7 years), Concrete operational (7 - 11 years) and Formal operational (11 years and above). Table 2 presents a highly simplified representation of Piaget's conception of these stages.

According to Piaget, humans inherit two basic tendencies: *organization,* the tendency to systematize and organize processes and experiences into coherent systems; and *adaptation,* the tendency to adapt or adjust to the environment and experiences (Biehler, 1975; Bee, 1975). These two tendencies combine to produce cognitive structures (or schemata) that permit the learner to differentiate between experiences and to generalize from one experience to the next. The process of adaptation

Table 2

Piaget's Stages of Cognitive Development.

Sensorimotor (birth to 2 years)	Learning about properties of things (interactions with objects, situations and people in the child's immediate environment) through the senses and motor activity. Eventual development of ways of accomodating new data. This stage is prior to language development and is what Bruner calls the Enactive Stage and Vygotsky calls the Prelanguage Stage (Bee, 1975, p. 179).
Preoperational (2 - 7 years)	Mental pictures or symbolic representations are being formed. Acquisition of language is egocentric which limits ability to consider other peoples' points of view. Inability to combine parts into a whole, to arrange parts in different ways or to reverse operations or processes. Gradual acquisition of ability to decenter (to think of more than one quality at a time); classify objects with obviously common attributes; place things in a series, and; understand conservation.
Concrete operational (7 - 11 years)	Ability to conserve, decenter, reverse and think logically, but only with reference to concrete objects. Capacity to mentally manipulate concrete experiences (which previously had to be physically manipulated), but thinking is still not abstract. Ability to deal with operations ("interiorized actions involving reversibility") (Biehler, 1974, p. 118).
Formal operational (11 years and above)	Ability to reason on the basis of hypothesis and the abstract and to deal with things not present. Capable of imagining various future alternatives and operate on operations, i.e. analyze the thoughts of others and identify variables in problems and analyze these critically.

Taken from Nye, 1977, pp. 22 - 23 and Biehler, 1974, p. 118.

is divided into two aspects of functioning. *Assimilation* is the process of incorporating experiences, either into existing cognitive structures, or by developing new ones; and *accomodation* is the process of adapting the concept to conform to assimilation as a result of interacting with objects in a variety of ways.

The principle of *conservation* is often used to describe the level to which a child has developed. It describes the idea that the mass or substance of an object does not change even though the shape or appearance of it may be transformed, and involves two processes. Preschool children have a tendency to *centrate* on only one quality at a time (such as height) and will insist that a taller vessel contains more water than a stouter one, even though the quantity of fluid is the same. With time, the child learned to *decentrate* (to think about more than one thing simultaneously, such as height and volume) and is able to understand that the quality of water remains the same even when its shape is altered.

Although Piaget's research deals primarily with quasimathematical structures and invariances, notions from his theory have formed the theoretical basis for several research projects in music education. Generally speaking, when a learner is able to mentally return to the initial state of a given material by an inverse operation, known as *reversibility*, conservation of that material is affirmed (Zimmerman, 1971). An example of conservation, as related specifically to music, is the ability to hear a melody and then recognize subsequent appearances of the tonal pattern of that melody. This recognition may be achieved even though subsequent appearances might occur with a change in the rhythmic pattern, the tempo, the timbre, or with other changes (Foley, 1975). Thus, conservation is of vital importance in developing some degree of musical understanding and in listening to music intelligently.

Taebel's (1974) research illustrates how students who are passing into the concrete operational stage lack the ability to conserve musical concepts. He discovered that, with these children, volume concepts were readily available, tempo concepts were slightly less so, and duration and pitch concepts were demonstrated poorly. He attests these inabilities to conceptualize to the tendency of the children to centrate on irrelevant aspects in the task situation (such as volume change), when such changes were either irrelevant or not even present.

Conservation is of importance when dealing with meter, as well as with the development of other musical concepts. The following studies summarize the approaches often used then attempting to measure conservation of music.

Research in Music Education Related to Piaget's Theory of Conservation

(Pflederer) Zimmerman and Sechrest (1970) devised four musical tasks to study the conservation process in musical learning of elementary and junior high school students. They adapted Piaget's meaning of conservation to be "the ability of an individual to retain the invariant quality, i.e. the sameness of a complex musical stimulus, in spite of variations in its presentation" (1968a, p. 19). They used two training tapes (experimental and control) which contained different musical stimuli. In the experimental condition, a pair of stimuli, consisting of a standard and a deformation, made up each item. The deformations were discussed during the training sessions, however, in the control no standards of comparison were used. During the training sessions, the phrases of music were discussed in terms of tempo, melodic movement, mode, pitch range, harmony and timbre.

In the test tape, four musical tasks, each of four phrases were paired with seven systematic deformations and its exact repetition. The experimenters noted whether or not the children could explain the relationship between the original and the comparison stimulus, that is, demonst te the presence of conservation. The subjects answered "same" or "different" and then explained their answers. The deformations were as follows:

ST	No change
RH	Change of rhythm
IN	Change of instrument
HA	Change of harmony
CO1	Change of contour
CO2	Change of interval
MO	Change of mode
TE	Change of tempo

Results showed that no effect of the experimental instruction was obtained for the conservation scores. However, since instruction was focused almost entirely on the recognition response, there was no reason to expect any special improvement in the children's abilities to express in verbal terms their musical experiences. The experimenters suggested that some type of musical task be devised in which response is not dependent upon verbal capabilities.

There was a strong age effect, with older children being superior in every facet of the task. Zimmerman and Sechrest (1970) concluded that the "superiority of the older children is not entirely attributable to better memory or other response capability. Almost certainly a better musical understanding is involved" (p. 34).

It seems apparent that music researchers are interested in constructing a series of musical tasks which are related to age and the sequencing of materials. DeYarman (1975), however, claims that different amounts and types of formal music instruction only minimally influence children's level of musical aptitudes before the fourth grade. He concluded that musical aptitude stabilizes by at least age six and seriously questions published conclusions which suggest that musical aptitude fluctuates among children in the primary grades. This view was substantiated by Schleuter and DeYarman (1977). Groves (1969) studied the effect of rhythmic training and its relationship to the synchronization of motor-rhythmic responses, concluding that age and maturation were more significant to rhythmic synchronization abilities of grade 1, 2 and 3 students than was instruction.

Some authors believe that methods of training do improve conservation abilities in some musical tasks. Foley (1975), for example, designed a study to see if a training program might be effective in helping students develop conservation ability in selected areas of music, namely tonal patterns (under the deformation of rhythmic patterns) and rhythmic patterns (under the deformation of tonal patterns). The results of her study were positive. Botvin (1974) pretested first grade students on conservation of four physical properties (mass, weight, number and liquid) and conservation of melody. Students who were non-conservers of melody were trained by either successive approximation only or by successive approximation and verbal rule instruction. Both experimental procedures produced a significant number of posttest conservers on both the melody training and the melody transfer task.

Other researchers have been interested in students' conceptual understanding or conservation abilities applied specifically to the rhythmic component, meter. Although methodological approaches and research objectives of these studies vary, the primary focus is the same, namely, to explore students' abilities to understand meter.

Research investigating students' understanding of meter

Zimmerman and Sechrest (1968b), in an attempt to measure conservation of meter, devised musical tasks which involved "durational value deformations" of the meter property. Durational values were presented both aurally (on a drum) and visually, in either duple or triple meters. The temporal units (beats) were constant while the distribution of the note values of the rhythm varied.

The introduction of the task included briefing students on: hearing and playing accents in duple meter, on every second beat (quarter note); listening to how two eighth notes take the same time as one quarter note, and hearing how accents, quarter, and eighth notes sound when they are combined, for example, as ♩ ♩ | ♩ ♫ | ♫ ♩ | ♩ ♩... A similar procedure was followed for triple meter examples.

Six examples were played for subjects and they were asked to discriminate between duple and triple meter by responding to each example as either "two" or "three" and giving reasons for each answer. Each pattern was "firmly established" before more variety in the subdivision was introduced. The authors, however, did not qualify how, or to what extent, this was done.

The results showed an increment in performance through ages 5, 7, and 9 to age 13 students, which is linear. Consequently there was no evidence for any "stage" approach in the development of the meter concepts. Those students who displayed non-conservation of meter were able to give a correct response but unable to explain reasons for the response. Frequently, students (regardless of age) perceived examples with ♩ ♫ to be in triple meter, and gave preoperational explanations such as "That was in three's because it had three sounds on it" (p. 62). Nearly all of the subjects' musical vocabularies were grossly deficient.

Jones (1976) revised Zimmerman and Sechrest's (1968b) conservation of meter task, but chose to designate it as a meter concept rather than a conservation task in order to be consistent with Piaget's terminology of "temporal meter" and "metric time". Less than 20% of his subjects passed this task: two nine-year-olds, three ten-year-olds, two eleven-year-olds, and three twelve-year-olds, and he suggested that the measurement of metric time does not usually develop before about 9 1/2 years of age. In spite of extensive verbal and motor pretraining, meter was still not completely understood by many of the older subjects. He concluded, however, that children from about age 9 1/2 on can be trained to identify the meter of a variety of rhythmic patterns with consistency.

Perney (1976) administered a test to second and third grade students to examine the relationship of 1. musical training, 2. verbal ability, and 3. the combination of sex and grade to the development of conservation of metric time. No significant differences in performance were found between students who played musical instruments and those who did not. In addition, a substantial positive correlation between performance on the musical tasks were related to verbal ability (for subjects of both sex) and to sex, with females out-performing males. It appears that performance on the musical tasks was more closely related to verbal ability than to age. The second grade students, who were more verbally proficient, outperformed the third grade students, although not significantly so.

Dittemore (1970) investigated the nature of specific musical capabilities of students in grades one through six to determine:

> 1. whether different melodic, rhythmic, and harmonic capabilities were manifest in students at different grade levels,
>
> 2. whether there appeared to be logical sequence in the development of these musical capabilities, and
>
> 3. whether capability levels and developmental sequences were related to musical aptitude (p. 2).

Positive results were found for all three questions. It was concluded that musical capabilities are well-developed in the average learner at the following designated grade levels:

> grade one - minor mode, duple meter, and triple meter,
>
> grade two - major mode, Dorian mode, mixed meter, round, and counter-melody, and
>
> grade three - unusual meter and two-part music.

Results of non-tonal and three-part music provided no definite conclusions and were inconsistent.

Results of the study showed the students' capabilities to perform music in the following sequences:

> melody - in minor mode, in major and Dorian mode, in non-tonal music,
>
> rhythm - in duple and triple meter, in mixed meter, in unusual meter, and
>
> harmony - a round and a counter-melody, two-part music, three-part music.

In a follow-up of Dittemore's study, DeYarman (1972) investigated whether instruction in mixed and unusual meters and instruction in non-tonal music might help or hinder kindergarten and first grade children's ability to perform music in usual meters and tonal music respectively.

It was concluded that instruction in mixed and unusual meters seemed to enhance rather than hinder kindergarten childrens' performances of usual meter. Likewise, students who were exposed to both tonal and non-tonal music performed tonal music better than those who received instruction in only tonal music.

It should be noted, however, that both the Dittemore and DeYarman studies, although it is not specifically stated, appear to base their concepts of rhythm on Gordon's (1971, 1976) theory of rhythm, which deviates significantly from standard texts. Parts of Gordon's theory are logical and sound. Inconsistencies appear in auditory perception applied to levels of thinking. To avoid a lengthy discussion of this aspect of his theory, it suffices to illustrate Dittemore's and DeYarman's (and Gordon's) view of triple meter. $\frac{6}{8}$ meter is classified as triple meter because two "tempo beats" are divided into three temporally equal "meter beats", as shown below (Gordon, 1976):

tempo beats

meter beats

These authors believe that the overall rhythmic feeling which is produced in $\frac{6}{8}$ meter is "1, 2, 3, 1, 2, 3" or possibly "1, 2, 3, 4, 5, 6" (where each set of three eighth notes are perceived as two units of three), rather than "1, 2" (where two dotted quarter notes are perceived as one unit of two). Consequently, the resultant meter is triple rather than duple, and the reader should be aware of this triple meter reference when interpreting the conclusions of the Dittemore and DeYarman studies.

Summary

Much of the music research of the late 60's and 70's has dealt with the application of Piaget's conservation to children's conceptualization of musical elements. Various studies, however, appear to have some methodological drawbacks. It is questionable whether student "non-conservers" have difficulty with conserving (recognizing sameness through reversibility) or simply lack prerequisite experiences, concepts or vocabulary to understand conservation.

Due to the disproportionate time allotted to "academic" subjects in North American schools, students develop language and mathematical concepts quickly because of their daily exposures to them. Asking a student to compare the quantitative content of two vessels of water is less complex than asking a student to determine whether beat groupings are in two's or three's, particularly when they contain subdivisions.

Music requires a relatively more abstract degree of conceptualization than other subject areas because stimuli are usually presented aurally rather than visually. According to Gagné's learning theory, the ability to illustrate concepts by symbolic representation develops after students have learned discriminations, concrete concepts and defined concepts. So, with music, perhaps the most appropriate approach to instruction is to ensure that discrimination precedes definition and symbolic representation of sound in a way similar to the Kodály method.

Because of the time-allotment and the abstractness of the subject content of music, it may be inappropriate to measure students' conservation abilities if they are unable to express verbally what they hear. The "grossly deficient vocabularies" to which Zimmerman and others refer might indicate a lack of intellectual development in the areas of discriminations, concrete and defined concepts. Through the use of wide-sensory concrete experiences and many opportunities to identify, classify and define concepts, conceptualization might occur more readily. Therefore, it is with these intellectual skills that the educational experience should begin.

CHAPTER III

RATIONALE OF THE STUDY

This study was designed to examine whether young children could discriminate meters of three types, namely duple ($\frac{2}{4}$), triple ($\frac{3}{4}$), and combined ($\frac{5}{4}$). This study is experimental in nature and the problem around which it is centered may be divided into four major questions:

1. Are the three meter types discriminated with the same ease?

2. Does a change in melodic rhythm effect the childs' perception of these meter types?

3. Are certain meters more easily discriminated at different grade levels?

4. Will a particular instructional approach facilitate childrens' abilities to understand and identify meter in music?

The rationale of the study stems largely from Gagné's learning theory, and the work of authors who have investigated conceptual development (Bourne, 1971; Andrews and Deihl, 1967; Taebel, 1974, and Stevenson, 1972), Piaget's theory of conservation (Zimmerman, 1974; Foley, 1975, and Taebel, 1974), and the understanding of meter (Zuckerkandl, 1959; Zimmerman and Sechrest, 1968b; Jones, 1976; Perney, 1976; Dittemore, 1970, and; DeYarman, 1972).

