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A COMPARISON OF THE SYNCHRONOUS, RHYTHMIC MOTOR, AND SPONTANEOUS RHYTHMIC MOVEMENT OF EDUCABLE MENTALLY RETARDED AND NORMAL CHILDREN

DISSERTATION

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

By

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* * * * *

The Ohio State University
1972

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If a man does not keep pace with his companions perhaps it is because he hears a different drummer. Let him step to the music that he hears however measured or far away.

- Henry David Thoreau
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CHAPTER I

THE PROBLEM

Introduction

Rhythm is the basis of man's life and is observable in many acts performed by man, yet little data are available on the motoric reaction of normal children to different types of rhythmic stimuli. Still less research is available on the response of the retarded or slow learning child, and almost no research has been undertaken on the reaction to rhythmic stimuli of either the normal or slow learning child in non-directed or spontaneous situations.

Although synchrony, rhythm and sequence are integral elements of physiological and developmental processes occurring in the temporal dimension, this aspect of behavior has been largely neglected in current literature on the remediation of perceptual and motor problems in children. If programming in the temporal dimension is to be effective there is a need to delineate the differences, if indeed there are differences, between normal and exceptional children in this area. There also is a need for the establishment of some guidelines as to how best to incorporate rhythm and music into motor programs.
Statement of the Problem

This study was undertaken to compare the bodily rhythmic movement of a non-auditory nature with the bodily rhythmic movement of an auditory nature and also to investigate the difference in movement in a non-directed situation between normal children and educable mentally retarded children.

The problem investigated by this study is based in part on the motor theory of perceptual learning formulated by Kephart (1964) which states that training programs requiring children to respond to auditory rhythms may not be acceptable for all children in that synchrony, which Kephart calls the basis of rhythm, has not been developed. Kephart's hypothesis is that training at the developmental level will enhance behavior in the temporal dimension. (Kephart, 1964, p. 201-206)

This same theory has been reiterated recently by the AAHPER task force on children's dance (JOHPER, June, 1971), and by Cratty, who states that "when we ask a child to duplicate a rhythmic pattern in some way, his inclination and ability to do so is probably influenced to some degree by the speed he would have preferred to move, without any external stimuli present." (Cratty, 1969, p. 147)

Further needed study of the rhythmic response of retarded and normal children was seen as taking into consideration their response in a non-directed situation. In
order to make these comparisons three observational techniques were used. One of these was a validated test for synchrony (Oseretsky) and the other two were adapted by the investigator from existing tests and observational techniques. These were: (1) a test of rhythmic motor response adapted from a test designed by McCulloch (1955); (2) a notational technique for observing spontaneous rhythmic movement based on Labanotation and motif writing.

Need For the Study

Testing in the area of rhythm has been, in the past, carried on largely by music educators and has been, for the most part, limited to the recording of small specific reactions to a tapped beat, reiteration of a specific rhythmic pattern or other quite limited motor responses.

Since physical educators are interested in fostering the total bodily movement of children, and since the responses previously tested related very little to aspects measured in dance, it seemed feasible to conduct an investigation where this movement response might be studied.

To an increasing degree, music and various rhythmic activities are being employed in educational programs for atypical children and the physical educator, in recent years, has been faced with providing programs for these children. With such a limited amount of data available on the response of normal children to music and still less on
retarded children, programs which are planned are often entirely inappropriate.

If we believe that movement plays a crucial role in the developing life of the child and that all education should foster creativity, body movement as a creative medium in early childhood attains great significance. (Murray, 1971, p. 20)

An indication of motoric rhythmic ability and the rhythmic meter preferred by retarded children in relation to the response and preference of normal children might aid curricular construction in dance. The extent to which the two types of children move spontaneously to music might encourage educators to place more emphasis on this area.

**Definition of Terms**

**Dance.** This term has been variously defined and, like the term "rhythm," has many connotations. Murray defines a dance as "movement put into rhythmic and spatial form, a succession of movements which start, proceed, and finish." She maintains that the simplest combinations of movements which a child puts together may legitimately be called a dance. (Murray, 1963, p. 6) To use Murray's illustration:

A child skipping forward is dancing, for a skip is a dance step. When he adds to his forward skip a skipping turn and repeats this succession of movement, he has made the beginning of a dance. These movements may be further structured in time if he decides to take a certain number of skips for each part, say six skips forward and four skips turning. Such a sequence of movements contains the beginning of formal movement structure, and on the child's level this is his dance just as much as a
highly complex composition belongs to the dance artist who composed it. (Murray, 1963, p. 7)

For the purposes of this study the term "dance" is defined in its broadest sense as any sequence of locomotor and nonlocomotor movements which the child puts together to music. It refers more to the creative aspect of dance rather than to the stereotyped movements found in folk, square or ballroom dance.

**Educable mentally retarded** are defined by Johnson as those children who are so intellectually retarded that it is impossible for them to be adequately educated in the regular classroom. They are, however, educable in the sense that they can acquire sufficient knowledge and ability in the academic areas that these skills can and will become useful and usable tools. Further, they have a prognosis of social adequacy and occupational and economic self-sufficiency as adults. They will be able to apply the skills learned during the years of their formal education toward maintaining an independent social and economic existence as adults. (Johnson, in Cruickshank and Johnson, 1967, p. 195)

The generally accepted classification of the degree of mental deficit and corresponding I.Q. between the educable mentally retarded (EMR) and the trainable retarded (TMR) is EMR 50-80, TMR 35-49.

**Effort-shape analysis** is a method of systematic description of qualitative change in movement, describing how one moves rather than the quantitative description of what one moves. Several people may do the same activity, but how each one moves is different. Effort shape
describes the variations in how people move in any part of the body regardless of what they are doing.

Haptic sense refers to the sense of touch. Individual differences in perception may be described by the visual and haptic framework. In general, it has been found that some individuals characteristically perceive more easily through visual impressions, while others add the most meaning to their experience through the haptic sense or through kinesthesis.

In time, in this study, refers to the coincidence of the subjects' response with the pulse beat of the music.

Kinesthesis or kinesthesia is the perception of the position and movement of one's body parts in space. It also includes perception of the internal and external tensions and forces tending to move and stabilize the joints. Several types of sense organs collect movement sensations and indicate the force, speed and extent of movement of body parts. These include (1) muscle spindles, (2) tendon organs, and (3) joint end-organs.

Labanotation is a notation system devised by Rudolph Laban which provides an accurate record of movement in terms of what direction, within what time, and with what body part shifts the dancer moves. It has been used in recording ballet, modern and folk dance for some thirty years.

Locomotor movement may be described as a means of moving the body through space. The four basic movements
of locomotion are: walking, running, jumping, and hopping. Combinations of these are also considered as locomotor movements, as well as movements on hands and feet, hands and knees and so forth.

Motif writing is a system of notation which gives the outline of a movement without describing in detail how the actions are performed. Symbols are used to denote general actions of the whole body, instead of describing the exact movement of a special part of the body, as in full notation.

Motor rhythm, in this study, is defined as regular recurrent movement in a specific sequence in response to musical accompaniment.

Kephart, in describing motor rhythm, said

It is the ability to perform a movement or series of movements with a constant time interval . . . such rhythm is used in marching, running, the swing of the arms in walking, and many other everyday activities. Motor rhythm also involves not only the rhythmic movement of a single part but also the rhythmic coordination between parts. (Kephart, 1971, 177)

For the purposes of this study motor rhythmic response will be defined as regular recurrent movement in a specific sequence in response to a musical accompaniment.

Nonlocomotor movement refers to movement which occurs around the axis of the body. It is performed from a relatively stable base of support and includes such basic movements as bending, stretching, swinging, and twisting plus combinations of these as seen in pushing, pulling, striking, dodging, lifting, and falling.

Normal intelligence refers to measured intelligence between the limits of 100 and 115 I.Q.
Phrase. A musical phrase, according to Murray, is comparable to a language phrase and is at least two measures long. It forms a continuous thematic sequence ending with what is known in musical terms as a cadence or semi-cadence. (Murray, 1963, p. 167)

Pulse beat, as defined by Murray, "is the underlying beat of all rhythmic structure repeated continuously to define a series of even time intervals." The response to pulse beats is the simplest of rhythmic responses. A series of claps or walks or any other single unit movements such as the basic movements of locomotion, if done "in time" are such responses. (Murray, 1963, p. 163)

Rhythm. This word has been variously defined and has broad connotations. Murray indicates that in its broadest sense it may be thought of as a repetition of like forms and suggests that for dance in education it seems advisable to confine its use to the periodicity of dance movement which results in an ordered sequence or structure in time. (Murray, 1963, p. 160)

Kephart, in defining rhythm, says:

Rhythm involves the awareness of equality among temporal intervals. A constant rhythm is a series of equal temporal intervals. Since these intervals are equal, they can become units on a temporal scale just as feet and inches, by virtue of their equality, become units on a spatial scale. The primary prerequisite is consistency from one unit to another. This consistency is supplied by rhythm. (Kephart, 1971, p. 177)

The terms "a rhythm" or the plural "rhythms" and
"rhythmic pattern" must not be confused with rhythm. Rhythm is the all inclusive term, while the other terms refer to a grouping of time and stress into a definite pattern resulting in a particular form. They embody rhythm. (H'Doubler, 1932, pp. 16-17)

Similarly the term "rhythms" should not be confused with "dance." Murray indicates that the term "rhythms" is misleading when it is applied to the total dance experience offered to children. Rhythm, as Murray defines it, is only one aspect of a duality of rhythm and movement which makes up a broad conception of dance. (Murray, 1963, pp. 159-160)

When this conception includes pattern of movement, audible or silent accompaniment, and the outward expression which is part of any movement of the body and is particularly manifested in dance movement, we come closer to the substance of dance. (Murray, 1963, p. 160)

**Rhythmic accent** might be described as an additional force placed on certain pulse beats of a series.

**Rhythmic pattern** refers to a group of at least three beats with unequal time intervals, the beats following in uneven rather than even sequence. Response to rhythmic patterns is more difficult than response to pulse beats and accents because it involves the combination of movements of different speeds in a sequence.

**Synchrony**, in this study, refers to the movement of two or more body parts simultaneously.
Limitations of the Study

Inhibition is a limiting factor in any testing situation, but particularly so with retarded children. With some normal children this factor was present during the specific testing sessions and with other children it was very evident during the spontaneous observation sessions.

Another limitation apparent in the observation of spontaneous movement was the degree to which the children had been encouraged to move to music in either their home or school backgrounds. The degree of inhibition mentioned above plus the lack of any kind of movement repertoire made spontaneous movement very difficult for some children.

Although every effort was made to see that children who evidenced overt motor dysfunction and auditory perception problems did not participate in the study, there were, undoubtedly, children whose diagnosis was incomplete in this area who were included.

The lack of emotional stability was also seen as a limitation of the study. Although, again, every effort was made to see that children who evidenced severe emotional problems did not participate, the environment in which many of these children lived made them candidates for emotional problems of some kind. This was evidenced in the extreme number of absences from school, suspensions for behavioral problems, and so forth. Since this type of child made up the population of at least one group tested.
and is duplicated in the school population in the inner city, it would not be easy to eliminate these children from the study. Retarded children, because of frustrations encountered in academic and play situations, also evidence concomitant emotional problems. The exclusion of retarded children with some emotional problems would have eliminated a great number of the population used for this study.
CHAPTER II

REVIEW OF RELATED LITERATURE

The Importance of Music, Movement and Dance in the Lives of Normal Children

Music, movement and dance have been cited by many authors as being of prime importance in the life of the human organism. It is known that man is surrounded by movement and rhythm. He lives in a moving, rhythmic environment—the river flows, trees sway in the breeze, plants grow, animals stalk their prey. Even in stillness there is rhythm—the heart beats, the lungs contract and expand, and nerve impulses send messages to the brain. Of all other life forms man has the greatest potentiality for movement.

Movement is one of the child's first means of expression and it is a fundamental one. Through movement the young child makes his needs known and learns about his world.

The baby squirms, wriggles and kicks; he grasps and manipulates; he rolls, achieves a sitting posture and finally stands. So he grows and develops into a toddler who investigates everything in a most active way. He is rarely still. He pulls himself onto his feet, he clambers, scrambles and crawls. His hands are busy exploring and he learns about his environment through such activities as tasting, sucking, poking, prodding, tugging, pushing, pounding, tearing and generally manipulating. (Russell, 1965, p. 12)
Binswanger, in studying the psychological considerations on motricity, points out that movements are the earliest vital manifestations in human embryology, and they influence and are influenced by affectivity. He emphasizes that the young child needs movement to express his vitality and to put him in contact with his environment. (Binswanger, 1941, p. 411)

Laban, in *Modern Educational Dance*, speaks of the first activity of a baby as the moving of his limbs.

In pushing his legs away from the center of the body and in hitting with the arms he loosens the spherical ball-like position which the body assumed during the embryonic state. (Laban, 1963, p. 14)

Russell, in analyzing Laban's work, indicates that what is of interest to the investigator of dance is the great resemblance of these first "stirrings of the human being" to the first dance movement which the child attempts to do a few years later. (Russell, 1965, p. 15)

This emergence of rhythmical pattern is also referred to by Findlay, who discusses the "vocabulary of locomotor rhythms" which evolve from the indiscriminate movements of the young child. (Findlay, 1962, p. 37)

Russell sees the same fundamental movement principles of kicking legs and hitting arms in the progression of the movements of early childhood, through the vocabulary of locomotor rhythms to the primitive dances of adults, as performed by natives of other continents. (Russell, 1965, p. 15)
The importance of a sound movement base in the performance of rhythmic movement appears repeatedly in the literature. Bird, in the introduction to the book Dance, an Art in Academe, says:

From the age of four, movement provides an important basis for one's sense of self—for one's self-image. It provides the groundwork for awareness of the body—its inner sense of moving is the basis for the autonomy of the individual and for the distinction of boundaries between self and non-self—me and not me.

Since it is vital to the healthy growth of the human being to move freely, it is the right of every child to be provided with opportunities to participate in a wide range of expressive movement experience throughout his school years. It may be that the range in relationships in the child's world are narrow, constricted, stereotyped, as now seen in urban and rural poverty areas. Imaginative dance experiences can counter these forces by offering expanded emotional experience amplified by the imagery of creative teaching situations. In such an atmosphere feelings can be better understood by the child, for there the purity of unadulterated imaginative fantasy is acceptance and not corroded by practical hard reality. Rage, fear, love, consideration, wonder, triumph, achievement, pride, confidence—all may be experienced and savored again and again. (Bird, 1970, pp. 3-4)

Kephart feels that relationships in time develop first in the motor activities of the child.

Synchrony is observed when muscles move in concert. Rhythm is developed when muscles move alternately or recurrently. Sequence is observed when movements occur in coordination patterns. From the generalization of many such observations, a temporal system evolves and a temporal dimension develops. (Kephart, 1964, p. 205)

Seashore combines the psychological effect of rhythm with motor development. Free rhythm is defined as "the temporal or intensive stress which one naturally makes in
free movements" and it is said to be intimately associated with motor development. (Seashore, 1938, p. 15)

It is not a matter of the ear or finger only; it is a matter of the two fundamental powers of life; namely, knowing and acting. And, therefore, indirectly it affects the circulation, respiration and all the secretions of the body in such a way as to arouse agreeable feeling. Herein we find the groundwork of emotion; for rhythm, whether in perception or in action, is emotional when highly developed, and results in response of the whole organism to its pulsations. Such organic pulsations are the physical counterparts of emotion. Thus when we listen to the dashing billows or the trickling raindrops, when we see the swaying of the trees in the wind and the waving of the wheat fields, we respond to these. We feel ourselves into them and there is rhythm everywhere; not only in every plastic part of our body, but in the world as we know it at the moment. (Seashore, 1938, p. 143-144)

Hawes, in speaking of music and movement, indicates that as movement is the medium of dance, tone is the medium of music, but tone without movement will not produce music. The merit of his suggestion that if music were viewed as "sound in motion" the relation between the two would result in a more integral collaboration should not be overlooked. (Hawes, 1964, p. 69)

The literature reviewed in dance for young children points to an overwhelming agreement of the importance of freedom of improvisation on the part of the child and the necessity of providing such opportunity in the schools.

Dance, according to Murray, is movement put into rhythmic and spatial form—"a succession of movements which start, proceed and finish." She maintains that the simplest combinations of movements which a child puts together can
legitimately be called a dance. (Murray, 1963, p. 6)

The teaching of dance, as Laban infers, should not be limited to music or dance steps or to the performance of choreographed dances but with education through movement, with fostering the child's love of movement and with giving scope for discovery and imagination. (Laban, 1963)

Russell reiterates this point of view and says:

The important thing is that the child is making something for himself. The result may be only a simple invention or a variation on a given theme, but as with his picture, his essay, his scientific experiment, it must be his. (Russell, 1965, p. 17)

With a lesser emphasis on set steps and patterns, less stress on appropriate movement to cadence imposed from without, and more understanding of idiosyncratic style rather than uniformity, the potential of dance as a medium of expression with retarded as well as normal children can more readily be seen.

The plight of the child's opportunity for creative expression through dance in the schools is succinctly stated in the Report of the Task Force on Children's Dance. (1971)

Too many teachers are not sure what makes a creative dance experience and are insecure in handling creative method. Being unsure and insecure, they never attempt this area of dance. (JOPER, June, 1971, p. 16)

Laban has said that one of the important tasks of education is to "preserve the spontaneity of movement and to keep
this spontaneity alive up to school leaving age." (Laban, 1963, p. 12)

Russell confirms this point and speaks of the contribution of dance to the aesthetic and creative aspect of education. (Russell, 1965, pp. 11-12) However, it appears from the literature that this important experience is lacking in the lives of many children at present.

Characteristics of the Educable Retarded Child

To an increasing degree music and various rhythmic activities are becoming popular in educational programs for atypical children. Before discussing the importance of remediation programs for these children it would, undoubtedly, be advantageous to review the characteristics of the particular exceptionality investigated in this study—the mentally retarded child.

It should be understood that while the term "characteristics" implies a group behavior, individuals in the group may exhibit any one or combinations of characteristics. Differences in characteristics are a matter of degree and not of kind and all characteristics associated with the educable retarded child are typical of the characteristics of the population as a whole.

There are several concepts which should be discussed in order to more completely understand the intellectual functioning of the educable retarded child. The first of
these is the concept of intelligence itself. As maintained by Robinson, intelligence is a hypothetical construct which has been invented to enable investigators to make more efficient and predictive statements about people. (Robinson and Robinson, 1963, p. 396) It is stressed that this construct can be evaluated only through behavior, which may or may not reflect the highest level at which the person is usually capable of functioning.

Intelligence is not directly open to observation and measurement; all we can evaluate is a child's performance, his observable behavior. It therefore follows that our evaluation of his intellectual ability is affected by anything which even temporarily inhibits the adequacy of his behavior. To put it differently, we cannot expect from tests magical insights into potential ability which are very different from the child's behavior in other situations. . . . the way in which a child functions in the test situation is thus a measure not of his potential intelligence (if only his life had been different), but of his functioning in a situation which is as propitious as possible. (Robinson and Robinson, 1963, p. 398)

The concept that the mentally retarded require more time to learn a task they are capable of learning than do normal children has not been verified in the literature. Most of the research indicates that the mentally retarded learn in the same ways as normal children, with the laws of learning which hold true for the normal child also holding true for the retarded.

Johnson emphasizes that the retarded are not "slow learners" in the sense that they comprehend slowly or grasp new concepts slowly or learn a skill slowly. The
slowness is related to their intellectual development. This development is one of the prime determiners of when the retarded will be able to comprehend, grasp a concept or learn a skill. The concept of mental age is an important one when discussing retardation. A descriptive account of this concept is given by Goldstein and Siegle, who refer to it as "a measure of the child's present intellectual status as determined by a standardized test of intelligence." (Goldstein and Siegle, in Rothstein, 1971, p. 184)

When retarded children are learning a task they follow the same laws of learning and show little or no difference from normal persons of the same intellectual developmental level or mental age. According to Johnson, when more difficult tasks are posed, normal subjects of the same chronological age are able to learn them; the mentally retarded are not. The difference, then, is one of development, not one of learning. (Johnson, in Cruickshank, pp. 459-460)

In tests of the Binet type where items are arranged by age levels the concept of mental age is used routinely to express the average intellectual achievement of children of that chronological age (CA). Where test results are expressed in terms of age norms what is being stated, in effect, is that the abilities of any given child correspond to the average abilities of children of a certain age. Thus regardless of his CA, a child is assigned a mental age of eight years when his total performance on the test
is on a par with the average for eight-year-old children.

(Goldstein and Siegle, in Rothstein, 1971, p. 184)

A child with an I.Q. of 75 has an intellectual development rate three-fourths that of the average or normal. A child with an I.Q. of 66 or 67 is developing intellectually at two-thirds the rate of the average or general population. It will, consequently, take this individual from one-fourth to one-third times longer to "pass through" a specified developmental growth period than is required for the "average" or normal child. Assuming each of three children has an intellectual developmental level (mental age) of 6-0 years, the normal child will achieve one year of intellectual growth in one chronological year, and after a one-year interval will have an intellectual developmental level of 7-0 years. During this same period of time, the child with an I.Q. of 75 will have grown intellectually 9 months, and the child with an I.Q. of 66 or 67 only 8 months. The child with an I.Q. of 75 will require one year and 4 months and the child with an I.Q. of 66 or 67 will require one year and 6 months to develop intellectually the one year that the normal child accomplished in a one-year period of time. (Johnson, 1963, p. 460)

It is felt that as long as normal and retarded children are equated for intellectual developmental levels (mental age), experiences, and previous learnings to insure equal readiness, they should have similar patterns of learning, require the same amounts of practice and retain equal amounts of the material learned. (Johnson, 1963, pp. 459-461)

In interpreting the I.Q. it may be said in general that (1) the greater the intellectual handicap, the wider the area of behavior which it determines. In other words, the more profound the retardation, the more likely that the deficit will limit to a narrow range the behaviors that are possible for the child; (2) the less pronounced the
intellectual handicap, the less the relative retardation in motor areas (aside, of course, from a gross neurological deficit in motor coordination). Within the mildly and moderately retarded ranges of intelligence, one can predict that the brighter children will show relatively less retardation in learning to walk, motor behavior and fine coordination, although as a group they will show significant retardation in these behaviors.

Among mild and borderline retardates, it is not unusual to find well-coordinated, lithe athletes and many others within the normal range in motor skills. Among the more severely retarded, there are also often discrepancies between mental and motor skills, but in this group damage to the CNS is often involved to such an extent that some deficit is usually apparent in motor proficiency. (Robinson and Robinson, 1963, p. 403)

It has been emphatically stated, and this was of prime interest to the investigator, that the concept of mental age must not be oversimplified by indiscriminately comparing educable retarded children with other educable retarded children or with normal or gifted children of the same mental age. Biological factors and life experiences of the retarded child often alter the qualitative nature of his mental age simply because he has lived longer and has had experiences not yet available to the normal or gifted child of the same mental age. (Goldstein and Siegle, in Rothstein, 1971, p. 184)

Keeping in mind the numerous conflicts which the educable retarded child faces in the demands of academic and
social situations for which he is developmentally unprepared, there are several academic problems which manifest themselves. These may be referred to as disabilities in learning and are identified as tendencies to oversimplify ideas and concepts, reduced ability in generalization, short memory and attention spans and limitations in incidental learning. Cruickshank and others point to the tendency of the educable retarded child to do better with concrete or functional ideas than with abstractions. For example, when asked to define or describe an object, it has been found that the educable retarded child will frequently do so in terms of utility. Thus, "an orange is for eating," "a chair for sitting," "a book for reading," and so on. The more abstract the related concepts in situations embodying a common principle the more difficulty the educable retarded child has in seeing the commonalities in the situation. (Goldstein and Siegle, in Rothstein, 1971, pp. 194-195)

Research by Ellis indicates that short term memory is a prevalent characteristic in the retarded child. As he uses the term, short term memory consists of active storage of a stimulus impression over a period of seconds or minutes. Ellis tentatively suggests that the basis for this aspect of learning behavior is probably a brief reverberatory trace, or circuit, which persists for a short time after a sensory event. This stimulus trace begins to decay very quickly but
it may itself produce or permit structural changes to occur in the brain which account for the storage or persistence of a memory for a much longer time. With regard to retarded children, who may have damaged central nervous systems, Ellis hypothesizes that the stimulus trace is both shortened in duration and lessened in intensity resulting in deficits in learning and retention. (Ellis, 1963, pp. 134-158)

Ellis's theory implies that the retardate has greater difficulty in making connections between one stimulus situation and another.

... as in the normal baby, "out of sight, out of mind." In teaching the concept eight, for example, a teacher might assign a lesson consisting of a series of problems employing several different number combinations totalling to eight. The child in whom the memory of one problem persisted as he attacked the next would soon develop a generalized concept incorporating all the combinations he had practiced. The child in whom such stimulus traces persisted too briefly would not automatically develop the generalized concept (Robinson and Robinson, 1965, p. 330)

Contrary to popular opinion, once a retarded subject has learned a response, he is about as likely to remember it as is a normal subject, provided that he has an equal opportunity to utilize the skills and information he has acquired. Workers who have studied long-term retention have generally failed to find significant deficits in retarded subjects as compared with normal subjects. (Cantor and Ryan, 1962; Jenson and Rohwer, 1963; Johnson and Blake, 1960; Lott, 1958)
With regard to incidental learning, as compared with normal children, the educable retarded child will not acquire information simply because it is there. He may grasp the central theme of a lesson, but the peripheral information may be lost to him. (Goldstein and Siegle, in Rothstein, p. 198)

When one considers the short attention span, the lack of generalization and the possible perceptual confusion, which is part of the retarded child's inherent background, it is little wonder that he also evidences a deficit in incidental learning.