Gagné emphasized the necessity for efficient programming for the learning of prerequisite intellectual skills which lead to conceptual development. The present study focusses on the first three of Gagné's intellectual skills: 1. discriminations - to distinguish "strong" and "weak" beats in music; 2. concrete concepts - to identify "strong" and "weak" beats through large and small body movements, and 3. defined concepts - to classify meter types through definition.

Writers in the area of conceptual development suggested the introduction of numerous concrete experiences which lead to the recognition of concept attributes, and the implementation of language to facilitate the organization of primitive concepts into more complex structures. Research question 1 was formulated specifically to examine the ability of young children to discriminate meters of three types and to lead children to formulate concrete and defined concepts by means of numerous concrete experiences in meter recognition.

Some authors have adapted Piaget's theory of conservation to music to see if subjects are able to retain the sameness of a musical stimulus in spite of variations in its presentation. Zimmerman and Sechrest (1968b), for example, used this approach to determine if subjects were able to recognize that two eighth-notes take the same time as one quarter-note. The same may be applied to the temporal relationship between half-notes and quarter-notes. The purpose of research question 2 was to determine if meter test items with half-note, quarter-note and eighth-note melodic rhythm were discriminated with the same ease.

Over the past ten years a major emphasis has been placed on the investigation of the effect of age on the development of musical concepts or the conceptualization of certain musical elements. The intent of many studies was to determine the appropriate age or developmental stage to teach musical concepts. The literature provided a background for research question 3, which is directed towards examining the relationship of age to the development of childrens' meter discrimination abilities.

Gagné's learning theory, based on categories of human capabilities, provided a framework for the building of prerequisite intellectual skills leading to the development of musical concepts. This literature, along with that dealing with conceptual development, Piaget's theory of conservation, and the development of meter discrimination skills, helped in the formulation of the instructional approach to meter discrimination used in this study. Research question 4 directs the investigation towards the effect of one teaching approach based upon learning theory principles.

Chapter V discusses the statistical approach used to examine these questions when directed toward the musical development of grade one three and five students, and illustrates the results which were obtained. Chapter VI answers these research questions, suggests possible reasons for the results, and provides suggestions for further research.

CHAPTER IV

METHOD AND PROCEDURE

Subjects

The principals and teachers of two urban elementary schools participated in this study. These two school draw pupils from a cross-section of socio-economic areas from relatively low-middle to middle class. Grade one, three and five classes were chosen with a total population of 153 students. 140 subjects were used in the study with approximately 45 students per grade - thirteen were excluded due to absence from testing sessions. Means and standard deviations of ages related to grade level, total sample size, group size, pretest size and sex size are shown in Table 3.

Subjects were matched on pretest scores and randomly assigned to the experimental group (receiving intervention) or the control group (receiving no intervention).

Procedure

A meter discrimination test was constructed by the researcher consisting of twelve items, four each of $\frac{2}{4}$, $\frac{3}{4}$ and $\frac{5}{4}$ meters. Aspects of these items will be described in more detail in the next section.

This pretest was conducted in the homerooms of the participating children. It was administered by the researcher to each separate grade on a group basis, and took approximately twenty minutes per group.

Subjects were asked to listen to tape-recorded musical examples and respond by circling a response which visually represented the appropriate strong and weak beat grouping. Students were scored on the basis of correct responses; questions which were omitted or indicated as a "question"

Table 3

Description of the Subjects by Grade.
Means and Standard Deviations of Age in Months, Total Sample Size, Group Size (Experimental, Control), Pretest Size (High, Medium, Low) and Sex Size (Female, Male).

GRADE	AGE IN MONTHS		SAMPLE SIZE	GROUP SIZE		PRETEST SIZE			SEX SIZE	
	Means	s.d.	Totals	Exper.	Control	High	Med.	Low	Female	Male
One	82.130	5.527	46	23	23	14	23	9	23	23
Three	108.302	6.522	43	21	22	10	21	12	16	27
Five	130.686	5.486	51	26	25	14	17	20	25	26
TOTALS			140	70	70	38	61	41	64	76

were scored a incorrect.

Students of the experimental group received four half-hour periods of meter discrimination instruction over four consecutive school days, while the control group received no experimenter-initiated instruction. The purpose of the intervention was to provide students with as many concrete experiences in meter discrimination as possible within the given time restrictions. Because of this time factor, it was necessary to introduce more than one concept per lesson. It should be noted, however, that under normal classroom conditions, the pacing of activities and the introduction of new concepts would be more gradual. After this intervention period, a posttest, containing the same test items and method of administration as the pretest, was administered.

The test

A twenty minute rhythm test, containing ten tape-recorded examples, was devised by the researcher. It consisted of taps of equal duration (tempo, ♩ = 90), played on wood blocks, with accents on the first beat of the $\frac{2}{4}$ and $\frac{3}{4}$ meter items and the first and fourth beats of the $\frac{5}{4}$ meter items. Three identical items for each meter (with one extra $\frac{2}{4}$ item) were randomly ordered and students were asked to respond to these items in the same fashion as described above. This rhythm test was tested in a pilot study conducted in March, 1978, using subjects from grades one, three and five. The test was found to have a significant ceiling effect for all children and was discarded. A new test was devised to include melody, harmony and more complex melodic rhythm.

This revised meter discrimination test was considerably more difficult as shown by the results of the short pilot study. [illegible] required students to identify strong and weak beats within the music, and determine whether these beats were grouped in two's, three's or five's. Because there are no known standardized music achievement or aptitude tests which include test items in $\frac{5}{4}$ meter, the experimenter-developed meter test was modeled from Richard Colwell's (1968) Music Achievement Test 1. Since much familiar music composed in meter groupings of five is generally syncopated and rhythmically complex (too difficult for elementary students), musical examples in $\frac{5}{4}$ meter were composed. To maintain consistency, and the desirability of unfamiliar test items, the duple and triple test items were also composed (see Appendix A).

Three sample questions preceded the test: one in $\frac{2}{4}$ meter with mixed quarter-note and eighth-note melodic rhythm; one in $\frac{3}{4}$ meter with half-note melodic rhythm, and one in $\frac{5}{4}$ meter with quarter-note melodic rhythm. Students were asked to follow visual charts (2' by 3' cards) as the tester pointed to the beats in time with the music. Students were shown how to respond on their answer sheets and the test began.

Each of the three meter types contained four items, one with melodic rhythm of eighth-notes, one with half-notes, and two with quarter-notes. Harmonization contained simple, diatonic chord progressions on quarter-note beats. Two items (7 and 8) were in the minor mode, three items (1, 4 and 6) fluctuated between major and minor, but ended in major, and the rest of the items were major throughout. Although there were some repeated pitches in the melodies, approximately half of the notes were step-wise and the others were skips.

The test was tape-recorded on good quality equipment to avoid inconsistencies in test item presentation, and the instrument used was piano. Tempo was approximately ♩= 80-100, and all items included eight measures of music.

Answer sheets, which were similar to the 2' by 3' cards, showed a large picture for the strong beat(s) and a small picture for the weak beat(s) (see Appendix B). Pictures alternated between bells, flowers, and balloons to provide variety and to help students who may have had difficulty with the concepts of numbers or rows and columns to find their places on the answer sheet. Although the grade three and five students may have been able to respond to an answer sheet such as the one found in the Richard Colwell Music Achievement Test 1 (1968), with items indicated such as:

1.	2	3	5	?
2.	2	3	5	?,

some grade one students may have had difficulty understanding such a format.

Intervention

The review of the literature indicated a need for sequencing and developing prerequisite intellectual skills, leading toward conceptual development and understanding of rules. Consequently, much of the intervention consisted of teaching children to discriminate strong and weak beats; identify and move to music with beat groupings of 2, 3, and 5; label these beats as strong and weak, and recognize how these beats may be symbolized, with large and small pictures representing strong and weak beats respectively.

The teaching of these intellectual skills focussed on leading the children to both unconscious and conscious awareness of the following concepts:

> CONCEPT ONE. Music is controlled by an underlying pulsation which is continuous and generally regular throughout, even through silences. These pulsations are called beats.

CONCEPT TWO. Beats are usually grouped in a set, with the first beat being slightly stronger than the other (weaker) beat(s). Sometimes these sets have so many beats that a "secondary strong beat" is necessary to give the effect of two subsets.

CONCEPT THREE. Meter is the measurement of the number of weak beats between more or less regularly recurring strong beats.

a. When beats are grouped in sets of two, giving the effect of "strong-weak", the music is said to be in duple meter.

b. When beats are grouped in sets of three, giving the effect of "strong-weak-weak", the music is said to be in triple meter.

c. When beats are grouped in sets of five, giving the effect of "strong-weak-weak-halfstrong-weak", the music is said to be in combined meter.

CONCEPT FOUR. Beats may be notated through simplified symbols, with large pictures representing strong beats, and smaller pictures representing weak beats.

CONCEPT FIVE. Melodic rhythm is either the same or an elongation or division of the beats. Consequently, there is a relationship between the beats, melodic rhythm, and meter in a musical work.

The sequencing of these concepts and the activities incorporated to help develop skills leading to conceptual understanding are described more fully in Appendix C. All tape-recorded musical examples used in the intervention were different to those used for testing and are illustrated in Appendix D.

Design

A pretest-posttest matched control group design was used to obtain precision in the statistical analysis of the data of this study (Borg and Gall, 1976). Students were matched into experimental and control groups based on closely comparable pretest measures in order to reduce initial differences on meter discrimination abilities. They were also randomly divided, approximately by half, based on sex and classroom.

This matching approach is a departure from true experimental designs (Campbell and Stanley, 1963), but useful in this study because the samples were small, and because large differences were not anticipated between the two groups on perception of meter when melodic rhythm changed. Through the matched-group design, sampling errors are usually reduced, and small differences which might occur may be more easily detected. This design also permits the division of experimental and control groups into sub-groups (high, medium, and low) on the basis of pretest scores. By analyzing the data of these sub-groups, it is possible to determine whether the intervention had a different effect on subjects who initially had different competency levels.

Test items were analysed first for the total population and second by individual grade to rank the order of difficulty for both pre- and posttests. Items were then analyzed and ranked by difficulty on the basis of types of melodic rhythm (that is, quarter-note, eighth-note, and half-note rhythms) by looking at all possible combinations of the following: melodic rhythm (quarter-, eighth-, half-notes); grade (one, three, five); group (experimental, control), and test (pre, post). For example:

1. Quarter-note, grade one, experimental, pretest
2. Quarter-note, grade one, control, pretest
3. Quarter-note, grade one, experimental, posttest
4. Quarter-note, grade one, control, posttest

Three-way analyses of variance tested significance for sex by group by pretest, and grade by group by pretest comparisons for the total population. The same analyses were performed on data from each grade. Analyses of this data will be discussed in greater detail in Chapter V.

CHAPTER V

RESULTS

Three types of analyses were performed in this study. First, a series of test item analyses examined: 1. how specific meters were perceived; 2. whether experimental group subjects improved in their recognition of specific meters after a period of intervention, and; 3. whether a ranking of test items, meter types and melodic rhythm types produced patterns indicative of learning difficulty. Next, a correlation was performed on pre- and posttest data to ascertain test consistency. Finally, a three-way analysis of variance tested significance for sex by group by pretest and grade by group by pretest comparisons for both the total sample and each of the three grade samples. These three anaylses will be reported and discussed below.

Test item analysis

Tables 4 through 11 illustrate the proportion of subjects answering the test items as perceived. These tables report total sample, grades one, three, and five results and show experimental and control group patterns. Test items are grouped by meter; the type of note constituting the items' melodic rhythm is illustrated. When students were unsure of an answer, they were asked to circle a "?" on the response sheet rather than guessing; the proportion of these responses are illustrated in the column entitled "unsure response". Asterisks are shown above the mean scores of each meter category and indicate the correct response.

Over all, the proportion of subjects responding correctly on each item in both the pre- and the posttest was small or moderate. In most instances correct responses were made by no more than forty to sixty percent of the samples, though in some cases proportions in the order of 0.80 to 0.90 were recorded. This should be kept in mind, especially when reviewing the section on separate grades, when sample size was small.

Tables 4 and 5 show the manner in which the total sample responded to the meter test. A comparison of experimental pretest and control pre- and posttest results for the $\frac{2}{4}$ items indicate that items 3 (𝅗𝅥) and 10 (♪) were most easily discernible. Item 5 (♩) was most frequently preceived as $\frac{3}{4}$ on the pretests and item 12 (♩) was confused with $\frac{3}{4}$ or $\frac{5}{4}$ meter. Experimental subjects correctly answered all of the $\frac{2}{4}$ items on the posttest. A slightly higher proportion of control subjects answered the posttest items 5 (♩) and 10 (♪) than shown in the pretest, but there was a decrease in the proportion on items 3 (𝅗𝅥) and 12 (♩).

A consistent pattern was evident in the experimental pretest and control pre- and posttest results for the $\frac{3}{4}$ meter tiems: Items 1 (𝅗𝅥) and 9 (♩) appeared to be easily discriminated, while items 2 (♩) and 6 (♪) appeared to be consistently perceived as $\frac{5}{4}$. Experimental subjects apparently rectified the incorrect responses on the posttest [with one split on item 2 (♩)], while the control subjects continued to perceive items 2 (♩) and 6 (♪) as $\frac{5}{4}$.

Of the $\frac{5}{4}$ items, number 4 (𝅗𝅥.) appeared to be easily recognizable in all cases. All other items [except in one case on 8 (♩)] indicated confusion between $\frac{3}{4}$ and $\frac{5}{4}$ on the experimental pretest and the control pre- and posttests. A greater proportion of both experimental and control group subjects answered correctly on the posttest item 11 (𝅗𝅥), however, items 8 (♩) and 7 (♪) continued to cause apparent confusion.

The relatively large size of the total sample appears to explain these

Table 4

The Distribution of the Perceptions of the Total Sample
(Experimental Subjects Only, N=70).

VARIABLES			PRETEST				POSTTEST			
Meter	Item	Note Type	2/4	3/4	5/4	Unsure Response	2/4	3/4	5/4	Unsure Response
2/4	3	𝅗𝅥	.61	.14	.16	.09	.73	.13	.06	.09
	5	♩	.26	.43	.19	.13	.46	.29	.17	.09
	12	♩	.30	.23	.37	.10	.46	.21	.26	.07
	10	♪	.31	.27	.30	.11	.59	.23	.16	.03
			*				*			
	X̄		.37	.27	.26	.11	.56	.22	.16	.07
3/4	1	𝅗𝅥	.03	.94	.03	.00	.11	.84	.01	.03
	2	♩	.06	.23	.63	.09	.20	.37	.37	.06
	9	♩	.07	.64	.24	.04	.16	.60	.21	[illegible]3
	6	♪	.11	.16	.57	.16	.16	.40	.34	.10
				*				*		
	X̄		.07	.49	.37	.07	.16	.55	.34	.06
5/4	11	𝅗𝅥	.10	.40	.39	.10	.07	.39	.49	.06
	4	♩	.09	.16	.69	.07	.10	.23	.63	.04
	8	♩	.09	.47	.40	.04	.16	.40	.41	.03
	7	♪	.21	.33	.34	.11	.23	.36	.36	.04
					*				*	
	X̄		.12	.34	.46	.08	.14	.35	.48	.04

Table 5

The Distribution of the Perceptions of the Total Sample (Control Subjects Only, N=70).

VARIABLES			PRETEST				POSTTEST			
Meter	Item	Note Type	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{5}{4}$	Unsure Response	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{5}{4}$	Unsure Response
	3	𝅗𝅥	.69	.04	.17	.09	.60	.14	.17	.04
$\frac{2}{4}$	5	♩	.20	.53	.13	.13	.36	.31	.23	.10
	12	♩	.30	.36	.33	.01	.26	.40	.26	.09
	10	♪	.40	.23	.36	.00	.54	.19	.24	.03
			*				*			
	$\bar{X}$		.40	.29	.25	.06	.44	.26	.23	.08
	1	𝅗𝅥	.01	.91	.04	.03	.04	.91	.04	.00
$\frac{3}{4}$	2	♩	.09	.13	.63	.16	.20	.24	.50	.06
	9	♩	.13	.56	.29	.03	.09	.61	.27	.03
	6	♪	.04	.17	.64	.13	.16	.27	.46	.11
				*				*		
	$\bar{X}$		.07	.44	.40	.09	.12	.51	.32	.05
	11	𝅗𝅥	.04	.43	.46	.07	.07	.39	.49	.06
$\frac{5}{4}$	4	♩	.14	.19	.66	.01	.19	.16	.61	.04
	8	♩	.06	.49	.39	.07	.13	.39	.44	.04
	7	♪	.26	.21	.50	.03	.24	.34	.39	.03
					*				*	
	$\bar{X}$		.10	.33	.50	.05	.16	.32	.48	.04

rather consistent results. When the sample was divided into grades (with N's averaging 23) some test item inconsistencies appeared. In addition to the smaller N's, test item inconsistencies may have resulted from larger gradations of individual subjects' prior musical experiences or competencies, thus affecting their perceptions of the music. Analyses of test items by grades are discussed below.

Tables 6 and 7 show the response patterns for the grade one sample. Experimental pretest and control pre- and posttest results for the $\frac{2}{4}$ items indicate that item 3 (𝅗𝅥) was quite easily discernible. The proportions on the pretest appear to indicate a feeling for $\frac{3}{4}$ on item 5 (♩), a split between $\frac{3}{4}$ and $\frac{5}{4}$ on item 12 (♩), and no consistent pattern was shown for item 10 (♪). Experimental subjects had little difficulty discerning the $\frac{2}{4}$ items on the posttest, and the proportion of correct answers was high on items 5 (♩), 12 (♩), 10 (♪) and 3 (♩). Although the control group corrected items 5 (♩) and 10 (♪), they continued to show confusion on item 12 (♩).

Of the $\frac{3}{4}$ items, 1 (♩) and 9 (♩) appeared to be easy. Item 6 (♪) was perceived as $\frac{5}{4}$ on the pretest; on the posttest, the experimental group was split between $\frac{3}{4}$ and $\frac{5}{4}$ and the control group showed more apparent confusion. A large proportion of the control subjects answered item 2 (♩) as "unsure" and the experimental pretest and control posttest results showed an inclination toward $\frac{5}{4}$. A larger proportion of the experimental subjects correctly perceived three of the $\frac{3}{4}$ items on the posttest and were split on item 6 (♪). The control group continued to perceive item 2 (♩) as $\frac{5}{4}$ and showed apparent confusion on item 6 (♪).

Both experimental and control group subjects perceived the $\frac{5}{4}$ item 7 (♪) as $\frac{3}{4}$ on the pretest. Both groups were split between $\frac{3}{4}$ and $\frac{5}{4}$ on the

Table 6

The Distribution of the Perceptions of the Grade One Sample
(Experimental Subjects Only, N=23).

VARIABLES			PRETEST				POSTTEST			
Meter	Item	Note Type	2/4	3/4	5/4	Unsure Response	2/4	3/4	5/4	Unsure Response
2/4	3	𝅗𝅥	.52	.13	.17	.17	.52	.26	.09	.13
	5	♩	.22	.43	.26	.09	.43	.30	.17	.09
	12	♩	.22	.30	.35	.13	.39	.26	.26	.09
	10	♪	.17*	.43	.26	.13	.43*	.30	.17	.09
	X̄		.28	.32	.26	.13	.44	.21	.17	.10
3/4	1	𝅗𝅥	.04	.91	.04	.00	.30	.61	.04	.04
	2	♩	.04	.26	.52	.17	.26	.39	.30	.04
	9	♩.	.04	.57	.26	.13	.26	.52	.17	.04
	6	♪	.13	.17*	.48	.22	.04	.39*	.39	.17
	X̄		.22	.48	.22	.07	.06	.48	.33	.13
5/4	11	𝅗𝅥	.13	.35	.39	.13	.17	.26	.48	.09
	4	♩	.17	.39	.30	.13	.09	.04	.70	.17
	8	♩	.13	.39	.43	.04	.09	.48	.39	.04
	7	♪	.22	.48	.26*	.04	.22	.35	.30*	.13
	X̄		.16	.40	.35	.09	.14	.28	.47	.11

Table 7

The Distribution of the Perceptions of the Grade One Sample
(Control Subjects Only, N=23).

VARIABLES			PRETEST				POSTTEST			
Meter	Item	Note Type	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{5}{4}$	Unsure Response	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{5}{4}$	Unsure Response
$\frac{2}{4}$	3	𝅗𝅥	.61	.09	.13	.13	.43	.17	.26	.13
	5	♩	.13	.52	.09	.22	.35	.26	.17	.22
	12	♩	.35	.35	.30	.00	.35	.39	.13	.13
	10	♪	.26	.30	.43	.00	.43	.22	.26	.09
			*				*			
	X̄		.34	.32	.24	.09	.39	.26	.21	.14
$\frac{3}{4}$	1	𝅗𝅥	.04	.78	.09	.09	.13	.87	.00	.00
	2	♩	.13	.22	.17	.48	.17	.26	.39	.17
	9	♩	.17	.61	.17	.04	.13	.48	.35	.04
	6	♪	.04	.13	.70	.09	.22	.22	.30	.26
				*				*		
	X̄		.10	.44	.28	.18	.16	.46	.26	.06
$\frac{5}{4}$	11	𝅗𝅥	.17	.26	.43	.13	.09	.35	.52	.04
	4	♩	.35	.22	.35	.09	.22	.26	.48	.04
	8	♩	.26	.35	.26	.13	.09	.26	.43	.22
	7	♪	.26	.43	.22	.09	.26	.30	.39	.04
					*				*	
	X̄		.26	.32	.32	.11	.17	.29	.46	.09

posttest. Item 11 (𝅗𝅥) appeared to be relatively easy in all cases. Items 4 (♩) and 8 (♩) were consistently split on the pretest. A much larger proportion of the experimental subjects corrected their response on the posttest than did the control for item 4 (♩). Item 8 (♩) continued to be perceived as $\frac{3}{4}$ by the experimental subjects.

Of the three meters, the experimental group had larger proportions of correct answers on both $\frac{2}{4}$ and $\frac{3}{4}$ items, and showed no difference (.47, .46) from the control on the $\frac{5}{4}$ items.

The manner in which grade 3 subjects perceived the meter in the pretest and posttest items is shown in tables 8 and 9. Of the $\frac{2}{4}$ items, 3 (♩) and 10 (♪) were quite easily discriminated in all cases. Item 12 (♩) was perceived as $\frac{5}{4}$ by both groups on the pretest. On the posttest, this was corrected by the experimental subjects; the control subjects were split between $\frac{3}{4}$ and $\frac{5}{4}$. Pretest proportions indicate some confusion between $\frac{2}{4}$ and $\frac{3}{4}$ for item 5 (♩) for both groups. This was rectified somewhat on the posttest.

The experimental subjects had no difficulty discriminating any of the $\frac{2}{4}$ items on the posttest and a larger proportion of experimental subjects answered correctly than did the control. Item 12 (𝅗𝅥) showed a split between $\frac{3}{4}$ and $\frac{5}{4}$ on the control posttest.

$\frac{3}{4}$ items 1 (𝅗𝅥) and 9 (♩) appeared to be easily discernable for both groups on both pre- and posttests (proportions in the order of 0.95). Items 2 (♩) and 6 (♪) were perceived as $\frac{5}{4}$.

Item 8 (♩) of the $\frac{5}{4}$ items was more consistently perceived as $\frac{3}{4}$ by both groups on both pre- and posttests. Although more control than experimental subjects perceived item 11 (𝅗𝅥) accurately on the pretest, both groups

Table 8

The Distribution of the Perceptions of the Grade Three Sample
(Experimental Subjects Only, N=21).

VARIABLES			PRETEST				POSTTEST			
Meter	Item	Note Type	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{5}{4}$	Unsure Response	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{5}{4}$	Unsure Response
	3	𝅗𝅥	.62	.19	.14	.05	.86	.00	.10	.05
$\frac{2}{4}$	5	♩	.43	.33	.19	.05	.52	.24	.19	.05
	12	♩	.29	.14	.48	.10	.48	.14	.33	.05
	10	♪	.52	.19	.24	.05	.71	.05	.24	.00
			*				*			
	$\bar{X}$		.47	.21	.26	.62	.64	.11	.22	.04
	1	𝅗𝅥	.05	.90	.05	.00	.05	.95	.00	.00
$\frac{3}{4}$	2	♩	.05	.24	.71	.00	.19	.29	.43	.10
	9	♩	.00	.71	.29	.00	.14	.71	.14	.00
	6	♪	.19	.19	.43	.19	.38	.24	.33	.05
				*				*		
	$\bar{X}$		.07	.51	.37	.05	.19	.55	.23	.04
	11	𝅗𝅥	.05	.52	.29	.10	.05	.48	.43	.05
$\frac{5}{4}$	4	♩	.14	.24	.62	.00	.05	.29	.67	.00
	8	♩	.14	.43	.33	.10	.24	.43	.29	.05
	7	♪	.24	.29	.38	.10	.24	.29	.38	.10
					*				*	
	$\bar{X}$		.14	.37	.41	.08	.05	.15	.37	.44

Table 9

The Distribution of the Perceptions of the Grade Three Sample (Control Subjects Only, N=22).

VARIABLES			PRETEST				POSTTEST			
Meter	Item	Note Type	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{5}{4}$	Unsure Response	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{5}{4}$	Unsure Response
	3	𝅗𝅥	.68	.05	.23	.05	.55	.18	.14	.14
$\frac{2}{4}$	5	♩	.32	.45	.14	.09	.45	.23	.27	.05
	12	♩	.27	.23	.45	.05	.14	.36	.36	.14
	10	♪	.45	.23	.27	.00	.45	.23	.32	.00
			*				*			
	$\bar{X}$		.43	.24	.27	.05	.40	.25	.27	.06
	1	𝅗𝅥	.00	.95	.05	.00	.00	.91	.09	.00
$\frac{3}{4}$	2	♩	.09	.14	.77	.00	.18	.18	.64	.00
	9	♩	.09	.59	.27	.05	.05	.68	.23	.05
	6	♪	.09	.18	.64	.09	.14	.14	.68	.05
				*				*		
	$\bar{X}$		.07	.47	.43	.04	.09	.48	.41	.03
	11	𝅗𝅥	.05	.36	.55	.05	.05	.50	.45	.00
$\frac{5}{4}$	4	♩	.14	.18	.68	.00	.23	.09	.68	.00
	8	♩	.09	.59	.32	.00	.09	.50	.41	.00
	7	♪	.27	.23	.45	.05	.14	.36	.50	.00
					*				*	
	$\bar{X}$		.14	.34	.50	.03	.13	.36	.51	.00

answered $\frac{3}{4}$ on the posttest. Items 4 (♩) and 7 (♪) were easily discriminated by both groups on both tests, and a higher proportion of the control subjects were correct.

A greater proportion of the experimental subjects answered the $\frac{2}{4}$ items correctly than did the control subjects; the reverse was true for the $\frac{3}{4}$ and $\frac{5}{4}$ items. These unusual results may be partly attributed to some of the grade three control subjects' curiosity about the study. Although experimental subjects were made aware of possible test result biasing which may be caused by discussing intervention activities with students outside the group, many of the experimental subjects from one school felt privileged to participate in the study and were occasionally overheard discussing what they had done. By chance, many of the experimental subjects were "high status" students, and their feedback may have influenced control subjects' performance. Such an effect was not obvious with grade one and five subjects.

Tables 10 and 11 refer to the responses of the grade five subjects. Results of the experimental pretest and control pretest and posttest indicate that $\frac{2}{4}$ items 3 (♩) and, in most cases, 10 (♪) were relatively easy. Item 5 (♩) was consistently preceived as $\frac{3}{4}$; although item 12 (♩) was confusing for experimental subjects on the pretest only, it was consistently perceived as $\frac{3}{4}$ on the control pre- and posttests.

Experimental subjects accurately answered all of the $\frac{2}{4}$ items on the posttest, while control subjects continued to perceive items 5 (♩) and 12 (♩) as $\frac{3}{4}$.

$\frac{3}{4}$ items 1 (𝅗𝅥) and 9 (♩) were consistently discriminated with relative ease in all cases. Analysis of experimental and control pretests show a

Table 10

The Distribution of the Perceptions of the Grade Five Sample (Experimental Subjects Only, N=25).

VARIABLES			PRETEST				POSTTEST			
Meter	Item	Note Type	2/4	3/4	5/4	Unsure Response	2/4	3/4	5/4	Unsure Response
2/4	3		.69	.12	.15	.04	.81	.12	.00	.08
	5		.15	.50	.12	.23	.42	.31	.15	.12
	12		.38	.23	.31	.08	.50	.23	.19	.08
	10		.27	.19	.38	.15	.62	.31	.08	.00
			*				*			
	$\overline{X}$		.37	.26	.24	.13	.59	.24	.11	.07
3/4	1		.00	1.00	.00	.00	.00	.96	.00	.04
	2		.08	.19	.65	.08	.15	.42	.38	.04
	9		.15	.65	.19	.00	.08	.58	.31	.04
	6		.04	.12	.77	.08	.08	.54	.31	.08
				*				*		
	$\overline{X}$		.07	.49	.40	.04	.08	.63	.25	.05
5/4	11		.08	.42	.38	.12	.04	.35	.62	.00
	4		.04	.19	.73	.04	.08	.04	.88	.00
	8		.04	.50	.46	.00	.12	.38	.50	.00
	7		.19	.35	.35	.12	.23	.31	.42	.00
					*				*	
	$\overline{X}$		.09	.37	.48	.07	.12	.27	.61	.00

Table 11

The Distribution of the Perceptions of the Grade Five Sample
(Control Subjects Only, N=26).