In language development the educable retarded child most nearly approximates his mental age. This is often true of both his ability to produce language and the quality of the language itself. With some young educable retarded children speech defects typical of the preschool child are evidenced. Baby talk and imperfect articulation are common. The prevalent language characteristic of educable retarded children to limit their communication to single words or fragments of sentences is due to many things, not the least being their impoverished background, their lack of ideas, and their limited vocabulary. (Goldstein and Siegle, in Rothstein, 1971, p. 199)

In speaking of the characteristics of retarded children, environmental conditions, such as cultural deprivation, should merit considerable attention, since a sizeable
proportion of educable retarded children come from substand-
ard homes.

There have been many different approaches used to study the extent to which cultural factors are responsible for the incidence of mental retardation. In the study of language, one conclusion generally supported by research is that culturally deprived children develop linguistic patterns which are significantly different from the language patterns found in middle class society. (Erdman and Olson, in Rothstein, 1971, p. 241)

Sampson reported that by the age of two years, upper and middle class children have surpassed their lower class peers in speech development. (Sampson, 1956, pp. 194-202)

Irwin found that infants from high income families learned speech sounds faster than infants from low income families. (Irwin, 1948, pp. 31-34.

Deutsch hypothesized that the noise level of lower class life combines with the absence of adult-child language interplay to retard the child's language development. (Deutsch, 1963, pp. 163-180)

In addition to differences in language development, personality differences are also reported in a number of studies dealing with social and economic deprivation. Bronfenbrenner summarized the literature by stating that lower class homes have greater possibilities for providing inadequate discipline for boys and overprotection for girls.
Mitchell found that lower class students reflected the presence of far less emotional satisfaction than subjects from the highest socio-economic levels. They expressed feelings of inadequacy, friendlessness, unfair treatment, hostility, mistreatment by teachers, discouragement, and physical ailments two to five times more frequently. (Mitchell, in Goff, 1954, pp. 179-183)

Sears hypothesized that the lower class child's unrealistically high expressed levels of academic and vocational aspirations probably reflect impairment of realistic judgment caused by the impact of chronic failure. (Sears, 1940, pp. 498-536)

When this characteristic is coupled with Record's observation that lower class Negroes tend to withdraw from the competition of the wider American culture, a rather unhealthy and frustration-prone personality stereotype begins to emerge. (Record, 1957, pp. 235-255)

There is also evidence of a much higher incidence of severe behavior disorders among the disadvantaged retarded than has been found in the middle classes.

It has been found that for many, a dramatic change in the environment of the retarded may cause significant changes to occur in their intellectual development rate. One of the most striking studies relating to the effects of
environmental change on I.Q. was conducted by Skeels and Dye in 1937. Thirteen children under three years of age, having an average I.Q. of 64, were taken from an orphanage where they had received a minimum of attention and were placed in an institution for the feeble minded. They were assigned to various wards where they received a great deal of attention from older patients and attendants. After a year and one-half, their I.Q.'s showed an average increase of 27.5 points. A contrast group of twelve infants remained in the orphanage. The initial average I.Q. of this group was 87.6. After thirty months with adequate physical care but a minimum of stimulation, they had dropped an average of 26.2 points in I.Q. (Skeels and Dye, 1939, pp. 114-36)

In a recent replication of the Skeels and Dye experiment Heber and Garber in Milwaukee, Wisconsin, believing that the environment, especially the environment of the ghetto, is of primary importance, and that children of retarded mothers need not be themselves retarded, went to a slum; chose 40 retarded mothers with newborn babies, all black, then assigned them randomly to two groups with 20 mothers and infants in each. In the experimental group, the mothers were given job training and taught home-making and baby care. Their babies, beginning at three months of age, were taken to the university every morning. There "infant stimulation teachers," fed, bathed and taught them
until 4 p.m. For the control group nothing special was done.

Tested at intervals, the 20 "stimulated" children have proved "distinctly" superior to the youngsters who stayed at home. They have I.Q.'s averaging about 125, compared with scores of 75 or less for their mothers and about 95 for untreated children of similar background. (Heber and Garber, *Time Magazine*, 1972, pp. 55-56)

Although much has been written about the prevalence of mental retardation in culturally deprived areas, it should be pointed out that mental retardation will not vanish from the scene with the solution of this sociological problem alone. Cultural deprivation as a socially disintegrating force knows no boundaries or limits and there is no reason to suspect that intelligence does not follow the same characteristics in regard to its distribution that has been found to be true for physical growth. (Johnson, 1963, p. 478) However, the relationship between retardation and deprivation does appear to have some validity. In view of this fact, the task of society must be to reduce cultural deprivation, with the hope that its negative ramifications can also be reduced or eradicated.

Behaviors and attitudes most frequently attributed to educable retarded children include overaggressiveness, self-devaluation, short attention span, poor memory, delayed language development, low tolerance for frustration.
When one considers that this child is operating in a "normal" world, but a world for which he is intellectually inadequately equipped, his proneness to frustration can be more readily understood. Purely on the basis of probability the retarded child will be faced with difficult or impossible situations more frequently than might be expected of his normal peers. While others succeed he finds himself more inadequate. The increased frequency of such situations for the retarded child renders him comparatively more prone to frustration than his normal peers.

In the ordinary course of events the retarded child also suffers from a comparison with children of his own age as well as with younger children who are more adept, swift and efficient in performing tasks seemingly at his level of achievement. A tendency toward self-devaluation is an almost inevitable outcome of this situation.

Psychologically, educable retarded children, like all children, require and seek love, security, recognition, and a sense of belonging.

Our culture smiles upon the bright, successful, creative individual and frequently rewards him with gestures of affection and recognition. Conversely it frowns upon the incompetent laggard and confers upon him the very antithesis of his basic needs, rejection. It is obvious that the educable mentally handicapped child's intellectual subnormality, must, in all too many cases, operate to prevent the fulfillment of his needs for affection, acceptance, and security if not in the home, at least in the more competitive and depersonalized activities in the school setting. (Goldstein and Siegel, in Rothstein, 1971, pp. 180-181)
To effectively teach the retarded child the educator should be sensitive to the child's uniqueness motorically as well as intellectually.

One of the most notable studies in motor ability was that done by Francis and Rarick. This study was designed to obtain information regarding the gross motor abilities of a group of 284 mentally retarded children in public schools whose chronological age was between 7.5 years and 14.5 years and who had I.Q.'s between 50 and 90. In tests of running speed, balance and agility the mentally retarded scored approximately two to four years behind the published age norms for normal children. (Francis and Rarick, 1960)

In a descriptive study, Thurstone found normal children to be superior to the mentally retarded in mean achievement scores on eight selected motor skill items. Increased chronological age, however, was accompanied by higher achievement and improvement in motor skill. (Thurstone, 1959)

Howe, in a carefully controlled study which attempted to eliminate the variables found in Francis and Rarick's work, selected children with a background of familial retardation. The test used was purported to be free of intellectual loadings and contained such items as sargent jump, balancing, grip strength, zig-zag run, fifty yard dash, squat thrust, as well as items including tapping and dotting speed and maze tracing.

It was found that normal boys were significantly
superior in all eleven motor tasks, while normal girls were superior in nine of the eleven tasks. A wide range of scores was noted in both groups with no definitive pattern being established, and a great deal of overlap found between normal and retarded achievement. (Howe, 1957, and Howe, 1959, pp. 352-354)

Using feeble-minded girls as his subjects Brace concluded that there is slight relationship between I.Q. and the ability to learn gross bodily motor skills of a sport type. It was suggested in this study that emotional reaction patterns, rather than a lack of physical ability, may have produced poor performance scores. (Brace, 1946, pp. 242-253)

Hunt, in the book Recreation for the Handicapped, says that success of the mentally retarded subject in performing motor tasks is based on the simplicity of the tasks (Hunt, 1955)

Skills which are "spiralling", or where one skill is built on another, are difficult for the retarded. This observation is well illustrated in a study by Fait and Kupferer where two motor tasks, the vertical jump and the Burpee squat thrust, requiring different degrees of insight and ability, were given to 41 male adolescent subjects. Results of the vertical jump were favorable when compared to those of a normal secondary school population. However, the Burpee results were significantly lower than the results
of the normal population. (T score, 23.90 for Burpee compared to T score, 47.68 for vertical jump. It was found that when the subject was faced with a complex task such as the Burpee jump, he evidenced uneasiness and stress. (Fait and Kupferer, 1960, pp. 729-732)

Asmussen and Heebøll-Neilsen found that the more complex the task the greater the failure rate in Danish boys of I.Q. 70-90 compared to boys of average or better intelligence. (Asmussen and Heebøll-Neilsen, 1956, pp. 371-38)

The literature appears to indicate that the complexity of movements and the associated intellectual action necessary to carry them out could be greater factors in limiting the motor performance of the retardate than the lack of motor ability per se. This is consistent with the findings of Heath, who postulated that the awkwardness exhibited by certain types of retardates was a function of intelligence and comprehension of the task, and not one of inherent motor deficit. He predicted that, as the intellectual counterpart of the motor act was learned and reduced to a habit level, the resultant performance would become increasingly quick and smooth. (Heath, 1943, pp. 282-284; Heath, 1944, pp. 482-499)

With regard to physical fitness, Brace reported that mentally retarded boys scored on the average materially below the national age norms, with 80 percent of all scores
falling below the median of the national scales. (Brace, 1961, pp. 269-275)

Cratty indicates several pertinent reasons why the retarded are unfit. These include social rejection by normal peers resulting in lessened opportunities to participate in rigorous games; complex rules encountered in many sports and games which exclude the retardate from these activities. Lack of coordination results in a disinclination to participate, which in turn leads to a decreased capacity to perform if vigorous muscular activity is not engaged in for long periods of time. The retardate also often does not recognize the long term goals of fitness programs. He is usually more interested in the emotional content of the experiences (i.e., the exercises are either "fun" or "oppressive."). If they seem oppressive, it is unlikely that he will "overload" himself and perform the exercises with vigor. When this is the case little or no change with regard to fitness will occur. (Cratty, 1969, p. 100)

The study of reaction time and its effect on human behavior has long interested the behavioral scientist. Ellis and Sloan found that all correlations of mental age and reaction time of 79 male and female defectives were highly significant. The effects of chronological age upon reaction time were negligible. Subjects with low mental ages tended to be more variable in speed of reaction.
than those with higher mental ages. (Ellis and Sloan, 1957, pp. 65-67)

Stein suggests that an explanation for the difference between the retardate and normal child could be that the concept of speed or time has little meaning for the defective and that differences found are as much influenced by intangible psychological factors as they are by actual response to stimulus. (Stein, 1963, p. 237)

Malpass attempted to determine whether comparable groups of institutionalized and non-institutionalized retarded children could be differentiated on the basis of motor proficiency and whether motor ability of retardates could be distinguished from that of normal children. No difference was found between the motor ability scores of institutionalized and non-institutionalized retarded children and no difference was found between scores of the sexes, but highly significant differences were found between the motor ability scores of retarded and normal children.

This study also confirmed the claim made by Tredgold (1947), Doll (1946), and Sloan (1931) that motor proficiency is related to intellectual ability, at least in so far as mentally retarded children are concerned. (Malpass, 1960, pp. 1012-1015)

In clinical observations on educationally sub-normal children in England, Keogh and Oliver indicted that many of
the problems of relationships are due to inaccurate measurements of the process of acquiring a score on a motor performance test. They call for an accurate description of performance rather than a pass, fail or other type of score used to typically represent the total performance level. On the basis of their observations of subnormal children these performance difficulties were found: (1) hesitating and halting movements and difficulty in initiating movements; (2) consistent failure in one side of the body; (3) movement in one set of limbs interfering with movement in another set of limbs; (4) difficulty in initiating and maintaining movements requiring alteration of rhythm or count such as alternate foot hopping; (5) inability to control force or speed of movement. Commitment in one direction seemed to prevent a child from preparing to move in another direction; (6) inability to perform in a limited area but could hop or move about in a large area; (7) extraneous or superfluous movements (8) timid lack of effort. (Keogh and Oliver, in Ismail and Gruber, 1967, pp. 31-32.

To summarize from the literature, it may be said that the psychomotor functioning of retardates is significantly below that found in the normal population. All the evidence strongly indicates a high, positive relationship between levels of intelligence and level of motor functioning. However, in spite of this rather gloomy picture
Stein, in reviewing the literature on the motor ability of the retardate, indicates that when these children are taught systematically and are involved in programs of exercise or movement their achievement can approximate the level of the normal population. (Stein, 1966)

Oliver found that strength and fitness as well as I.Q. scores of retardates improved after a ten-week program of physical education. This success was attributed to such emotional factors as are affected by achievement, success, improved confidence, better adjustment, and a feeling of importance that the children developed from having interest and attention centered on them. (Oliver, 1957, pp. 19-22)

Corder replicated this study and indicated the same results after a program of only twenty days' duration. (Corder, 1965)

Hayden (1964) and Carter (1966) in recent studies indicated that retardates can improve in fitness up to the level of their normal peers.

From all of these studies one can deduce that the motoric potential is not solely a matter of inability, for in this respect the retarded are most like normal children, but rather it is, to a large extent, a matter of careful teaching. In the absence of central nervous system impairment the motor performance of educable mentally retarded
children can, indeed, approximate that of the normal population.

Undoubtedly the most important and constructive characteristic of the educable mentally retarded child is the fact that he is educable. Inherent in the term itself is the implication that the child is in some degree amenable to education as it is defined in the public school frame of reference. If the learning situation takes into account the characteristics of the retarded child, yet recognizes his individual differences, his school experience can be of great benefit to him and to society.

Importance of Music, Movement and Dance in the Lives of Retarded Children

The importance of rhythm in remediation programs for atypical children is emphatically stated by Kephart. It is felt that much of the information which is obtained from the senses is probably aided and militated by the ability to establish and maintain rhythm relationships. It is further felt that many of the problems of auditory span and temporal order in series information may be related to weakness in ability to establish and/or maintain rhythm patterns. (Kephart, 1971, p. 227)

In any complex task, all of the rhythmic relationships in all of the areas must coincide and the same rhythm pattern must be dominant throughout. (Kephart, 1971, p. 227)

The importance of rhythm in the acquisition and improvement of reading skills is also a matter of
consideration. Although Kephart speaks of the slow learner, his comments also have merit for the retarded.

... Among poor readers there is a very high percentage of problems with simple constant rhythms. (Carton, 1963, cited in Kephart, 1971, p. 177)

Many children with learning disabilities lack a consistent rhythmic pattern. When asked to tap the table top with a constant beat, they start out but are unable to hold the pattern, and their performance soon becomes chaotic, the beats being irregular and inconsistent. (Kephart, 1971, p. 177)

Sterritt and Rudnick completed two studies which indicate that rhythmic ability influences first and second graders' early attempts to read. These researchers report that by the third grade, factors other than the ability to fragment time into rhythmic patterns begin to influence reading ability. (Sterritt, 1966, and Rudnick, 1967)

There are three kinds of rhythm: motor, auditory and visual. Each of these three types should be consistent within the human organism. If not the result is temporal confusion.

When the task becomes more complex the child performs either without rhythm or in a series of different rhythms. In either event the temporal unit is ill defined and the temporal dimension lacks consistency. (Kephart, 1971, p. 178)

Much could be written on the relationship of the temporal or rhythmic dimension to academic pursuit. Although no studies prove that training in rhythm will cause reading to improve, the strong arguments put forth by Kephart could form the basis for further research in this area.
The two great realities, space and time, are intricately interwoven in the child's environment. Some events are presented predominantly in one phase, some predominantly in the other. Seldom is an event limited to one phase. Even more, any manipulation of events always requires dealing with both phases simultaneously. When time is a true fourth dimension of space, the child can translate from space into time and back again with facility, since both phases are integrated in all his manipulations. (KePhart, 1971, p. 182)

The example is given by KePhart of a child who is structured in space but weak in time. In trying to read, this child can recognize the spatial relations on the page and identify the word. However, each word remains separate for him and he cannot integrate them in time so that the thought appears. Although such a child may read words fluently he has a poor understanding of the content. Similarly, lacking rhythm, he has problems in writing. Writing is a complex sequential series of events in time. If the child's structure in time is weak, his writing will be full of errors and illegible. (KePhart, 1971, p. 183)

In education, however, if the whole child is to be considered, the importance of rhythm as a vehicle for creative expression should be reviewed.

Contrary to popular belief that only a few can create, the creative power is known to be present to some degree in every individual. (Findlay, 1962, p. 37)

Guilford attacked the concept that creativity is the possession solely of the gifted, and provided evidence for the
theory that I.Q. and creativity are not one-to-one correlates. He further indicated that remaining components of the creative act are motivational and temperamental in nature. (Guilford, 1950, p. 444-445)

Canner writes of the importance of creative dance in the life of the retarded child.

... It is an environment in which the aggressive child is given an outlet for pent up energies or hostile feelings. It is when every child is offered a time to experience the joy and freedom of using his body and his creative uniqueness—a time to dance.

... Using the child's own rhythmic feelings and movements increases their sense of acceptance and self-worth. When a child beats a drum for others to follow he is aware that he is the leader, he can decide when the group will dance and when it will stop, if the sound quality will be loud or soft, or the time fast or slow. (Canner, 1968, pp. 8-9)

Bluemal, in discussing the value of music therapy for retarded children, says:

Rarely is a child found whose emotional set-up is not disturbed as a result of mental retardation or deficiency. This makes the retarded or deficient child more than just a slow learner, and limits him not just to the point of his deficiency but rather to the point of his emotional stability and to the non or disorganization of his whole personality. (Bluemal, 1956, p. 165, cited by Loven)

Devereaux speaks of the retarded child as being often hyperactive, restless and destructive and needing large amounts of activity. He emphasizes that unless this natural tendency for gross bodily movement is utilized in the early stages of development it becomes an increasingly difficult activity as the child grows older and develops
self consciousness and inhibitions. Therefore he encourages free interpretations to music. (Devereaux, 1956, p. 167)

As Canner suggests, children vary in the advantages and disadvantages with which they are born but this does not preclude the ability of the less advantaged to enjoy and respond creatively to rhythm.

Developmental Studies Relating to the Response of Normal Children to Rhythm

Before dealing with the atypical child and his motoric response to rhythm, there are several questions which were posed by Christiansen which bear repeating in this study. For example, when do children begin to respond rhythmically? What types of music elicit such responses? What kinds of rhythmic movements may be considered typical at various age levels? Is the child who apparently ignores the music or makes only slight overt responses less rhythmic than others in the group who are dancing or moving? What part does emotional responsiveness play in the motor rhythmic behavior of the child?

The literature reveals some answers to these questions. Although there have been a few analyses on the ability of children to respond to rhythm as well as to produce rhythmic patterns, there seems to be some discrepancy concerning the age at which rhythmical activities first appear. Feldspar indicates that the first cry of the infant is the
first audible manifestation of the sense of rhythm already dwelling in the infant. (Feldpar, 1933, p. 291)

Seashore suggests that rhythmic movement is evidenced in the crudest rhythmic kicking and tapping movements of the infant. (Seashore, 1939, p. 67)

Gessell speaks of bodily rhythmic movement at nine months as a typical aspect of behavior. (Gessell, 1935) In another reference he says that the first sign of rhythmic movement appears at the age of eighteen months when the child responds rhythmically to music with whole body activity, and in finger painting often uses rhythmical motions. (Gessell, 1943, p. 153)

Observations by Winn suggest that by eighteen months the child often responds to music by change of positions and motions, but does not suggest that rhythm is the contributing factor. He surmises that the child responds to rhythm by the age of three, but admits that this response has not been definitely determined. He makes the general statement that rhythm is the main thing that appeals to the child before the age of six. (Winn, 1943, p. 255)

Mainwaring maintains that the ability of young children to perceive even the simplest rhythmic pattern cannot be assumed as a general phenomenon. He found that even though a young child could "beat time" and could coordinate reasonably well with the rhythmic pattern for a while, his
movements soon became formless and vague. (Mainwaring, 1935, p. 185)

Chorus, in a study of personal rhythm, found that children between the ages of six and eight prefer a constant rhythm in simple tasks. Unstable children are seen to elicit variable responses which can lead to diagnosis of chronic instability and character maladjustment. (Chorus, 1946, p. 484)

This finding was more recently corroborated by Rimoldi and others who indicated that certain personal tempi are relatively consistent from time to time within specific parts of the body, and yet the individual's personal tempo in one part of his body cannot be predicted by knowing how fast he prefers to move another part. (Rimoldi, cited by Cratty, 1969, p. 151)

Thus, according to Cratty, the ability of a child to duplicate a rhythm pattern is probably influenced by the speed he prefers to move when no stimuli are present. Consequently it can be expected that some children will resist moving rapidly in a given task despite the characteristics of the music and the beat they are to duplicate, while others move too rapidly despite their exposure to a slow tempo. (Cratty, 1969, p. 151)

Regarding the question of the typical rhythmic movements of various age levels, Baldwin and Stecher investigated the differences in rhythmic ability of preschool
children by means of an individual tapping experiment in which the child used wooden clappers to keep time to a march played on a phonograph. The child's responses were electrically recorded by means of a kymograph. The findings showed that rhythmic ability does not depend on age; two of the best records being made by three-year-olds. It was further reported that good rhythm was seen to lapse for a few measures and then was recovered. (Baldwin and Stecher, 1924)

Williams adapted the Seashore motor rhythmic test for use with preschool children and found significant age differences (ranging from a seventy-five percent failure in the test at the three-year level to practically no failures at six years), in tapping a regular pattern sounded out by a Hollerith Counter. Correlations with other motor tests were low with one exception, namely the ability to walk rhythmically. Here Williams found a substantial correlation with the tapping test. (Williams, Sievers, and Hathwick, 1933)

Heinlein, reporting from the psychological laboratories of Johns Hopkins University, compared marching response to rhythmic musical stimulation (electrically projected and recorded on a kymograph drum) with the observations of trained observers. As the response was being electrically recorded the observers also recorded the incidence and frequency of the child's steps by tapping a telegraph key.
The first observations were made without music; then a markedly rhythmical composition was introduced. Both the objective and the observational records of the child's walking were transcribed on the kymograph drum. The music as it affected the children seemed to induce more regularity of movement. In only two cases, however, was there a truly rhythmic response, according to the standard of the examiner; that is exact temporal coincidence of musical beat and foot movement during an interval of fifteen seconds. To the observers the music proved, in most cases, to be a disturbing factor. Only the professional musicians to whom the perception of rhythm had become automatic reported that the music did not interfere with their judgments of pace frequency. The experimenter concluded that the method of simple observation was unreliable as a basis for recording the child's motor response in marching to rhythmic music. (Heinlein, 1929, p. 205-29)

In a study to determine the preferred rhythmic tempo of children Hulson (1929) experimented with twenty-one four-year-olds in a group situation which closely resembled the set up of their rhythm periods. The purpose was to study whether children's rhythmic performance in locomotor movement to music was more easily attained at one tempo or series of tempi. The tempi which in this experiment were found to be most conducive to rhythmic responses for this particular group of children were as follows.
The categories "best later" and "limits" refer to the adaptation which the child might make with training.

(Hulson, 1929, p. 78-80)

Christiansen, in a follow-up of Hulson's study, set up an experiment with ninety-three pre-school children designed to (1) study the duration of rhythmic response at various age levels; (2) observe evidences of emotional response to rhythmic stimulation; and (3) compare the rhythmic responses of children with reference to nationality backgrounds.

The observation of these children was not based on mathematically precise timing of the child's locomotor response with reference to beats in music, but rather on duration of bodily rhythmic movements satisfying to the eye and ear of a musically trained observer.

In this experiment observations were made of the children galloping, walking, running, dancing. The music was classical and the meter was 6/8, 4/4, 2/4 and 4/4,
respectively. The conclusions of this study were:

(1) Differences due to nationality were of minor importance compared with differences due to age, sex and certain personality traits which tended toward inhibition or toward spontaneous whole-hearted bodily rhythmic activity.

(2) The nursery school children were more successful in synchronizing their movements with fast tempi than with slow ones; the kindergarten and junior-primary children were able to adapt to tempi of both types.

(3) In all three groups, children were more successful with the suggested locomotor activities of running, walking, and galloping than with dancing. Lively music for some of the younger children tended to heighten activity and to accelerate rate of movement. (Christiansen, 1938)

In a study using motion pictures of the performance of children age two to five years and some adults when they walked and when they beat time with their hands to the accompaniment of music played on a mechanical piano, Jersild and Bienstock (1935) made the following observations:

(1) There was an increase with age in ability to keep time, but this ability did not substantially improve with practice extending over a period of
ten weeks involving a group of three-year-old children.

(2) Children's scores were no higher when highly simplified music was played.

(3) Children were better able to keep time in response to faster than to slower tempi. (In various test series music was played at the following rates: 76, 136, 160, 186 beats per minute).

(4) Comparisons between three different meters 2/4, 3/4, 4/4, showed no substantial difference in the children's scores.

(5) There was not a significant difference between children's ability to keep time with their hands and their ability to keep time while walking.

(6) There was a high but not perfect correlation between children's rhythmic ability as measured by these tests and their ability to sing as measured by the number of tones they could produce.