VARIABLES			PRETEST				POSTTEST			
Meter	Item	Note Type	2/4	3/4	5/4	Unsure Response	2/4	3/4	5/4	Unsure Response
2/4	3		.76	.00	.16	.08	.80	.08	.12	.00
	5		.16	.60	.16	.08	.28	.44	.24	.04
	12		.28	.48	.24	.00	.28	.44	.28	.00
	10		.48	.16	.36	.00	.72	.12	.16	.00
			*				*			
	$\bar{X}$		.42	.31	.23	.04	.52	.27	.20	.01
3/4	1		.00	1.00	.00	.00	.00	.96	.04	.00
	2		.04	.04	.92	.00	.24	.28	.48	.00
	9		.12	.48	.40	.00	.08	.68	.24	.00
	6		.00	.20	.60	.20	.12	.44	.40	.04
				*				*		
	$\bar{X}$		.04	.43	.48	.05	.11	.59	.29	.01
5/4	11		.00	.56	.32	.12	.00	.40	.56	.04
	4		.08	.12	.80	.00	.00	.16	.80	.04
	8		.00	.60	.40	.00	.04	.32	.64	.00
	7		.24	.12	.64	.00	.32	.24	.44	.00
					*				*	
	$\bar{X}$		.08	.35	.54	.03	.09	.28	.61	.02

much higher proportion of subjects perceiving items 2 (♩) and 6 (♪) as 5/4. Experimental subjects discerned all of the 3/4 items on the posttest, while the control continued to perceive item 2 (♩) as 5/4, and only marginally corrected item 6 (♪).

Pretest results for 5/4 items show the following patterns. Items 11 (♩) and 8 (♩) were perceived as 3/4, item 4 (♩) was correctly perceived, and item 7 (♪) was split between 3/4 and 5/4 by the experimental subjects and perceived accurately by the control subjects. Posttest results indicate that a higher proportion of both experimental and control group subjects were able to accurately perceive all of the 5/4 items.

A summary of grade five results indicate that experimental subjects accurately discriminated all posttest items for all three meters. Control subjects accurately perceived approximately half of the 2/4 and 3/4 items and all of the 5/4 items on the posttest.

Summary

Table 12 provides a summary of item analyses tables 4 through 11. The "meter" column in the far left indicates the meter which was to have been discriminated. All other meter markings show how the meter was actually perceived. Dashes (-) indicate that the meter was accurately perceived on either the pretest or posttest. Question marks (?) indicate splits in the results.

Other than occasions where there were splits in the results, all but one (experimental posttest item 6) of the incorrect responses in the 3/4 items were perceived as 5/4 and all incorrect 5/4 responses were perceived as 3/4. Except for one 2/4 item [5 (♩)], which was incorrectly perceived as 3/4, such consistency was not evident in the other two items, [items 12 (♩) and 10 (♪)

Table 12

A Summary Table Showing the Major Perceptions on the Meter Discrimination Test for Grades One, Three and Five Samples (Condensed from Tables 4 through 11).

VARIABLES			GRADE ONE				GRADE THREE				GRADE FIVE			
			Experimental		Control		Experimental		Control		Experimental		Control	
Meter	Item	Note Type	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
	3		-	-	-	-	-	-	-	-	-	-	-	-
	5		3/4	-	3/4	-	-	-	3/4	-	3/4	-	3/4	3/4
	12		5/4	-	?	3/4	5/4	-	5/4	?	-	-	3/4	3/4
	10		3/4	-	5/4	-	-	-	-	-	5/4	-	-	-
	1		-	-	-	-	-	-	-	-	-	-	-	-
	2		5/4	-	-	5/4	5/4	5/4	5/4	5/4	5/4	-	5/4	5/4
	9		-	-	-	-	-	-	-	-	-	-	-	-
	6		5/4	?	5/4	5/4	5/4	2/4	5/4	5/4	5/4	-	5/4	-
	11		-	-	-	-	3/4	3/4	-	3/4	3/4	-	3/4	-
	4		3/4	-	?	-	-	-	-	-	-	-	-	-
	8		-	3/4	3/4	-	3/4	3/4	3/4	3/4	3/4	-	3/4	-
	7		3/4	3/4	3/4	-	-	-	-	-	-	-	-	-

were incorrectly perceived both as $\frac{3}{4}$ and $\frac{5}{4}$].

More subjects had difficulty correctly answering $\frac{3}{4}$ items 2 (♩) and 6 (♪) and $\frac{5}{4}$ item 8 (♩). $\frac{2}{4}$ items 5 (♩) and 12 (♩) produced scattered effects, making it difficult to generalize. Items which were accurately perceived on both pre- and posttests were:

$\frac{2}{4}$	item 10 (♪)	-	grade three
$\frac{2}{4}$	item 3 (𝅗𝅥)	-	all grades
$\frac{3}{4}$	item 1 (𝅗𝅥)	-	all grades
$\frac{3}{4}$	item 9 (♩)	-	all grades
$\frac{5}{4}$	item 11 (𝅗𝅥)	-	grade one
$\frac{5}{4}$	item 7 (♪)	-	grades three and five
$\frac{5}{4}$	item 4 (♩)	-	grades three and five

Ranking of test items

Tables 13, 14 and 15 give a further summary of test item results through the examination of how their correct response proportions ranked according to difficulty. Pretest scores were averaged for the total sample and for each grade. Results of these tables are discussed below.

Table 13 illustrates the ranking of the proportion of correct responses for all test items. In most cases, when ordered according to difficulty, test items were in fairly close proximity. The "total sample" column gives an overall discription of the averaging of the difficulty ranking for the grade one, three and five samples. Although Table 13 gives a discriptive overview of the test items *per se* it is difficult to make generalizations about meter and melodic rhythm types when illustrated in this format.

Table 13

Ranking of Test Items, Based on Pretest Proportions of Correct Responses (Prop.) for Total Sample, and Grades One, Three and Five.

TOTAL SAMPLE				GRADE ONE				GRADE THREE				GRADE FIVE			
Item	Meter	Type	Prop.	Item	Meter	Type	Prop.	Item	Meter	Type	Prop.	Item	Meter	Type	Prop.
1	3/4	𝅗𝅥	.93	1	3/4	𝅗𝅥	.86	1	3/4	𝅗𝅥	.93	1	3/4	𝅗𝅥	1.00
4	5/4	♩	.68	4	5/4	♩	.59	4	5/4	♩	.65	4	5/4	♩	.76
3	2/4	𝅗𝅥	.65	9	3/4	♩	.59	9	3/4	♩	.65	3	2/4	𝅗𝅥	.73
9	3/4	♩	.60	3	2/4	𝅗𝅥	.57	3	2/4	𝅗𝅥	.65	7	5/4	♪	.51
11	5/4	𝅗𝅥	.43	11	5/4	𝅗𝅥	.50	10	2/4	♪	.49	8	5/4	♩	.43
7	5/4	♪	.42	8	5/4	♩	.42	11	5/4	𝅗𝅥	.42	10	2/4	♪	.37
8	5/4	♩	.40	7	5/4	♪	.35	7	5/4	♪	.42	9	3/4	♩	.35
10	2/4	♪	.36	12	2/4	♩	.29	5	2/4	♩	.37	11	5/4	𝅗𝅥	.35
12	2/4	♩	.30	2	3/4	♩	.24	8	5/4	♩	.32	12	2/4	♩	.33
5	2/4	♩	.23	10	2/4	♪	.22	12	2/4	♩	.28	5	2/4	♩	.16
2	3/4	♩	.18	5	2/4	♩	.18	2	3/4	♩	.19	6	3/4	♪	.16
6	3/4	♪	.17	6	3/4	♪	.15	6	3/4	♪	.19	2	3/4	♩	.12

Table 14 illustrates the ranking of test item difficulty according to melodic rhythm. Half-note melodic rhythm test items show identical test item rankings for all grades, and the proportion of students answering correctly is higher than for quarter- and eighth-note items. Most of the quarter- and eighth-note melodic rhythm test items were in close proximity in position of ranking. The total sample column shows an averaging of difficulty ordering. It appears that quarter-note items were second easiest and eighth-note items were most difficult. Implications for these melodic rhythm results will be discussed in Chapter VI.

Meter type items were ranked according to difficulty and are illustrated in Table 15. Grade one subjects found the $\frac{5}{4}$ and $\frac{3}{4}$ items to be approximately equally easy and $\frac{2}{4}$ items more difficult. Although the results of the grade three sample show fairly equal meter rankings, $\frac{3}{4}$ items were slightly easier, followed by $\frac{5}{4}$ and $\frac{2}{4}$. Grade five subjects ranked the $\frac{5}{4}$ items easiest, and the $\frac{3}{4}$ and $\frac{2}{4}$ items hardest. The average ranking of meter difficulty is illustrated in the "total sample" column as $\frac{5}{4}$ (easiest), $\frac{3}{4}$ (slightly more difficult), and $\frac{2}{4}$ (most difficult). Implications of these meter difficulty results will be discussed in Chapter VI.

Analyses of test item results give an indication of how subjects performed when their scores were grouped. These groupings show that test item proportions illustrate relatively consistent results. However, inconsistencies may arise between pre- and posttest results when each individual's scores are compared. Test consistency was examined by correlating pre- and posttest results for subjects in grades one, three, and five, results of which are illustrated in Table 16 below.

Table 14

Ranking of Melodic Rhythm, Based on Pretest Proportions of Correct Responses (Prop.) for Total Sample, and Grades One, Three and Five.

TOTAL SAMPLE				GRADE ONE				GRADE THREE				GRADE FIVE			
Item	Meter	Type	Prop.	Item	Meter	Type	Prop.	Item	Meter	Type	Prop.	Item	Meter	Type	Prop.
1	3/4	𝅗𝅥	.93	1	3/4	𝅗𝅥	.86	1	3/4	𝅗𝅥	.93	1	3/4	𝅗𝅥	1.00
3	2/4	𝅗𝅥	.65	3	2/4	𝅗𝅥	.57	3	2/4	𝅗𝅥	.65	3	2/4	𝅗𝅥	.73
11	5/4	𝅗𝅥	.43	11	5/4	𝅗𝅥	.50	11	5/4	𝅗𝅥	.42	11	5/4	𝅗𝅥	.35
	.67 =	𝅗𝅥			.64 =	𝅗𝅥			.67 =	𝅗𝅥			.69 =	𝅗𝅥	
4	5/4	♩	.68	4	5/4	♩	.59	9	3/4	♩	.65	4	5/4	♩	.76
9	3/4	♩	.60	9	3/4	♩	.59	4	5/4	♩	.65	8	5/4	♩	.43
8	5/4	♩	.40	8	5/4	♩	.42	5	2/4	♩	.37	9	3/4	♩	.35
12	2/4	♩	.30	12	2/4	♩	.29	8	5/4	♩	.33	12	2/4	♩	.33
5	2/4	♩	.23	2	3/4	♩	.24	12	2/4	♩	.28	5	2/4	♩	.16
2	3/4	♩	.18	5	2/4	♩	.18	2	3/4	♩	.19	2	3/4	♩	.12
	.40 =	♩			.39 =	♩			.41 =				.36 =	♩	
7	5/4	♪	.42	7	3/4	♪	.35	10	2/4	♪	.49	7	5/4	♪	.51
10	2/4	♪	.36	10	2/4	♪	.22	7	5/4	♪	.42	10	2/4	♪	.37
6	3/4	♪	.17	6	3/4	♪	.15	6	3/4	♪	.19	6	3/4	♪	.16
	.32 =	♪			.24 =	♪			.37 =	♪			.35 =	♪	

Table 15

Ranking of Meter, Based on Pretest Proportions of Correct Responses (Prop.) for Total Sample, and Grades One, Three and Five.

TOTAL SAMPLE				GRADE ONE				GRADE THREE				GRADE FIVE			
Item	Meter	Type	Prop.	Item	Meter	Type	Prop.	Item	Meter	Type	Prop.	Item	Meter	Type	Prop.
4	$\frac{5}{4}$		.68	4	$\frac{5}{4}$		.59	1	$\frac{3}{4}$		.93	4	$\frac{5}{4}$		.76
11	$\frac{5}{4}$		.43	11	$\frac{5}{4}$		.50	9	$\frac{3}{4}$		.65	7	$\frac{5}{4}$		.51
7	$\frac{5}{4}$		.42	8	$\frac{5}{4}$		.42	2	$\frac{3}{4}$		.19	8	$\frac{5}{4}$		.43
8	$\frac{5}{4}$		.40	7	$\frac{5}{4}$		.35	6	$\frac{3}{4}$		.19	11	$\frac{5}{4}$		.35
	.48 = $\frac{5}{4}$				.47 = $\frac{5}{4}$				.49 = $\frac{3}{4}$				.51 = $\frac{5}{4}$		
1	$\frac{3}{4}$		.93	1	$\frac{3}{4}$		.86	4	$\frac{5}{4}$		.65	1	$\frac{3}{4}$		1.00
9	$\frac{3}{4}$		.60	9	$\frac{3}{4}$		.59	11	$\frac{5}{4}$		.42	9	$\frac{3}{4}$		.35
2	$\frac{3}{4}$		.18	2	$\frac{3}{4}$		.24	7	$\frac{5}{4}$		.42	6	$\frac{3}{4}$		.16
6	$\frac{3}{4}$		.17	6	$\frac{3}{4}$		.15	8	$\frac{5}{4}$		.33	2	$\frac{3}{4}$		.12
	.47 = $\frac{3}{4}$				.46 = $\frac{3}{4}$				.46 = $\frac{5}{4}$				.41 = $\frac{3}{4}$		
3	$\frac{2}{4}$		.65	3	$\frac{2}{4}$		.57	3	$\frac{2}{4}$		.65	3	$\frac{2}{4}$		.73
10	$\frac{2}{4}$		.36	12	$\frac{2}{4}$		.29	10	$\frac{2}{4}$		.49	10	$\frac{2}{4}$		.37
12	$\frac{2}{4}$		.30	10	$\frac{2}{4}$		.22	5	$\frac{2}{4}$		.37	12	$\frac{2}{4}$		.33
5	$\frac{2}{4}$		.23	5	$\frac{2}{4}$		.18	12	$\frac{2}{4}$		.28	5	$\frac{2}{4}$		.16
	.39 = $\frac{2}{4}$				.32 = $\frac{2}{4}$				.45 = $\frac{2}{4}$				.40 = $\frac{2}{4}$		

Table 16

Correlation Between Pretest and Posttest Total Scores for Subjects in Grades One, Three and Five.

GRADE	GROUP	
	Experimental	Control
One	0.724*	0.352
Three	0.376	0.191
Five	0.314	0.646*

* P<0.001

This check of test consistency indicates positive pre- and posttest correlations for the grade one experimental group and grade five control group. Preferably, all control groups should have shown positive correlations, as it was anticipated that no intervention would produce pre- and posttest consistency. Analysis of the raw data show unusual control posttest results: 1. grade one - many subjects did worse, and some made marginal improvement; 2. grade three - a relatively equal number of subjects either improved or dropped, and; 3. grade five - most subjects showed consistent, minimal improvement, and a few showed minimal drops.

It was anticipated that experimental results would show consistent improvement, consequently producing positive correlations. However, analysis of experimental pre- and posttest raw data scores show the following results: 1. grade one - all subjects showed consistently equal improvement or drop, and 2. grade three and five - most subjects showed good improvement, but there were a few drastic drops (average of three points).

These results appear to show questionable test reliability. Possible improvement for this test's reliability will be discussed in Chapter VI. Means and standard deviations for the grade one, three and five samples are illustrated in Table 17.

Table 17

Means and Standard Deviations for Experimental and Control Groups of the Grade One, Three and Five Samples.

GRADE	GROUP							
	Experimental				Control			
	Pretest		Posttest		Pretest		Posttest	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
One	4.91	1.95	5.09	2.13	4.87	1.78	4.65	2.01
Three	5.43	1.53	6.52	2.26	5.59	1.27	5.55	1.67
Five	5.39	1.78	7.23	2.12	5.56	1.70	6.84	2.01

Analysis of variance

A three-way analysis of variance was performed for sex (female, male) by group membership (experimental, control) by pretest score (high, medium, low) for the total sample. For the pretest versus posttest comparison, groups were split into three on the basis of pretest scores so that each subgroup (that is, high, medium, low) contained approximately 1/3 of the subjects in each grade. This division ensured near equal degrees of freedom, and that test score variance was homogeneous, thereby strengthening the power of the test.

Table 18 shows the sex by group by pretest analysis of variance. Only one significant result was found, namely, the pretest main effect. Figure 2 shows the plotted pre- and posttest means for the total sample high, medium and low groups.

The plotting appears to indicate that the significant result achieved in the analysis of variance was due to the performance increase in the low subgroup and, to some extent, the medium subgroup.

A similar analysis was performed for grade (one, three, five) by group membership (experimental, control) by pretest score (high, medium, low) on the total sample data. Table 19 shows the results of this grade by group by pretest analysis. Two significant results were found: the grade main effect, and; the pretest main effect.

Figure 3 shows the plotted pre- and posttest means for the total sample split by grades one, three and five. In this figure, it can be seen that the grade one and five samples both improved their test performance, while the grade three showed a slight decrement. The pretest main effect means were the same for this analysis as for the sex by group by pretest analysis of variance (see Figure 2).

Table 18

Summary Table for Analysis of Variance.
Sex (Female, Male) by Group (Experimental, Control) by Pretest (High, Medium, Low)
for the Total Sample.

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARES	F-RATIO	PROBABILITY	DECISION
Sex	7.925	1	7.925	1.737	1.737	N.S.
Group	6.329	1	6.329	1.387	0.241	N.S.
Sex/Group	0.047	1	0.045	0.010	0.920	N.S.
Pretest	52.092	2	26.046	5.707	0.004	SIG.
Group/Pretest	12.166	2	06.083	1.133	0.267	N.S.
Sex/Pretest	24.481	2	12.240	2.682	0.072	N.S.
Sex/Group/Pretest	12.271	2	6.136	1.344	0.264	N.S.
Errors	584.191	128	4.564			

Figure 3

Plotted Pre- and Posttest Means for the Total Sample High, Medium and Low Groups, Pretest Main Effect.

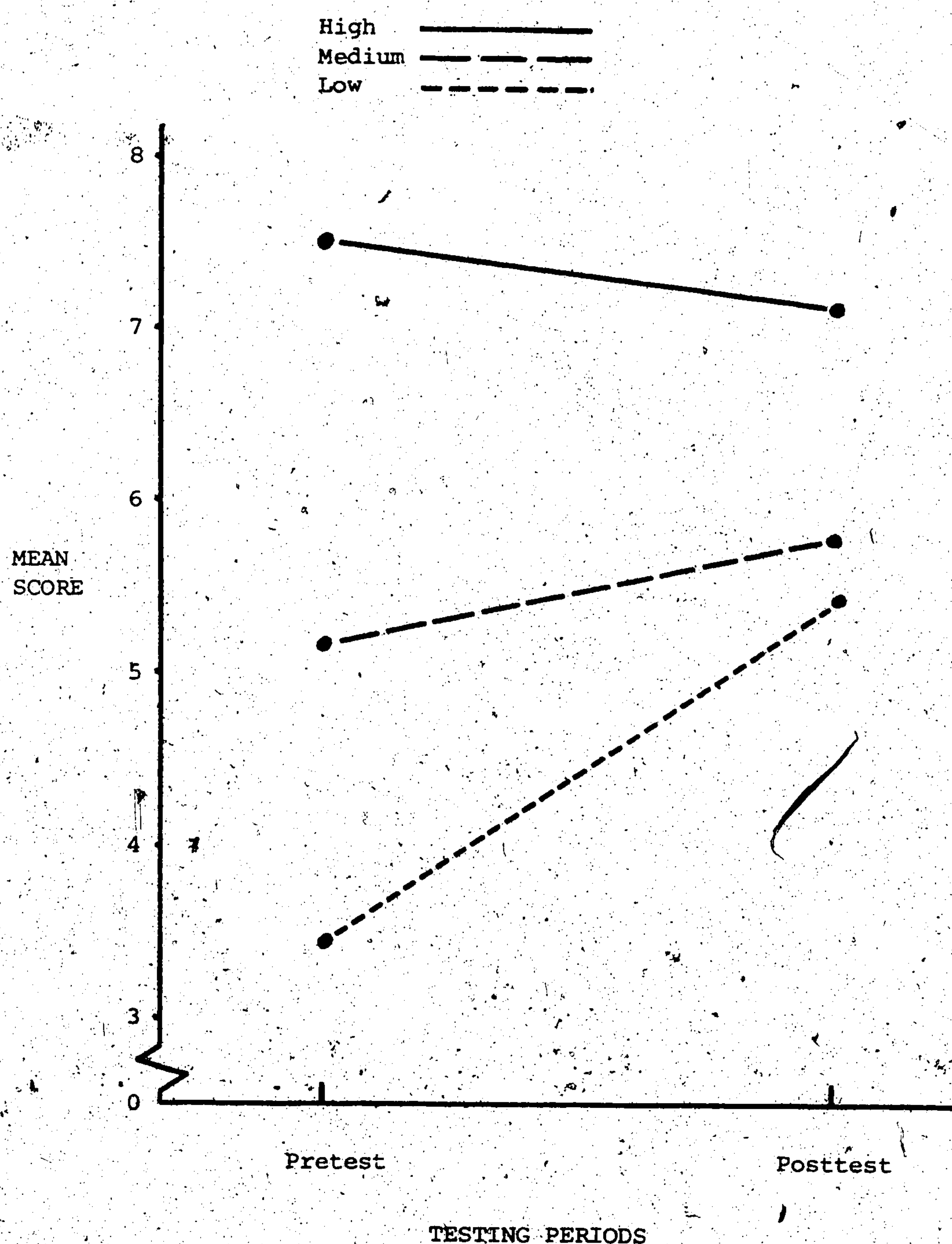


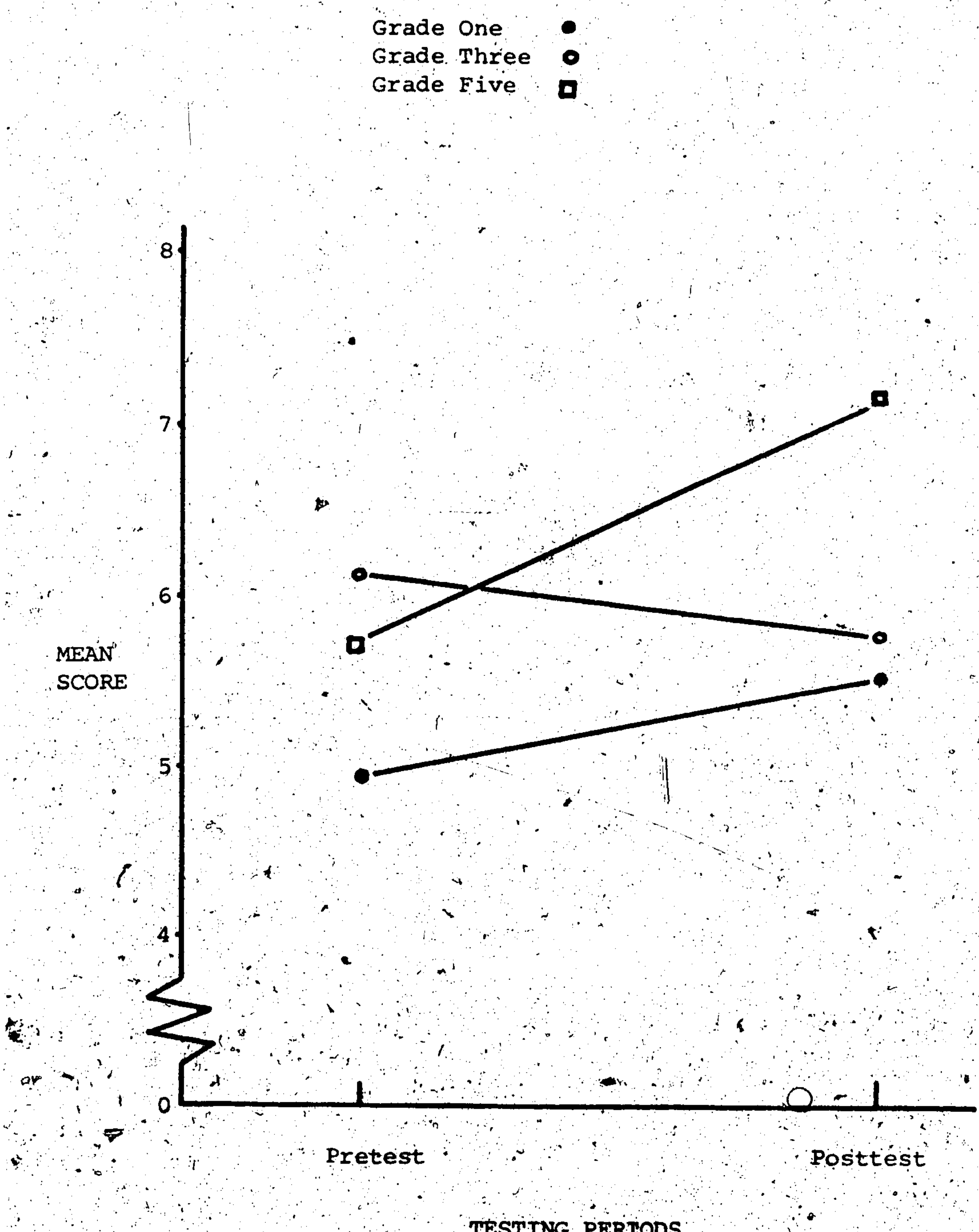
Table 19

Summary Table for Analysis of Variance.
Grade (One, Three, Five) by Group (Experimental, Control) by Pretest (High, Medium, Low)
for the Total Sample.

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARES	F-RATIO	PROBABILITY	DECISION
Grade	116.598	2	58.299	15.795	0.000	SIG.
Group	7.246	1	7.459	1.963	0.164	N.S.
Grade/Group	6.500	2	3.250	0.881	0.417	N.S.
Pretest	68.103	2	34.052	9.225	0.000	SIG.
Group/Pretest	17.219	2	8.610	2.333	0.101	N.S.
Grade/Pretest	16.163	4	4.408	1.095	0.362	N.S.
Grade/Group/Pretest	27.297	4	6.824	1.849	0.124	N.S.
Errors	450.313	122	3.691			

Figure 4

Plotted Pre- and Posttest Means for the Total Sample
Grade One, Three and Five,
Grade Main Effect.



Three-way analyses of variance were then performed for sex by group by pretest for each of the three grades. Table 20 shows the grade one analysis of variance.

The only significant result was on the pretest main effect. Figure 4 shows the plotting of the high, medium and low group means. In this figure, it can be seen that the low subgroup improved its test performance, while the medium and high subgroups showed some decrement.

Table 21 shows the analysis of variance for the grade three sample. Although an examination of the raw data showed some improvement in the posttest results, no significant differences were found in either main, or interaction effects.

In the analysis of variance for the grade five sample (Table 22), two significant results were found: sex main effect, and sex by pretest interaction effect. Figures 5 and 6 show the plotted pre- and posttest means for the grade five sex and sex by pretest results respectively.

An examination of Figure 6 shows the anomalous downward shift in the high, male group means. This may have been a result of a shift in interest or attitude, however, this was not apparent during the testing or intervention sessions.

Summary

The analysis of variance showed five significant results. A summary of these results are below:

1. Total sample	Pretest main effect
2. Total sample	Grade main effect
3. Grade one	Pretest main effect
4. Grade five	Sex main effect

Table 20

Summary Table for Analysis of Variance.
Sex (Female, Male) by Group (Experimental, Control) by Pretest (High, Medium, Low) for the Grade One Sample.

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARES	F-RATIO	PROBABILITY	DECISION
Sex	0.657	1	0.657	0.191	0.665	N.S.
Group	0.017	1	0.017	0.050	0.944	N.S.
Sex/Group	2.674	1	2.674	0.779	0.384	N.S.
Pretest	42.222	2	21.111	6.151	0.005	SIG.
Group/Pretest	13.812	2	6.906	2.012	0.149	N.S.
Sex/Pretest	5.987	2	2.994	0.872	0.427	N.S.
Sex/Group/Pretest	7.877	2	3.938	1.148	0.329	N.S.
Errors	116.692	34	3.432			

Figure 5

Plotted Pre- and Posttest Means for the Grade One Sample High, Medium and Low Groups, Pretest Main Effect.