(7) The study finally indicated that even an experienced worker's judgment of the temporal accuracy of a child's response in keeping time to music is highly untrustworthy as compared with objective methods. (Jersild and Bienstock, 1935)
Christiansen, in discussing this study, makes this pertinent statement:

Work in the field of motor rhythm with young children should not center primarily upon cultivating the child's ability to keep accurate time, but rather upon encouraging a variety of activity and exercises, and cultivating the child's own spontaneity and his interest in participating in rhythmic activities. (Christiansen, 1938, p. 12)

Mussey studied the learning curves of white and negro children in learning a rhythmic pattern. Her study showed the rhythmic superiority of some negro children but more important, from this investigator's point of view, was the fact that each grade showed rhythmic superiority to the preceding grade. (Mussey, 1933, p. 62-71)

Starke, a classroom teacher, studied the development of rhythmic abilities of first grade children. In order to study directions of growth in rhythmic ability she devised an observation summary listing categories such as: (a) ability to follow the metric pattern of the music, (b) ability to follow the rhythmic pattern with simplest movements, (c) attentive listening, (d) creative use of music, (e) participation with enjoyment, (f) ability to create own rhythmic patterns.

The children were tested before and after participation in a rich program of both motor and musical experience. Results showed "continuous, cumulative growth for the group as a whole, individual patterns of rhythmic development emerged, and the observation guide was judged a valuable aid.
Scheihing, in a study considered of great significance in procedural preparation for this present investigation, endeavored to observe the natural rhythms expressed by preschool children (age three years-three months, to four years-four months), in their free vocalizations and motor activities found the following results:

1. Sixty-seven percent of all rhythms shown in vocalization and body movement were made of notes of equal duration.

2. There was a marked preference for duple rhythm; ninety-two percent of all rhythms revealed this duple form.

3. Younger boys (three years-three months) presented over four and one-half times as many rhythmic activities as girls. In the older group (four years-four months) 1.11 as many responses were from girls as from boys.

4. There were five times as many complicated rhythm patterns from the older group as a whole and this group was more creative in its response.

5. Tempi of 120 and 60 comprised forty-four percent of all tempi shown.

6. Poorly adjusted children showed almost no rhythmic response.
The conclusions made by Scheihing which seem pertinent to this present study are that if music is to be presented to preschool children or regressed "patients" it must be simple in rhythmic pattern and melodic line. Music for these children, according to Scheihing, should be "of the most simple, evenly pulsated rhythmic pattern, in duple rhythm, in legato style and within a narrow vocal range." (Scheihing, 1951, p. 188-189)

Studies Relating to Response of Retarded Children to Rhythm

Seashore, in discussing the musical mind, makes some fundamental statements which should be borne in mind when dealing with the musical rhythmic response of retarded children. He postulates that the senses of pitch, loudness and timbre are inborn and elemental, and function in early childhood.

After a comparatively early age they do not vary with intelligence, with training, or with increasing age, except as the exhibition of these capacities is limited by the child's ability to understand or apply himself to the task. (Seashore, 1933, p. 3)

This last statement is particularly important and has been inferred by many researchers who have been involved with investigating the motor response of retarded children—that if the child understands the task his response
approximates that of the normal population. Seashore goes on to say:

The apparently complex forms of sensory capacities also tend to be elemental to a considerable degree; that is, the young child has the sense of tone quality, of volume, of rhythm, and the sense of consonance long before he begins to sing or know anything about music. It is the meaning, and not the capacity, of these forms of impression which we train and which matures with age in proportion to the degree of intelligence and emotional drive. (Seashore, 1933, p. 3)

It seems that a distinction has to be made between musicality and rhythmic ability. The latter is inherent in some form in all individuals; the former seems to be more concerned with intelligence.

Seashore speaks of the great composer, the great conductor and the great interpreter as living in "large intellectual movements." One could also add the great dancer to this list.

They have the power of sustained thought, a great store of imagination, and the ability to elaborate and control their creative work at a high intellectual level. (Seashore, 1933, p. 8)

However, Seashore stresses that there is much musicianship which occurs on the sensorimotor level and that often the "highest and most beautiful achievements of thought have the charm of simplicity." (Seashore, 1933, p. 8)

Some of the earliest studies in dance with atypical children were carried out by Chace and associates in dance therapy. Although many of these studies are anecdotal in
nature they do have significance in relating the response of the retarded child to rhythm.

Alvin, after a six-week program of music therapy, reported that severely retarded and disturbed children, some who had no speech and ten who were not testable, showed the following reactions to music: "smiled inwardly, made noises, got hands ready to clap." The more capable children beat time and asked for favorite selections to be played. The majority of the children disliked high pitched sound and could not respond to music played at a fast tempo. (Alvin, 1959, p. 988)

Reeves and Alvin also suggested that music is a help in attracting the attention and increasing the attention span of retarded children. (Reeves, 1952, p. 11, and Alvin, 1959, p. 988)

Weir pointed out that the autistic retarded child is the most difficult to reach, yet the response he makes to music is described as "instinctive." Although these children have a block insofar as comprehension of words is concerned, the world of music, "largely one of memory, imagination and feeling, seems able to reach them and prove meaningful." She further indicated that music is a strong organizing force with retarded children which "helps them create group spirit, gains attention, helps coordination and builds enthusiasm." (Weir, 1952, pp. 129-132)

The greatest success when retarded children are
exposed to rhythms has been reported by Robins and Robins. In this program children are "bombarded" by rhythmic activities using a number of sensory inputs including flags and various sounds. (Robins, F., and Robins, J., 1965)

One of the most comprehensive studies on the response to rhythm of retarded children was done in France by Faisse and Pichot in 1949. Their premise was that a sense of rhythm is characterized by the ability to translate the perception of a group of sounds into a motor act which synchronizes with the perceived sound. In this study the natural tapping rhythm for each subject was recorded. Then each subject was asked to reproduce a series of taps given to him by the experimenter. In addition, the subjects were to discriminate between the patterns and to produce a complex rhythm pattern. The final test had the children move to certain pieces of music with their performance rated by judges. Subjects in this study were thirty retarded children with mental ages of three to six years, and chronological ages ranging between six and seventeen plus. Twenty-three children with chronological age between six and sixteen were used as a control. The latter two groups were matched on a one to one basis with the retarded group. The children, chronological age three to six, were matched with the retarded children with a mental age of three to six, and the children chronological age six to sixteen, with those children age six to seventeen plus. Results
indicated no difference between normal and retarded children on the basis of mental age. The retarded children did adapt better to faster than to the slower rhythms. The authors noted that children with fine motor ability were able to compensate for poor rhythmic performance. In summary, the authors concluded that the rhythmical behavior of mental defectives was comparable to that of normal children of the same mental age, but inferior to that of normal children of the same chronological age. (Fraisse and Pichot, 1949, pp. 309-330)

A study by Murphy (1957) with low grade and middle grade mental defectives formulated the same conclusion as that given by Fraisse. In this study data were collected from a series of observations made during a music therapy program designed to elicit active participation on the part of the children. Two types of behavior were studied: (1) individuals who expressed rhythm with spontaneous rocking movements, (2) individuals who responded to rhythm with conventional clapping. The behavior was found to be comparable to that of normal children of the same mental age. (Murphy, 1957, pp. 361-364.

The child who is mentally retarded often has underlying emotional disturbance, as evidenced in his disinterest in his environment, his rocking behavior, self-destruction and aggressiveness. For these children music can act as a distracting influence away from self, or as a
sedative. It can also help establish some socializing activities and can help relieve the strain behind physical problems of locomotion and speech.

Chace indicates that the young retarded child, like all children, needs to establish sound movement patterns. By using music or percussion, these movements can be channelled to better coordination. Chace also makes the point that the teacher is often too concerned with technical skill and the spontaneous, communicative aspect of the performance, so important in the life of the less verbal or non-verbal child, is overlooked. (Chace, 1956)

Unfortunately in our culture we are not so aware of the potency of rhythmic actions and music, as we should be. We relegate the enjoyment of making music and dance to especially talented men and women who perform in a concert hall, where a large audience sits in silence attempting to remain absolutely motionless and giving vent to their desire to move only at those moments of pause by coughs, fluttering of programs and shifting of positions, which makes the hall sound for a moment as though a sudden restless wind had entered and passed through—leaving a sudden stillness in its wake. (Chace, 1952, p. 63)

Studies Relating to Rhythm and Perception

Rhythmic perception has long been a concern of inquiry in psychology. Wundt said that rhythm was no more than a special case of time perception, concluding that if the lapse of time were accompanied by the experience of rhythm, the subject would be more able to perceive a time interval. It was believed that a close association existed between the perception of rhythm and kinesthetic
sensations and concluded that these two elements were actually the basis for rhythmic perception. (Wundt, 1908-1911)

Strumpf also concluded that rhythm and time perception were functions of the same sense. As he felt that this time and rhythm sense was formed chiefly by walking, his thoughts also appear to emphasize the role of kinesthetic patterning. (Strumpf, 1883)

Eberly indicates, however, that the work of both Wundt and Strumpf was highly speculative and provided no experimental evidence to support their assumptions. (Eberly, 1966, p. 11)

Bolton, in 1894, conducted the first extensive experimental investigation concerning rhythm. He believed that if the subject were limited in muscular or motoric movement, he would also be limited rhythmically. (Bolton, 1894)

Woodrow (1909) continued the work of Bolton and formulated conclusions which were summarized by Squire and Seashore, as follows: "Within the human body these actions are muscular and the stimuli based upon the rhythmic nature of contraction and relaxation (the release of energy and the recovery for further release of energy)." (Squire, 1901, p. 6)

Robert W. Seashore concluded that the fundamental condition for rhythmic perception could be found in the laws
of periodicity governing function of the body organs. (Seashore, 1926, p. 142)

MacDougall believed that every rhythmic presentation tends to arouse some movement or innervation in the human organism. MacDougall also stated that this movement is imitative of the original and that a succession of regularly recurrent stimuli, therefore, sets up a process of rhythmical movement. Not to accompany the presentation of such a stimulus indicates "inhibition of some sort." (MacDougall, 1902, p. 469)

The importance of temporal perception and organization has been discussed earlier in this study; however Kephart's ideas on developmental growth are considered important enough for reconsideration here.

According to Kephart, temporal judgments arise through synchrony and simultaneity in time. This acts as the point of origin for the development of the temporal scale. This scale is more commonly known as rhythm and is characterized by stable, equal intervals.

This motor-temporal system when projected onto outside events functions as an integral component of perception. The child, after having established a temporal scale, is in a position to order events in time. As illustrated by Kephart, auditing rhythm develops, speech becomes rhythmical, and the eyes move rhythmically across a page. Each of these perceptual attributes compliment each other and facilitate learning. (Kephart, 1964)
The literature reveals few studies on rhythmic perception involving senses other than hearing. Of these studies, that of Lorenz is probably the most pertinent. In 1925 Lorenz obtained measures of the influence of the auditory sense and also the haptic sense on rhythmic movement by asking subjects to produce a pounding rhythm while changes were made in their hearing and fingers were desensitized. Measurements based on the deviations made from the chosen rhythm patterns were recorded and showed that the largest loss occurred when the auditory channel had been blocked, slightly less change when the kinesthetic sense was decreased, and only a small change for decrease in the haptic sense. (Lorenz, 1925)

Lorenz preferred the use of personal rhythmical patterns rather than patterns imposed from without. Other researchers do not agree and feel that the most accurate way to study either auditory or motor rhythm is by providing a model stimulus pattern to which the subject responds.

Seashore believed that kinesthetic memory was the best factor measured by motor rhythm, sense of rhythm or tonal memory. His studies are, undoubtedly, the best known in the area of motor rhythm. In his work, kinesthetic memory is described as "the ability to comprehend and retain a fine muscular set for a sufficient length of time to repeat or compare the action of a second presentation." (Seashore, 1926, p. 159)
Of importance to this present study is Seashore's comment that tests of general motor coordination or precision in overt actions are of less value than tests of kinesthetic memory predicting ability in motor rhythm. However, a knowledge of scores on tests of motor coordination as well as scores for kinesthetic memory would form the best basis for prediction of ability in motor rhythmic performance. (Seashore, 1926, p. 159)

A follow-up study on Seashore's conclusions by Smith supported the conclusion of a positive and significant correlation between discrimination and performance given by Seashore. (Smith, 1957)

Annett made a comparison of discriminative ability in aural rhythmic perception with an expert's rating in motor rhythm and dance skills. Subjects in this study were 122 senior physical education majors at Wisconsin State Teachers' College. Motor performance was measured by having the subjects execute a triple step-hop and run and secondly a triple step-hop with a creative movement. Judgement of motor rhythm by experts was based on precision, grace, and natural movement. A correlation of .47 ± .05 was reported between motor performance as measured by expert judgment and the C. E. Seashore Test of Rhythm. Annett concluded that that the Seashore rhythm test was a fairly accurate and satisfactory instrument for use in predicting skill in motor rhythm. (Annett, 1932, pp. 183-191)
Findley, at the University of Wisconsin, in 1933 studied the influences of intelligence, motor memory, auditory acuity, musical training, and motor experience on the perception of rhythm. It was found that the group of students rating high on a given rhythm test excelled in all except auditory acuity and motor experience factors. Intelligence, motor memory, and musical training all influenced the auditory perception of rhythm. The study was based on a group of students rating high on a written test of seventy-two rhythm patterns given with auditory stimuli and a group rating low on the same written test. The question arises, would the subjects have ranked in the same order in a test based on a simple motor response to an auditory rhythm? It is possible that intelligence and training may be necessary for the particular type of response to rhythm which was used in the written test, but that they may not be related to the perception of rhythmic patterns. (Findley, 1933)

Studies Relating to the Development of Tests of Motor Rhythm

The need for measures of dance and motor rhythms is recognized by many authors writing in the field of evaluation and research. (Ashton, Scott and French, Richardson) Until recently the approach to measurement in dance has been done mainly by means of ratings of the performance of college students. Few attempts have been made to
measure the response of young children to music and, as was discussed earlier, almost no research is available relevant to the response of the retarded child.

Although there have been several attempts made to construct objective measures of motor rhythmic activity, low reliability, validity and administrative difficulties have discouraged the establishment of norms. Because of the complexity of devising a test of motor response to music, small parts of this total area have been used to test this ability. Several tests have done away with the whole body response. The Seashore Test of Motor Rhythm, The Drake Musical Aptitude Test, The Kwalwasser Music Talent Test and the Wing Musical Aptitude Test are all examples of devices which utilize this type of response.

Neilson (1930) and Williams (1933) have done studies of rhythmic response and used elaborate equipment, as did Stetson (1905).

Van Alstyne and Osborne, in their study of the rhythmic response of negro and white children, also used tapping of wooden blocks to an electrically operated telegraph sounder. (Van Alstyne, and Osborne, 1937, pp. 1-63)

Lemon and Sherbon used the Brace scale of motor ability, the Carl Seashore test of rhythmic perception, Robert Seashore's test of motor rhythm, and an original practical rhythm test. Their evidence indicated a low but positive relationship between rhythmic ability and motor ability in
physical education. They suggested that their own test was more useful as a test of rhythmic ability in physical education because it tested rhythmic perception and general body response. Further investigations with tests of this kind were recommended. (Lemon and Sherbon, 1934, pp. 82-85)

The test devised by Lemon and Sherbon was one of the first motor response tests to involve a gross motor movement to auditory and visual stimuli.

The majority of the studies reviewed have undoubtedly made a contribution to the field of knowledge on rhythmic response but used complicated equipment impractical for classroom use. For example, Heinlein compared marching response to rhythmic musical stimulation which was electrically projected and recorded on a kymograph with the observation of trained observers. (Heinlein, 1929, pp. 205-29)

Mussey, in her analysis of learning a rhythmic pattern, used the movement of stepping on a pedal to the beat of a tom-tom, recorded on an electrically controlled drum. One of the pertinent findings of this study was the fact that each grade showed rhythmic superiority to the preceding grade. (Mussey, 1933, pp. 62-70)

Swindle made use of electric buttons in a study on rhythmic ability and concluded (1) that rhythm is acquired, not inherited; (2) that the best means of developing rhythm is by methods that approach ordinary life activities, and
(3) that in developing rhythm large muscle activity is best. (Swindle, 1913, pp. 180-203)

Simpson (1958) designed a rhythmeter to measure locomotor response to auditory rhythmic stimuli. Results of this study indicated that when women from the general college population were compared to trained amateur and professional dancers, the scores achieved by the dancers were statistically superior. A comparison of scores received on the rhythmeter with those made on a written sensory test indicated a very low correlation between these factors. It was found that sensory and motor responses were not similar even within individuals or among groups. (Simpson, 1958, pp. 324-48)

An attempt at a practical test not involving mechanical devices was Ashton's test of gross motor rhythm developed to cut across the skills of folk, square and modern dance for college students. In this study students were rated on a five point scale on their ability to respond to a beat and correct rhythmic pattern, ability to maintain and vary movement, ability to change direction and on their style of movement (from forced and mechanical to alive and spirited).

Because the administration of the test and the items on which the students were rated corresponded to that used in the present study and the difficulties experienced by Ashton similar to those experienced by this investigator
during pilot study, Ashton's study was scrutinized carefully.

Ashton found the need for standardized and clear directions on the recording and the need to change some of the musical excerpts because they were found to be either too short or too long or too much alike in rhythm or melody. Judging was made difficult by irregularities in the spacing of the musical excerpts.

Finally, and of most importance, the rating scale was found to be vague and subject to individual interpretation. In spite of these problems, the study reported that reliable discriminations between "poor" and "good" college students could be made in terms of rhythmic ability as a result of this test. (Ashton, 1953, pp. 253-260)

In 1955 McCulloch developed a test of rhythmic response through movement for first grade children. This was the only test found in the literature which attempted to evaluate the rhythmic response of young children. The test was based on the four main aspects of rhythm discussed by Murray in the book Dance in Elementary Education: response to pulse beat, response to accent, response to rhythmic patterns, and response to musical phrasing. (Murray, 1963, p. 162)

The ability of first grade children to respond rhythmically to musical accompaniment was determined in terms of how accurately in time each pupil performed the movements of the items included in each of the four aspects of rhythm.
McCulloch actually devised two tests, one of sixty-five items and the other of fourteen items. The fourteen item test was made up of the items which, after item analysis, were found to be good discriminators between children with good ability in rhythmic response and children with poor ability in this respect.

In preparing this present study, the investigator found McCulloch's test to be of significant value.

In McCulloch's study 196 subjects in the first grade were given the complete test of sixty-five items. Judges were three physical education teachers who had considerable background in the teaching of rhythms and dance. The seven most discriminating items in terms of rhythmic ability were chosen from this sixty-five item list. Because reliability of this number of items was not found to be high enough, seven more items were added. With the inclusion of items which involved nonlocomotor responses, it was felt that the items now had good discriminatory value, plus a good variety of responses. (McCulloch, 1955, p. 54)

A test-retest correlation of the fourteen items with a new sample of first grade children increased the reliability from .76 to .90. It was therefore considered to be an acceptable and reliable test which could be used by classroom teachers in determining the ability of first
grade children to make an accurately timed motor response to music. (McCulloch, 1955, p. 58)

Scoring for this test was on a "1," "2," or "3" basis, with a "1" assigned as the highest score and "3" as the lowest. (McCulloch, 1955, pp. 20-25)

As a result of this study McCulloch made several observations and arrived at several conclusions regarding both the sixty-five item test and the fourteen item test. Since the investigator's main concern is with the shorter test, conclusions which center around it will be discussed.

(1) The correlation of $r > .80$ obtained between the total score on the long test and the total score on the short test indicated that the two tests were arriving at reasonably comparable results and would suggest that the short form was an adequate test of rhythmic response through movement for first grade children.

(2) In developing the short form of the test as based on Murray's criteria, it was determined that the weightings for each section should be as follows: accent, (section B) should receive 50 percent of the emphasis, pulse beat (section A) 30 percent of the weight, and rhythmic patterns, (section C) and phrasing, (section D) should carry approximately 20 percent of the test items. Roughly the emphasis on each section in
both tests was on a 5-3-2-2 basis. (McCulloch, 1955, p. 45)

(3) Meters which showed up statistically to be the best discriminators between the good and poorly skilled in motor rhythmic response were all done to 4/4 or 2/4 time. It is possible that 3/4 time did not show up as a discriminating meter due to a peculiarity of the sample or that items done in 3/4 time were not done correctly by either the good or the poorer subjects, in which case this meter would not show up as a good discriminator. (McCulloch, 1955, p. 47)

(4) A cutting point for special help was arbitrarily set at 30 for the fourteen-item test. (Remember that the scoring system was on the basis of "1," "2," "3," with a "1" being assigned as the highest score, the highest obtainable score, therefore, would be 14 and the lowest 42. The child who responded incorrectly to ten of the items would receive a score of 30 and would then be considered eligible for special help, or the child who scored with a combination of "2's" and "3's", adding up to a total of 30, would similarly be eligible for special help). An investigation should be made using the short form of the test with a large sample of first grade
children so that norms could be established, and a cutting point for additional help more scientifically determined than the arbitrarily determined cutting point which was originally used. (McCulloch, 1955, p. 63)

(5) An investigation should be made of the fourteen-item test as related to intelligence, physical development and general motor ability. (McCulloch, 1955, p. 66)

Coppock undertook to develop a test which would evaluate the rhythmic element in dance as performed by physical education majors at the State University of Iowa. This test involved response by a walking movement to 23 patterns of different meters. Subjects were also tested on rhythmic perception using the Gordon measures of musical perception and motor ability, and the Scott and French motor ability test. Intelligence was measured by the American College Testing Program. The test was found to have a relatively high relationship with the rhythmic element in dance, particularly folk and square dance. (Coppock, 1968)

A comment by Coppock seems pertinent to this study:

Measuring motor rhythm involves an inherent difficulty present to a lesser extent in the measurement of other types of motor skills, and not at all in the measurement of perception: the role that inhibitions play in the overt response of some individuals. Patterson (1916) recognized this problem in his discussion of the self-conscious individual who finds himself a prey to the inhibitions of modern society. His natural rhythmic
response is so attenuated that his image of time is blurred and his coordinating processes are obstructed. (Coppock, 1968, p. 915)

In spite of the recognized difficulty of measuring rhythmic response, perseverance in the development of diagnostic procedures in this area should continue. Sensitivity on the part of the examiner in the testing situation can alleviate much of the inhibition on the part of the child and the very fact that rhythmic response is being observed can act as a spur to the educator to place more emphasis on the teaching of rhythm.

If we believe that the problem of observing, analyzing, and improving motor movement is too difficult to be surmounted, the fine or even acceptable motor movement will be possible only for those who are endowed with a high level of motor capacity. What are we doing? Are we just going through the motions or are we improving the practices of the profession?

This is our challenge in the elementary school—to keep an open mind, to be willing to contribute to inquiry in the field, and, at the same time, protect the child's inherent interest in rhythmic movement. (Ashton, 1960, p. 39)

Studies Relating to Spontaneous Rhythmic Response to Music

If one is to get a complete picture of the child's rhythmic response, what the child does in a controlled situation undoubtedly is of importance. However, this response does not tell the child's whole rhythmic story. Christiansen says:

... Art demands additional criteria for evaluation. The best painting is not the one which exactly reproduces the scene contemplated
by the artist. Neither is the best dancer necessarily the one who responds to the music with mathematical precision. Sensitivity in seeing, hearing, and reproducing is important and should be measured. But that is not enough. The individual's creative reaction to the stimulus must be studied even though techniques for so doing are comparatively crude. (Christiansen, 1938, p. 13)

The dearth of studies in this aspect of rhythmic response has not been alleviated in recent years. Although increasing attention has been paid to non-verbal behavior, the analysis of expressive movement has remained largely at the level of subjective description.

One of the earliest and most significant studies on the spontaneous response of children to music was carried on by Christiansen in 1938. She developed a technique of observing child behavior during situations involving music by devising a rating scale to show the child's responsiveness to markedly rhythmic movement. This scale was used with a selected group of forty-seven children in nursery school, kindergarten and first grade. The study was conducted over a two-year period. Responses of the children were judged on four things: synchronization, social-emotional responses, dance patterns, and rhythmic dramatic play. The observations were marked on a chart according to the degree of response. Mean scores were then computed from these four items. Synchronization was judged on the child's ability to synchronize bodily movements with the music. Social emotional response was judged.
on facial expression, random movement, hyperactivity, freedom of bodily movement, enjoyment of the sharing experience. To score a five on this section the child should show integration of thought, feeling, and movement to an unusual degree by "adaptation of the entire body to the flow of the music and enrich the enjoyment of the group by beauty or appropriateness of interpretation." (Christiansen, 1938, p. 31)

Dance pattern was concerned with the development of a pattern in keeping with the tempo, intensity and phrasing of the music.

Rhythmic-dramatic play was judged on the utilization of rhythm in appropriate situations as a means of enhancing the dramatic expression of ideas. To score a four on this section the child should "enter thoughtfully into rhythmic-dramatic interpretation, find clues in play situation or music (words of song, variations in intensity, more subtle changes in tempo, phrasing), suggestion, more detailed expression of ideas and modified movements accordingly." To score a five the child had to "contribute original ideas and become completely absorbed in rhythmic dramatic expression." (Christiansen, 1938, pp. 30-32)

The rating scales for synchronization and dance patterns are included here because they have significance for this study in that the responses parallel and explain
several of the categories found in the summary of responses, as discussed in Tables 9 and 10, Chapter IV.
Synchronization

When the young child hears simple, yet colorful music with a markedly rhythmic element, he tends to synchronize his bodily movements with the rhythm of the music.

Score 0. The child makes no bodily movement in response to music although there is ample opportunity. He may continue non-musical activities.

Score 1. He makes slight overt responses or random movements.

Score 2. He responds actively to markedly rhythmic music; often at a tempo of his own; if tempo of music is somewhat similar to his rate of movement, his steps, or movements, may become synchronous with the rhythm of music for a few successive beats.

Score 3. He spontaneously adapts rate of movement to tempo of music. Movements are synchronous with rhythm of music for several successive beats at occasional intervals during the selection.

Score 4. Synchronizes movements quite readily and keeps rhythm for several successive measures. Sometimes loses rhythm temporarily
when hampered by insufficient space, or when trying out a new idea.