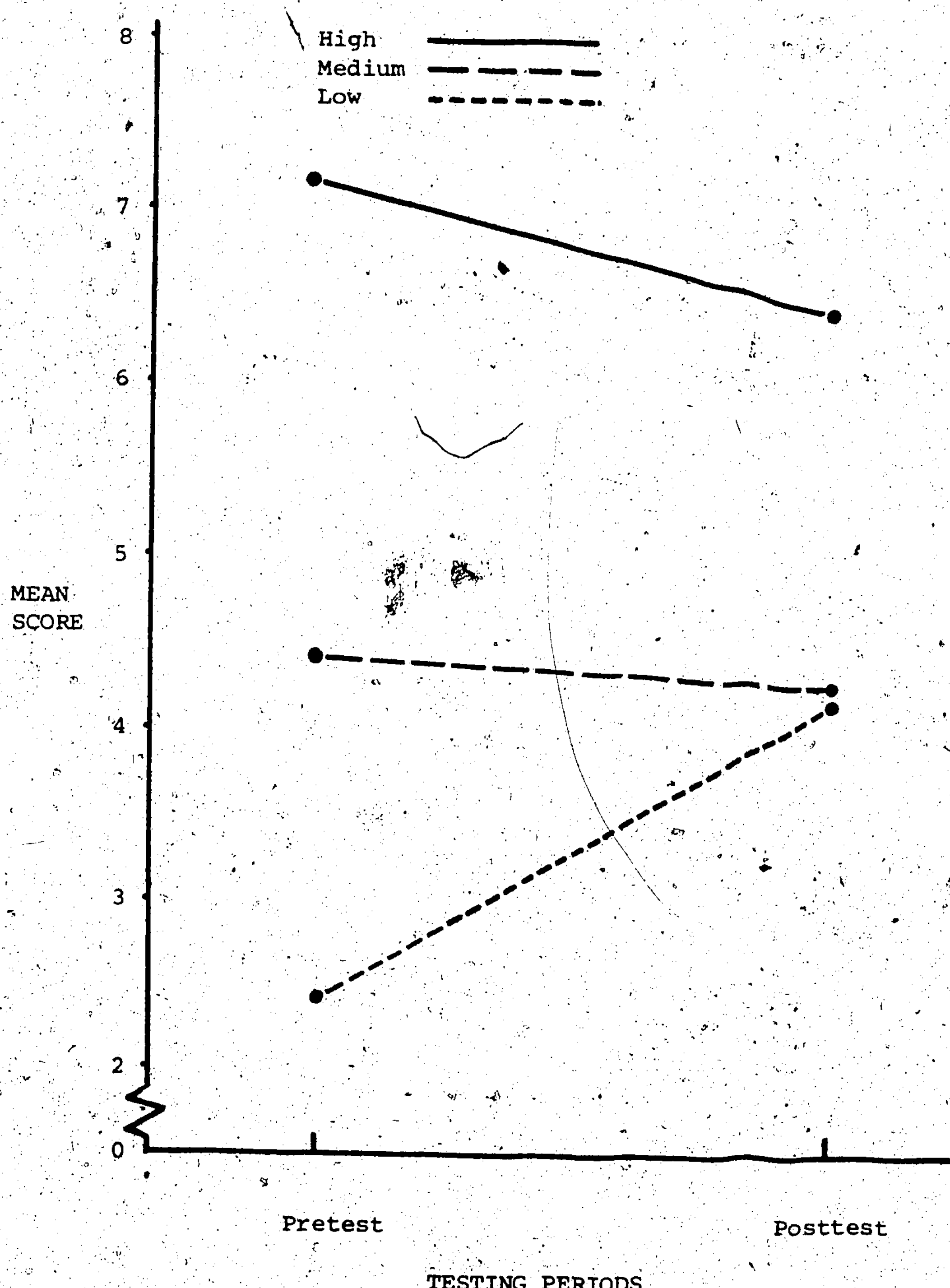


Table 21

Summary Table for Analysis of Variance.
Sex (Female, Male) by Group (Experimental, Control) by Pretest (High, Medium, Low) for the Grade Three Sample.

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARES	F-RATIO	PROBABILITY	DECISION
Sex	0.626	1	6.259	0.148	0.70[illegible]	N.S.
Group	8.712	1	8.712	2.064	0.161	N.S.
Sex/Group	0.626	1	0.626	0.148	0.703	N.S.
Pretest	13.109	2	6.554	1.553	0.228	N.S.
Group/Pretest	0.868	2	0.434	0.103	0.903	N.S.
Sex/Pretest	9.597	2	[illegible]	1.137	0.334	N.S.
Sex/Group/Pretest	6.887	2	[illegible]	0.816	0.452	N.S.
Errors	130.835	31	4.221			

Table 22

Summary Table for Analysis of Variance.
Sex (Female, Male) by Group (Experimental, Control) by Pretest (High, Medium, Low)
for the Grade Five Sample.

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARES	F-RATIO	PROBABILITY	DECISION
Sex	23.930	1	23.930	8.591	0.006	SIG.
Group	0.460	1	0.461	0.165	0.687	N.S.
Sex/Group	5.271	1	5.271	1.892	0.177	N.S.
Pretest	11.925	2	5.963	2.141	0.131	N.S.
Group/Pretest	17.228	2	8.614	3.092	0.057	N.S.
Sex/Pretest	27.778	2	13.889	4.986	0.012	SIG.
Sex/Group/Pretest	5.210	2	2.605	0.935	0.401	N.S.
Errors	108.633	39	2.786			

Figure 6

Plotted Pre- and Posttest Means for the Grade Five Sample
Female and Male Subjects,
Sex Main Effect.

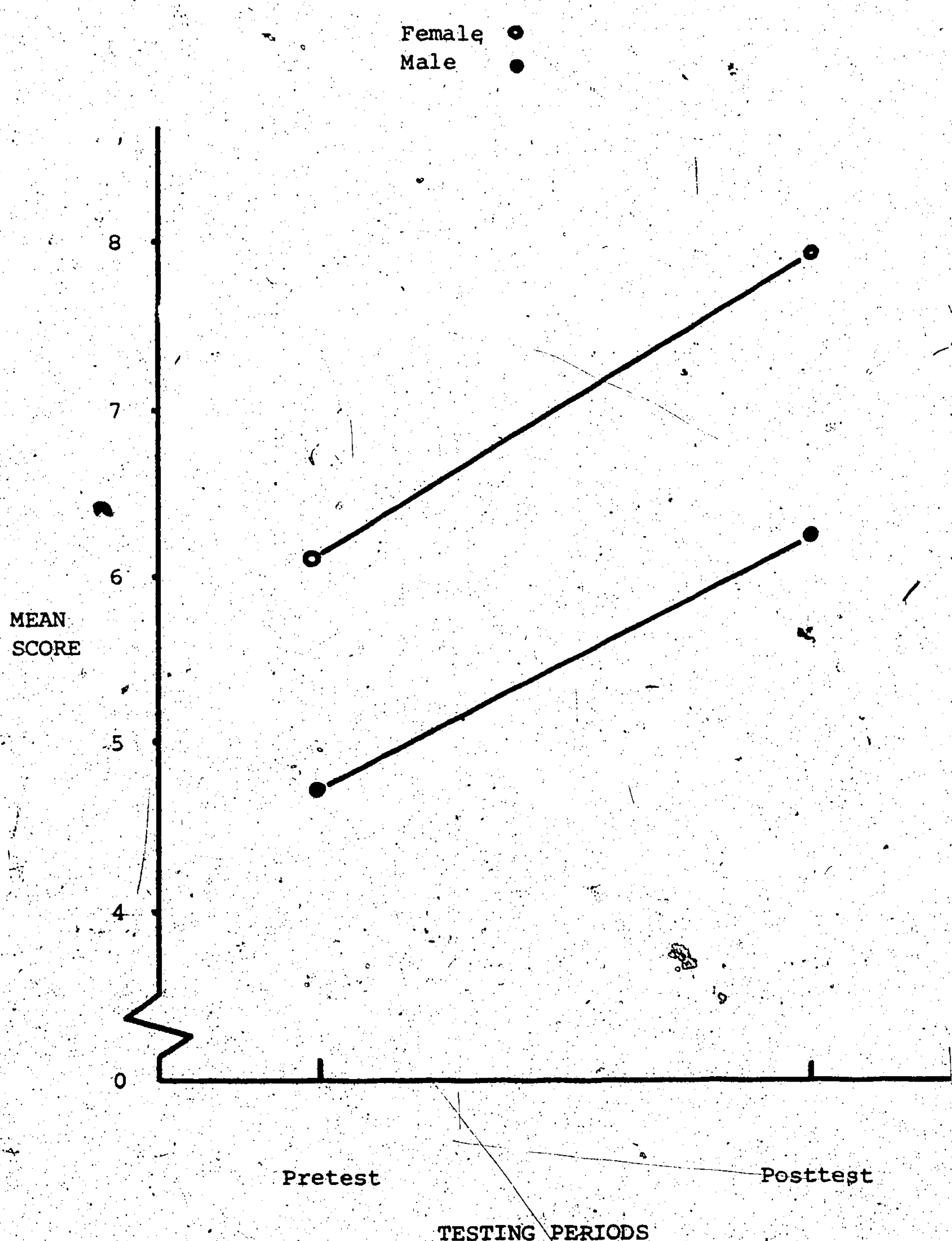
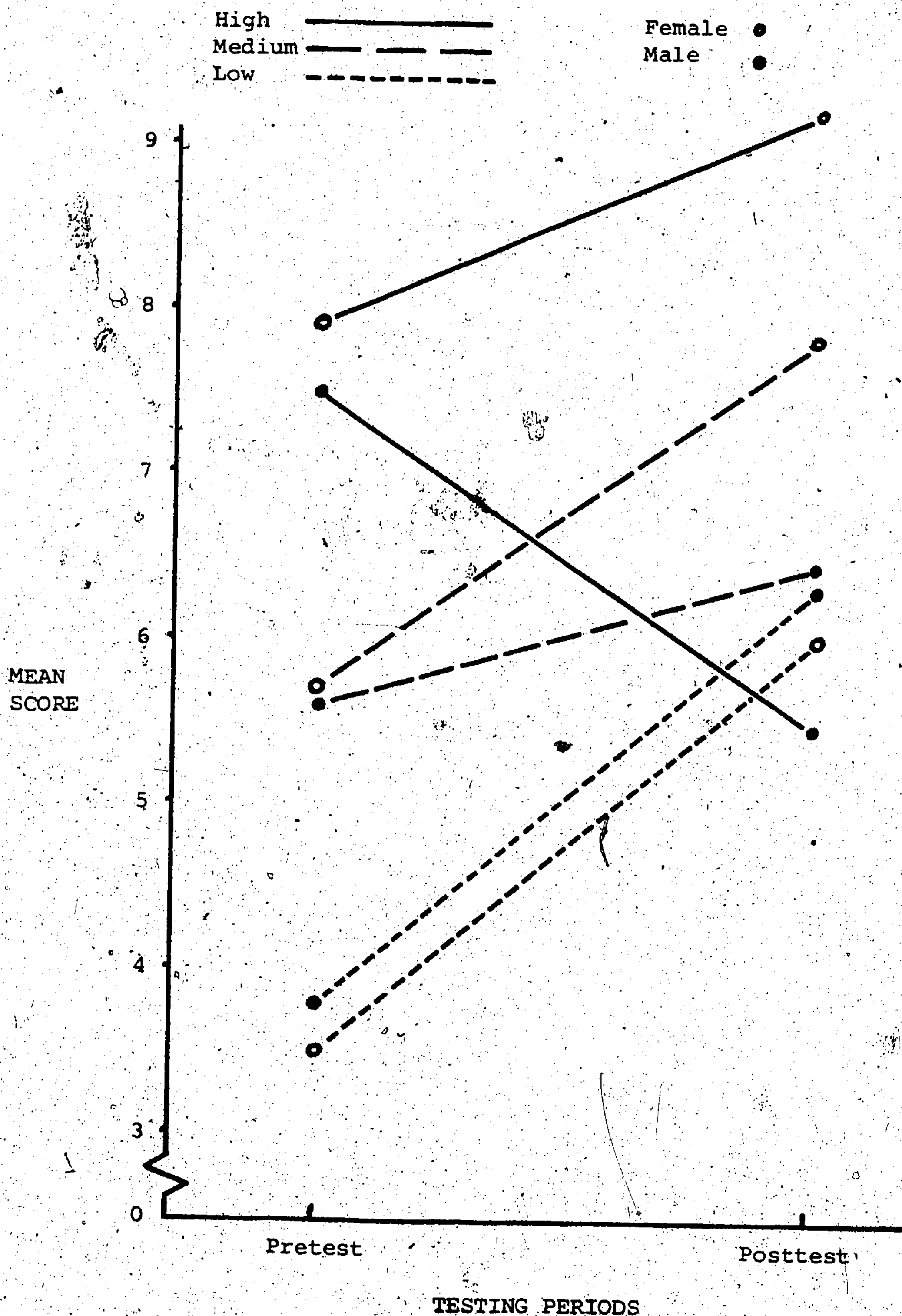


Figure 7

Plotted Pre- and Posttest Means for the Grade Five Sample Female and Male Subjects and High, Medium and Low Groups, Sex by Pretest Interaction Effect.



5. Grade five   Sex by pretest interaction effect.

Analysis of variance tested group (experimental, control) main and interaction effects to investigate research question 4, namely, the effect of one teaching approach based on learning theory principles. The analysis of these effects showed non-significant results, indicating that the intervention used in this study had minimal effect. This may be attributed to many factors, implications of which will be discussed in Chapter VI.

CHAPTER VI

DISCUSSION

This study was designed to examine whether young children could discriminate meters of three types. Four research questions were investigated and they will be reviewed below.

Question 1. Are the three meter types discriminated with the same ease?

The review of the literature suggested that the meter types used in this study might show a predicted ranking of meter difficulty of $\frac{2}{4}$ followed by $\frac{3}{4}$, and lastly, $\frac{5}{4}$. The results of this study did not support this position. The finding is interesting and implies that some re-evaluation of instructional sequencing of meters should be considered. However, the characteristics of the test may have been partly responsible for the disparate results.

Firstly, since the test was administered in a paper-pencil format, the probability of guessing accurately was one in four. Although subjects were asked to circle a response which indicated uncertainty, it was difficult to determine whether this was conscientiously observed. Also, it is possible that some students may have recognized one or two of the meter types with relative ease, and through elimination, determined the questionable items. This may account, partly, for the contradictory results (that is, this study's ranking of $\frac{5}{4}$, $\frac{3}{4}$, $\frac{2}{4}$ versus the anticipated $\frac{2}{4}$, $\frac{3}{4}$, $\frac{5}{4}$).