Score 5. Spontaneously adapts bodily movement to changes in tempo and keeps rhythm practically throughout the selection, oftentimes entirely throughout.

DANCE PATTERNS

III. The child dances spontaneously in response to markedly rhythmic music, tending to develop dance patterns in keeping with the tempo, intensity, and phrasing of the music.

Score 0. Refrains from bodily movement in response to music although there is ample opportunity. May continue non-musical activities.

Score 1. Makes some active response without much regard for space or type of activity. May make some spontaneous bodily rhythmic movement while engaged in some non-musical activity, or may continue a purely rhythmic movement while others are engaged in dramatic play. May respond for a few measures only.

Score 2. Engages in a fundamental rhythmic movement as walking, running, jumping, jiggling,
skipping (or in simple patterned activity, as Ring-around-a-Rosy) with some spontaneous adaptation to tempo and floor space being used by other children. At times may be hampered by insufficient motor coordination, by limited space or congestion, or by an unfamiliar music accompaniment.

Score 3. Begins to develop patterns by spontaneously trying out or combining two steps or movements during a selection, by evolving some new movement, or by beginning to get design in space with a familiar movement. (Imitation may still be a factor in some cases, however.)

Score 4. Responds with dance steps or movements in keeping with tempo and intensity of music, and tends to evolve patterns (often including three or more simple variations) in use of floor space, or in combination of movements in varying degrees of intensity.

Score 5. Evolves more complicated rhythmic patterns influenced by phrasing in music, by the rhythmic pattern of the melodic line, or by enjoyment in new-found skill in more complex combinations.
In reviewing the data for the study it was found that at age two years children scored higher in social emotional response than in synchronization, while at the five and six year-old level high scores in social emotional response, dance patterns and rhythmic dramatic play were comparatively few—"in view of the motor coordination and their rapidly growing awareness of meanings and relationships in neighborhood and community activities." (Christiansen, 1938, p. 171)

Christiansen indicates that social emotional response is probably the keynote in the total configuration of responsiveness to music. Although it may be entirely possible for a child to show by facial expression, posture, and movement his enjoyment in an activity, it may not be possible for him to objectify in dance pattern or rhythmic-dramatic play the essence of a vivid experience without genuine integration of thought, feeling, and movement.

Christiansen asks whether the child naturally loses this "delightful spontaneous expressiveness" as he gets older or are certain cultural pressures so strong that inhibitions are set up even as early as five or six years of age?

It is possible, according to Christiansen, that the older child, even at age 6, while still feeling responsive, has already begun to curb overt manifestations in
conformity to the social tradition in his immediate environment. (Christiansen, pp. 170 and 171)

These findings are in agreement with Jersild's theory which indicates that emotional reactions in older children are probably as frequent and intense as ever, even though there is a decline in overt expression of them. (Jersild and Holmes, 1935, pp. 305-306)

Christiansen implies that certain inhibitions develop because older children experience rhythmic dramatic play and dancing in large group situations in settings apart from ideas and interests which are more satisfying to them individually. (Christiansen, 1938, p. 171)

It seems possible too, according to this study, that previously conceived notions of sex differences in children's dance responses are not founded on fact. Comparisons between average ratings of eighteen boys and eighteen girls, matched with respect to age, showed slight differences in favor of girls but these differences were not large enough to be statistically reliable.

Although intelligence scores were available on only one-third of the children, rank correlations between intelligence quotients and the factors scored in bodily rhythmic responses to music showed no relationship.

Grandprey studied the responses to music of twenty-five nursery school children between the ages of two and five. Attempts were made to rate their abilities in the
fields of rhythm, time, intensity and singing ability, as well as general responsiveness to music. To measure responsiveness music was introduced during regular free play periods but no suggestion or encouragement was given by the teachers. The responses to the music were observed to vary greatly. (Grandprey, 1932, p. 54)

A study of the spontaneous rhythmical activities of pre-school children was made by Scheihing in 1949 using thirty-six nursery school children over a ten-week observation period. The observer studied the subjects while they were engaged in their regular nursery school program in order to determine what natural rhythms they expressed both vocally and motorically.

When a rhythmic sequence occurred it was timed with a stop watch for duration and then recorded on regular music staff paper. If there were no marked accents and the rhythmic pattern were perfectly even, the notes were recorded as quarter notes. In order to compute a tempo the quarter note equalling one beat at a tempo of sixty was used as a standard. The formula for ascertaining tempo was: \[
\text{number of notes} \times 60 = \text{tempo}.
\]
If the rhythm were accented and notes obviously grouped, they were recorded as they sounded or were expressed in motor movements. The method of recording motor movement was recorded as drum music is written; e.g., if a child clapped his hands six
times in a regular, rhythmical manner for a three-second interval, it would be recorded as \[\begin{array}{ccccccc} & & & & & \bullet & \bullet \bullet \end{array}\] \(S\), (Subject 1) three seconds (tempo 120). When chants or singing were heard, the notes were written down and when rhythmical sequences occurred in the child's speaking these were also recorded.

Scheihing's conclusions from this study were several, but only those which pertain to motor response will be reviewed here.

Of all the bodily movements which appeared most rhythmical and which showed whole body action one form of crawling occurred repeatedly. This movement was performed by the child placing both hands on the floor simultaneously, bringing both knees up to touch the hands and adding the head downward as the legs moved forward (Scheihing, 1951, p. 60) Ninety-seven percent of the motor activities occurred with regular quarter note patterns which means that they were at a faster tempo and had no accents; whereas, only seventy percent of the vocalizations using strict quarter notes and eighth notes were of quarter note patterns. Scheihing saw this as an indication that the capacities of the child for expressing himself rhythmically are more limited in motor actions than in vocalizations. The child seems better able to improvise more complicated rhythms through vocalizations than through motor activities. (Scheihing, 1951, p. 72)
This last statement is corroborated by Lebedinsky, who investigated the peculiarities of spontaneous movements of children and concluded that the higher motor reactions develop parallel with the development of the whole personality. Just as the child's personality is limited in expression, so are his bodily actions. (Lebedinsky, 1932, p. 461)

In comparing sex differences in output of two rhythmic motor patterns, girls contributed an average of six patterns apiece and boys an average of 5.8 apiece; in vocal activities, boys contributed 4.6 apiece and girls averaged 2.5. The influence of cultural environment was seen by Scheihing to be a causative factor in these results. (Scheihing, 1955, p. 73)

Two hundred and nineteen out of a total of 558 rhythms used a motor response and in all of these notes of equal duration were used, involving the rhythmic pattern of \( \frac{1}{4} \) or \( \frac{1}{2} \). Tempo was also investigated in this study. The motor responses observed were those of jumping, clapping, pounding and miscellaneous movements such as swinging arms, tapping one foot, kicking, crawling, and so forth. Other locomotor movements such as walking, running, and skipping were not investigated because Hulson had already established the preferred tempi for these activities. Tempo 120 was found by Scheihing to be used most in motor activities and
60 in vocalizations. Over one-fourth of all rhythmic bodily movements were done at a tempo of 120. The tempo which showed the next nearest number of responses was 160 with 26 responses as compared to 58 responses at 120. (Scheihing, 1955, p. 52 and 64)

Comparing the rank order of tempi for motor activities and vocalizations, it was found that motor activities were carried on at a faster rate. Scheihing made some interesting observations regarding this phenomenon.

Although a child's speech is not limited by his size, his actions are. Because of his small stature, his movements are more rapid than those of an adult, i.e., his movements are relative to his size but are much quicker than an adult's in comparison. (Scheihing, 1955, p. 74)

The fact that the mid-point of tempo for both motor activities and vocalizations fell at 100 seems to be indicative that this is a stabilizing point for both sets of tempi.

The easiest tempo at which children can coordinate muscular movements seems to be at 120.

The comparisons shown of the differences between rhythmical activities evidenced by the oldest boy and girl and youngest boy and girl pointed out that the number of rhythmical activities increase as the child grows older because he is better coordinated musically, affectively and intellectually.

From studying the rhythmical activities of well-adjusted children as opposed to those who were poorly adjusted soci-
rhythmic contributions. Those who were poorly adjusted emotionally evidenced few rhythmical motor activities or vocalizations, while those who were stable and well-adjusted to their environment showed a far greater tendency to be rhythmical in their actions.

According to Scheihing, it is obvious that if the motor, affective and intellectual manifestations are unbalanced, there will be less tendency toward rhythmical activity which demands constancy. In the case of the poorly adjusted child, affectivity is not stable and this would tend to unbalance his motor movements and also his intellectual creations. (Scheihing, 1955, p. 79)

One implication drawn from this study is that if music is to be presented for preschool children at their level of understanding and ability, it must be very simple, both in rhythmic pattern and melodic line. If young children are being taught melodies or are doing bodily movements to music, the music itself must be within the realm of their capabilities.

Rhythmic patterns and tempi, as found in this study, have proven useful to this investigator in setting appropriate tempi and patterns in tests of rhythmical response.

**SUMMARY**

This chapter presented a review of literature pertinent to the study and focused on the following areas: (1) the
importance of music, movement and dance in the life of the normal child, (2) characteristics of the educable retarded child, (3) importance of music, movement and dance in the life of the retarded, (4) developmental studies relative to the response of normal children to rhythm, (5) studies relating to the response of retarded children to rhythm, (6) studies relating to rhythm and perception, (7) tests of motor rhythm, (8) studies relating to spontaneous rhythmic response to music.

Authors such as Russell, Laban, Murray and Seashore agree on the importance of music and dance in the life of all children and emphasize the importance of understanding idiosyncratic style rather than uniformity.

If it is remembered that mentally retarded children learn in the same way as normal children, with motor development following the same sequence and pattern as that of the normal; that they have the same desires, fears, hopes, frustrations as anyone else, the importance of music and dance in their lives takes on equal significance. If their deficiency in communication by verbal means is remembered, the creative and communicative aspect of dance takes on added significance.

In surveying the developmental literature some conflicting findings are revealed. Baldwin and Stecher are of the opinion that rhythmic ability does not depend on age, while Jersild, Mussey and Williams share the opinion
that rhythmic ability as measured by "keeping time" depends on age. Richardson and Heinlein agree that individuals differ in their natural rhythmic tempo, or "inner rhythm" and this has been corroborated by Rimoldi, as reviewed by Cratty.

Regarding the response of retarded children to music it was found that music is an aid in attracting attention and increasing the attention span in the retarded. (Alvin, Weir, Reeves and Robins and Robins) An important study done in France in 1949 by Fraisse and Pichot concluded that rhythmical behavior of retardates is comparable to that of normal children of the same mental age but inferior to that of normal children of the same chronological age. The majority of other studies (Bienstock and Jersild, Baldwin and Stecher and Fracker and Howard) showed no correlation or only a slight correlation between intelligence and rhythmic ability.

A major study on the importance of perception in rhythmic ability conducted by Lorenz in 1925 showed that the blocking of the auditory channel greatly affected rhythmic perception. Other studies (Annett, Lemon and Sherbon and Bond) showed no correlation between rhythmic perception and motor performance.

Because of the complexity of devising a test of motor response to music, small parts of this total area have been used to test this ability. Several tests have done
away with the whole body response and have substituted a tapping response. The Seashore Test of Motor Rhythm, The Drake Musical Aptitude Test and The Kwalwasser and Wing Tests are all examples of tests which utilize this limited response. Lemon and Sherbon used the Seashore test in a study with college students and concluded that it was not "an adequate test of the type of rhythmic ability emphasized in physical education" since it tested a limited motor response made to one simple rhythmic pattern involving only the small muscles of the hand and arm. (Lemon and Sherbon, 1934, p. 85) This objection is pertinent for the elementary grades as well as at the college level.

To summarize, the literature revealed several tests which used a limited motor response in testing rhythmic ability and other tests which required complicated mechanical testing instruments while still requiring a limited response. No tests measuring rhythmic ability have been validated using retarded children as subjects.

Few studies have attempted to record the rhythmic response of children in a spontaneous situation. Christiansen devised a scale where observations of young children were marked on a chart on a 0 to 5 basis according to the degree of response. Scheihing studied the spontaneous rhythmic response of nursery school children over a ten-week observation period. A preference for evenly pulsated patterns, duple rhythms and legato style
was shown by the children in this study. The difficulty of accurately recording children's motor response to music was pointed to by Heinlein and Jersild.

Several experimenters, among them Heinlein and Jersild, pointed out the extreme difficulty in recording children's motor response to music.

In spite of this difficulty it is the consensus of opinion that testing and observation of rhythmic response should continue and with perseverance in this area observational techniques will be refined. An example of the refinement of these techniques is already appearing with the work of Bartenieff, Davis, Schmais and others in dance therapy using effort-shape analysis.
CHAPTER III

PROCEDURES

This chapter will present the procedure followed in the selection of subjects, rationale determining the use of certain observational instruments, rationale for determining categories of movement to be observed in a non-directed situation, selection and description of the music, and the notational devices used to record spontaneous movement.

Two tests and an observation of children moving in a non-directed or spontaneous situation were used in this study. In each case the rationale for determining the use of these techniques will be examined, followed by a discussion of the administrative procedure used for the particular observation.

Selection of Subjects

Subjects selected for this study were twenty educable mentally retarded children, ten males and ten females, whose chronological age was between nine years, ten months and thirteen years, and whose mental age ranged between six years, one month and nine years, eight months. Twenty children of normal intelligence whose chronological age
fell between the ages of ten years, four months, and twelve years, seven months, and whose mental age was computed as being between eleven years, six months, and thirteen years, five months were also chosen for the study.

The I.Q. range of the retarded subjects was between fifty-four and eighty-six ± four to five points, and of the normal subjects between ninety and 116 ± four to five points.

Retarded children below chronological age nine were not selected because of the limitation placed by the use of the synchrony items from the Oseretsky scale, which was standardized on normal children age nine to thirteen. In order to find retarded children whose mental age was six, it was necessary to go to the nine to thirteen year old range.

It was also found during the pilot study that many of the motor responses were beyond the capabilities of young normal children. This was especially true of item four (tapping with alternate feet and both fingers) in the Oseretsky test, and the items dealing with heel tapping and sweeping in the rhythmic motor test. If retarded children of chronological age seven to eight years had been included in the study, the mental age in most cases would have been four to five years. The extreme difficulty in soliciting either a specific or spontaneous response from these young children, and the time involved in the already
lengthy testing period led the investigator, reluctantly, to exclude them from the study.

The subjects who were selected came from several classrooms in two elementary schools in Columbus, Ohio. These schools were designated as being in the inner city. Children who did not exhibit overt motor dysfunction and extreme emotional problems, as well as those whose aural acuity had been tested as normal, were selected for the study. All of the subjects had received some musical and physical education from their classroom teachers, but none of them had received either type of program to any great degree.

Information regarding intelligence quotients and mental age was derived from existing school records. In the case of the retarded children this information was determined on the basis of the Stanford Binet or Peabody tests. In the case of normal children a device called the Columbus Testing Profile is used which indicates the child's score on several tests, including the Metropolitan Reading Readiness Test and California Reading Test (vocabulary and comprehension). When profiled the student's score is graphically shown as below average, average, or above average. Because these tests are reported in terms of T scores, where the mean is 50 and standard deviation is 10, it is possible to compute the I.Q. for each student, and once this is done, the mental age can also be computed.
Although such computation is not standard practice in Columbus schools, for purposes of the study this computation was made by the investigator. Because of the range of the total scores for all of the tests, it is estimated that the computed I.Q. is accurate within + 4 to 5 points.

Computation of the I.Q. using the Columbus Testing Profile is as follows:

<table>
<thead>
<tr>
<th>Total Score of</th>
<th>IQ*</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>84</td>
</tr>
<tr>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>60</td>
<td>116</td>
</tr>
<tr>
<td>70</td>
<td>132</td>
</tr>
</tbody>
</table>

*Mean = 50 and SD = 10

A discussion of the mental age and its computation may be found in the review of literature.

Rationale Determining the Use of the Revised Lincoln Oseretsky Motor Development Scale (Synchrony)

Synchrony or simultaneity of movement is considered to be one of the basic components of rhythmic action. Oseretsky describes rhythm as synchrony (Sloan, 1931, p. 209), while Kephart speaks of simultaneity in movement as being the "point of origin of the temporal dimension."

According to Kephart if the child cannot maintain synchronous movement, the temporal dimension will be
loose and unstable. (Kephart, 1971, p. 175).

Recognizing the importance of synchronous movement performed at the child's own natural tempo, it seemed feasible to first study the response of children to a test of synchrony which used no auditory stimulation other than verbal direction. The test of synchrony which was chosen, therefore, was from the Revised Lincoln Oseretsky Motor Development Scale.

The original Oseretsky scale was designed to test the motor ability of children between the ages of six and fourteen years. It is an individually administered scale consisting of 85 items involving a wide variety of motor skills such as finger dexterity, eye-hand coordination, and gross activity of the hands, arms, legs and trunk. Both unilateral and bilateral motor tasks are involved in the scale. Sloan's revision (1955) has not changed the original scale except to reduce the number of items from eighty-five to thirty-six; to arrange them in order of difficulty rather than by age, and to make the directions more clear.

The Sloan revision of the Oseretsky scale was standardized on 380 males and 369 females between the ages of six and fourteen years, all of whom were attending public schools in small towns in Central Illinois. Subjects came from moderate to low-moderate socio-economic backgrounds. In all cases subjects for Sloan's study were selected on the basis of their being in a certain grade or falling into
a certain chronological age group. No attempt was made to select subjects on the basis of mental age.

Reliability for the items chosen by Sloan are expressed in terms of split-half reliability coefficients. The subject's performance was fairly consistent throughout the entire scale (.96 for males; .97 for females) except for a .59 coefficient for fourteen year old girls. Because of this inconsistency the ceiling for the test was set by Sloan at 13.5 years rather than 14 years. Some criticism has been focused on these scores, as the sample used to select the items was the same sample used to compute the reliability, tending to cause higher reliabilities. However, in spite of its limitations, the Lincoln-Oseretsky scale has received widespread use as an index for evaluating the motor performance of both normal and retarded children.

Only those items which specifically measured rhythm were selected from Sloan's revision of the Oseretsky scale. The definition given for rhythm in this scale, as discussed earlier, refers to rhythm as being synchrony of movement. For example, rhythm is determined if the subject taps his fingers at the same time as he taps his feet. (Sloan, 1955, p. 22).

Five items which test synchrony were chosen from Sloan's revision of the Oseretsky scale. A sixth item (number 35), also tests synchrony, but it was rejected for use in this
study because of the requirements of a complex motor response. The selected items were as follows:

1. Item 6. Tapping rhythmically with feet and fingers (alternately).
4. Item 29. Tapping with both fingers while the feet move alternately.
5. Item 31. Tapping with alternate feet while the fingers move alternately.

In choosing to use these items consideration was given to the fact that the original Oseretsky scale was constructed through the clinical observation of normal and abnormal children (Sloan, 1955, p. 189) and that the items, in general, involved simple motor activities using fingers, hands, arms and feet or combinations. No movement was maintained longer than sixty seconds.

**Administration and Scoring Procedures of the Revised Lincoln Oseretsky Motor Development Scale (Synchrony)**

The test of synchrony was administered to each subject individually. Standardized directions, as presented by Sloan (1955) were used by the investigator, with one change--the term "right" was never used in referring to the hand or foot to be used; rather the terms "this hand" or "this foot" were used, with the hand or foot designated by the examiner. Since, according to Sloan, the scale is
one which tests motor proficiency and not general intelligence, every effort was made to make sure that the subject comprehended the directions. If the subject's first attempt were not correct because of obvious lack of understanding, the item was repeated without penalizing the subject's score. Encouragement was also given to the subject during the performance.

Standardized equipment, as outlined by Sloan (Appendix A) was used for this test, with the exception of the use of felt pens rather than pencils in item two. The examiners found it much easier to see and count the dots when these pens were used.

Subjects from each school were tested on all items in the Oseretsky scale and on all subsequent tests in the same room. The rooms in each school were comparable in size, measuring eight by twenty feet. Scoring procedures for each item were standardized by Sloan and are included with the instructions in Appendix A. All items were scored on a three-point system, with some items receiving a different point score depending on the subject's performance. Item 21 was scored separately for each limb. In this case the sum of the points for both limbs was the score for that item. When rhythm was used as a scoring criteria, the term was taken as referring to synchrony of movements and not to continuity of speed. (Sloan, 1955, p. 209). For example, in Item 6 if the subject did not tap
his fingers at the same time he tapped his feet the rhythm was considered to be broken. However, if he started out fast and then slowed down, the rhythm was not considered broken as long as the hand and foot movements remained synchronous. The total score possible for this portion of the test was eighteen points. Performance on all items was judged by the investigator and one observer, a male major dance student at The Ohio State University.

Rationale and Description of the Test of Motor Rhythm

The second test which was administered was adapted by the investigator from a test of rhythmic motor response devised by McCulloch in 1955. A test of this nature was considered necessary because the investigator was interested in seeing the similarities or differences involving movement of a locomotor and nonlocomotor nature, which would involve movement more closely aligned to dance than previous tests of rhythmic ability had shown. Several tests measuring motoric response to rhythm, as designed by Heinlein (1929), Mussey (1933), Lemon and Sherbon (1934), and Ashton (1953) were considered for use in this study, but were rejected for the following reasons:

(1) They were validated on subjects beyond the age range of children used in this study; (2) the motoric response required was considered too complicated for retarded children; (3) several tests used mechanical devices
which measured a single response only and the devices themselves were considered impractical for the purposes of this study.

The four main aspects of rhythm have been designated by Murray as being response to pulse beat, response to accent, rhythmic pattern and musical phrasing. (Murray, 1953, p. 162-170). In devising a test of rhythmic motor response, it was considered necessary to include these four aspects.

McCulloch designed a long and short form of a rhythmic motor test which was considered a reliable test in rating first grade children on their ability to make accurate response to musical accompaniment. (McCulloch, 1955, p. 64). Since this test corresponded most closely to the objectives of the present study, a careful analysis of this test was made and its use was decided upon as a basis for measuring rhythmic movement, with adoptions as seen necessary to get a reliable measurement of the response of retarded children.

The short form of McCulloch's test included these items:

<table>
<thead>
<tr>
<th>Part 1--Items included because of discrimination values.</th>
<th>Part 2--Items included for logical variety of responses.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse Beat</td>
<td>Pulse Beat</td>
</tr>
</tbody>
</table>
2. Fast and slow walk to 4/4 time.  

Accent
1. Clap to each beat, clapping harder on the accented notes to 4/4 time.

Rhythmic Pattern
1. Clap to 4/4 time: slow, fast, fast

Phrasing
1. Walk in place and turn at the beginning of each new phrase to 2/4 time.

2. Fast and slow swings to 3/4 time.

1. Stamp on the whole foot on the accented notes and step on tip-toe on the other notes to 4/4 time.

2. Walk to each beat, and clap only on the accented notes to 3/4 time.

Rhythmic Pattern
1. Clap to the following pattern:

Phrasing
1. Alternate phrases of walk and run to 4/4 time. Walk and run in time with the music. Listen to the music to know when to change.

(McCulloch, 1955, Appendix C)

Changes were made in the fourteen-item short test as follows:

In view of the fact that it was considered necessary to see if the child could respond using a simple motoric response such as a hand tap and then with a more complex motor response, in all items measuring pulse beat this simple response was required. In order to see response to all the moderate long and short time intervals the 2/4 meter was added to this section of the test.

When these additions were made to the section on pulse

(McCulloch, 1955, Appendix C)
beat this section of the test included eight items instead of McCulloch's original four. This weighting of items in reference to pulse beat was considered important because response to pulse beat is considered one of the simplest of responses and is also primary in ascertaining rhythmic response (Murray, 1953, p. 163).

Changes were also made in the test items themselves, because it was felt that McCulloch's items sometimes tested motor performance rather than rhythm. In deciding on this list of items the work of Murray and research done by Cratty and associates on the response of retarded children to movement was an invaluable aid. (Murray, 1953, p. 389-401 and Cratty, 1969, p. 150-160)

In the section on accent, no motoric response other than tapping was required. Tapping was included rather than clapping because it was found during pilot study that this latter response was beyond the capabilities of some retarded and some young children. Some children became so involved in making a loud clap that it was difficult to tell whether they had, indeed, heard the accent. Tapping on the desk alleviated this problem. To include two separate motoric movements, such as McCulloch had done in the section on accent, was found to be too confusing for the children. In fact, McCulloch stated that in the item which involved stepping backward on the accented notes, the poorer subjects became so concerned with the movement
backwards they forgot to listen for the accented beat. (McCulloch, 1955, p. 48)

Because it was thought necessary to have children respond to several different meters, items including 4/4, 2/4, 3/4 and 6/8 time were used.

In the section involving rhythmic pattern two patterns were chosen, both of which were presented in 4/4 time. These were: \( \begin{array}{c}
\text{\texttt{\textbf{\textbackslash d\textbackslash d}}} \\
\end{array} \) and \( \begin{array}{c}
\text{\texttt{\textbf{\textbackslash d\textbackslash d\textbackslash d\textbackslash d}}} \\
\end{array} \)

Of several patterns used in the longer form of her test, McCulloch indicated that these two patterns were found to be the most discriminating. (McCulloch, 1955, p. 49) The pattern \( \begin{array}{c}
\text{\texttt{\textbf{\textbackslash d\textbackslash d\textbackslash d}}} \\
\end{array} \) was found to be difficult for all first grade children regardless of skill and seemed to be too fine a coordination for their level of development. (McCulloch, 1955, p. 36) Bearing in mind that McCulloch's test was validated on normal children, while some of the children tested in this present study were functioning mentally at the first grade level, with some lag in motor development, it was decided to omit this more difficult pattern.

Based on Murray's statement that "recognition of musical phrasing by children is another phase of rhythmic learning" (Murray, 1953, p. 167), a short test of phrasing was included in the study. Since McCulloch found that 2/4 time resulted in the best indication of skill in recognizing phrasing, the 2/4 meter was used for this item. The
requirement here was for the subject to walk in place and turn at the beginning of each new phrase.

The intellectual difficulty of the concept of phrasing led McCulloch to accent the beginning of each new phrase. Rather than continue with other items of this nature, which appeared to be a repetition of the items on accent, it was decided to include only one of these items.

In deciding on the number of items, consideration had to be given to the weightings which should be given to each section. McCulloch's suggestions, based on Beta Coefficients, were followed to some degree.

In developing a short test of motor rhythmic response, accent should receive 50 per cent of the emphasis, pulse beat, 30 per cent of the weight, and rhythmic patterns and phrasing should carry approximately 20 per cent of the items. (McCulloch, 1955, p. 45)

However, bearing in mind the importance of pulse beat in the response to music of young children as "the support on which rhythmic composition rests and to which all of its parts are related" (Murray, 1963, p. 163), it seemed feasible to change these weightings so that pulse beat would receive 50 per cent of the emphasis, accent, 21 per cent, with rhythmic pattern and phrasing also receiving 21 per cent.

Changes were also made in the number of measures which were played for each item, as it was found during the pilot study that the eight measures indicated by
McCulloch were not long enough for the observer to get an accurate picture of the response. This was particularly true in items requiring a motor response other than tapping, and in the sections on accent, pattern and phrasing. If the measures were too short many children would have received a "0" instead of a "2" simply because they could not establish the pattern before the music had stopped.

McCulloch's scoring system was also changed. In her study the subject received a "1" if the movement were always in time with the music, "2" if sometimes in time with the music, and "3" if seldom or never in time with the music. In this present study the investigator chose to record a "3" for a movement always in time with the music, "2" if sometimes in time and "0" if seldom or never in time. Originally it was planned that if the subject responded correctly on one out of three trials he would be scored on a pass-fail basis. However, with the increased number of measures for each item this made the testing period too long. It was found necessary to include a score for "sometimes in time" because, as Hulson pointed out, young children tend to lose the rhythmic sequence and then pick it up again (Hulson, 1928). This was found to be true during the pilot study with the young children and some of the retarded children tested. Other factors which influenced the thinking with regard to scoring was
that a criticism of studies done with retardates in the past, which were scored on a pass-fail basis, has been that such scores do not indicate the true functioning or potential of the subject. Certainly if remediative follow-up is to be considered in rhythm or other motoric pursuits, a child who shows some potential on a particular item should be differentiated from a child who makes a completely incorrect response. Realizing the novelty of the testing situation and the inhibition and tenseness resulting therefrom, it seemed realistic to indicate a score for correct response some of the time.

The test items which were decided upon and length of measures for each are as follows:

1. Tapping on desk with preferred hand--4/4 time--8 measures.

2. Walking forward, taking one step to each beat of the music, 4/4 time--16 measures.

3. Tapping with preferred foot--6/8 time--8 measures.

4. Heel tapping--6/8 time--8 measures.

   Response to a short time interval

5. Clapping 2/4 time--16 measures.

6. Running in place--2/4 time--16 measures.

   Response to a long time interval

7. Tapping on desk--3/4 time--16 measures with preferred hand.
By inspection of the items it may be noted that within the major divisions of pulse beat, accent, rhythmic patterns and phrasing are to be found: (1) two fundamental forms of locomotion (i.e., walk and run); (2) nonlocomotor movements (swings, taps, claps, bouncing); (3) changes of meter (4/4, 3/4, 2/4, 6/8), (4) changes of tempo, (5) changes in direction, (6) changes in force (accented beats), and (7) changes in level (sitting, standing, bending).

It is believed that this variety includes many of the areas that are developed in work in movement to music.
and is sufficiently complete for the purposes of this study.

After the complete list of items was formulated, the help of a music specialist was solicited and piano accompaniments were arranged for each item of the test lists. By using piano accompaniment it was hoped to circumvent the auditory confusion which could result with orchestrated accompaniment. The instrumentation was the same for each repetition of 4/4, 3/4, 2/4 or 6/8 accompaniment. In other words, each time the response required was to 4/4 time, the same accompaniment was played. A different accompaniment was played for the other meters, but it was repeated for each response. This was done so subjects could devote their attention to the movement or response without having to become familiar with different music for each new item.

The test requirements of making different motoric responses, supported by different body parts at different levels, and the fact that the test was administered in two parts alleviated the monotony to a large degree.

A tape recording was made on 166-1/4 inch magnetic tape of the music, with an introduction by the investigator indicating the item which was to be tested and the meter for that particular item. All other directions were given verbally by the investigator and are included in Appendix B.
Administration of the Test of Motor Rhythm.

In this test one practice trial was given on each item to each subject. In order to insure that the subject understood the directions a visual demonstration was also given, and the subject, when necessary, was manually assisted through a portion of the practice item. This type of demonstration and assistance was considered important in order that the retarded children, whose verbal comprehension was, in some cases, at the first grade level, could take full advantage of the testing situation.

Scoring for this test was on a 3-2-0 basis. A score of "3" indicated a completely correct response. A score of "2" indicated a response which was correct for at least half of the required number of measures, or if a response which was correct for half of the required number of measures became incorrect and then were reinstated correctly again. A "0" was recorded if the responses were entirely incorrect as far as the scoring criteria was concerned.

The scoring criteria for the specific items were, therefore, determined as follows:

A score of "3" was recorded if the child were always in time on the test of pulse beat. Similarly a "3" was recorded in the items relating to accents if all of the accents were responded to correctly. In this section a decision had to be made regarding the amount of lag in
response which would be allowed. It was found that children who scored well on pulse beat responded to the cadence of the music and marked the accents accordingly, while others had to listen for the strong beat and would then respond. If the response always occurred but lagged for an extremely brief period of time, this response was still scored as a "3."

Rhythmic pattern was scored on the maintenance of the pattern by the subject after the leader had stopped clapping. If the original pattern were maintained, in time with the music, a "3" was scored.

In the section on phrasing, because two factors of recognition were at work, one being the recognition of the beginning of the phrase itself, and the other the recognition of the accent which marked the phrase, the same criteria for judging accent had to hold true. Therefore, if the subject turned correctly at the beginning of the phrase or on the accent which marked the phrase, without undue hesitation, this response was scored as a "3." The subject received a score of "2" if his response were correct for at least half of the required number of measures, or if his response were correct for half of the required number of measures, became incorrect and then the correct response were reinstated. The subject, therefore, received a score of "2" if he were in time for four out of eight measures, or eight out of sixteen measures on tests.
of pulse beat. A "2" was recorded if any four accents were correctly marked in an eight measure pattern.

In the test of rhythmic pattern, if the subject correctly responded for at least two patterns out of the eight measure sequence, or four patterns out of the sixteen measure sequence, a score of "2" was recorded.

The test of rhythmic pattern was actually a test of rhythmic memory. If the response were correct over only the first measure it was considered as being due to chance. However, if the subject could maintain the pattern or correct errors he had made in the response over the next or subsequent patterns it was considered as being a significant indication that he had identified the pattern, could remember it, and could make adjustments in his response according to this memory.

In the test of phrasing, if the subject turned correctly at the beginning of at least two phrases or on the accent which marked the phrase, without undue hesitation, he scored 2 points. A score of "0" was recorded if, on the test of pulse beat, the subject could not respond to the pulse beat. In the test of accent, if an extreme lag occurred in the response or if the accents were incorrectly marked, a score of "0" was recorded. In the test of phrasing, if there were an extreme lag in response to either the accent or the beginning of the new phrase,
or if the subject continued walking but failed to turn, a "0" was recorded.

The test was administered by the investigator to each subject individually. The first section included items 1-8 (pulse beat), while the second section included items 9-14 (accent, pattern and phrasing). Both sections of the test took approximately fifteen minutes to administer. Observation and judgment of response was made by the investigator and one assistant, a male major dance student at The Ohio State University.

Rationale Determining the Categories of Movement to be Observed in the Non-Directed Situation

The third observation which was made in this study was that of children's movement to music in a non-directed situation. During this period the subject was asked to move individually to music of three contrasting types.

It is generally agreed that movement takes place in space, in time, and requires some degree of force to perform. It is also agreed that each movement has a certain shape which can be described and, because of the advances which have been made in dance theory, can now be notated. Any natural basic movement has certain definite characteristics because it uses these movement elements in particular ways.
These characteristics have been further defined by Russell under the following four headings:

1. The body
2. Effort
3. Space and shape

For the purposes of this study body activity and body parts were delineated as the two categories under the heading of the body which would be observed. Space and shape were also considered as categories which would be observed. Although effort is also one of the major classifications under which movement may be observed, the notation of some of the effort qualities of weight, time, space, and flow was considered beyond the capabilities of the investigator and the effort category was therefore omitted from this study.

The concept of relationships is an important one in dance. Although the solo dancer may set up his own relationship with the environment in which he is performing and with the observers who are his audience, relationship in dance implies interaction between people. Because the subjects in this study performed alone, a description of relationship was not considered as a major part of this investigation.

Activity of the body is usually thought of in two
ways: as locomotor movement of some kind, or as nonlocomotor movement. Primary to the concept of locomotor movement is the intention of travelling along the surface of the floor or ground in some way. In the basic forms of locomotion, such as walking or running, movement is accomplished by the transference of weight from one foot to the other. In hopping, skipping, leaping, and jumping elevation is achieved when the weight is maintained on one or both feet as the body is lifted in the air. (Murray, 1963, p. 105) Variations and combinations of these movements result in the locomotor movements used in work and play as well as many varieties of dance steps including the polka, gallop, waltz, and mazurka. (Murray, 1963, p. 39).

Creative dance often makes use of other forms of locomotion on different body parts. Although still using the metrical beat, these forms of movement are often done with a free rhythm.

For example, a fugitive may run low, slide suddenly to a long pause, slowly crawl a few paces before rising, running hard and finishing with a wide leap. Movements of exuberance are likely to use skipping, running, or leaping. Movements of sorrow are more likely to be symbolized by walking, or walking patterns, even rolling, sinking or rising while moving forward or backward. Nonlocomotor movements form much of the basis for systems of techniques used by adult dancers. These movements, also used in work and play, do not move the body from place to place with the feet acting as the steering factor, rather the feet, legs and lower trunk form a stationary base. If they move they do so only
to retain balance or to give greater force or dimension to the movement. (Stanley, 1963, p. 143)

The simplest nonlocomotor movements are the bend, stretch, twist and swing. Variations and combinations of these movements result in the more descriptive actions of the body and movement of body parts outlined by Laban and Russell as being those of gesture. (Laban, 1958 and Russell, 1965)

By definition, gestures are movements of the body which do not involve the transfer of weight. Hence, "the hands can wave, the leg swing, the head nod, the shoulder shrug, the elbow jab, the knee lift (if the leg is not supporting the weight)." (Stanley, 1969, p. 143)

Gesture is also described as "shaping movements in the air with arms or legs, gathering, scattering or penetrating the space." (Russell, 1965, p. 20)

Gestures or movement of body parts can assume significant importance in dance. Hawaiian and Japanese dances are very much dances of the hands. Many South American dances encourage the use of the hips, while many primitive dances place particular stress on selected parts of the body. Aside from this, hand claps, finger snaps, struts with knees meeting elbows can suggest a dramatic quality of jauntiness or bravado. A good movement in any part of the body can be expressive, such as the shrug of a shoulder, the lead of an elbow or the drag of a toe. (Stanley, 1969, p. 141)

Other more simple forms of locomotion which are common in the movement experiences of all people are those which have a functional connotation, such as pull, push, strike, dodge, spin, sit, fall and lift. (Murray,
Still other movements such as clapping, pressing, tapping or stamping the feet, nodding or shaking the head, striking another part of the body with the hands, are also considered as forms of nonlocomotor movement. Activity of the body may also be observed in rising and sinking, opening and closing, advancing and retreating, and in turning or spinning.

The rising action is concerned with reaching upwards, striving for the greatest possible distance of one's body from the ground, pulling against gravity. The sinking action goes with the pull of gravity as the body drops, sinks, collapses and presses itself into the ground. (Russell, 1965, p. 20)

Opening is concerned with the extension or broadening of the body, while closing may be thought of as a contraction, or a folding where the limbs reach across the body and arrive at a position where all parts of the body are near to each other.

In advancing the body reaches forward using gestures of the arms with the intention of moving outward. In retreating there is a drawing backwards with the intention of withdrawal. (Russell, 1965, p. 20)

Turns are often significant in dance. They may have an especially expressive quality or they may be significant because of their spatial patterning and design. The expressive significance of turning might be exemplified as an impression of "confusion, chaos, searching, joy, excitement, an embracing of all the world, a turning one's back on a situation." (Stanley, 1969, p. 143)
Design and spatial patterning may be seen in travelling circles, rising and falling circles or shrinking and expanding circles. Dance, being a three dimensional design that flows through space, a knowledge of the theory of space is necessary in observing the movements of children.

The expressions inherent in spatial concepts are those of extension, level, direction, air and floor pattern. Extension deals with the size of movements in space. It deals with movement done far from or close to the body. If a movement is done far from the body it usually gives the impression of dominance, flamboyance, assertion, joy, exhilaration or exuberance, whereas if the movement is small, it gives the impression of insignificance, shrinking, yielding, curling into oneself or perhaps cowardice. This is not to say that a small movement is any less dramatic or significant in dance. According to how it is done it may be extremely so.

Extension is, in reality, a description of range of movement. By definition, range refers to "the extent of movement, space, object or interval in all planes." (Williams, 1971, p. 89). Extension implies change from the center outward, and a contraction implies change from an outer point toward a center. (Williams, 1971, p. 69)

Level and elevation are perceived on the basis of an
imaginary line which is used to differentiate high, medium and low. Russell distinguishes high level as the area above the shoulder girdle, medium level as being between the hips and the shoulders, and low level as being below the hips. (Russell, 1965, p. 23)

Leaps, jumps, twists in the air and elevations onto the balls of feet and through the spine are characteristic of movements which take the body into the high level, while movements which are associated with advancing and retreating, opening, closing and turning, as well as locomotor movements such as walking and running are usually characteristic of the medium level. Activities which are performed in close proximity to the floor such as rolling, kneeling, sitting, crouching, crawling, curling, twisting, and stretching in the horizontal plane are all examples of the low level in space. Variation of levels gives contrast and design to the dance movement.

The different levels can express particular ideas. Which would be used for dominance, for obeisance, for the meeting of two compelling forces? Light things rise to higher levels. Strength gathers at a low level, and is reinforced by a firm grip at the base of support which should be under the center of gravity. Mobility comes at the medium level. The characteristics of movement at the different levels should become evident as the dancer finds himself increasing the versatility of his movement in space. (Stanley, 1969, p. 150-151)

Direction has been called "the anchor point of man's space concept." (Hunt, 1964, p. 82) This concept is
important in dance because all body attitudes, air patterns and extension into space lead out into some direction. The body has certain natural divisions: right and left, upper and lower, front and back. From these six zones of movement alone much exploration can be carried out and much movement can be observed. Laban identified twenty-seven directional possibilities for movement, using the human body as the twenty-seventh point of orientation. These directions are forward, backward, right, left, high, deep, and the possible combinations of these such as high-left forward. (Laban, 1948, p. 37) Movement examples of the use of these directions may be found in advancing and retreating, which uses the forward and backward direction, rising and sinking, which uses the directions of high and deep and opening and closing, which would use the directions of right or left.

More complex activities will travel toward other directions. A movement with the right side leading which simultaneously rises and opens will lead into the direction of high-right, while a counter movement which sinks and collapses will lead into deep-left. (Russell, 1965, p. 23)

To summarize, it has been said that from the categories of locomotor and non locomotor movements "dance experiences are born and dances made." (Ravielli, in Murray, 1963, p. 39)

In considering the categories of movement to be observed and notated during the spontaneous session, activity
of the body and its parts were considered of prime importance. Movement in space, which includes direction, level and extension or range of movement, was also considered important for purposes of this study. Omissions made in the notation of spontaneous movement were those dealing with effort actions, because they were considered to be beyond the notating capabilities of the observers. The category of relationship, which implies interaction with people, was also omitted because the subject performed in a solo situation.

Any attempt at describing aesthetic, artistic or imaginative response had to be omitted because of the difficulty in determining if the child were responding in this manner. The final categories of movement which were observed in the spontaneous situation are outlined below:

1. Locomotor and nonlocomotor movement.
2. Movement of body parts and body position and supports.
3. Direction, level and pathways.
4. Range of movement.

Rationale Determining the Selection of Music for Use in the Non-Directed Situation

The statement by Russell (1965, p. 63) that music chosen for children should be brief, simple, yet have
rhythmic clarity and be emotionally recognizable had considerable influence in determining the criteria for the selection of music to be used in this particular part of the study.

It was felt that the music selected should meet the following criteria:

1. The music should be contrasting.
2. It should be classical yet recognizable enough to stir up an image.
3. It should not have been used in previous tests, or in the classroom or gymnasium as singing games might have been, so that children had not learned stereotyped movements to it.
4. It should be orchestrated to some degree in order to enhance the mental imagery.
5. The selection decided upon should be of long enough duration to allow the observers to record, yet short enough to avoid fatigue on the part of the subjects.

The decision as to what three selections to use was a complicated one. However, this eventually was determined from a review of the music suggested in the literature pertaining to children's dance (Murray, 1963; Russell, 1958 and 1965; Gray and Percival, 1962; Christiansen, 1936.) Suggestions put forward by specialists in the School of Music, The Ohio State University, as well as from the investigator's own listing of music which had been effectively used in teaching creative dance to children were also considered in determining the music to be used in this part of the study.
Three main sources of music were used. These were:

Adventures in Music. RCA Victor Grades 1-VI
Children's Rhythms in Symphony (Bowmar)
Listen and Move, Albums I, II and III (MacDonald and Evans)

The selections contained in the RCA Victor series are abbreviated and well orchestrated. Each album contains a booklet which gives a description of the selections. Selections on the Bowmar albums Children's Rhythms in Symphony are short, well orchestrated and quite emotionally recognizable, while selections on the Listen and Move albums make use of percussion instruments, voices and music of different moods. They have been described by Murray as being "exceptionally good and very useful for creative movement exploration and dance making."
(Murray, 1963, p. 428)

All of the recordings on the six albums of the RCA Victor series were audited, as well as the eleven selections on the Bowmar albums, plus the Listen and Move series. Each selection was then charted under the following headings: mood, descriptive elements, tempo, dynamics, range. Mood refers to the feeling which is evoked by the music. For example the mood of "Dagger Dance" was described as "heavy," "stalking," "threatening," "deliberate," "wild," "barbaric" (RCA Victor, Grade 3, Vol. 1, p. 24).
while another selection might be described as "quiet," "vague" or "mysterious."

The heading of descriptive elements, having to do with the imagery evoked by the music, was considered an important one, since children with little background in dance tend to use mental pictures when they first begin to dance creatively. Nunn, in speaking to this point, says:

The minds of children do much of their thinking by the aid of things used in symbolizing concepts which would otherwise elude their mental grasp . . . when a person thinks without the aid of any perceptual object or symbol to guide his thoughts, his ideas are in the full sense of the word "free." All of us can deal in this way with familiar objects and events, recalling the past, looking into the future, or pursuing in idleness the dreams of fancy; and more gifted and powerful minds can thus follow the "way of ideas" far into remote realms of abstruse speculation. But even here thought needs the support and guidance of images, which are mental copies of perceptual objects including movements. (Nunn, in Russell, 1958, p. 69-70)

Tempo refers to the rate of speed of the selection. As well as observing the fastness and slowness of the selection, it was considered important to also observe whether the selection changed tempo, and whether the rhythm observed was steady or unsteady.

Dynamics in music refers to intensity, that is, whether the music is loud or soft and if there are noticeable contrasts.

Range refers to changes in pitch from low to high or vice versa. This was considered an important category
because it had been found from working with retarded children in the past that high pitched music, such as that of a flute, was extremely disturbing to them.

After audition and charting using the above classification, several selections were discarded as being perceptually confusing or disturbing, not dynamically contrasting, too vague in imagery, too long or too short in duration. Ten selections were then chosen which included:

"March (from "Memories of Childhood") (Pinto) Bowmar, Children's Rhythms in Symphony

"Semper Fidelis" (Sousa) RCA Victor, Adventures in Music, Grade 3, Volume 2

"In the Hall of the Mountain King" (from Peer Gynt Suite No. 1) (Greig), RCA Victor, Adventures in Music, Grade 3, Volume 2.

"Tarantella" (from "The Fantastic Toy Shop") (Rossini-Respighi), Bowmar, Children's Rhythms in Symphony

"Dagger Dance," (from "Natoma") (Herbert), RCA Victor, Adventures in Music, Grade 3, Volume 1

"Wild Horsemen" (Schumann), Bowmar, Children's Rhythms in Symphony

"Mechanical Doll," MacDonald and Evans, Listen and Move, Album 1, Record Number 4

"Cuckoo in the Deep Woods" (Saint-Saens) Bowmar, Children's Rhythms in Symphony

"The Swan," (from "Carnival of the Animals") (Saint-Saens) RCA Victor, Adventures in Music, Grade 3, Volume 2

"The Snow is Dancing," (from "Children's Corner Suite") (Debussy), RCA Victor, Adventures in Music, Grade 3, Volume 1
The charting of these selections may be found in Appendix D. The selection of music for a study of this kind could indeed be a study in itself. Since children react individually to different types of music, the reliability of choosing music on the basis of having a small sample of children listen to it is open to question. More important, perhaps, is that the music used in this study was identified in the literature as being appealing to children. The investigator was familiar with the music and had used it successfully with children, and, finally, the selections chosen were those which would lend themselves to a wide variety of movement, and would show the child's repertoire to advantage.

When the final choice of the music was made, it was taped on 166-1/4 inch magnetic tape, with a brief introduction as to what was expected of the subject in this spontaneous situation. A copy of these instructions is included in Appendix C.

The Observation of Movement in the Non-directed Situation

The subject was asked to listen to the verbal introduction as played on the tape, and in order to insure that the subject understood the instructions, he was asked to repeat them for the investigator. He was then asked to listen to the music and to think about how he might move to it. After the subject listened to the first selection
he was asked to move until the music stopped. This procedure was followed for each selection. If the subject had questions as to what he could do in the situation, these questions were answered briefly. Any suggestions that the subject might have as to imagery were received noncommitally. No demonstration was given by the investigator and as little verbalization as possible was engaged in.

If it were evident after several seconds that the subject could not respond, that selection was stopped and the next one, with its brief introduction, was played. A similar arrangement was made for the next selection.

Introduction for the first selection took thirty-five seconds, for the second, fifteen seconds and for the third, thirteen seconds. Playing time for the first selection was thirty-three seconds and for the last two selections, thirty seconds each. Listening and performance time for each child was just over five minutes. However, by the time the child had had a brief rest between selections and the notation for each selection was completed, ten additional minutes were spent with each subject making a total time of fifteen minutes for this observation.

Throughout this entire session every effort was made to establish an accepting atmosphere. By the time the children had been tested by the same investigators on two
previous occasions good rapport had been established. This rapport did not seem to diminish in the week which was allowed to lag between the testing of rhythmic motor response and this last observation. The children were observed during this session by the investigator and the same observer who assisted with the other tests. It was felt that the investigator had to be personally involved in the testing and observation of the children because of the complexity of the rhythmic response, the difficulty in teaching the notational technique to another observer, and the fact that permission to film responses by means of video tape could not be obtained.

The Notational Technique Used in the Non-Directed Situation

The form of notation which was used for this part of the study was adapted from a system originally developed by Rudolph Laban. This system, known as Labanotation in America and Kineotography Laban in Europe, allows for the recording of all forms of movement ranging from the simplest to the most complex through a conversion of the effort characters of space-time-force and the parts of the body involved into symbols which can be read on a graph and then reconverted into movement. Standard Labanotation has been primarily a graphic representation of the quantitative aspect of the effort characters. This movement description using Labanotation has been expressed in terms of:

The body—specific parts that move space—the specific direction level, distance, or degree of motion; time—meter and duration, such as a whole note, a
sixteenth; and dynamics—the quality or "texture" of the movement, whether it is strong, heavy, elastic, accented, emphasized, and so forth. (Hutchinson, 1970, p. 12)

Motif writing, as described in the definition of terms, is a system of notation, based on Labanotation, which gives the outline of a movement without describing in detail how the action is performed. The basic symbols of Labanotation or Kinetography are used in motif writing to denote general actions of the whole body, instead of describing the exact movement of a special part of the body as in full Kinetography. (Dunlop, 1967, Preface, Book I)

Motif writing was decided upon as a system of notation for this study for several reasons: (1) the observers, although having some background in the study of Labanotation, were not expert enough to record or notate using this method; (2) the investigator was primarily interested in the response displayed through movement of the body parts, locomotion, direction, level and range and not in recording aesthetic or emotional response; (3) effort-shape analysis, which deals with the dynamic content or expressive aspect of movement, was considered to be beyond the scope of this study.

Motif writing was seen as being the system of notation which could give a general profile of the child's movement and one which, with some adaptations, could be notated quickly. Using this system, kinetographic symbols are written within a vertical staff to show which parts
of the body are moving. For purposes of this study, a simplified staff was used. This staff has a central spine line and can distinguish movement on the right and left sides of the body. However, it is not capable of distinguishing between the upper and lower halves of the body. Its use, although limited to descriptions of movement which are very general, was considered adequate for purposes of this study.