Second, Zuckerkandl's (1959) theory of sources of accent in music (dynamic stress, duration, pitch, and phrase) is of particular interest when discussing the forming of beat groupings. Although test items were composed in attempts to be compatible with this theory, some items may have been more easily perceived than others because of musical reasons. For example, the dynamic stress of one item may have been clearer than on another. To the researcher's knowledge, however, all items were as unambiguous as possible.

Question 2. Does a change in melodic rhythm effect the child's perception of the three meter types?

The literature suggested that the meter of test items with eighth-note melodic rhythm would be more difficult to perceive than meter with quarter-note melodic rhythm, since young children have difficulty conserving that two eighth-notes take the same time as one quarter-note. Based on this assertion, it might be predicted that children would also have difficulty conserving the relationship between quarter-notes and half- or dotted half-notes.

Subjects from all three grades found the melodic rhythm to be ranked as follows: half-notes easiest followed by quarter-notes, and lastly, eighth-notes. That the half-note melodic rhythm was easiest may be a result of the effect produced by the individual components of rhythm, that is, the manner in which the melodic rhythm interacted with the beat. Because the half-note melodic rhythm produced a strong emphasis on "one", with the harmony (left-hand line of the piano excerpt) establishing the beat, the forming of accent groups may have been more obvious than with items with quarter- or eighth-note melodic rhythm.

One limitation of the test was that there were three items each of half- and eighth-note melodic rhythm and six items each of quarter-note melodic rhythm. This imbalance was partly attributed to the desire to keep the test within a fifteen-minute time limit. It is difficult, however, to determine how this disproportion of melodic rhythm test items may have effected the outcome.

Question 3. Are certain meters more easily discriminated at different grade levels?

The review of the literature suggested that the conceptual development of meter, related to age, would be $\frac{2}{4}$ followed by $\frac{3}{4}$, and lastly $\frac{5}{4}$. It might be predicted, therefore, that grades could be easily discriminated by different performance in $\frac{3}{4}$ and $\frac{5}{4}$ test items; grade one children doing more poorly. The older subjects might show a more even distribution of proportions answering all three types correctly because of prior musical training in meter discrimination. The results of the meter difficulty ranking indicated that this was not the case. Grade one subjects found the $\frac{5}{4}$ and $\frac{3}{4}$ items to be approximately of the same difficulty and $\frac{2}{4}$ items more difficult. Although the results of the grade three sample show fairly equal meter rankings, $\frac{3}{4}$ items were slightly easier, followed by $\frac{5}{4}$ and $\frac{2}{4}$. Grade five subjects ranked the $\frac{5}{4}$ items easiest, and the $\frac{3}{4}$ and $\frac{2}{4}$ items hardest.

Question 4. Will a particular instructional approach facilitate childrens' abilities to understand and identify meter in music?

The instructional approach to meter discrimination used in this study was formulated from the following literature: Gagné's learning theory, based on categories of human capabilities; approaches to conceptual development; Piaget's theory of conservation, and research in the development of meter discrimination skills.

Analysis of variance for experimental and control group pre- and posttest scores showed non-significant results, indicating that the intervention used in this study had minimal effect. These results may be attributed to four factors.

1. Although the experimental group's posttest results were higher than the control's for all three grades, a check for test consistency indicated positive pre- and posttest correlations in only two out of six possibilities. These results appear to show questionable test reliability.

2. The period of time allowed for intervention was too short to teach the necessary prerequisite skills. According to Gagné, it is necessary to programme efficiently for the learning of prerequisite intellectual skills which lead to conceptual development, namely, discriminations, concrete concepts and defined concepts. The literature review suggested the introduction of numerous concrete experiences which lead to the recognition of concept attributes, and the implementation of language to facilitate the organization of primitive concepts into more complex structures.

Based on general observation of subjects' abilities to "feel" the beat kinesthetically, children may have had difficulty with Gagné's first intellectual skill, discrimination. Consequently, this would lead to difficulty in formulating concrete and defined concepts which were necessary prerequisites to the understanding of differentiations in the three meter types presented on the test. If subjects could not grasp the concept of "beat", they could not consistently determine whether beat groups were in two's, three's, or five's.

3. The intervention activities were enjoyable to many of the experimental group subjects. Some control subjects wished to participate in the intervention. Although experimental group subjects were told of the possibility of biasing the study through discussing intervention activities with control group subjects, it was difficult to prevent them from doing so. A number of design changes may have given more conclusive results.

4. It was originally intended to test subjects on an individual basis, where each would be required to show the beats through physical movement, such as clapping or swaying, and a verbal description of "two", "three", or "five" to indicate the beat groupings. These responses were to be video-taped and rated by two judges based on a predetermined criterion of correctness. This may have alleviated subjects guessing which would have been obvious from the video-tapes. However, because of the extensive time necessary for the individual testing of 140 subjects, this was not possible.

The possibility of test result biasing, due to experimental-control group discussion of intervention activities may have been alleviated by the following means. Four near-matched schools with similar teaching conditions and school environment might have been used, with two of the schools receiving control conditions and two receiving experimental conditions. This would produce larger samples and possibly more successful intervention results.

Summary

According to Gordon (1976), a learner must develop a sense of two basic aural elements, tonality and meter, in order truly to understand music. Because this study was exploratory in nature, the original intent was to investigate childrens' sense of both of these elements, and to investigate the interaction effects produced. Originally, test items were designed to focus on several variables: 1. modality - major, minor and atonal; 2. melody - stepwise, skipwise passages; 3. rhythm - various combinations of long and short rhythmic patterns (for example, ♩ ♫, ♫ ♩, ♫ ♫), and 4. harmony - large- and small-range accompaniment. In order to test so many variables, this would have required several test items, consequently exceeding the desired twenty-minute length.

The test which was used in this study was only a foundation for the exploration of childrens' abilities to understand the formulation of beat groupings, however, the produced results were surprisingly contrary to the literature. An exploration of the original test may have produced similar results.

There were some inconsistencies in the results when the grades were separated, however, the analysis of test item results indicated that a larger proportion of the total sample discriminated $\frac{5}{4}$ meter most easily, followed by $\frac{3}{4}$ and finally $\frac{2}{4}$. Whether subjects were able to apply this knowledge practically cound not be determined from this study. These results, however, question the belief that children must have mastered $\frac{2}{4}$ and $\frac{3}{4}$ meter before being exposed to $\frac{5}{4}$ meter. DeYarman (1972) found that instruction in mixed and "unusual" meters seemed to enhance kindergarten childrens' performance of "usual" meter. A possible implication of the present study might be that music educators may be doing a disservice to children by delaying the introduction of asymmetrical meters. A follow-up study might clarify some of the issues raised herein.

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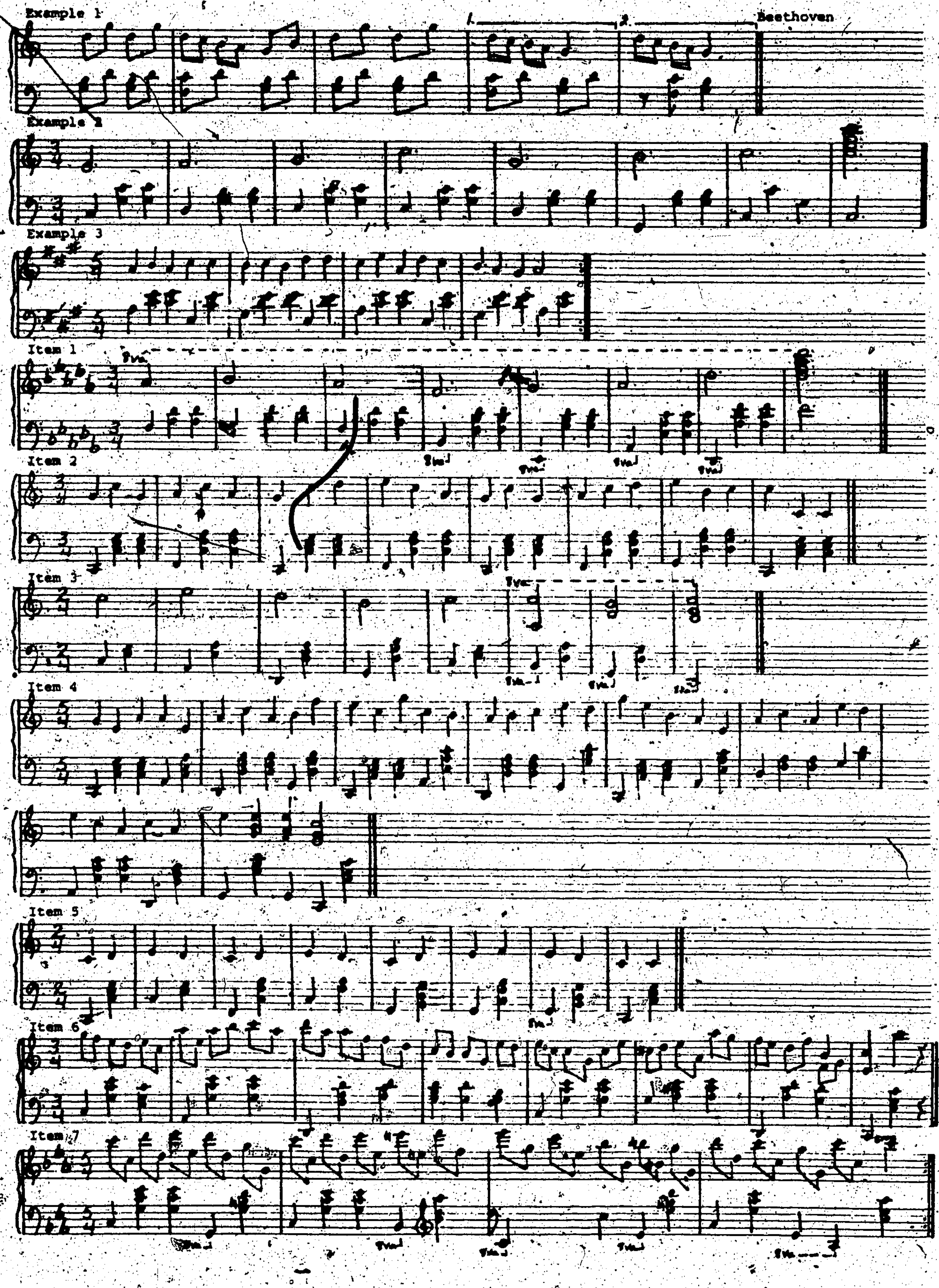
APPENDICES

APPENDIX A

APPENDIX A

TEST ITEMS



Item 8

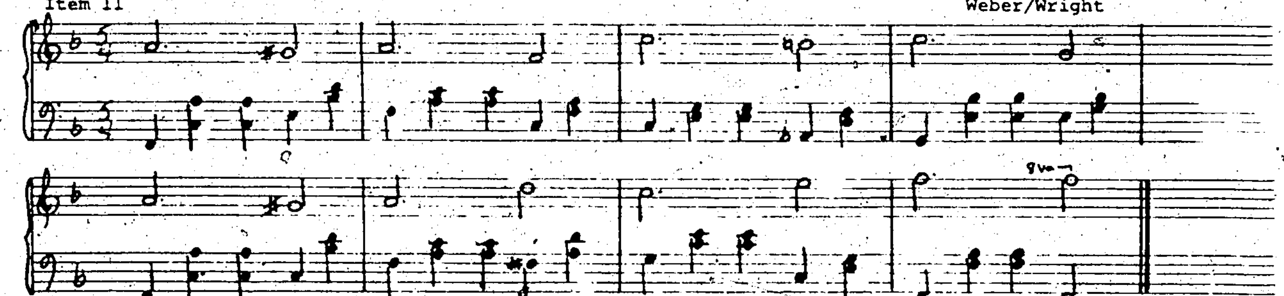
Beethoven/Wright

Item 9

Item 10

Item 11

Weber/Wright



Item 12

Note: Items 1, 3 and 7 were written by Ontario composer, Peter Landey.

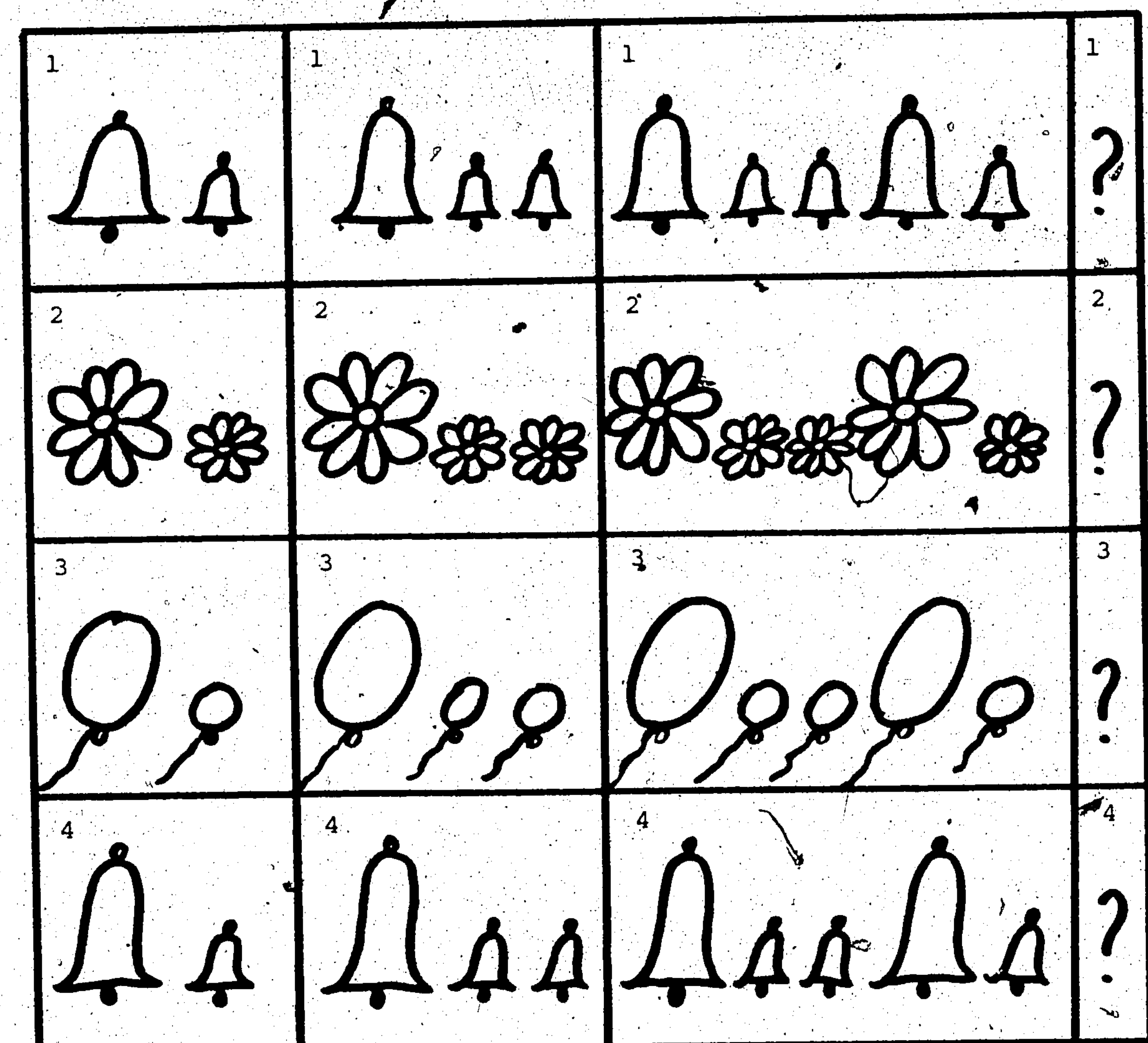
APPENDIX B

APPENDIX B

ANSWER SHEET

NAME ______________________

GRADE __________ ROOM __________



Repeated up to question twelve.