According to Dunlop one of the decisions that a kinetographer has to make when writing movement is which staff is suitable to his needs for the particular task at hand. (Dunlop, 1969, p. 4)

If the kinetographer wishes to write a detailed description of a dance study, gymnastic skill, or track event he should, undoubtedly, use the full staff. But if only the general outline of the movement is desired and actions of all parts of the body not described, the simple staffs should suffice.
Fig. 1. The staff.

The score is read from the bottom upwards. It always starts with a double bar line, while a double bar line at the end indicates that the action is finished.

Locomotion is depicted by action strokes, placed on either side of the spine line depending which foot is involved. Figure 2 depicts hopping from one foot to the
same foot; Figure 3 depicts jumping from both feet to both feet; Figure 4 depicts running.

In Dunlop's writing, to differentiate between walking and running, the action stroke in walking is written longer than that used for running.

Fig. 2. Hopping.  Fig. 3. Jumping.  Fig. 4. Running.
In this study, however, walking was depicted as an action stroke with an arrow pointing in the direction of the movement.

Fig. 5a. Walking Forward
Fig. 5b. Walking backward.
Skipping and galloping were notated as in Figures 6 and 7.

Fig. 6. Skipping

Fig. 7. Galloping
A directional line on the top or bottom of an action stroke, using Dunlop's method, indicates a curved path clockwise or counterclockwise, as in Figures 8a and 8b. In this study, since additions had already been made to the action strokes, these symbols were placed on the staff, thus the type of locomotion which was taking place and the path were both duly indicated. (Figure 9)
In motif writing the direction and level of a movement are shown by an elaboration of the action stroke. The shape given to the stroke shows the direction of the movement. For example the symbol \( \rightarrow \) depicts sideways movement. Rather than discuss these symbols in detail the reader is referred to Dunlop, *Practical Kinetography Laban*, page 27, and Dunlop, *Readers in Kinetography Laban*, pages 4-5.

While the main direction is shown by the shape of the sign, the level of the direction is shown by the shading of the sign. The three levels of medium, high, and deep are depicted in Figure 10-a, b, and c. The dotted sign shows the medium level, the striped sign shows the high level, and the black sign shows the deep level.

![Fig. 10a. Medium](image1) ![Fig. 10b. High](image2) ![Fig. 10c. Deep](image3)
For purposes of this study, it was felt necessary to record the precise type of locomotor movement which was performed; therefore the symbol for level was added to the locomotor symbol. For example, if the subject were performing well up on the balls of his feet, as in tiptoeing, it was recorded as in Figure 11, while high skipping was recorded as shown in Figure 12. Steps performed at a deep level were recorded as in Figure 13.
Fig. 11
Walking - High Level

Fig. 12
High Skipping
Body Signs. Figure 14 shows the symbols for the main parts and joints of the body. These signs are used in conjunction with other symbols to show actions and modifications of a detailed nature as follows:

1. With a vertical bracket to indicate that a part leads or initiates a movement.

2. With a space measurement sign to indicate that the part contracts or extends.
3. Within the support column to indicate that a part or parts supports the body, as in sitting, kneeling, lying and so forth. (Dunlop, 1969, p. 98)

Body signs are used, in the main, to supply further details of a movement which plays a special part in the action, and, in this study, took precedence over traveling symbols.

Figure 15 depicts an action led by the right hand, the left hand and both wrists. Here the body symbol has been recorded as well as the action symbol.

In figure 16 the body symbol has taken precedence over the action symbol, but by the recording of one action symbol, the recorder knows what type of action has taken place, in this case, walking.
Fig. 15
Sequence - Right Hand Leading

Fig. 16
Sequence - Body Signs Taking Preference
Fig. 17
When the body is supported on one or more of its parts, the symbols are as written in Figure 17.

In Figure 17

a. Means sitting
b. Means kneeling
c. Means lying on the back
d. Means lying on the right side
e. Means lying on the left side
f. Means lying on the front
g. Means on the hands
h. Means on the elbows
i. Means on the head
j. Means on the right knee and left elbow
k. Means on the hands and knees

The body sign alone, on the simplified staff, cannot indicate support, so it must be accompanied by a support sign. The support sign as shown in Figure 18 is a straightened horizontal bracket.

[Fig. 18]

In Figure 19 a sequence in which weight is transferred from one part of the body to another is shown. It describes kneeling, to sitting on one hip and then the other, lying down and lifting up on the shoulders; lying on the back and rolling on to the right side and then on to the front.
Fig. 19

Sequence - Showing Weight Transference
Space Measurement Signs. Figure 20a shows the basic sign for contracting, and Figure 20b the basic sign for extending. These signs also cover the terms bending, curling, and stretching or spreading.

Fig. 20a. Contracting
Fig. 20b. Extending

Figure 21a and b, the doubled signs, show a greater degree of contracting and extension. According to Dunlop, the words contraction and extension are not adequate to cover the range of use of these signs. Contraction may also be referred to as bending, curling in, enclosing, decreasing in size, diminishing, small, while extension may be expressed as stretching, spreading, enlarging, elongating.

Fig. 21a. Greater Contraction
Fig. 21b. Greater Extension
In the simple staffs, unlike directional signs, space measurement signs are not able to elongate and shorten themselves according to the duration that the contraction or extension takes. The following methods are used to deal with this:

Fig. 22a. The sign written in a "V" means that the action of contracting or extending is taking place.

Fig. 22b. The sign written above an action stroke and connected to it describes the position arrived at in terms of being bent or stretched, e.g., the body moved and stopped in a bent position.

Fig. 22c. The symbol \( \diagup \) is used for cancellation, meaning do less of what has been indicated. (Dunlop, 1969, p. 26)

Figure 23 describes a sequence starting with three actions, all qualified as being small; the body then extends; then it makes a movement, unqualified in extension; it then moves to arrive very stretched, gives up the stretched position, and contracts markedly.
Fig. 22a  Contraction or Extension

Fig. 22b  Final Contracted or Extended Position

Fig. 22c  Cancellation Symbols
Fig. 23.

Sequence (From Dunlop, 1969, p. 57).
To summarize, the symbols which were used in this study were those which it was felt would describe the movement in each of the categories. The inherent principle is Labanotation, which indicates that the notator can record as much as is needed, making certain that he has recorded enough so that the movement can be correctly read (Nicholson, JOHPER, January, 1959) was the main principle which determined what would be recorded in this study.

Symbols used included those for locomotor movements, pathways, direction and level, body parts being used, movement of body parts, as in leading and supporting, non-locomotor movements of the body such as clapping, tapping feet or snapping fingers. Contractions and extensions were also recorded and covered the movements of bending, stretching and curling, as discussed earlier. Gymnastic sequences which occurred were also recorded.

Attention to conformance to metrical rhythm was not notated because the purpose of this part of the study was not to record how accurately in time children moved to the music. In creative dance it is often possible that the performance appears in "free rhythm," that is that the rhythm used by the performer does not necessarily conform to a particular meter, but rather that the performance portrays an image or feeling about the music.

A separate sheet was notated for movement to each
selection. At the end of each session the two observers collaborated and made out a profile sheet on each child, which included a check list of the categories and indicated how the child moved over the entire spontaneous period. A sample of the notation sheet and the profile sheet is included in Appendix G and H. The notation sheet allowed the observer to see and notate rapidly the flow and sequence of movement as it appeared, whereas the profile sheet was used as an indication of how the child responded in terms of the choices in the movement profile which were open to him. The teachers of the retarded children were especially interested in seeing how their children moved and the profile sheet was used to advantage in this situation.

From the notation sheet it was possible to determine, within the confines of the tempo of the music, (1) if the child were motivated to move by locomotor means, how varied were his locomotor responses or was his repertoire limited? (2) What types of nonlocomotor movement did he use? (3) What parts of the body were used, and was the child's movement bilateral or concentrated on one side of the body? (4) Did the child change direction; did he ever use sideward or backward movement; did he ever use turns? (5) Did the child ever use high or low levels, or was his movement concentrated at a medium level? (6) How did the child use plane space? (6) What was the range of the child's
movement? How close to his body or far from his body were the movements of body parts?

A summary of these findings may be found in Tables 9 and 10, Chapter 4.

It should be pointed out that rather extensive preparation in becoming familiar with the symbols and their adaptation was necessary for both the investigator and the observer. This preparation took the form of a knowledge of the symbols and practice in notation while one person simulated a dance performance. This rehearsal was followed by a one-week pilot study in the schools. During this period all of the tests were scrutinized and notation was practiced with children performing. As a result of this pilot study some items were changed, others eliminated, music was re-taped at more appropriate speeds and with more appropriate introductions, symbols were added to cover the type of movement which was seen. In general, all tests, administrative and observational procedures were refined during this pilot study period.

Testing and observation was done in the schools over a nine-week period, beginning January 25 and ending March 21, 1972.
CHAPTER IV

DATA AND ANALYSIS

This study was designed to compare the synchronous movement, motoric rhythmic movement and spontaneous movement to music of educable mentally retarded and normal children. Data on items measuring synchrony and auditory motor rhythm were collected on twenty educable mentally retarded and twenty normal children of the same chronological age. In addition both groups of children were asked to move in a non-directed situation with the movement being observed and notated using motif writing. These notations were then transferred to a profile sheet (Appendix II.)

The data will be discussed under the following headings: determination of inter-observer reliability; determination of reliability of the test of motor rhythm; item difficulty of the Oseretsky items (synchrony) and the items on the auditory motor rhythm test; comparison of retarded and normal children on the Lincoln-Oseretsky items measuring synchrony; comparison of retarded and normal children on the test of motor rhythm; relationship between the test of synchrony and the test of motor rhythm;
description and comparison of the spontaneous response to music of retarded and normal children.

**Determination of Inter-Observer Reliability**

Inter-observer reliability was determined by correlating the scores assigned by the two judges. The Pearson product-moment correlation was used. The two judges rated simultaneously but independently the same subjects. Correlations were then run on each item of the Oseretsky and the rhythm test, as well as on the total scores for each test. A decision was made to obtain at least a reliability coefficient of .80 between the judges for the scores of each item and for the total scores. The observers worked closely during the pilot study in order to achieve this end.

The relationships of the judges' scores may be found in Table 1.

It will be noted that all of the reliability coefficients are high (.8057-1.000), indicating the extent of the agreement between the judges.

On the Oseretsky items where agreement reached 1.000 (item 1, tapping with alternate feet and fingers, and item 2, making dots), the preciseness of the response made the judging of performance a relatively simple matter.

The lower correlations in item 4 of the Oseretsky test (tapping with alternate feet and both fingers) could be due to the difficulty in observing whether the finger
tapping was synchronous with the correct foot. Also, prior to scoring this item the investigator was usually involved in manually assisting the child, making the judgment of the response more complex.

The lower correlations on items 2 and 3 (Table 2) of the rhythm test (r = .8594 and r = .8251) point up the fact that there can be variations in judging what are considered to be simple responses, in this case walking and tapping the foot to 4/4 and 6/8 time, respectively. When locomotor movement, such as walking, is involved the judgment of response becomes very difficult. However, in an item such as number eleven involving running in place, where there is no directional movement, the response becomes more precise and is therefore easier to judge, as indicated by the correlation r = .9930.

The lower correlation of r = .8251 for item 3 of the rhythm test (tapping foot—6/8 time) was probably caused by the inability of one or the other of the observers to judge whether, indeed, the foot was tapping or whether there was merely the intent of tapping without the foot actually hitting the floor.

Section B of the rhythm test included items 9, 10 and 11, having to do with accent. Here it was a relatively simple matter to judge when the subject was correctly responding to the accented beat.

Similarly, in Section C, which had to do with clapping,
rhythmic patterns, the response required was precise. Also, explicit scoring procedures regarding the number of measures which would be considered for a score of "2" probably led to the high correlations of \( r = .9759 \) and \( r = .9687 \) on these items.

Section D consisted of one item on phrasing. Here the subject was asked to make a turn at the beginning of each new phrase. There was high agreement between the judges on this item, because it was easy to formulate a pattern for the three responses required. For example, if only one phrase turn were missed, or if the subject responded to the phrase but had a slight delayed reaction in turning, it was rated a "2." If two or more phrase turns were missed or if there were undue hesitation in responding, the performance was scored as "0." If all phrase turns were made correctly without undue delay in response, a 3 was scored.

It can be seen in the table that the reliability coefficients for both item scores and total scores are in close agreement. This is attributed to the prior agreement on judging procedures on the part of the judges, the judges' background in the area of rhythm and the precise aspect of the majority of the items on both tests.
Determination of Reliability of the Test of Motor Rhythm

Since many of the items which were presented in McCulloch's original test had been changed, and having determined that the ratings of the judges could be considered reliable, it was also necessary to determine the reliability of the test of motor rhythm. In order to do this a random sample of twenty out of the forty children from both groups originally tested was retested on all items of the motor rhythm test. The retesting was done by the investigator alone and results were correlated with the investigator's original scores, using the Pearson product-moment correlation statistic.

Usually between two to three weeks elapsed between the first testing and the retest and, as far as is known, no other practicing of the items took place during this interval. The length of time which elapsed between the test and the retest was not considered great enough for significant change in growth and maturation to have taken place.

From Table 3 it can be seen that eight items were proven to be reliable at the 5 percent level of significance and that six of the items tested did not reach this level.

On items 9 and 11 all subjects scored the same on these items on both test and retest, leading to a perfect correlation.

The overall reliability of the total scores was .7469,
which was significant beyond the 5 percent level.

It should be noted that three of the items which were found to be unreliable were those which had to do with listening, producing and maintaining a rhythmic pattern, and phrasing. It could be hypothesized that during the retest the subjects were more familiar with the requirements for the correct execution of these items, leading to improved scores.

No explanation can be given for the unreliability of item 1 (tapping on desk to 4/4 time) other than the fact that this was the first item tested and during the initial test the inhibition factor could have led to lower scores here than were found on the retest.

The unreliability of item 2 and item 6 (walking and running) could be due to the unreliability of the judgment of the observer rather than to unreliability of the item per se. As indicated elsewhere in this paper it was very difficult to judge the difference between a "2" and a "0" on item 6 because it was possible through the natural cadence of the movement itself to have the step coincide with the beat purely by chance, rather than through actual coincidence produced through an accurate response to the beat of the music.

It is interesting to note from Table 4 that where there were changes in scores from one test to another that these changes were mainly in a positive direction.
In the case of the retarded children, eight of the ten children retested scored higher on the retest, one scored lower and one remained the same. The normal children's scores followed a similar pattern, with five scoring higher on the retest, three scoring one point lower and two remaining the same.

From Table 4 it can be seen that of ten educable mentally retarded children retested the amount of fluctuation was nine points, from one point below the original score to eight points above the original score. The fluctuation in scores of the ten normal children was within six points, from one point below the original score to five points above the original score, with two children remaining the same.

The fluctuation in the scores of both groups could be due to emotional instability, the fact that only one observer was present during the retest, and the rapport which had been established during previous testing sessions, leading to higher scores on the retest.

In view of these findings it may be assumed that ability in rhythmic response through movement of retarded and normal children between the ages of nine and thirteen years varies somewhat from day to day under normal conditions.

The correlation coefficient of the total score being .7469 indicated that the test as administered in this
study can be considered a reliable instrument for measuring the rhythmic response of retarded and normal children. However, it is suggested that if any stable estimate is to be made of this type of response the test should be repeated more than twice. No doubt reliability coefficients would increase if ratings were done by the regular classroom, music or physical education teachers who could elicit better response initially than could be obtained by an outsider.
### TABLE 1

RELIABILITY COEFFICIENTS BETWEEN JUDGES' RATINGS ON LINCOLN-OSERETSKY SCALE (SYNCHRONY) *

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>r</th>
<th>JUDGES A &amp; B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1 (tapping alternately with feet and fingers)</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Item 2 (making dots)</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Item 3 (winding thread while walking)</td>
<td>.9738</td>
<td></td>
</tr>
<tr>
<td>Item 4 (tapping with feet and fingers)</td>
<td>.8057</td>
<td></td>
</tr>
<tr>
<td>Item 5 (tapping feet and making circles in the air)</td>
<td>.9512</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>.9260</td>
<td></td>
</tr>
</tbody>
</table>

* Number of subjects rated 20
TABLE 2

RELIABILITY COEFFICIENTS BETWEEN JUDGES' RATINGS ON
THE TEST OF AUDITORY MOTOR RHYTHM*

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>JUDGES A &amp; B</th>
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</tr>
<tr>
<td>Section A - Pulse Beat</td>
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</tr>
<tr>
<td>1. Tapping hand 4/4 time</td>
<td>.8997</td>
</tr>
<tr>
<td>2. Walking 4/4 time</td>
<td>.8594</td>
</tr>
<tr>
<td>3. Tapping foot 6/8 time</td>
<td>.8251</td>
</tr>
<tr>
<td>4. Heel tapping 6/8 time</td>
<td>.9190</td>
</tr>
<tr>
<td>5. Clapping 2/4 time</td>
<td>.9343</td>
</tr>
<tr>
<td>6. Running in place 2/4 time</td>
<td>.9930</td>
</tr>
<tr>
<td>7. Tapping hand 3/4 time</td>
<td>.9040</td>
</tr>
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<td>8. Sweeping 3/4 time</td>
<td>.9391</td>
</tr>
<tr>
<td>Section B - Accent</td>
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<tr>
<td>9. Tapping to accented beat 4/4 time</td>
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<td>10. Tapping to accented beat 3/4 time</td>
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<td>11. Tapping to accented beat 2/4 time</td>
<td>.9036</td>
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<td>Section C - Clapping Rhythmic Patterns</td>
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<td>12. Clapping</td>
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<td>13. Clapping</td>
<td>.9687</td>
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<tr>
<td>Section D - Phrasing</td>
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<tr>
<td>14. Walking and turning and the beginning of each new phrase</td>
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<td>Total</td>
<td>.9793</td>
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*Number of subjects rated 20
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<th>Item</th>
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<tr>
<td>1. (tapping - 4/4)</td>
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<tr>
<td>2. (walking - 4/4)</td>
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<td>3. (tapping foot - 6/8)</td>
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<td>4. (heel tapping - 6/8)</td>
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<td>5. (clapping - 2/4)</td>
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<td>6. (running - 2/4)</td>
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<td>7. (tapping - 3/4)</td>
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<td>8. (sweeping - 3/4)</td>
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<td>9. (accent - 4/4)</td>
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<td>10. (accent - 3/4)</td>
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<td>11. (accent - 2/4)</td>
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<td>12. (clapping pattern)</td>
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<td>13. (clapping pattern)</td>
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<td>14. (phrasing)</td>
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<td><strong>Total</strong></td>
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*Significant at the 5 percent level.
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<tr>
<td>23</td>
<td>F</td>
<td>3</td>
<td>38</td>
<td>41</td>
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<tr>
<td>24</td>
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<td>30</td>
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<td>5</td>
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<td>44</td>
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<td>45</td>
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<td>5</td>
<td>40</td>
<td>39</td>
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<td>M</td>
<td>5</td>
<td>23</td>
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<tr>
<td>49</td>
<td>F</td>
<td>5</td>
<td>42</td>
<td>42</td>
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</tbody>
</table>

*Group 1 - EMR - Second Avenue School  
*Group 4 - EMR - Hubbard Elementary School  
*Group 3 - Normal - Second Avenue School  
*Group 5 - Normal - Hubbard Elementary School
Item Difficulty of the Oseretsky Items
(Synchrony) and the Items on the
Auditory Motor Rhythm Test

Some of the items on the Oseretsky scale measuring synchrony, although standardized on children age six to thirteen years, proved very difficult for both groups of children. The items particularly referred to are items 4 and 5.

All of the retarded children failed item number 4 (tapping with alternate feet and both fingers), and twelve out of the twenty retarded children tested failed item number 5 (tapping alternate feet and making circles in the air). Among twenty normal children tested, seventeen failed item 4 and six failed item 5. The other items on the Oseretsky scale did not appear to cause any great difficulty.

As far as the rhythm test was concerned the items which proved most difficult were items 13 (clapping a rhythmic pattern, fast tempo) item 6 (running in place) and item 4 (heel tapping).

Of the twenty retarded children tested eight failed item 13, ten failed item 6, and two failed item 4. Of the twenty normal children tested four failed item 13, seven failed item 6, and one failed item 4.

The failure on these items could be attributed to the complexity of the motoric response and the tempo of the music. Although most subjects passed item 12, which
involved clapping a rhythmic pattern to a relatively slow tempo \( J = 138 \). The same pattern repeated at a faster tempo \( J = 152 \) seemed to be too complex a response.

Item 4, which involved tapping both heels simultaneously to 6/8 time, also proved to be motorically difficult, chiefly due to the measure of control necessary to correctly perform this item.

Running in place (item 6) proved to be difficult for several subjects, due chiefly to the rate of speed at which the music was played \( J = 126 \) and the particular motoric adaptation which the subject had to make in order to be in time.

Comparison of Retarded and Normal Children on the Lincoln-Oseretsky Items (Synchrony) and on the Test of Auditory Motor Rhythm

In order to determine the effects of intelligence and sex on the performance of the five items on the Oseretsky scale measuring synchrony and on the fourteen items measuring motor response to an auditory rhythmic stimulus, a 2 X 2 multivariate test of significance using the Wilks Lambda criterion was employed. The 5 percent level of significance was established for all tests.

The figures shown in Table 5 indicate that neither the F ratio for sex nor intelligence was significant for measures of synchrony. The F ratio for the interaction effect of sex and intelligence on synchrony was less than
l, indicating that the difference in performance between educable mentally retarded and normal children is independent of sex. The two factors do not interact to a significant degree.

Table 6 shows the effects of sex and intelligence on auditory motor rhythm to be non-significant at the 5 percent level. The interaction effect of sex and intelligence was similarly found non-significant at the 5 percent level.

The nineteen variables were examined by means of univariate analyses of variance. Table 7 summarized these analyses of variance.

From this table it can be seen that variable 12, which is tapping with the hand, 3/4 time, is significant at the 5 percent level (F = 4.114). This indicates that there were some difference in the performance of males and females on this item.

From an inspection of the data it was discerned that the difference occurred mainly in the "2" and "3" scores which were recorded for this item. In both retarded and normal groups males were found to have scored more "2's" than had females, indicating less consistency in the response of the males. There obviously was a tendency for the males of both groups to have lost the rhythmic response and then to have picked it up again.

It was found in both groups that more females than
### TABLE 5
MULTIVARIATE TEST OF SIGNIFICANCE FOR EFFECT OF SEX AND INTELLIGENCE ON LINCOLN-OSERET SKY SCALE (SYNCHRONY)

<table>
<thead>
<tr>
<th>Test Of</th>
<th>F</th>
<th>df</th>
<th>df (error)</th>
<th>P Less Than</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1.007</td>
<td>5.0</td>
<td>32.0</td>
<td>0.430</td>
</tr>
<tr>
<td>Intelligence</td>
<td>1.679</td>
<td>5.0</td>
<td>32.0</td>
<td>0.168</td>
</tr>
<tr>
<td>Sex and Intelligence Interaction</td>
<td>0.483</td>
<td>5.0</td>
<td>32.0</td>
<td>0.786</td>
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</table>

### TABLE 6
MULTIVARIATE TEST OF SIGNIFICANCE FOR EFFECT OF SEX AND INTELLIGENCE ON THE TEST OF AUDITORY MOTOR RHYTHM

<table>
<thead>
<tr>
<th>Test Of</th>
<th>F</th>
<th>Degrees Of Freedom</th>
<th>Degrees Of Freedom</th>
<th>P Less Than</th>
</tr>
</thead>
<tbody>
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<td>18.0</td>
<td>0.472</td>
</tr>
<tr>
<td>Intelligence</td>
<td>1.837</td>
<td>19.0</td>
<td>18.0</td>
<td>0.102</td>
</tr>
<tr>
<td>Sex and Intelligence Interaction</td>
<td>1.156</td>
<td>19.0</td>
<td>18.0</td>
<td>0.381</td>
</tr>
</tbody>
</table>
### TABLE 7

**UNIVARIATE F TESTS FOR THE INDEPENDENT VARIABLES OF SEX AND INTELLIGENCE**

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Sex $F(1, 36)$ P Less Than</th>
<th>Intelligence $F(1, 36)$ P Less Than</th>
</tr>
</thead>
<tbody>
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<td>2.077 0.158</td>
<td>0.231 0.634</td>
</tr>
<tr>
<td>2</td>
<td>0.433 0.515</td>
<td>0.048 0.838</td>
</tr>
<tr>
<td>3</td>
<td>0.468 0.498</td>
<td>2.549 0.119</td>
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<tr>
<td>4</td>
<td>0.360 0.552</td>
<td>3.240 0.080</td>
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<tr>
<td>5</td>
<td>0.890 0.352</td>
<td>2.473 0.125</td>
</tr>
<tr>
<td>6</td>
<td>0.220 0.642</td>
<td>1.976 0.168</td>
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<tr>
<td>7</td>
<td>2.945 0.095</td>
<td>11.782+ 0.002</td>
</tr>
<tr>
<td>8</td>
<td>0.198 0.659</td>
<td>0.000 1.000</td>
</tr>
<tr>
<td>9</td>
<td>0.026 0.873</td>
<td>0.026 0.873</td>
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<tr>
<td>10</td>
<td>0.600 0.444</td>
<td>0.067 0.798</td>
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<tr>
<td>11</td>
<td>2.025 0.163</td>
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</tr>
<tr>
<td>12</td>
<td>4.114+ 0.050</td>
<td>0.000 1.000</td>
</tr>
<tr>
<td>13</td>
<td>1.014 0.321</td>
<td>0.254 0.618</td>
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<tr>
<td>14</td>
<td>2.384 0.131</td>
<td>3.941 0.055</td>
</tr>
<tr>
<td>15</td>
<td>1.331 0.256</td>
<td>6.444+ 0.016</td>
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<tr>
<td>16</td>
<td>0.871 0.357</td>
<td>0.871 0.357</td>
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<tr>
<td>17</td>
<td>0.848 0.363</td>
<td>0.094 0.761</td>
</tr>
<tr>
<td>18</td>
<td>2.965 0.094</td>
<td>5.070+ 0.031</td>
</tr>
<tr>
<td>19</td>
<td>0.857 0.361</td>
<td>3.429 0.072</td>
</tr>
</tbody>
</table>

*Items 1-5, Oseretsky +Significant at the .05 level.

Items 6-19, Rhythm
males scored a perfect "3" on this item.

No reason can be given for this difference in response other than that 3/4 time, being in triple meter, is not one traditionally used by males in movement to music.

McCulloch indicated that 3/4 time is recognized as being one of the most difficult meters in terms of motor response. In her test, responses to this meter proved to be next to 4/4 tempo in terms of discrimination between good and poor performances. She was unable to give any reason why the 4/4 tempo rather than the 3/4 proved to be more discriminating, but indicated that it could have been due to peculiarity of the sample. (McCulloch, 1955, p. 47)

It should be noted that of the forty children tested, twelve also failed item 8 of the rhythm test, which was "sweeping" to 3/4 time. Of these ten failures, seven were males and five were females, which could indicate a difficulty of response to the meter rather than motoric difficulty per se.

Table 7 indicates that variable 7 (walking, 4/4 time) differentiated between the retarded and normal subjects with respect to intelligence. From an inspection of the data it was seen that seventeen normal subjects received a perfect score of "3," while only nine of the retarded subjects did so. Again, the retarded subjects scored more "2's," nine achieving this score. The fact that only three normal subjects received a "2" seemed to indicate
a lack of consistency in rhythmic response on the part of the retarded subjects. Several reasons could be put forward for this: many retarded children have an arhythmic gait which is not overcome in one session with music. This arhythmic tendency was noticeable in some retarded children in both the testing and the non-directed situation. Further, this item extended over sixteen measures which could have resulted in a lack of attention on the part of the retarded subjects, leading to lower scores. The difficulty of accurately judging response on this item could also have been reflected in the scores.

With regard to the effect of intelligence there was some difference between the responses of retarded and normal children on the item having to do with tapping an accented beat, 3/4 time, as indicated by variable 15, Table 7. All of the normal children scored a "3" on this item, thirteen retarded children scored 3 points, five of them scored "2" and two retarded children scored "0." Although more disparate, the scores on this item are similar to scores received by the retarded subjects on other items involving accent. It is quite probable that faulty auditory perception on the part of these subjects resulted in lower scores. The fact also that normal children recognized the regularity of the accent and responded almost immediately to it, while some retarded subjects had to listen for
the accent and possibly responded too late could have led to lower scores.

The shorter attention span of the retarded subjects could also have affected the scores on accent more than other scores, because the motoric response was limited, and during the three items measuring response to accent the subject remained in the same position.

Table 7 also shows variable 18 as differentiating between retarded and normal subjects. This item had to do with clapping a rhythmic pattern to a fast tempo ($J = 152$). Eight retarded children and four normal children failed this item. Ten normal children passed it with a score of "3," while five retarded children passed it with this score. Six normal children passed this item with a score of "2" and seven retarded children passed it with this score.

The speed of the music, undoubtedly, resulted in lower scores on this item for both groups. Although, traditionally, response to music played at a fast tempo has been shown to be easier for children, the contrast between the tempo at which the music for this item was played ($J = 152$) and the preceding item ($J = 138$) was possibly too much of a perceptual and motoric adjustment for the retarded subjects.

Table 8 indicates that variable 8 is significant ($F = 7.128$), showing differences in the response of male
# TABLE 8

UNIVARIATE F TESTS FOR THE INTERACTION EFFECTS OF SEX AND INTELLIGENCE

<table>
<thead>
<tr>
<th>Variable*</th>
<th>F(1, 36)</th>
<th>P Less Than</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2.077</td>
<td>0.158</td>
</tr>
<tr>
<td>2</td>
<td>0.048</td>
<td>0.828</td>
</tr>
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<td>0.821</td>
</tr>
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<td>5</td>
<td>0.099</td>
<td>0.755</td>
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<td>6</td>
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<td>0.642</td>
</tr>
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<td>7</td>
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</tr>
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<tr>
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<td>0.360</td>
</tr>
<tr>
<td>19</td>
<td>3.429</td>
<td>0.072</td>
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</table>

*Items 1-5, Oseretsky
Items 11-19, Rhythm
+ Significant at .05 level
and female, retarded and normal subjects on response to this item, which involved tapping the foot, 6/8 time. With the retarded population it was found that the males scored higher on this item than did the females, while with the normal population this phenomenon was reversed. The only suggestion which can be put forward is that the retarded female population had not achieved the motor control necessary for successful response to this item that the males in their group had, while the females in the normal group had achieved this control and were able to demonstrate it in this particular situation better than their male counterparts could. No reason can be given as to why this should be so.

To summarize this part of the study, multivariate analyses of variance indicated that there was no significant difference between the responses of males and females on the test of auditory motor rhythm. The data further revealed that, although some individual items did differentiate between the performance of retarded and normal children of the same chronological age, there was no overall significant difference in performance of these subjects on either the test of synchrony or the test of motor rhythm.

Relationship of the Test of Synchrony to the Test of Auditory Rhythmic Response

In order to investigate the relationship between synchronous movement and auditory rhythmic response the
Pearson product-moment correlation technique was applied to the total scores of the Oseretsky items measuring synchrony and the items measuring auditory rhythmic response for both groups. Although a significant correlation was shown between the two tests ($r = .3609$) it accounts for only 13 percent of the variance and thus cannot be considered substantial enough to indicate that the five items of the Oseretsky test measuring synchrony can be considered a valid measure for the prediction of rhythmic response.

As a result of correlating the total scores for both tests mentioned above, it was found that while there was a significant relationship between the two tests, it was not substantial enough for one to be used as a predictor of the other. This finding was in agreement with research conducted by Seashore (1926), Lemon and Sherbon (1934), Bond (1958), and Eberly (1966).

The data did indicate that rhythmic behavior of educable retardates was similar to that of normal children of comparable chronological age, which is in agreement with studies conducted by Bienstock and Jersild (1935), Baldwin and Stecher (1924), Fracker and Howard (1928), and Mainwaring (1931), but does not agree with research reported by Fraisse and Pichot (1949), Murphy (1957), Cantor and Girardeau (1959), and Eberly (1966). However, it should be remembered that of the last mentioned studies,
Eberly's was the only one which dealt exclusively with educable retarded subjects. It could be said that the motor performance of educable retarded children more nearly approximates that of the normal population than does the performance of profoundly retarded or trainable retarded children as were used in the studies conducted by Murphy, Cantor and Girardeau.

It should also be pointed out that none of the studies required the range of motoric response that the present study did. Therefore, the motor discrepancies of children matched on mental age were possibly not seen. Observations of a group of young children during the pilot study whose chronological age approximated the mental age of the subjects used in this study indicated the lack of motor control or coordination necessary for the successful performance of several items of the test.

The Spontaneous Response of Children to Music

As indicated earlier, inhibition plays a large role in the extent to which children will move spontaneously to music. In fact, to be given the freedom to move when one has not previously experienced such freedom is undoubtedly an inhibiting factor in itself. However, it is stressed that although this factor was present among some of the children who participated in this study, it was present as an individual and not as a group trait. Some
children from both groups moved with abandon, some of both types of children were limited in their response and some of both types were not able to respond at all, although in this latter category it was found that more retarded than normal children could not respond.

The reasons for this lack of response are several: for some of the retarded children the classical type of music used was perhaps too sophisticated a stimulus. However, this should be considered in view of the past experience of these children in hearing music of this nature.

The retarded children undoubtedly needed more structuring of the movement problem, particularly since they had had no prior experience in moving in this way.

The retarded children who did not move could have lacked a repertoire of skills. One boy expressed this quite aptly when he said, "I would like to skip to that, but I can't skip." Other factors contributing to the lack of response of the retarded subjects were seen to be the lack of emotional stability, as was found in one child who, after five years in school was just beginning to make social contacts, and as found in the case of one boy whose personality seemed to change daily. Age and size probably had some effect on the degree of spontaneity seen, as in the case of a tall, thirteen year old girl who had not been exposed to creative dance before and who,
undoubtedly, felt quite embarrassed when asked to move in this non-direction situation.

In the case of the normal children, two of whom failed to respond, similar reasons to the above could be cited.

For normal children the fact that the music evoked images could, in itself, have been an inhibiting factor. In the case of "Dagger Dance" some children verbalized that they knew what the music was depicting but that they preferred not to move that way.

The retarded children, almost without exception, could not understand directions from the tape recording. It was necessary to play the directions in two parts, ask them to repeat the directions and then summarize the directions, with reassurance that the subject could move in any way he wanted to the music. The normal children, on the other hand, were able to understand the directions readily and would indicate by a nod that they did so. They seemed, in most cases, to be ready to move before the selection was completed.

In comparing the responses as tabulated on the profile sheet, the reader is referred to Tables 9, 10, and 11. In reading these tables it should be remembered that the tabulations reflect the response over three selections and six children did not respond, therefore the sum of percentages in any category is not equal to 100 percent.
From Table 9 it can be seen that the locomotor responses which predominated were walking, running and skipping, with the retarded children using more skipping than the normal children, and the normal children using slightly more running. Some galloping was evidenced, but in the total group of forty retarded and normal children, only six galloped, although at least one of the three selections ("Wild Horseman") lent itself very favorably to this type of movement. Some jumping was evidenced by both groups, but there was little hopping, although the selection "Mechanical Doll" could have elicited this response. There was little movement on the hands and feet and only one child from each group crawled.

The reason for this lack of movement on body parts other than the feet could have been due to the music, although some children indicated that at least one selection reminded them of animals. This lack of movement could also be due to lack of experience in moving on body parts other than the feet and the natural inhibition in doing so in this novel situation.

Some gymnastic type of movement in the form of cartwheels, crab walks, and rolling was seen in both groups, but not to any great degree. Of the three children who performed this way, two were girls. (Tables 11 and 12) The retarded children used nonlocomotor movement to a greater degree than the normal children. The predominant
movement of this type seen in the two groups, however, was clapping and tapping hands and feet. The fact that bending and stretching was seen to such an extent was probably due to the selection "Dagger Dance" chosen for this part of the observation. This selection lent itself to bending and stretching movements.

It could be that the children remembered the types of nonlocomotor activities which had been recently used in the testing situation. Also it could be that they lacked experience in the movements of swinging and swaying, rising and falling, twisting and turning, and were hesitant to perform in this manner.

The body parts which were used were nearly the same for both groups of children. Hands, arms, head and feet predominated. There was little movement of the elbows, shoulders or knees. The selection "Mechanical Doll" could have elicited movements of these body parts, but there appeared to be a lack of awareness of parts of the body other than those used in everyday activity. Body parts were rarely used as leads, and support on body parts other than the feet or buttocks was rarely seen in either group.

The direction which was used by both groups (Tables 9 and 10) was predominantly forward. Fifteen out of twenty normal children and thirteen out of twenty retarded children used the forward direction. Movement in a backward direction was used to almost the same extent by both groups, as
was movement in a sideward direction. Rarely was up and down movement seen, but the retarded children seemed to enjoy turning and whirling which is evidenced in the tabulations recorded in Table 10.

The lack of awareness of direction other than forward is not surprising in view of the fact that it is this direction which is stressed when children are taken into the gymnasium. Until recently, with the advent of movement education, directions other than forward were not explored, and with the lack of physical education programs at present in the elementary schools in Columbus, it is doubtful if the teaching of directionality of movement has been given any impetus.

Total space was used by approximately thirty percent of the normal children and only five percent of the retarded, while half of the space was used by forty percent of both groups. The tendency of the retarded children not to use the total space available could have been due to the lack of security felt in using a large space. Also, since movement was performed within the medium range, there was no compelling necessity for either group to use a great deal of space.

With regard to change of levels (Table 9 and 10), neither group used the high or low level to any degree, most movement being performed at the medium level. From Table 10 it can be seen that sixteen out of twenty, or
eighty percent of the normal children used this level, while thirteen out of twenty or sixty-five percent of the retarded children did so (Table 10). More retarded children used a high level, in moving on tiptoe, while more of the normal children used the low level. No explanation can be given for this latter phenomenon, except that level was used in accordance with what movement was performed and in accordance with how the child perceived the music. The music did not lend itself to leaping where the high level would have been evidenced. One selection particularly lent itself to movement at the lower level. This could have been perceived by the normal children more readily than the retarded.

The body positions used by both groups were standing or sitting (Tables 9 and 10). No children performed while kneeling or in prone or supine positions. One normal child performed while squatting in a dramatic presentation of a hunter whittling a stick at a campfire. Again the lack of experience in supporting the body on parts of the body other than the feet could have resulted in the stereotyped body positioning. Inhibition also, undoubtedly, was a factor here.

The range of movement for both groups was similar, with the medium range predominating (Tables 9 and 10). At least one selection ("Dagger Dance") lent itself to large, extended slashing movements, and several children utilized
this range. There were some contrasting smaller movements in both groups, but these did not follow the extended movement. In other words, there was not a noticeable sequence of extension and contraction in any of the responses.

The pathways in which the children moved were more indirect than direct in both groups. It should be noted that indirectness of pathway was noted only when the pathway was flexible or a pattern of movement was depicted, as in forward, backward, sideward, or turning movement. Moving in a circle was considered as being direct because it was always in a forward direction and occurred because of the confines of the space rather than because of the child's motivation to move in an indirect pathway.

Interesting patterns were seen in the movements performed by both groups of children, with several children using turning which led to the notation of indirect pathways.

The speed at which both groups of children moved was predominantly moderate. This was undoubtedly due to the fact that two of the selections out of the three were played at this speed. Even when the music was fast and dynamic, as in the case of "Wild Horsemen," there was a lack of exuberance or the feeling of speed, possibly because of the unfamiliarity with the music, the lack of discussion about the music and the confines of the space.
More normal children performed generally in time to the music than did the retarded children, but many children in both groups used free rhythm. The retarded often made inappropriate locomotor choices which in no way suited the rhythm, thus leading to the notation of "performed in free rhythm." However, they also moved expressively to the music, and when this occurred the main focus was on the dramatization rather than on performance in time.

Although not notated as such, some indication of interpretation or dramatization was indicated by the observers on the profile sheet. In these cases the child vividly portrayed a dramatic scene through movement. Although the retarded children could not verbalize about the music initially, as many of them communicated the meaning of the music through their movement as did the normal children. In most cases if the child were depicting a story through movement, the type of movement used was locomotor which explains the large percentage of children using this type of movement.
<table>
<thead>
<tr>
<th>Type of Response</th>
<th>Total Out of 20 Using</th>
<th>Percentage Using</th>
<th>Type of Response</th>
<th>Total Out of 20 Using</th>
<th>Percentage Using</th>
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<tr>
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<td><strong>Body Parts</strong></td>
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<td>15</td>
<td>75</td>
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<td>35</td>
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<td>9</td>
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## TABLE 10

### SUMMARY OF SPONTANEOUS RESPONSE: RETARDED CHILDREN

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<thead>
<tr>
<th>Type of Response</th>
<th>Total Out of 20 Using</th>
<th>Percentage Using</th>
<th>Type of Response</th>
<th>Total Out of 20 Using</th>
<th>Percentage Using</th>
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<td></td>
<td><strong>Body Parts</strong></td>
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<tr>
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<td>14</td>
<td>60</td>
<td>Hand(s)</td>
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</tr>
<tr>
<td>Run</td>
<td>5</td>
<td>25</td>
<td>Arm(s)</td>
<td>9</td>
<td>45</td>
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<tr>
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<td>8</td>
<td>40</td>
<td>Elbow(s)</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Gallop</td>
<td>3</td>
<td>15</td>
<td>Shoulder(s)</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Hop</td>
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<td>15</td>
<td>Head</td>
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<td>15</td>
</tr>
<tr>
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<td>Leg(s)</td>
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<td>20</td>
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<td>0</td>
<td>Foot (Feet)</td>
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<td>5</td>
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<tr>
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<td></td>
<td><strong>Direction</strong></td>
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<td>15</td>
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<td>65</td>
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<tr>
<td>Taps Hand(s)</td>
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<td>15</td>
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<td>10</td>
<td>Down</td>
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<td>5</td>
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<td>Bend-Stretch</td>
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<td>Space</td>
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TABLE 10 (Continued)

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<th>Total Out of 20 Using</th>
<th>Percentage Using</th>
<th>Type of Response</th>
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<tr>
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<td>0</td>
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<td>10</td>
</tr>
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<td>No Response</td>
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<td>Flexible</td>
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</table>
From Tables 11 and 12 the differences in the numbers and types of responses between males and females can be seen.

From an inspection of the tables it could be said that the movement of females was greater than the movement of males in the non-directed situation. The numbers of males and females using gymnastic movement was comparable. In the normal groups more boys were observed as being limited in their response than were girls, while in the retarded groups the opposite was true.

It should be noted that a performance could be of a locomotor or nonlocomotor nature and still be considered "limited" in the opinion of the judges. For example, a child who walked in one direction for the entire selection during the non-directed situation would have been considered as having given a "limited" performance, but this performance also would have been categorized as locomotor.

The reason put forward for a smaller incidence of observed limited response in favor of the males in the retarded groups is that possibly the males in this group, being younger mentally than normal males, had not been faced with the social stigma of moving to music to the same degree as had their normal peers.
<table>
<thead>
<tr>
<th>Type of Response</th>
<th>Number of Males Using Response Out of 10</th>
<th>Percentage Using</th>
<th>Number of Females Using Response Out of 10</th>
<th>Percentage Using</th>
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<td>60</td>
<td>8</td>
<td>80</td>
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<td>30</td>
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</table>

*Based on three selections.
<table>
<thead>
<tr>
<th>Type of Response</th>
<th>Number of Males Using Response Out of 10</th>
<th>Percentage Using</th>
<th>Number of Females Using Response Out of 10</th>
<th>Percentage Using</th>
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<tr>
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<td>30</td>
<td>3</td>
<td>30</td>
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</table>

*Based on three selections.*
From the tables it can be seen that an equal number of males and females in both groups failed to respond.

It is the feeling of the investigator that males of both groups could approach the degree of movement used by the females if appealing music, acceptance of performance and encouragement were part of their background.

As indicated earlier, no response was elicited from eight children, six retarded and two normal children. There was some relationship between the scores on the rhythm test and the lack of response in the spontaneous situation. Of the six children who did not respond, four of them received the lowest scores recorded on the rhythm test. This latter finding seems to point up the fact that children need to be able to move well in basic, natural ways before these movements can be used for points of departure in dance. It is doubtful that a child who has difficulty in clapping to music will find satisfaction in moving to it in other ways.

The implications for teaching apply to both groups and are cited in Chapter V.
CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This study was designed to compare the synchronous movement, motoric rhythmic movement and spontaneous movement to music of educable mentally retarded and normal children. The aspects of synchrony, rhythm and sequence, although recognized as integral elements of physiological and developmental processes in the temporal dimension, have been largely neglected in current literature on the remediation of perceptual and motor problems in children. It would seem that an understanding of the abilities of normal and exceptional children in the area of rhythms could make planning for these children more appropriate.

Little research has been undertaken by physical educators regarding the motoric reaction of normal children to different types of rhythmic stimuli and of this research, motoric response has been measured mainly by a tapped beat. Some research is available on the response to music of profoundly retarded or trainable retarded children, but studies dealing with the response of educable mentally retarded children have been few. Almost no research has been undertaken to determine the reaction
to rhythmic stimuli of either the normal or retarded child in a non-directed situation.

The present study attempted to compare three dimensions of rhythmic response of educable mentally retarded and normal children. Specifically these were:

(1) The retarded and normal child's ability to synchronize movements of two or more parts of his body as dictated by his own "inner" rhythm.

(2) The retarded and normal child's ability to respond to pulse beat, accent and pattern using motor responses more closely aligned to dance than other studies had used.

(3) The ability of retarded and normal children to move spontaneously to music.

Data were collected on twenty educable retarded and twenty normal children whose chronological age was between nine years, ten months and thirteen years. Individual performance of the subjects was observed by two judges. The tests and observational techniques used were (1) Lincoln-Oseretsky motor development scale (synchrony); (2) test of auditory motor rhythm, and (3) spontaneous response to three contrasting selections of music.

The Oseretsky scale consisted of five items specifically measuring synchrony chosen from the standardized Lincoln-Oseretsky Motor Development Test.

The test of auditory motor rhythm was originally
designed by McCulloch (1955) and was revised for this study by the investigator.

Spontaneous response was observed and notated on three contrasting musical selections using an adaptation of motif writing. These notations were then transferred to a profile sheet. (Appendix H)

Inter-observer reliability, obtained through the Pearson product-moment correlation statistic, indicated high reliability coefficients (.8057-1.0000). These were attributed to prior agreement on judging procedures during the pilot study, the judges' background in the area of rhythm and the precise aspect of the majority of the items on both the test of synchrony and on the test of auditory motor rhythm.

Results of test-retest on auditory motor rhythm were correlated and indicated that the rhythm test was a reliable instrument for measuring the rhythmic response of retarded and normal children.

Multivariate analyses of variance indicated that there was no significant difference between the performance of normal and retarded males and females of comparable chronological age on either the test of synchrony or the test of motor rhythm.

Correlations of the total scores for both tests showed that there was a positive relationship between the two. Although the correlation was statistically significant, its
small size (.3609) suggests limited predictive value. This leads to the questioning of the validity of remediation through non-auditory means before an auditory stimulus is introduced.

The spontaneous movement of both retarded and normal children was seen to be quite similar. Where inhibition was a factor it was present as an individual and not as a group trait. The ability to respond appeared to be related to rhythmic ability as measured by the auditory rhythm test, leading to the hypothesis that children should experience success in moving to music in basic, natural ways before these movements can be used for points of departure in dance.

Conclusions

This investigation did not reveal a significant difference between educable mentally retarded and normal children in their performances on tests of synchrony and auditory motor rhythm. Within the limits of this investigation it is suggested that perhaps these abilities are dependent upon factors other than intelligence as measured by standardized intelligence tests.

The investigation revealed no significant differences in performance on tests of synchrony and auditory motor rhythm between males and females in either the retarded or normal groups. This then suggests that these abilities,
as measured by these tests, are independent of sex.

The degree of correlation between scores on the Lincoln-Oseretsky items measuring synchrony and those on the auditory motor rhythm test was statistically significant, but of small size. The small size of the correlation indicates a relatively small proportion of shared variance, thus limiting the predictive value of the relationship. This investigation seems to suggest that rhythmic performance as measured by a test of auditory motor rhythm may not be reliably predicted from scores on the Lincoln-Oseretsky items measuring synchrony.

The movement responses of retarded and normal children in a non-directed situation were found to be similar, suggesting that spontaneous movement response is a function of factors other than intelligence or sex.

**Implications and Recommendations**

The implications for programming in the area of rhythms for both retarded and normal children are several. These will be discussed under two headings: specific rhythmic response and spontaneous rhythmic response.

**Specific Rhythmic Response**

Serious consideration should be given to research on the relationship of synchrony to rhythmic response, keeping in mind that rhythmic response as used in physical
education and dance covers a wider range of response than has been heretofore researched.

More developmental research is necessary in order to ascertain the rhythmical response of young retarded and normal children. Since McCulloch's original test was validated on first grade children, and the recent adaptation found reliable with older normal and retarded children, some interesting comparisons could be made.

Because the data indicated that a test of synchrony such as that found in the Lincoln-Oseretsky motor development scale should not be used exclusively to predict performance using an auditory rhythmic stimulus, the value of programs where synchronous movement is carried on without the aid of music is open to question.

Since the study indicated few differences in the manner in which males and females of chronological age nine to thirteen responded specifically or spontaneously to music, it might be suggested that it is the teacher's inhibition rather than the child's which has led to the misconception that males of this age will not respond to rhythm and dance.

Murray has suggested that an academic and motoric understanding of pulse beat, accent, pattern, and phrasing should be part of the child's repertoire by the sixth grade, and many of these concepts should be established after three years of study. (Murray, 1953, p. 394) The
present practice of cutting back the employment of music and physical educators who can give the child this kind of background is seen as a great detriment.

**Spontaneous Rhythmic Response**

The spontaneous movement of retarded and normal children being so similar, the implications for teaching apply to both groups are cited here.

Before children can be expected to make appropriate movement choices the building of a movement vocabulary through exploration and problem solving, as well as the development of motoric control, is seen as a necessity.

The body in order to speak eloquently must be able to move with strength, flexibility and control . . . to jump more easily; to leap more smoothly, to stretch more easily; to turn, to fall, to reach with confidence and ease . . . . (Berg, 1970, p. 40)

There also appears to be a need for children to explore movement which may be performed on body parts other than the feet. Children who participated in this study rarely made use of the upper body and its parts while moving. Movement of these parts seemed to be isolated rather than being brought in as an integral part of the movement sequence. A knowledge of how different body parts can lead a movement was not seen in this group of children. The scope, meaning and use of body leads and gesture could bear exploration with this group of children, leading to a greater awareness of body parts and their function.
Concepts of directionality should be reinforced. From the movement of his own body the child should be able to transfer ideas and concepts to academic learning. With the retardate, the use of the body as the focus in this transfer is of prime importance. For all children the ability to change directions is paramount to success in games and gymnastics. In dance the awareness of direction brings with it an awareness of level. The ability to perform in directions other than forward and at levels other than medium adds excitement and vigor to the dance. If boys experienced this vigor of movement their interest in dance might be enhanced.