APPENDIX C

APPENDIX C

INTERVENTION LESSONS

Day one

CONCEPT. Music is controlled by an underlying pulsation which is continuous and generally regular throughout, even through silences. These pulsations are called beats.

SKILL. "Keep the beat" through imitative movement.

ACTIVITY. Play the game called "Follow Me".

Teacher establishes a beat and students follow through clapping, patschen, marching and other movements. Individuals suggest other movements and the class imitates while the teacher taps the beats on a drum or improvises on the piano (avoiding accented beats).

CONCEPT. Beats are usually grouped in a set with the first beat being slightly stronger than the other (weaker) beat(s). Sometimes these sets have so many beats that a "secondary strong beat" is necessary to give the effect of two subsets.

SKILL. Teacher establishes a beat and students imitate while accenting in groupings of 2's, 3's and 5's. Students are not yet conscious of the terms "strong" or "weak".

ACTIVITY. Same as the "Follow Me" activity above, but beats are accented in groups of 2, 3, and 5.

After the game has been played for a few minutes and most of the students can perform the skill relatively accurately, the teacher directs a discussion toward the development of the concept of "strong" and "weak". Students are asked to show strong and weak beats through body movements.

CONCEPT. Same as previous concept.

SKILL. Show beat groupings in 2, 3, and 5 by large and small body movements.

ACTIVITY. Recorded musical examples are played, and individuals suggest large and small movements to coincide with the beats - the class imitates, as if they are the mirror image of that student. Play the "Mirror Game": Students break into pairs, one student being "real" and the other the "mirror image". "Real" students indicate strong and weak beats through movement and the "mirror images" imitate.

Day two

CONCEPT. Beats are usually grouped in a set with the first beat being slightly stronger than the other (weaker) beats(s). Sometimes these sets have so many beats that a "secondary strong beat" is necessary to give the effect of two subsets.

SKILL. Create sounds to be combined with strong and weak beat movements.

ACTIVITY. Individuals are asked to think of strong and weak (loud and soft) sounds which may be combined with their movements. The class imitates while the teacher taps the beats on a woodblock, accenting the "one".

CONCEPT. Meter is the measurement of the number of weak beats between more or less regularly recurring strong beats.

SKILL. Internally count the number of weak beats between strong beats to determine if the groupings are in 2's, 3's, or 5's.

ACTIVITY. The teacher plays a woodblock, accenting the "one" and students count silently to determine the beat grouping. Once an individual has guessed the meter, he/she chooses a particular beat grouping, combines large and small movements with loud and soft sounds, and other students guess his/her meter. The game procedes in this fashion until many of the students have had an opportunity to present his/her movements and sounds.

CONCEPT. Meter is the measurement of the number of weak beats between more or less regularly recurring strong beats.

SKILL. Individuals conbine their movements and sounds with other childrens'.

ACTIVITY. "Create a Group Machine". After a short discussion of how individual machine parts combine to make up the whole, the teacher chooses three students to demonstrate how they might join to create an "imaginary machine". It is emphasized that the sounds and movements must coincide with the predetermined beat groupings to give the impression that the machine parts are working collectively. Students split into small groups (2 - 4) and are given approximately ten mintues to create a group machine. Each group demonstrates their machine, and the other groups determine the meter of their machine.

Day three

CONCEPT. Meter is the measurement of the number of weak beats between more or less regularly recurring strong beats.

SKILL. Count "one" on the strong beat, and continue until the next "one", to determine the meter of a piece of music.

ACTIVITY. Students listen to tape-recorded music and make large and small movements. On the strong beat, where they previously created "strong" sounds, they substitute the word "one". They are asked to continue counting (silently) the number of beats which occur before the next "one". When an individual has determined the meter, he/she is asked to count the beats out loud while continuing to make large and small movements. When most of the students can do this relatively well, they are introduced to the following game.

CONCEPT. Beats may be notated through simplified symbols, with large pictures representing strong beats, and small pictures representing weak beats.

SKILL. Understand that the beat counts coincide with the beat symbols.

ACTIVITY. Play the game "Guess the Meter": Students are divided into two teams and the game procedes in a manner similar to a "Spelling Bee". Students sit while counting the beats in their heads to determine which of the three 2' by 3' cards symbolically represents the beat groupings. The first student of a team to raise his/her hand is asked to state the meter by responding "2, 3, or 5" and pointing to the appropriate card. The game procedes and the teams tally up their points. Musical excerpts which have caused confusion are repeated, and all students make large and small movements while counting the beats out loud.

Day four

CONCEPT. Meter is the measurement of the number of weak beats between more or less regularly recurring strong beats.

SKILL. Count "one" on the strong beat and continue until the next "one" to determine the meter of a piece of music.

ACTIVITY. "Break Into Groups of 2, 3, or 5": Students march around the room to the time of the beats while counting silently to themselves. When the tape-recorder is stopped, they join hands to form groups of 2, 3, or 5 (to represent the beat groupings). If individuals are unable to join any groups because the desired number has already been attained, they are asked to identify the meter. Those groups which have the appropriate number of students are told so. Musical excerpts which have caused confusion are repeated, and all students make large and small movements while counting the beats out loud.

CONCEPT. Rhythm is either the same or an elongation or division of the beats.

SKILL. Recognize that rhythm may not be the same as the beat.

ACTIVITY. Play "Echo Movement": The teacher makes large and small movements in two measure groupings while counting the beats. Students imitate immediately without "breaking the beat". Elongated and divided movements are implemented while the beats are counted.

CONCEPT. Melodic rhythm is either the same or an elongation or division of the beats.

SKILL. Recognize that melodic rhythm may not be the same as the beat.

ACTIVITY. "Chant the Rhythm of Words While Stepping the Beat" ($\frac{2}{4}$ meter only): Children chant the words to "Hot Cross Buns" while stepping the beat. When most of the students are able to do this relatively well, they are asked to chant this rhyme while clapping the rhythm of the words and stepping the beat.

CONCEPT. Beats may be notated through simplified symbols, with large pictures representing strong beats, and smaller pictures representing weak beats.

SKILL. Recognize the beat groups, even though the melodic rhythm may be an elongation or division of these beats.

ACTIVITY. Play "Meter Bingo": Students listen to musical examples to determine the strong and weak beat groupings. At the end of each example, they mark their bingo sheet by penciling an "X" over the appropriate answer (see appendix E). After six examples have been heard, all students should have "bingo".

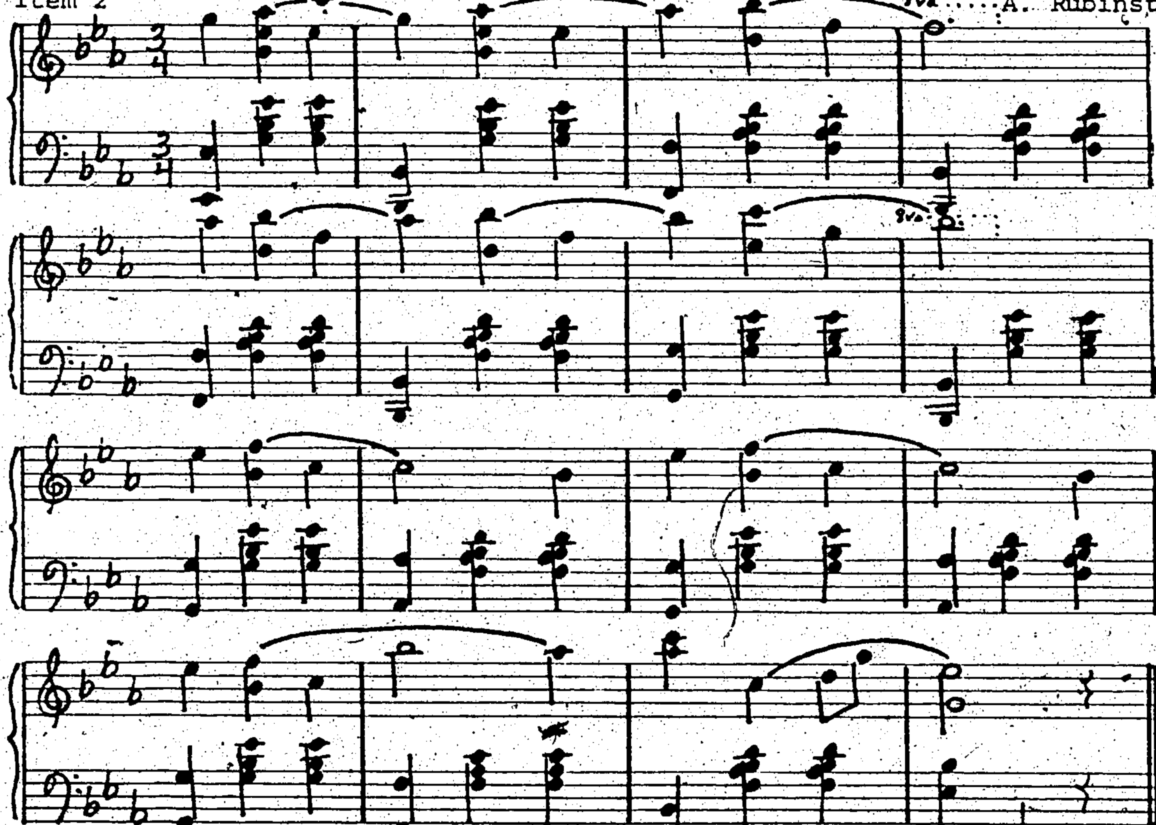
APPENDIX D

APPENDIX D

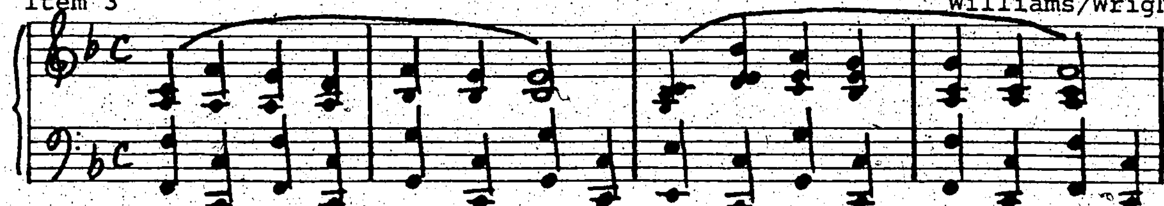
MUSICAL EXAMPLES FOR INTERVENTION

Item 1 Seymour Smith

Item 2 A. Rubinstein



Item 3 Williams/Wright



Item 4 Landey

Item 5 Gilbert & Sullivan

Item 6 Landey

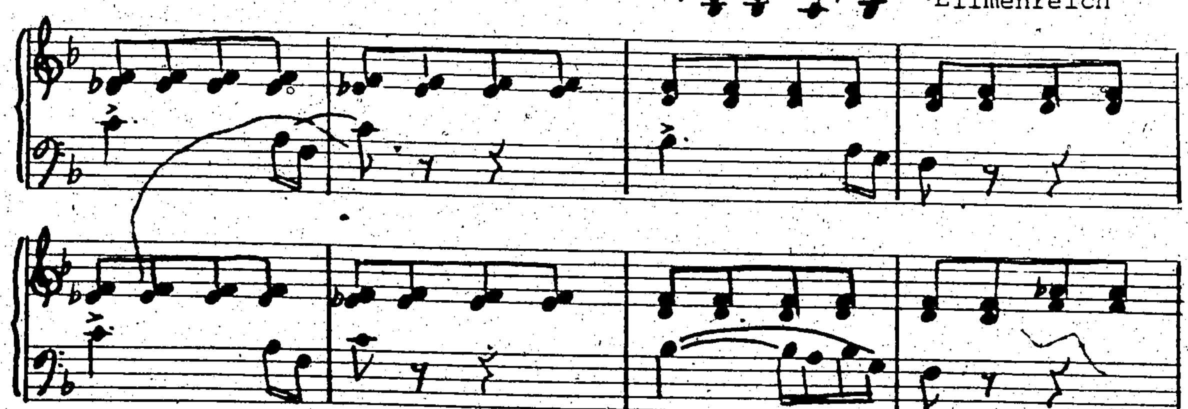
Item 7 Waldteafel/Grant

Item 8 Ellmenreich

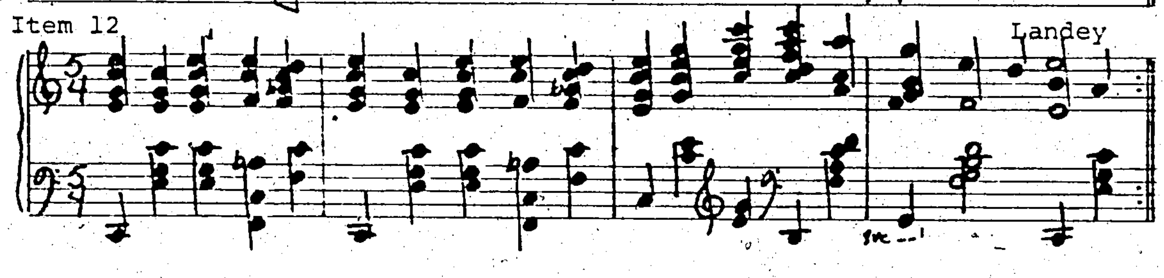
Item 9 Puccini/Grant

Item 10 Landey

Item 11 Ellmenreich



Item 12



APPENDIX E

APPENDIX E

METER BINGO