Children should be freed from the inhibiting factor of always moving in time. Moving to music should often be experienced for the sheer joy of moving. Creative expression should not be inhibited by the imposition of moving to a particular cadence.

Dance is a generous not meagre activity. In good dance something of the self must be given out, not held back or repressed; otherwise the spark that makes it exhilarating, dynamic and vital is extinguished. If presented or engaged in where the atmosphere is one of fear, suppression, or imposition, dancing emerges as no more than a series of wooden mimetics. (Murray, 1953, p. 17)

Finally, there seems to be a need on the part of children to hear, discuss and understand different types of music and to be allowed to express themselves in other than traditional ways. Dance can combine with the
other arts and academic subjects to bring the child a stimulating and rewarding experience. In the lives of all children, but particularly those who live in the inner city, this type of experience is seen as a necessity.
Administration and Scoring of the
Oseretsky Scale (Synchrony)

(A) General Instructions
Throughout this scale the symbol "S" means subject and "E" means examiner. Whenever the word "right" is used it is taken to mean the preferred side. The examiner should determine before the beginning of the test, the laterality of the subject and administration, and scoring then should proceed with "right" meaning preferred.

(B) Directions
Since this scale is primarily one of motor proficiency and not of general intelligence, every caution should be taken to make sure the subject comprehends each task (test item) he is expected to do. While it probably is impossible to eliminate the factor of verbal comprehension, every effort should be made to minimize this intellectual function as a variable in the overall test performance. Anything that can be done to assist the subject in understanding the task is permissible. In all cases it is desirable for E to demonstrate the required performance. S may be encouraged while he is performing a task provided this encouragement does not interfere with the performance. There may be times when the subject's first attempt is not correct because of obvious lack of
understanding. In such cases the item is repeated without penalizing the subject's score.

(C) **Fatigue**

In a test of this nature fatigue is an important consideration. Every effort should be made to minimize its influence. The examiner should recognize the variability of fatigue between different subjects and modify the speed of testing accordingly.

(D) **Materials and Testing Facilities**

It is desirable to have a relatively spacious room, free from extraneous objects such as book cases, lamps, rugs, and so forth. A wooden floor which is not highly polished or a linoleum floor is most desirable. A marble floor seems less desirable. While it is difficult to control the type of shoes S is wearing, whenever possible, it would be best for him to have rubber heels; and certainly, metal "taps" should be avoided. The subject should not be tested on his stocking feet. A good sized table and a straight backed chair will be needed. One of the items in the test of synchrony require the subject to make dots on paper. With these items the examiner may use tacks or Scotch tape to hold the paper in place.

Test materials for the items dealing with synchrony are listed on the following page.
(1) Thread on wooden spool. Thread is No. 20. and should be unwound 78". Spool cylinder (on which thread is wound) is 2-3/8" in circumference by 1-1/8" long. Circumference of outer rim of spool is 5". Overall length of spool is 2-3/8".

(2) Two pencils and plain white paper. Pencils should not have fine points. Number 2 pencils about 5" long are satisfactory.

(3) Stop watch.

(E) Description of the Items and Scoring Procedures

ITEM 6. Tapping Rhythmically With Feet and Fingers

Equipment. None

Number of trials. One.

Directions. While seated, S is to tap the floor rhythmically with the soles of the feet, performing the movement alternately with each foot at any speed he elects. At the same time, the corresponding index fingers are to tap the table top which is placed in front of S. The finger and foot tapping should synchronous. Say, "Let's see if you can do these two things at the same time. Make a fist with this finger (index) stretched out like this. Next tap the floor with your right foot and tap the table at the same time with your right finger. Let's
see if you can remember. You use first one hand and foot and then the other hand and foot. The right hand goes with the right foot, and the left hand goes with the left foot." E demonstrates several times to show a rhythm. "Keep tapping until I say stop."

**Scoring criteria.** The trial is passed if the rhythmic tapping is maintained for at least 20 seconds. The trial is failed if the rhythm of the movement is changed, or if the tapping of the finger does not correspond to that of the same foot.

**Points.**
- + on 1st trial = 3
- - on 1st trial = 0

**ITEM 11. Making Dots**

**Equipment.** Two pencils (blunt points). Two sheets of plain paper approximately 8-1/2 by 11 inches.

**Number of trials.** Two (if necessary).

**Directions.** S is to tap simultaneously with two pencils, one in each hand, on two sheets of blank paper placed one beside the other. S's forearms rest on the table edge. At a given signal S begins to tap simultaneously the two pencils on the paper as rapidly as he can. S may distribute the dots as he pleases but should avoid striking twice in the same place. Say: "Let's take a pencil in each hand and see how many dots you can make. Make dots with this pencil on this paper (E points) and use the other pencil on this paper (E points). Tap with both
pencils at the same time. When I say "go" make the dots as quickly as you can. "Try not to run the dots together. Do you understand? Ready, go!"

**Scoring criteria.** Time limit is 15 seconds. Only the hands may move in performing the test. S's forearms should be kept relatively still. If the difference in the number of dots on the two sheets is no more than two and/or the rhythm is not broken more than once the trial is considered passed. Asynchronous tapping or gross movements of the arms constitute failure of the item.

**Points.**
- + on 1st trial = 3
- - on list, + on 2nd trial = 2
- - on both trials = 0

**ITEM 21. Winding Thread While Walking**

**Equipment.** Spool of thread.

**Number of trials.** One trial with each hand.

**Directions.** S is to wind a six and one-half foot thread around his index finger as quickly as he can while walking. E demonstrates, saying: "I want you to walk about the room holding the thread in one hand and winding the thread onto your finger while walking." S is given the spool of thread already unwound with the spool attached and dangling at the end. Say: "Wind as fast as you can and don't stop walking while you are winding. Ready, go!" E records time. After the trial with the preferred hand the test is repeated with S using the other hand.
Scoring criteria. The test is scored according to the time limits given below. If the rhythm of synchronous walking and winding is broken more than three times during the trial, that trial is scored as a complete failure. E should warn S of the errors he is making up to a maximum of three warnings without penalty.

Points.

<table>
<thead>
<tr>
<th></th>
<th>Right Hand</th>
<th></th>
<th>Left Hand</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>0 to 12 seconds</td>
<td>3</td>
<td>0 to 13 seconds</td>
<td>3</td>
<td>0 to 14 seconds</td>
</tr>
<tr>
<td>13 to 15 seconds</td>
<td>2</td>
<td>14 to 21 seconds</td>
<td>2</td>
<td>15 to 24 seconds</td>
</tr>
<tr>
<td>16 to 21 seconds</td>
<td>1</td>
<td>22 to 39 seconds</td>
<td>1</td>
<td>25 to 44 seconds</td>
</tr>
<tr>
<td>22 or more seconds</td>
<td>0</td>
<td>40 or more seconds</td>
<td>0</td>
<td>45 or more seconds</td>
</tr>
</tbody>
</table>

ITEM 29. Tapping With Feet and Fingers

Equipment. None

Number of trials. One.

Directions. S is seated at a table and is to tap the floor alternately with the two feet, in a rhythm elected by S. The index fingers of both hands should tap the table, only as the right foot taps the floor. (E
demonstrates first and then S sits down.) Say: "Let's see if you can do these two things at the same time. I want you to tap the floor with one foot and then with the other, but when you tap with your right foot, I want you to tap the table with both of these fingers like this, at the same time. Remember, you do not hit the table when your left foot taps." E should make sure S understands fully, and allow him to get well settled before proceeding with the test.

**Scoring criteria.** The trial is passed if an even rhythm is maintained, if the tapping of the fingers is simultaneous with that of the right foot, and if the two index fingers tap the table at the same time for 20 seconds. If S's performance fails to meet these criteria the test is failed.

**Points.** + on 1st trial = 3
- on list trial = 0

**ITEM 31. Tapping Feet and Describing Circles With Fingers**

**Equipment.** None.

**Number of trials.** One.

**Directions.** S is seated with arms extended horizontally at sides with feet touching the floor. S is to tap floor alternately with right and left feet in any rhythm, and simultaneously describe circles with the index finger of each hand. E demonstrates, saying: "Let's see if you can do two things at the same time. Make a fist with this
finger stretched out like this. Now stretch your arms out like this. Now see if you can make circles with both your fingers while you tap your feet at the same time like this. Do not move your hand around—just your fingers should make the circles."

**Scoring criteria.** The subject's performance should last at least 15 seconds. The trial is failed if there are changes in rhythm in any of the motor acts, or if figures other than circles are described. Circles should be made with finger only, and not by the hands.

**Points.**

+ on 1st trial = 3
- on 1st trial = 0

*Only the directions pertinent to items used in this study are cited here and are quoted from Sloan, *Genetic Psychology Monographs*, 51, 1955, 205-212.*
Directions for Test of Rhythmic Motor Response

Preliminary Instructions:

"Today we are going to do some things to music which is recorded on this tape. Listen carefully to my instructions and then try to do what the instructions say.

You will always have one practice and then we will begin."

Item 1. Tapping preferred hand - 4/4 time

"You are going to hear some music and we want you to tap on the desk to the music with the fingers of this hand, like this." (Investigator designates hand and demonstrates.)

"Keep on tapping until the music stops. Do you understand? You will hear one chord—then begin." (Repeat performance for scoring.)

Item 2. Walking - 4/4 time

"This time we would like you to walk to this same music. When you walk you must step to every beat of the music, like this" (demonstrate)." Do you understand? Keep walking until the music stops. You will hear one chord then begin."

(Repeat performance for scoring.)

Item 3. Tapping foot - 6/8 time

"This time you may sit down. We want you to tap your foot to every beat of the music, like this" (demonstrate.)

"This music is different so you may have to listen to it carefully. Do you understand? You will hear one chord,
then begin." (Repeat performance for scoring.)

**Item 4. Heel tapping - 6/8 time.**

"Can you do this? (demonstrate) to that same music. Try it—your heels touch the floor together on every beat of the music, like this," (demonstrate again.) "Keep moving until the music stops. Do you understand?"

You will hear one chord, then begin."

**Item 5. Clapping - 2/4 time**

"We would like you to listen to this music and clap to it so that you are doing two claps to every measure, like this" (demonstrate). "Do you understand? Keep clapping until the music stops. You will hear one chord, then begin."

**Item 6. Running in place - 2/4 time**

"This is the same music only played slightly faster so that you can run to it. If you run on your toes like this (demonstrate) and keep your knees high you will find it easier. Do you understand? Keep running in place until the music stops. You will hear one chord, then begin."

**Item 7. Tapping on desk - 2/4 time**

"Here is a different rhythm; it goes 1, 2, 3, /1, 2, 3. We want you to tap on the desk, using this hand to this rhythm. Do you understand? Keep tapping until the music stops. You will hear one chord, then begin."
Item 8. Sweeping - 3/4 time

"Can you do this?" (demonstrate, bending from the waist, keeping the knees quite straight, feet slightly apart, touching fingers to the floor and swinging arms from side to side so that the fingers "sweep" the floor, and at the same time making the body bounce).

"Do you understand? You will hear one chord, then begin."

Note: On the practice trial, if the child needs assistance in synchronizing arm movements and body bounce this should be given.

Items 9, 10, 11 - Accent

"In this section we want you to listen for the strong beat of the music, which is called an accent, and tap this strong beat with the fingers of this hand."

Item 9. "The first music you will hear will be 4/4 music which means that the first beat in each group of four will receive an accent, like this" (demonstrate). "Do you understand? You will hear one chord and the first note after the chord should receive a tap."

Item 10. Tapping accented beat - 3/4 time

"This music is played in 3/4 time which means that the first beat in each group of three will receive an accent; like this" (demonstrate). "Keep doing this until the music stops. Do you understand? You will hear one chord and the beat immediately after that chord should
receive an accent."

Item 11. **Tapping accented beat - 2/4 time**

"This music is written in 2/4 time and is counted 'one and, two and.' The first beat of this group should receive an accent, like this" (demonstrate). "Keep doing this until the music stops. Do you understand? You will hear one chord and the beat immediately after that chord should receive an accent."

**Pattern**

"In this section we want to see if you can hear the pattern which I am clapping and then can repeat that pattern by yourself."

Item 12. **Pattern**

"Listen to the music and clap with me. When I stop, you must keep on going. Do you understand? You will hear one chord, then begin. Remember, when I stop you keep on going."

Item 13. **Pattern**

"This pattern is played faster. Clap with me and when I stop you keep clapping the same pattern. Do you understand? You will hear one chord, then begin. Remember, you keep clapping even when I stop."

**Phrasing**

"Now we want to know if you can hear what we call a phrase in music. Do you know what a phrase is? Well, a
phrase is like part of a sentence that starts over. For example, 'Humpty Dumpty sat on the wall,' is one phrase. What is the next phrase? . . .

Listen to the music and see if you can hear when the same line is repeated.

In this music we have a helper to show us where the new phrase starts. What is it? It's a loud note, or an accent."

**Item 14. Walking and turning at the beginning of each new phrase**

"Now we would like for you to walk in place and turn this way (demonstrate) when you hear the first accent, this way for the next accent, and finally this way (demonstrate) when you hear the last accent. You should only make three turns. Do not turn on the first chord. When you hear the first chord start walking in place. Do you understand? Ready, begin."
APPENDIX C
Directions Used for Spontaneous Movement

Selection Number 1: "Wild Horsemen"

"Now, in a few seconds you are going to hear some music. We would like you to move to this music any way you want. Think about what the music reminds you of and think of several different ways you can move to show us what the music says to you.

You may move all around the room, you may move in as many different directions as you want and you may move any body parts you want, or you may just want to sit down or lie down somewhere and do very small movements to the music. You may do anything you want to show us what the music says to you. Do you understand? Here is some music."

Selection Number 2: "Mechanical Doll"

"Now this music is quite different. Listen to it; think about it and move to it so that you will be showing us what the music says to you. Do you understand? Keep moving until the music stops."

Selection Number 3: "Dagger Dance"

"This music is different again. Think about what this music reminds you of and all the things you can do to it--move to it any way you can. Keep moving until the music stops."
# MUSIC SELECTION CHART

<table>
<thead>
<tr>
<th>Selection</th>
<th>Mood</th>
<th>Possible Descriptive Elements</th>
<th>Tempo</th>
<th>Dynamics</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>Light</td>
<td>Toy Soldier</td>
<td>Moderately Fast</td>
<td>No Contrasts</td>
</tr>
<tr>
<td><strong>Semper Fidelis</strong></td>
<td><strong>Exciting</strong></td>
<td><strong>Soldier</strong></td>
<td><strong>Moderately Fast</strong></td>
<td><strong>Loud with Some Soft Contrasts</strong></td>
</tr>
<tr>
<td><strong>In the Hall of the Mountain King</strong></td>
<td><strong>Mysterious</strong></td>
<td><strong>Halloween Pranks Gathering Storm</strong></td>
<td><strong>Increasingly Faster</strong></td>
<td><strong>Loud to Increasingly Loud</strong></td>
</tr>
<tr>
<td>Tarantella</td>
<td>Exciting</td>
<td>Gypsy Dancers Leaping, Whirling, a Carnival</td>
<td>Fast</td>
<td>Sudden Changes</td>
</tr>
<tr>
<td><strong>Dagger Dance</strong></td>
<td><strong>Heavy, Stalk ing, Threatening</strong></td>
<td><strong>Indians-Natives Fighting with Swords</strong></td>
<td>Steady, hypnotic</td>
<td>Few Contrasts</td>
</tr>
<tr>
<td>Wild Horsemen</td>
<td><strong>Wild, Exciting</strong></td>
<td>Horsemen Galloping</td>
<td>Fast</td>
<td><strong>Loud to Louder</strong></td>
</tr>
<tr>
<td>Mechanical Doll</td>
<td><strong>Playful</strong></td>
<td>Doll, Toy, Clock Hobby Horse</td>
<td>Moderate</td>
<td>Few Contrasts Use of Several Instruments</td>
</tr>
<tr>
<td>Cuckoo in the Deep Woods</td>
<td><strong>Mysterious</strong></td>
<td>Listening for Sound - Look for it</td>
<td>Slow</td>
<td>Quiet</td>
</tr>
<tr>
<td>The Swan</td>
<td>Serene, Quiet</td>
<td>Lullaby, Evening Shadows, Clouds, Soft Breezes</td>
<td>Deliberate</td>
<td>Soft</td>
</tr>
<tr>
<td>Snow is Dancing</td>
<td>Delicato, Subdued</td>
<td>Raindrops, Leaves Snow Falling</td>
<td>Moderate</td>
<td>Subdued, Some Contrasts at End</td>
</tr>
<tr>
<td>Range</td>
<td>Select Yes-No</td>
<td>Reason</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>---------------</td>
<td>------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>x</td>
<td>Dynamics. Similar to music used in test. Might not induce movement in body parts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td>As above.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some very High Notes</td>
<td>x</td>
<td>Could have used. Could restrict movement to jumping and kicking.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low to Medium</td>
<td>x</td>
<td>Mood-imagery. Hypnotic yet uses crescendo and accent. Lends itself to strong arm and torso movement, changes in level.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium High</td>
<td></td>
<td>Mood-imagery. Lends itself to wide range of locomotor movement.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>x</td>
<td>Contrasts in instrumentation and imagery lends itself to movement of body parts and torso. Appealing to children.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium To High</td>
<td>x</td>
<td>Evokes imagery but possibility of movement other than the head limb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Medium</td>
<td></td>
<td>Too quiet. No contrasts. Not received well by boys.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some Contrasts</td>
<td>x</td>
<td>Imagery vague without prior listening experience. Few contrasts. Not received well by boys.</td>
<td></td>
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APPENDIX E
<table>
<thead>
<tr>
<th>Items</th>
<th>Trials</th>
<th>Possible Score</th>
<th>Child's Score</th>
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<tr>
<td>1. Item 6</td>
<td>One</td>
<td>3</td>
<td></td>
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<tr>
<td>2. Item 11</td>
<td>Two</td>
<td>+ on 1st = 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- on 1st, + on 2nd = 2</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Male(R)</td>
<td>Female(R)</td>
</tr>
<tr>
<td>3. Item 21</td>
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<td></td>
<td>16 - 21 sec = 1</td>
<td>22 - 29 sec = 1</td>
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<td>22 - 7 sec = 0</td>
<td>40 - 7 sec = 0</td>
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<td></td>
<td></td>
<td>Male(L)</td>
<td>Female(L)</td>
</tr>
<tr>
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<td></td>
<td>0 - 14 sec = 3</td>
<td>0 - 14 sec = 3</td>
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<td>45 sec = 0</td>
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<td>4. Item 29</td>
<td>One</td>
<td>3</td>
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<td>5. Item 31</td>
<td>One</td>
<td>3</td>
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<tr>
<td></td>
<td></td>
<td>Total Score</td>
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</tbody>
</table>

Total Score _____
Rhythmic Motor Response

Observer ______ School ______ Teacher ______ Date ______
Child's Name ______ ID ______ Sex ______ CA ______ MA ______
Group ______ Race ______

Section A (Pulse Beat)

Item 1. _______
Item 2. _______
Item 3. _______
Item 4. _______
Item 5. _______
Item 6. _______
Item 7. _______
Item 8. _______
Total Section A ______

Section B (Accent)

Item 9. _______
Item 10. _______
Item 11. _______
Total Section B ______

Section C (Pattern)

Item 12. _______
Item 13. _______
Total Section C ______

Section D (Phrasing)

Item 14. _______
Total Section D ______

List

Items Passed (3) ______
Items Passed (2) ______
Items Failed ______

Total Score ______
<table>
<thead>
<tr>
<th>Observer</th>
<th>Selection #</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td>ID</td>
<td>Sex</td>
</tr>
<tr>
<td>School</td>
<td>Teacher</td>
<td>Race</td>
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222
APPENDIX H
<table>
<thead>
<tr>
<th>Locomotor</th>
<th>Body Parts</th>
<th>Level</th>
<th>Pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk</td>
<td>Hands</td>
<td>High</td>
<td>Direct</td>
</tr>
<tr>
<td>Run</td>
<td>Arms</td>
<td>Medium</td>
<td>Indirect</td>
</tr>
<tr>
<td>Skip</td>
<td>Elbow</td>
<td>Low</td>
<td>(Curved, twisted)</td>
</tr>
<tr>
<td>Gallop</td>
<td>Shoulder</td>
<td>Body Position</td>
<td>crooked, pattern)</td>
</tr>
<tr>
<td>Hop</td>
<td>Head</td>
<td>Prone</td>
<td>Rate of Speed</td>
</tr>
<tr>
<td>Hop</td>
<td>Leg</td>
<td>Supine</td>
<td>Slow</td>
</tr>
<tr>
<td>Slide</td>
<td>Foot</td>
<td>Sitting</td>
<td>Moderate</td>
</tr>
<tr>
<td>Jump</td>
<td>Knee</td>
<td>Kneeling</td>
<td>Fast</td>
</tr>
<tr>
<td>Crawl</td>
<td>Direction</td>
<td>Squatting</td>
<td>Generally in</td>
</tr>
<tr>
<td>Hands &amp; Feet</td>
<td>Forward</td>
<td>Standing</td>
<td>Time</td>
</tr>
<tr>
<td>Gymnastic</td>
<td>Backwards</td>
<td>Elevated</td>
<td>Performed in Free</td>
</tr>
<tr>
<td>Nonlocomotor</td>
<td>Sidward</td>
<td>Range of Movement</td>
<td>Rhythm</td>
</tr>
<tr>
<td>Claps</td>
<td>Diagonal</td>
<td>Extended</td>
<td>Gymnastic</td>
</tr>
<tr>
<td>Taps Hand</td>
<td>Turning</td>
<td>(Large, tall, high, wide)</td>
<td>Locomotor</td>
</tr>
<tr>
<td>Taps Foot</td>
<td>Up</td>
<td>Medium</td>
<td>Limited</td>
</tr>
<tr>
<td>Snaps Fingers</td>
<td>Down</td>
<td>Small</td>
<td>No Response</td>
</tr>
<tr>
<td>Swing-Sway</td>
<td>Use of Space</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bend-Stretch</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rise-Fall</td>
<td>One-half</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twist-Turn</td>
<td>One-quarter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Push-Pull</td>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX I
Dr. Joseph L. Davis  
Assistant Superintendent  
Special Services  
Columbus Public Schools  
Columbus, Ohio 43215

Dear Sir:

Attached please find a copy of a proposal for a doctoral study which I would like to carry out, with your permission, in the Columbus Public Schools.

This study will involve educable mentally retarded, learning disabled and normal children in primary or first grade classes.

It is hoped that I may be able to start working with the children immediately following the Christmas vacation, so your cooperation in expediting this request would be very much appreciated.

Yours sincerely,

(Mrs.) Jane R. Evans

CC: Mr. Leo McGee (O.S.U. Student Field Experience Office)  
Dr. Heil (Director of Special Education)  
Dr. Merriman, (Supervisor of Evaluation & Research  
Mrs. Bolon (Consultant, Primary EMR Classes)  
Mr. Norman (Supervisor of Continuing Education)  
Mrs. Sierio (Consultant, Neurologically Handicapped Classes)  
Miss Dyer (Consultant, Normal Children)
January 10, 1972

Mrs. Jane Evans
2887 Chateau Circle
Columbus, Ohio 43221

Dear Mrs. Evans:

Your proposal has been reviewed carefully by the staff of the Department of Evaluation, Research, and Planning and the staff of the Department of Special Education of the Columbus Public Schools. We appreciate your supplying additional information to Mr. Robert Rodosky.

I am now in position to grant central-office approval to your proposed study subject to the following provisions:

1. That you involve only **normal** children in your study.

2. That you inform Mr. Rodosky of any changes in your proposal.

3. That you share your findings with Mrs. Lucille Bolon, of our Department of Special Education.

Our approval attests to such matters as research design, methodology, and instrumentation. It still will be necessary for you to secure the approval of the principal(s) of school(s) from which you wish to draw your subject-pupils before proceeding with the study. In approaching a principal, I suggest that you show him this letter.

If we can be of further service, please let me know.

Sincerely yours,

Joseph L. Davis
Assistant Superintendent
Special Services

cc: Mr. Leo McGee (OSU Student Field Experience Office)
Dr. Herriman
Mr. Rodosky
Dr. Heil
Mrs. Bolon
Mr. Norman
Dear Parent,

In connection with a study which I am doing at _______ School regarding the rhythmic response of children to music, I would like to have permission to test your child.

The complete test will take approximately one-half hour per child and will be done at the school. The child will not be identified except by a number.

Permission for your child to participate in this study would be greatly appreciated.

Please indicate your wishes on the form below and return it to the principal.

Thank you,

Mrs. Jane R. Evans

I hereby permit ___ do not permit ___ my child ____ to take part in the study on rhythmic response.

signed __________________________
The Ohio State University
Physical Education Dept.
1760 Neil Avenue
Columbus, Ohio
March 23, 1972

Mr. J. J. Balint, Principal
Hubbard Ave. Elementary School
Hubbard Avenue
Columbus, Ohio

Dear Mr. Balint:

My sincere thanks for allowing me to conduct my study in your school over the past few weeks.

The hospitality which you and your staff extended and the cooperation of the children was much appreciated.

Yours sincerely,

(Mrs.) Jane R. Evans
Mr. George Zorich, Principal
Second Avenue Elementary School
Second Avenue
Columbus, Ohio

Dear Mr. Zorich:

My sincere thanks for allowing me to conduct my study in your school over the past few weeks.

The hospitality which you and your staff extended and the cooperation of the children was much appreciated.

Yours sincerely,

(Mrs.) Jane R. Evans
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Unpublished Material


Other Sources


Standardized Tests for Rhythm:


