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The Relationship Between Musical Experience, Sensory Rhythm, and Dance Skill

Patricia Ann Mays Price
University of Tennessee - Knoxville

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I am submitting herewith a thesis written by Patricia Ann Mays Price entitled "The Relationship Between Musical Experience, Sensory Rhythm, and Dance Skill." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Education.

Ben A. Plotnicki, Major Professor

We have read this thesis and recommend its acceptance:

Patsy Crockett

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

December 7, 1963

To the Graduate Council:

I am submitting herewith a thesis written by Patricia Ann Mays Price entitled "The Relationship Between Musical Experience, Sensory Rhythm, and Dance Skill." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Physical Education.

Bernard Plotnicki
Major Professor

We have read this thesis
and recommend its acceptance:

James A. Crockett
Robert O. Hanson

Accepted for the Council:

Hilton A. Smith
Dean of the Graduate School

**THE RELATIONSHIP BETWEEN MUSICAL EXPERIENCE,
SENSORY RHYTHM, AND DANCE SKILL**

**A Thesis
Presented to
the Graduate Council of
The University of Tennessee**

**In Partial Fulfillment
of the Requirements for the Degree
Master of Science**

**by
Patricia Ann Mays Price
December 1963**

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CHAPTER I

INTRODUCTION

Although rhythm in music and dance evolved simultaneously, "few people realize the singularly close bonds which unify—or should unify!—the work of the dancer and the musician."¹ It has generally been accepted that rhythm is an important element of both music and dance; however, the relationship between musical experience and skill in dance has not been substantiated.

A difference of opinion has existed regarding the effectiveness of rhythmical training as a means of improving rhythmical ability. Many studies and opinions have supported the theory that rhythm perception can be improved, while others have agreed with Seashore in that "this capacity is a fairly fixed constant and is elemental to a considerable degree in that it does not change greatly with age, practice, or training."²

I. THE PROBLEM

Statement of the problem. It was the purpose of this study (1) to compare, by means of sensory rhythm capacity and dance skill,

¹Patricia Bowman, "Good Dancers Are Good Musicians," Etude, LXVII (September, 1949), p. 12.

²Carl E. Seashore, Psychology of Music (New York: McGraw-Hill Book Company, Inc., 1938), p. 146.

those persons who had had one or less years of musical experience with those who had had five or more years of musical experience; (2) to compare sensory rhythm capacity scores with skill grades in dance to determine what correlation, if any, exists between sensory rhythm capacity and dance skill; (3) to determine whether rhythm perception increases after a quarter of dance—tap, folk and square, and modern.

Importance of the study. According to Dalcroze, musicians should know the body's capacities for interpretation if they are going to "project a score for that complex instrument."³ Likewise, if dance teachers are going to use the body as their instrument, surely they should understand its capacities for interpretation. They might possibly use a sensory rhythm test, as was incorporated in this study, to measure the rhythm capacities of dance students.

The relationship between musical experience and dance skill, and rhythm perception and dance skill, if found to be significantly positive, might prove to be helpful in predicting skill in dance. If such prediction were possible, dance instructors might be able to plan their class sessions more efficiently, meeting the needs of all students. Dance teachers might be able to validate their ratings of dance skill by comparing these ratings with musical experience or rhythm perceptual capacities, that is, if the relationship between dance skill and these two criteria were found to be positive, to a significant degree.

³Emile Jacques-Dalcroze, Rhythm, Music, and Education (New York: G. P. Putnam's Sons, 1921), p. 302.

If dance teachers knew whether rhythm increases after training, they might better understand the proper weight to be placed on training in rhythm.

Limitations of the study. Since the subjects in this study were enrolled in different sections of dance classes meeting winter and spring quarter, 1963, skill in dance was determined by eight instructors who rated the participants in their own classes. This might have tended to lower the reliability of the results.

Instructions for the rhythm test were given verbally to some subjects and to others in written form. This procedure was followed in order to obtain a sufficient number of participants for the study, since the investigator could not be present at all testing sessions.

During part of the testing the record on which the test was given was used with a large scratch on it, since another record could not be obtained at that time. Most subjects indicated that the defect was not distracting to the extent that their scores might be affected; however, some of the participants said that the defect tended to be somewhat annoying.

Since all subjects were obtained on a volunteer basis, there was a different number of participants in each area of dance. Many of the subjects who took the test at the beginning of the quarter did not return after training to repeat the testing procedure. There was no way to determine if rhythm perception increased after a quarter of dance in those subjects who did not return for testing after training.

II. DEFINITIONS OF TERMS USED

Sense of rhythm. "The sense of rhythm is the capacity for hearing and recalling rhythmic patterns with precision in time." It may also be considered from the point of view of intensity in the method of precision of accent.⁴ In this study rhythm perception, or the sense of rhythm, was measured by Seashore's sensory rhythm test.⁵ The test consists of thirty double rhythm patterns occurring in pairs, played from a phonograph record. The subjects indicate whether the second pattern is the same or different from the first. The score is the number of correct responses out of a possible thirty points.

Kwalwasser-Dykema music tests. These series of tests measure capacity for tonal memory and movement, melodic taste, pitch and rhythmic imagery, and time, rhythm, and pitch discrimination.⁶

Capacity. Capacity referred to innate powers; however, ability denoted skill in the use of this capacity.⁷

⁴Seashore, op. cit., p. 146.

⁵Carl E. Seashore, Don Lewis, and Joseph G. Saetveit, "Rhythm," Seashore Measures of Musical Talents (Series A, Part V, No. 452-A. New Jersey: R. C. A. Manufacturing Company, Inc., 1939); and Carl E. Seashore, Don Lewis, and Joseph G. Saetveit, "Rhythm," Seashore Measures of Musical Talents (Series A. New York: Psychological Corporation, 1960).

⁶Jacob Kwalwasser, Exploring the Musical Mind (New York: Coleman-Ross Company, Inc., 1955), p. 87.

⁷Carl E. Seashore, "The Inheritance of Musical Talent," Musical Quarterly, VI, No. 4 (October, 1920), p. 587.

Musical training. In this study musical training included experience in vocal, instrumental (band, piano, violin, etc.), and high school and college choral music.

CHAPTER II

REVIEW OF THE LITERATURE

Studies concerning rhythm have been numerous, but information directly related to dance is limited. Most investigators have agreed that rhythm is an important element in both music and dance; however, the relationship between music and dance is still questionable. When rhythm has been investigated, the question has usually arisen as to whether rhythm is innate or whether it increases with training. Both theories have been supported with scientific evidence.

I. THE VALIDITY AND RELIABILITY OF CARL SEASHORE'S SENSE OF RHYTHM TEST

Carl Seashore's sense of rhythm test is one of a series of tests included in his Measures of Musical Talents. He has defined the sense of rhythm as "an instinctive disposition to group recurrent sense impressions vividly and with precision by time or intensity or both in such a way as to derive pleasure and efficiency through the grouping."¹ The development of this test was based on the theory that basic musical talents vary considerably, in type and in degree, and that this capacity can be measured before musical education begins. Its purpose was to

¹Ashley R. Coffman, "Is Rhythm Subject to Training," School Musician, XXI, No. 1 (September, 1949), p. 14.

obtain a "general measure or single 'quotient' to express its predictive value."² Seashore stated that these tests are "practical devices for shortcut and snapshot samplings of musical capacities."³ According to Jean Corrodi Moos, the sensory rhythm test does measure the discrimination of likenesses or unlikenesses between short rhythm patterns. But, he asked, "Is that all there is to the rhythmic sense?"⁴ Lillian Stupp stated that this battery of tests measures specific traits of the musical mind, and not the musical mind as a whole.⁵

Although this test is supposedly a measure of capacity and takes into account practice, training, age, and intelligence,⁶ many investigators have questioned its validity and reliability. Raleigh Drake said that a test must be valid and reliable if it is to be used for predictive purposes. According to him, Seashore's sensory rhythm test does not possess such qualities.⁷

²Carl E. Seashore, Pioneering in Psychology (Iowa City: University of Iowa Press, 1942), pp. 75-76.

³Carl E. Seashore, "Measures of Musical Talent--A Reply to Dr. C. P. Heinlein," Psychological Review, XXXVII, No. 1 (January, 1930), p. 179.

⁴Jean Corrodi Moos, "The Yardstick Applied to Musical Talent," Musical Quarterly, XVI (1930), p. 242.

⁵Lillian L. Stupp, "Correlation of Musical Ability and Dancing Ability" (unpublished Master's thesis, University of Wisconsin, Madison, 1922), p. 3.

⁶Seashore, Pioneering in Psychology, op. cit., p. 79.

⁷Raleigh Drake, "The Validity and Reliability of Tests of Musical Talent," Journal of Applied Psychology, XVII (1933), p. 458.

If this sensory test can predict those who might be successful in music, as Seashore has claimed, it would seem that students with superior musical training and experience might possibly make superior scores on the test. Esther Gaw once said, "Those who are below average in acuteness are weeded out before this stage is reached."⁸ After administering twenty-six tests of musical capacity, including tests of rhythmic action, precision, and time, to women students enrolled in the Northwestern School of Music, Gaw tentatively concluded that persons with superior achievement in music perform on a superior level on musical capacity tests. No music student in the study was found to score below average in more than one of the rhythmical measures.⁹ William Larson, in predicting the success of beginners and advanced students in instrumental music, found that the Seashore sensory rhythm test was significant in the selection of those students who continued to study.¹⁰

H. M. Stanton conducted several projects at the Eastman School of Music, testing the validity of the Seashore battery. She found striking similarities between scores on the Seashore tests and rankings of talent by teachers and directors of music.¹¹

⁸Esther Allen Gaw, "A Survey of Musical Talent in a Music School," Psychological Monographs, XXXI, No. 1 (1922), p. 148.

⁹Ibid., pp. 128-132, 149.

¹⁰William S. Larson, "Measurement of Musical Talent for the Prediction of Success in Instrumental Music," Psychological Monographs, XL, No. 1 (1930), pp. 37, 62.

¹¹Max Schoen, The Psychology of Music (New York: The Ronald

Marjorie Bond quoted Seashore as saying that the reliability of any of the tests in his battery would run as high as the nineties, if given under laboratory conditions by a trained expert.¹² In the manual that accompanies his battery, Seashore has given a coefficient of reliability of .62 for the rhythm test.¹³

R. C. Larson found reliabilities of $.60 \pm .02$ and $.72 \pm .03$ when retesting two groups of university students immediately after the first rendition of the test.¹⁴ On immediate retests, F. S. Salisbury and A. B. Smith found a reliability of $.83 \pm .02$ for the rhythm test.¹⁵ These correlations are probably high because of memory carryover.¹⁶

Press Company, 1940), p. 181, citing H. M. Stanton, Measurement of Musical Talent: The Eastman Experiment (University of Iowa Studies, No. 291, 1935), pp. 1-140.

¹²Marjorie Helen Bond, "Rhythmic Perception and Gross Motor Performance" (unpublished Doctoral dissertation, University of Southern California, Los Angeles, 1958), p. 13, citing Carl E. Seashore, Psychology of Music (New York: McGraw Hill, 1932), 332 pp.

¹³Carl Seashore, Don Lewis, and Joseph Saetveit, Seashore Measures of Musical Talents--Manual (New York: Psychological Corporation, 1960), p. 7.

¹⁴Paul Farnsworth, "A Historical, Critical, and Experimental Study of the Seashore-Kwalwasser Test Battery," Genetic Psychological Monographs, IX, No. 5 (May, 1931), pp. 309-310, citing R. C. Larson, Studies on Seashore's Measures of Musical Talent (University of Iowa Studies: Series on Aims and Progressive Research, Vol. II, No. 6, First Series, No. 174. Iowa City: University of Iowa, 1930), p. 83.

¹⁵Ibid., p. 317, citing F. S. Salisbury and H. B. Smith, "Prognosis of Sight Singing and Ability," Journal of Applied Psychology, XIII (1929), pp. 425-439.

¹⁶Ibid.

Andrew W. Brown gave the Seashore battery twice to junior and senior high school students, with four months intervening between the testing periods. The reliability coefficient of the rhythm test, using eighty-nine subjects, was $.29 \pm .06$. After being ranked by their music instructor according to musical ability, a correlation of $.17 \pm .06$ was found between scores on the rhythm test and teachers' ratings of musical ability.¹⁷

II. HEREDITY VS. THE ENVIRONMENT

"We know that the development of an individual is dependent upon the interaction of two sets of factors--heredity and environment. Galton named these values 'nature' and 'nurture.'" We have been taught that we are the products of our environment, but heredity is definitely emphasized in the field of genetics. Educators, and especially music educators, have placed more importance on "nurture," as would be expected.¹⁸

J. J. Findlay claimed that we are in our innate nature subject to rhythm. The following are examples: our pulse beat; our legs that swing in rhythmic motion; our voice which accents and degrades in a continuous rhythm. He said that these activities are manifested whether

¹⁷Andrew W. Brown, "The Reliability and Validity of the Seashore Tests of Musical Talent," Journal of Applied Psychology, XII, No. 4 (1928), pp. 471-473.

¹⁸Jacob Kwalwasser, Exploring the Musical Mind (New York: Coleman-Ross Company, Inc., 1955), p. 4, citing Francis Galton, Hereditary Genius (New York: MacMillan, 1925).

we will it or not.¹⁹

It has been proven that while the insect's heart beat is one hundred beats to the minute, his chirp manifests itself at the same speed; also, while the human heart beat is sixty to eighty-five beats to the minute, our musical rhythms run within the same limits. This arterial beat possibly left some impression on our unconscious brain, guiding and determining conscious expressions.²⁰

According to Jacob Kwalwasser, biological research has indicated that gifted parents are more prone to produce gifted children, and inferior parents are more prone to produce inferior children. Such studies have also shown that prediction increased when twins were compared musically; however, the resemblance was not as great with brothers and sisters and was nearly non-existent in non-related children.²¹ Kwalwasser stated that talent in music "is in all probability inherited through a number of genes acting together, and without the required number of genes, there can be no musical talent."²²

Amram Scheinfeld employed the questionnaire method in a study of musical inheritance. She inquired into the careers of one hundred and twenty-two musicians who represented three groups: (1) thirty-six

¹⁹J. J. Findlay, "Rhythm and Education," School and Society, XVII, No. 419 (January 6, 1923), p. 2.

²⁰Mary Hallock, "Pulse and Rhythm," Popular Science Monthly, LXIII (August, 1903), p. 435.

²¹Kwalwasser, op. cit., pp. 14-15.

²²Ibid., p. 7.

outstanding instrumental musicians of world renown; (2) thirty-six principals of the Metropolitan Opera; (3) fifty students of the Juilliard Graduate School of Music. She concluded that 71 per cent of the instrumental group were talented when both parents were talented, 60 per cent when one parent was talented, and 15 per cent when neither parent was talented. In general, the same results held true for the other groups. When studying the environment, he found no uniform environmental influence. Many backgrounds of these musicians were highly favorable to talent, but some were not. Negative environments produced such musicians as Toscanini, Rubenstein, and Grace Moore.²³

Seashore stated that each of us has a certain native capacity, and we develop various kinds and degrees of ability within the limits of this capacity.²⁴ "Different people differ in their feeling for rhythm, just as they have certain peculiarities of physiological structures and tendencies." All persons can express rhythm in some form, but not all persons can express rhythm in all forms. "The reason why a child fails to express himself in a certain way is because he has never developed that mode of expression, and not because he is wanting in rhythmic disposition or tendency."²⁵

According to Seashore, achievement is usually classified as an

²³Ibid., pp. 4-7, citing Amram Scheinfeld, You and Heredity (New York: F. A. Stokes, 1939), pp. 234-235.

²⁴Carl E. Seashore, The Psychology of Musical Talent (Boston: Silver Burdett Company, 1919), p. 15.

²⁵Charles H. Sears, "Studies in Rhythm," Pedagogical Seminary, VIII (1901), p. 20.

evidence of capacity; but we must find some means of rating undeveloped capacities in comparison with developed capacities. The normal mind and body are musical; but whether they distinguish themselves in music depends on circumstance and opportunity.²⁶ Jo Pennington stated that musical aptitudes are often hidden in an individual and do not find an outlet for manifesting themselves, "just as certain springs flow underground and are only brought to the surface after a pick axe has opened the way."²⁷ Margaret H'Doubler said that everyone experiences rhythm in some degree, but since all persons do not understand the elements and laws underlying rhythm, they cannot consciously employ it; thus, many of our possible rhythms lie dormant.²⁸

After testing fifteen subjects on their ability to repeat rhythm patterns of varying difficulty, P. F. Swindle proposed that the simple rhythm patterns of two and three and their multiples are fundamental and instinctive; however, patterns with numbers and their multiples higher than three are no rhythms at all. Almost all persons performed the more simple patterns of two and three and their multiples, but very few produced the more difficult five and seven rhythm.²⁹ According to

²⁶Carl E. Seashore, "The Inheritance of Musical Talent," Musical Quarterly, VI, No. 4 (October, 1920), pp. 587-588.

²⁷Jo Pennington, The Importance of Being Rhythmic (New York: G. P. Putnam's Sons, 1925), p. 56.

²⁸Margaret H'Doubler, Rhythmic Form and Analysis (Wisconsin: J. M. Rider, 1932), p. 3.

²⁹P. F. Swindle, "On the Inheritance of Rhythm," American Journal of Psychology, XXIV (April, 1913), pp. 184-190.

Swindle, "there seems to be no reason for concluding that rhythm of any sort is instinctive, but only that generally in life certain movements are called for more often than others and hence become automatic, more habitual."³⁰

III. MUSIC AND THE DANCE

Both music and dance have incorporated rhythm as one of their most important elements. J. J. Findlay referred to music and dance as members of the same type of experience.

In music the waves of sound stimulate the ear and find response in movements of organs in the throat and mouth; in dance the movements of winds, of trees and birds, the movements of one's fellows stimulate the limbs and find response in bodily rhythms.³¹

Margaret H'Doubler defined dance as a "rhythmic experience." She referred to such expressions as "It felt right" and "It had a swing" as showing our feeling for rhythm. "It is this feeling of the organization of parts into wholes that is the fundamental fact common to rhythm, whether experienced in poetry, music, or bodily activity."³²

Psychologists have agreed on the importance of kinaesthetic sensations in the perception of rhythm; that is, our responses to rhythm are based on experiences that we gain from muscular tension and other activities that provide sensations. Through the kinaesthetic sense we have come to know movement in terms of duration and intensity;

³⁰Ibid., p. 191.

³¹Findlay, op. cit., p. 7.

³²H'Doubler, op. cit., p. 1.

however, in sensing the body in activity, we must give attention to the sensations reported to the brain and to the principles of motion.

"These two phases cannot be separated, for one involves the other."³³

Because of our modern style of living, many of our natural rhythms no longer result spontaneously. Eurhythmics, Emile Jacques Dalcroze's system of training the body and mind, is very similar to dance in form and movement. This system has promised to restore many of our natural rhythms, to establish the relations between instinctive bodily rhythms and those created by the will or by the senses, and to allow an individual to become master of his own body.³⁴ Dalcroze proposed special exercises which would develop a sense of muscular rhythm and nervous sensibility; thus, the ear becomes more attentive to all shades of intensity, time, duration, and phrasing, so that the body might better reproduce rhythms that are perceived by the ear. He believed that a student that had undergone this training would be better prepared to begin studies that aim at the conversion of impression to expression.³⁵

J. J. Findlay expressed eurhythmics as a process "by which the body can actually become a rhythmical medium, interpreting all that a piece of music has to convey, except the sound." The technique was

³³ Ibid., p. 2.

³⁴ Emile Jacques Dalcroze, Eurhythmics--Art and Education (New York: A. S. Barnes and Company, 1930), pp. 4-5.

³⁵ Ibid., p. 106.

developed in such a way as to represent bars, tones, and musical values, since it was through yielding to a system that the body and mind could be related to the rhythms offered by the music.³⁶

Lillian Stupp said that all external stimuli that finds its way to the brain must find some method of discharge, which normally is through the muscles. The outward expression of this mental activity can be manifested in "rhythmic movement giving dancing."³⁷ "The normal mind is musical, and the normal body is the instrument for adequate expression of music."³⁸

IV. THE RELATIONSHIP BETWEEN MUSICAL RHYTHM AND MOTOR RHYTHM

Some investigators have stressed that rhythm is never a fact of perception alone but involves an active attitude on the part of the individual and his body. Others have disagreed in that an individual can perceive a rhythm but may not be able to react to it.

Thaddeus Bolton said that no one could listen to music in which the rhythm was strong and clear without making some kind of muscular movement. In testing to see what the mind did with a series of simple

³⁶J. J. Findlay, "Rhythm and Education," School and Society, XVII, No. 419 (January 6, 1923), p. 8.

³⁷Lillian Stupp, "Correlation of Musical Ability and Dancing Ability" (unpublished Master's thesis, University of Wisconsin, Madison, 1922), p. 6.

³⁸Seashore, "The Inheritance of Musical Talent," op. cit., p. 588.

auditory impressions, he found that most subjects felt themselves urged by an irresistible force to make some type of movement. This movement most commonly expressed itself in beating time with the feet, nodding the head, swaying the body, and contracting the diaphragm, chest, or eyelids; however, most subjects were not conscious of what they were doing until their attention was called to it.³⁹

Jacques Dalcroze observed that some children devoid of rhythmical feeling in singing were also devoid of rhythm in walking and in general movement. "Good hearers may be incapable of mentally coordinating and analysing their auditive sensation."⁴⁰

Marjorie Bond's study was concerned with the relationship between rhythm perception and gross motor performance in white and Negro girls, ages nine through twelve. Tests used in the study were Seashore's rhythm perception test (in its original form and adapted to aural, visual, and tactile methods, projected on an electronic apparatus) and measures of motor performance--Sargent jump, sixty-yard dash, basketball throw for distance, lie-sit stand, and the Iowa Revision of the Brace.⁴¹ The intercorrelations between all rhythm perception and motor tests ranged from $.24 \pm .11$ to $.32 \pm .10$.⁴²

³⁹Thaddeus L. Bolton, "Rhythm," The American Journal of Psychology, VI, No. 2 (January, 1894), pp. 163, 234.

⁴⁰Emile Jacques-Dalcroze, Rhythm, Music, and Education (New York: G. P. Putnam's Sons, 1921), p. 302.

⁴¹Marjorie Helen Bond, "Rhythmic Perception and Gross Motor Performance" (unpublished Doctoral dissertation, University of Southern California, Los Angeles), p. 3.

⁴²Ibid., p. 69.

Robert Seashore administered the following tests of motor rhythm, sensory rhythm, and muscular coordination to elementary psychology classes at the State University of Iowa: motor rhythm, at speeds of forty and fifty r. p. m.; the rhythm, tonal, memory, and pitch sections of the Seashore battery; eye-hand coordination; steadiness in tracing; thrust precision; motility; speed of tapping; and simple reaction time to auditory stimulus. The correlation between motor rhythm and sensory rhythm was .72.⁴³

Eloise Lemon and Elizabeth Sherbon used college, junior high and high school, and elementary school students in studying the relationships of certain rhythmic and motor abilities. While motor ability was measured by the Brace Scale of motor ability, tests for rhythm included Robert Seashore's test of motor rhythm, Carl Seashore's rhythm perception test, and an original practical rhythm test which included large body movements associated with the elements of rhythm.⁴⁴

The practical rhythm test correlated more closely with the Brace and the laboratory tests for rhythm perception and motor rhythm than the laboratory tests did with each other. When either of the laboratory tests were correlated with the Brace and the practical test partialled out, the coefficient of correlation was insignificant; however, when

⁴³Robert H. Seashore, "Studies in Motor Rhythm," Psychological Monographs, XXXVI (1926-1927), pp. 142, 149-150, 154.

⁴⁴Eloise Lemon and Elizabeth Sherbon, "A Study of the Relationship of Certain Measures of Rhythmic Ability and Motor Ability in Girls and Women," Research Quarterly Supplement, V, No. 1 (March, 1934), pp. 82-83.

the laboratory tests were partialled out, the relationship between the practical rhythm test and the Brace remained unchanged. Lemon and Sherbon concluded that there was a definite, although low, correlation between rhythmical ability and motor ability in college women.⁴⁵

Since motor response is not measured by the Seashore rhythm perception test, Lemon and Sherbon believe the test to be an inadequate measure of the type of rhythmical abilities emphasized in physical education activities. While the Seashore motor rhythm test limits motor response to one simple rhythm pattern and involves only the small muscles of the hand and arms, the practical test had the element of perception, while allowing for bodily response to auditory and visual stimuli.⁴⁶

Thomas Annet found a correlation of .47 between musical and motor rhythm; thus, all persons who ranked high or low in motor rhythm did not rank correspondingly high or low on the sensory tests. Musical rhythm was determined by the Seashore rhythm perception test, and motor rhythm was determined by teachers' ratings of precision, grace, and natural spontaneous movements in dance. The correlation of .47 was reasonably high when we realize that the rhythm test only has a reliability of .50 and that teachers' ratings are never considered to be very reliable.⁴⁷

⁴⁵Ibid., pp. 84-85.

⁴⁶Ibid., p. 85.

⁴⁷Thomas Annet, "A Study of Rhythmical Capacity and Performance in Motor Rhythm of Physical Education Majors," Research Quarterly, III, No. 2 (May, 1932), pp. 184-186.

A study by Shirley Simpson was concerned with the relationship between sensory rhythm and locomotor response. Tests used were the time discrimination and rhythm identification sections of the Kwalwasser-Dykema music tests and a locomotor response test administered on a rhythmeter. Results of the study showed that performance on the rhythmeter may well serve as an indication of rhythmical ability; however, no evidence was found that the ability to score successfully on the sensory test would enable an individual to perform as well on the locomotor test.⁴⁸

Lillian Stupp investigated the correlation between musical and dance ability. While the rhythm perception test was not used in this study, musical ability was determined by the other five tests in Seashore's battery--pitch, intensity, time, consonance, and tonal memory. Dance ability was determined by teachers' estimates ranging from excellent to poor. Stupp found a slight correlation of .203--.398 between musical capacity and teachers' estimates of dance ability. Stupp stressed the fact that the ability to dance includes more than the ability to react to the stimulus to music and to react to the fundamental traits in music which are also used in dance. The following are other factors believed to be essential to dance: muscular coordination and control; ability to express the emotions; balance; mental capacity;

⁴⁸ Shirley Simpson, "Development and Validation of an Objective Measure of Locomotor Response to Auditory Rhythmic Stimuli," Research Quarterly, XXIX, No. 3 (October, 1958), pp. 342-345, 347.

imagination.⁴⁹

Rachael J. Benton concluded that dance skill could be predicted from several motor and sensory rhythm tests--Seashore's Series A Sensory Rhythm Test, left boomerang, static balance, Brace-type battery, motor ability, and a fitness index. After testing, the dynamic balance test was eliminated since it was of no value to the correlation. Dance skill was determined by ratings of teachers who were experts in dance.⁵⁰

Correlations found in relation to the criterion are found in Table I. This table contains part of the information found in a table compiled by Benton. When the ratings were corrected for attenuation, the multiple correlation was .93. From the data Benton realized that dance skill is composed of several elements and is not dependent on any single quality. According to Benton, an individual would not be a good dancer if he lacked any of these qualities. He found that the multiple regression equation could be used to predict dance skill in movement technique if scores on the separate tests were known.⁵¹

In Edith Haight's study subjects were divided into three groups--athletes, dancers, and avoiders of athletics and dancing. After testing subjects on an apparatus that electrically recorded responses to

⁴⁹Lillian Stupp, "Correlation of Musical Ability and Dancing Ability" (unpublished Master's thesis, University of Wisconsin, Madison, 1922), pp. 4-5, 28, 36.

⁵⁰Rachael Jane Benton, "The Measurement of Capacities for Learning Dance Movement Techniques," Research Quarterly, XV, No. 2 (May, 1944), p. 140.

⁵¹Ibid., pp. 139-141.

TABLE I
CORRELATIONS BETWEEN DANCE SKILL AND
MOTOR AND SENSORY TESTS*

Tests	Correlation with criterion	Reliability in literature
Left boomerang	.3516	.91
Static balance	.3667	.8 -.9
Dynamic balance	.2259	.95
Brace-type battery	.3983	.71
Johnson-type battery	.6464	.97
Series A, Seashore rhythm test	.0411	.62
Motor rhythm	.2916	.89
Fitness index	.3536	.86-.92

*Source: Rachael Jane Benton, "The Measurement of Capacities for Learning Dance Movement Techniques," Research Quarterly, XV, No. 2 (May, 1944), p. 141.

rhythmic stimuli, she concluded that there was no relationship between making adaptations from a walking rhythm to reactions to a rhythmic stimuli and athletic or musical ability, background, or activity.⁵²

Bond, in referring to Haight's study, said that it seemed evident that the perception of a rhythmic pattern and a neuromuscular experience involve two different factors necessary for an act of coordination.⁵³

V. THE EFFECT OF TRAINING ON RHYTHM

According to J. R. Kantor, "perception is the conscious behavior through which all develop the meanings of objects and reactions which operate in the adapting of the individual to his surroundings and in the control of them." After practicing perception and coming into direct contact with objects, we develop reaction patterns that enable us to differentiate and distinguish; these reactions are "natural psychophysiological" responses, and not "knowing" reactions. As the reactions to an object multiply, that is, as the number of responses which it calls out increases, the object takes on more and more meaning.⁵⁴

Dalcroze said that rhythm could only gain expression in our emotional being when we cultivate our primitive instincts and retrain

⁵²Edith C. Haight, "Individual Differences in Motor Adaptations to Rhythm," Research Quarterly, XV, No. 1 (March, 1944), pp. 39-40, 42.

⁵³Marjorie Helen Bond, "Rhythmic Perception and Gross Motor Performance" (unpublished Doctoral dissertation, University of Southern California, Los Angeles, 1958), pp. 83-84.

⁵⁴J. R. Kantor, "Suggestions Toward Scientific Interpretation of Perception," Psychological Review, XXVII, No. 3 (1920), pp. 192-193, 207.

our nervous system. This retraining can give our motor organs the faculties they need for the free play which can give rhythm its expression. He emphasized training early in life, since through enabling the child to sense instinctive rhythm, we are enabling him to freely see life itself.⁵⁵

How can we expect the child's sensibility to flourish if we do not cultivate his elementary vital manifestations from the first, and throughout his school training? Surely it is the most bizarre of anomalies to teach him the rhythm of speech and thought of others before enabling him to sense those of his own organism.⁵⁶

J. J. Findlay went even farther and stated that all normal children are ready for formal instruction in singing and rhythmic movement by the age of five or six. "Leave them free to wander where they will and they will never advance."⁵⁷

Should it not be possible to create new reflexes, to undertake a systematic education of nerve-centers, to subdue the activities of too excitable temperaments, to regulate and harmonize muscular synergies and conflicts, to establish more direct communication between the feeling and understanding, between sensations which inform the mind and those which re-create sensorial means of expression? Every thought is the interpretation of an action. If, up to the present, muscular movements of hands and fingers alone have sufficed to create in the spirit a distinct consciousness of rhythm, what far more intense impressions might we not convey were we to make use of the whole organism in producing the effects necessary for the evocation of the motor-tactile consciousness?"⁵⁸

⁵⁵Emile Jacques-Dalcroze, Rhythm, Music, and Education (New York: G. P. Putnam's Sons, 1921), pp. 314-315.

⁵⁶Ibid., p. 318.

⁵⁷J. J. Findlay, "Rhythm and Education," School and Society, XVII, No. 419 (January 6, 1923), p. 7.

⁵⁸Emile Jacques-Dalcroze, Rhythm, Music, and Education (New York: G. P. Putnam's Sons, 1921), p. 8.

Charles Sears, after administering a questionnaire to mothers, kindergarten teachers, and others, concluded that some means must be offered to foster and develop perception as the child begins to appreciate rhythm. He also found that a child of nine or ten years, when called upon to express rhythm, is at a disadvantage if his environment is not favorable to call forth this rhythmical sense.⁵⁹

Sears conducted an experimental study to determine the abilities of children at various ages to perceive and respond rhythmically to a stimulus that had been tapped in their presence. This rhythm test was a measure of executing rhythms and not a test of keenness in discerning rhythms or in having the feeling for it. "Ability to execute involves ability to perceive, and great keenness of perception would hardly be present without some skill in execution."⁶⁰

By giving the test to various age levels, Sears found that the period of most rapid progress in the case of boys ends between nine and ten years, and in girls between seven and eight years. After these ages progress was slower; after sixteen or seventeen there seemed to be an actual falling off, although this could have been accidental. The curve for rhythmic abilities corresponded closely with physical superiority and inferiority, as shown by anthropometric curves.⁶¹

⁵⁹Charles H. Sears, "Studies in Rhythm," Pedagogical Seminary, VIII, No. 1 (1901), p. 26.

⁶⁰Ibid., p. 32.

⁶¹Ibid., pp. 39, 91.

The purpose of Neomi Klauer's study was to determine whether training in rhythm improved rhythm discrimination in children of the intermediate grades--four, five, and six. The Seashore sensory rhythm test was given to these grade levels at the University School of Iowa where training was given and at St. Patrick's School where no training was given. Training at the University School consisted of twenty minutes of intensive rhythmical instruction per week for two months. Instruction, emphasizing auditory and motor practice, was of the following types: auditory; motor; kinaesthetic; visual; tactual. Special activities included clapping, tapping, marching, observation of notes and baton, organic response to rhythm, and the analysis of different types of rhythm patterns.⁶²

After two months the discrimination test was given again in both schools. Since the mean average gain in rhythm discrimination was somewhat greater in St. Patrick's school (3.8 vs. 2.76), where no training was given, Klauer concluded that training has little to do with improvement in rhythmic discrimination.⁶³

Elizabeth Baugh studied fifteen children, ages seven through ten, to see if their rhythm perception increased after rhythmical training. Subjects took the Seashore rhythm perception test, participated in two weeks of rhythmical training, and then took the Seashore test again.

⁶²Neomi Klauer, "The Effect of Training Upon Rhythmic Discrimination in the Intermediate Grades" (unpublished Master's thesis, University of Iowa, Iowa City, July, 1942), pp. 7, 9-14.

⁶³Ibid., pp. 15-18.

Training included the following activities: constituents of music; rhythm in general—beating, tapping, and subjective study; rhythm in poetry; rhythm in music; training definitely for development in relation to the Seashore test.⁶⁴

Baugh found that the group increased six points in their median score.⁶⁵ This seems significant; however, as was noted in the foregoing study, Klauer reported a median increase of four points in a group of subjects not participating in rhythmical training, merely from repetition.⁶⁶ Baugh believed that his subjects improved on the test, after training, because of familiarity with the test and the examiner. He concluded that rhythm perception cannot be improved by training but develops inherently; thus perception is an entirely separate capacity, apart from training, environment, or intelligence. Any of these factors may stimulate the environment, but they cannot develop what is already inherent.⁶⁷ A teacher of dance once said, "I have had repeated instances among my pupils at the beginning of their practice, who seemed totally devoid of an ear for music, yet in the end have been capable of adapting the step of the music with critical exactness."⁶⁸

⁶⁴Elizabeth Baugh, "Development of Rhythm Perception Through Training" (unpublished Master's thesis, Ohio State University, Columbus, 1928), pp. 9-14.

⁶⁵Ibid., p. 25.

⁶⁶Klauer, op. cit., p. 18.

⁶⁷Baugh, op. cit., pp. 28-29.

⁶⁸Sears, op. cit., p. 21, citing Brookes, Modern Dancing, p. 16.

A study conducted by Eloise Lemon and Elizabeth Sherbon indicated that rhythmical ability was more the result of innate tendencies than training. The correlations between rhythmical ability and motor ability for physical education majors who had had training in rhythm and motor response were no higher than those obtained from the general college population. Motor ability was determined by the Brace Scale while rhythmical ability was determined by Carl Seashore's test of rhythmical perception, Robert Seashore's test of motor rhythm, and an original practical rhythm test.⁶⁹

Ashley Coffman tested a group of rhythmically deficient eighth grade and college students with the rhythm sections of the Seashore battery. After the first rendition of the tests, the experimental group participated in percussive work, eurhythmics, and other rhythmical procedures using tactual, kinaesthetic, auditory, and visual experiences. Eighth graders had sixteen hours of training, while the college students had only ten hours. The experimental group improved in rhythm, in contrast to the group that received no training.⁷⁰

K. J. McCristal conducted an experimental study in gymnastic and tap dance to see if rhythm, like form, could be acquired through practice. Group X and Y participated in gymnastic and tap dancing for

⁶⁹Eloise Lemon and Elizabeth Sherbon, "A Study of the Relationship of Certain Measures of Rhythmic Ability and Motor Ability in Girls and Women, Research Quarterly Supplement, V, No. 1 (March, 1934), p. 82.

⁷⁰Ashley R. Coffman, "Is Rhythm Subject to Training," School Musician, XXI, No. 1 (September, 1949), pp. 14, 25.

one semester. Group C participated in an athletic coaching class in calisthenics for the first half of the semester and in gymnastic and tap dancing during the second half.⁷¹

Testing consisted of standing on a brass contact plate and marking time with the pace set by a metronome. A test of auditory reaction time and the Seashore Motor Rhythm Test, modified in this study by the construction of a spring contact foot pedal, were also administered. These tests were given every week during dance participation, and rhythmic gain and loss was recorded.⁷²

The period of the most pronounced gain for group C was from the end of the seventh week to the end of the ninth week, the first two weeks in which the group engaged in dance activity. Their gain in rhythm was due to participation in dancing and to lengthened practice periods in the activity. Subjects who took dance for a whole semester were superior in rhythm to those persons who took dance for only one half of the semester.⁷³

Data from this study tended to indicate that rhythm is not innate since those subjects who had had the most previous training in rhythmic activities made the best showing on the rhythm tests given. There was a greater increase in rhythm when fundamental rhythms were

⁷¹K. J. McCristal, "Experimental Study of Rhythm in Gymnastic and Tap Dancing," Research Quarterly, IV, No. 2 (May, 1933), pp. 63-64.

⁷²Ibid., pp. 65-68.

⁷³Ibid., pp. 71-72.

taught early in the learning experience; thus, dances making use of simple rhythms tended to increase fundamental foot rhythms more than dances involving complicated rhythms.⁷⁴

⁷⁴Ibid., pp. 74-75.

CHAPTER III

PROCEDURE

The following chapter is concerned with the procedure which was followed in this investigation. The selection of subjects, the testing procedure, and the organization of subjects and their test results are included.

I. SUBJECTS

As a preliminary step in this study, a questionnaire concerning the number of years of musical experience was administered to freshmen and sophomores enrolled in elementary modern, tap, and folk and square dance classes meeting winter and spring quarter at the University of Tennessee. These classes met three times each week. A copy of this questionnaire can be found in Appendix B.

After administering the questionnaire to all dance classes meeting winter quarter, the investigator, on the basis of the results obtained thus far, selected two groups of subjects to participate in the study. These groups were composed of students who had had one or less years or five or more years of musical experience. The purpose of this selection was to represent extremes in musical experience. In order to save time, only persons with the indicated years of experience were asked to fill out the questionnaire in the remaining classes.

The investigator notified those persons who were qualified to

participate in the testing procedure. These persons were not obligated to engage in the study, but participated on a voluntary basis. A method was developed whereby the subjects could participate in this study and get regular make-up credit for class absences.

II. TESTING

Each qualified volunteer was given the Seashore rhythm perception test¹ three times at the beginning of the quarter and three times at the end of the quarter, while enrolled in dance training. Testing occurred during a two week span at the beginning and at the end of both winter and spring quarter. In order to improve the reliability of the results, the test was administered on different days, not necessarily in succession. Subjects took the test at different times during the day, since their schedules didn't always coincide with the times that equipment could be available for testing.

Since the schedule of the investigator kept her from being present at all testing sessions, many of the subjects had to take the test alone. This did not introduce any problems because the instructions for the test were very simple and could be given in written form.

Vocal and written instructions for the test were as follows:
"You will hear two successive rhythm patterns followed by a span of silence. Record an S or a D on your answer sheet, indicating whether the second pattern was the same or different from the first. In order

¹Carl E. Seashore, Don Lewis, and Joseph G. Saetveit, "Rhythm," Seashore Measures of Musical Talents (Series A, Part V, No. 452-A. New Jersey: R. C. A. Manufacturing Company, Inc., 1939).

that you might better understand the test, I will play a few examples (approximately three or four) in the middle of the record. Answer aloud during the practice period." If the experimenter was not present, the subject practiced alone. The next step was to take the test of thirty double rhythm patterns in its entirety.

The initial testing included both Series A and B of the test; however, after receiving the Seashore manual of directions,² the investigator found that results from Series B, the more difficult series, were not considered to be valid unless that part of the test was administered on a high fidelity phonograph. Since such equipment was not available, the testing that followed included only Series A.

A few days after the initial testing had begun spring quarter, the test had to be administered on a new record because of a defect in the previous record; however, the same identical test was given. The new record was the nineteen and sixty edition of the Seashore Measures of Musical Talents,³ while the first record used was the nineteen and thirty-nine edition.

Final skill grades in dance for all subjects were obtained from grade books. This grade was a combination of several objective ratings based on the ability to perform skills pertinent to the specific

²Carl E. Seashore, Don Lewis, and Joseph Saetveit, Seashore Measures of Musical Talents--Manual (New York: The Psychological Corporation, 1960), p. 10.

³Carl E. Seashore, Don Lewis, and Joseph Saetveit, "Rhythm," Seashore Measures of Musical Talents (Series A. New York: Psychological Corporation, 1960).

type of dance. This raw skill grade represented the highest possible score out of a total fifty points. Skill ratings were made by several classroom instructors, although the same point system was used by each instructor.

III. ORGANIZATION OF SUBJECTS AND THEIR TEST RESULTS

Subjects were organized according to the three areas of dance and then sub-divided by their years of musical experience. After all data were gathered, each subject had six rhythm scores, three representing rhythm perception at the beginning of a quarter of dance and the other three after a quarter of dance. Each score represented the number of correct responses out of thirty rhythm patterns. Each group of three scores was averaged and converted to a percentile score based on national norms given in Seashore's manual of directions.⁴ Dance skill grades were also listed for each subject.

⁴Carl E. Seashore, Don Lewis, and Joseph Saetveit, Seashore Measures of Musical Talents--Manual (New York: The Psychological Corporation, 1960), p. 10.

CHAPTER IV

ANALYSIS OF DATA

An analysis of the data collected, including musical experience, rhythm perception scores, and dance skill grades is included in this chapter. Mean scores in rhythm perception and dance skill for those persons with one year or less and five years or more of musical experience were compared to determine if a significant difference existed. Coefficients of correlation were computed to determine the relationship between rhythm perception and dance skill. The t-statistic was used in the determination of the significance of the difference between rhythm perception before and after dance training.

I. THE RELATIONSHIP BETWEEN RHYTHM PERCEPTION AND MUSICAL EXPERIENCE

Initial raw and percentile rhythm scores were converted to mean scores for each group of subjects within each area of dance. Mean rhythm scores for subjects with the designated amounts of musical experience are found in Table II. Subjects with five or more years of experience scored higher in each area of dance. On the basis of raw scores, the subjects with more experience scored one and three to four tenths of a point higher than those subjects with one or less years of experience. When these scores were converted to percentile scores found in Seashore's test manual, the more experienced group

TABLE II

COMPARISON OF INITIAL RAW MEAN RHYTHM SCORES, PERCENTILE MEAN RHYTHM SCORES, AND THE YEARS OF MUSICAL EXPERIENCE

Type of dance	<u>Initial mean rhythm scores</u>				<u>Mean difference</u>	
	<u>One year or less musical experience</u>		<u>Five years or more musical experience</u>		Raw mean difference	Percentile mean difference
	Raw score	Per cent score	Raw score	Per cent score		
Modern	24.7	33	26.0	47	1.3	14
Tap	23.9	23	25.0	37	1.1	14
Folk and square	22.7	14	24.4	30	1.7	16
Total	23.8	23	25.1	38	1.3-1.4	15

scored fifteen points higher. According to the percentile scale, based on national norms, the group with more musical experience was superior in rhythm perception.

II. THE RELATIONSHIP BETWEEN MUSICAL EXPERIENCE AND DANCE SKILL

A comparison of final raw skill ratings obtained in dance classes was made for those groups of subjects with the designated amounts of musical training. The group with one or less years of musical experience made one and four tenths of a point higher in dance skill than the persons having had five or more years of experience; however, this difference wasn't significant. Table III shows approximately the same mean scores in dance skill for groups of subjects with different amounts of musical experience.

III. THE RELATIONSHIP BETWEEN RHYTHM PERCEPTION AND DANCE SKILL

Coefficients of correlation were computed to determine the relationship between rhythm perception and dance skill for subjects with different amounts of musical experience within each area of dance. Table IV gives the initial mean rhythm scores, final dance skill ratings, and the coefficients of correlation between these two criteria. The results showed no significant relationship between rhythm perception and dance skill; the correlations ranged from $-.234$ to $.195$.

TABLE III
 COMPARISON OF MUSICAL EXPERIENCE AND
 MEAN SKILL RATINGS IN DANCE

Type of dance	Dance mean skill ratings		Mean difference
	One year or less of musical experience	Five years or more of musical experience	
Modern	26.6	26.3	.3
Tap	34.6	33.6	1.0
Folk and square	41.7	38.9	2.8
Total	34.3	32.9	1.4

TABLE IV
THE CORRELATION BETWEEN INITIAL MEAN RHYTHM SCORES
AND FINAL MEAN SKILL GRADES IN DANCE

Type of dance and years of musical experience	Initial mean rhythm scores	Dance mean skill ratings	r
Modern dance			
One year or less	24.7	26.6	.104
Five years or more	26.0	26.3	.193
Tap dance			
One year or less	23.9	34.6	.182
Five years or more	25.0	33.6	-.131
Folk and square dance			
One year or less	22.7	41.7	-.234
Five years or more	24.4	38.9	.195
All groups			
One year or less	23.8	34.3	-.114
Five years or more	25.5	32.9	-.034
Total	24.7	33.6	.010

IV. COMPARISON OF RHYTHM PERCEPTION BEFORE AND AFTER DANCE TRAINING

The t-statistic was used in the determination of the significance of the difference between initial and final percentile scores in rhythm perception. While folk and square groups increased in rhythm perception, modern and tap dance groups decreased. The most significant level of confidence was 5.24, computed from initial and final rhythm scores for tap dance students who had had five or more years of musical training. The t's for all other groups were statistically insignificant. Table V includes t's and their per cent levels of confidence for groups with different amounts of musical training, enrolled in modern, tap, and folk and square dance.

TABLE V
 COMPARISON OF INITIAL AND FINAL MEAN PERCENTILE
 SCORES IN RHYTHM PERCEPTION

Type of dance and years of musical experience	Mean percentiles		Mean difference	t	Per cent level of confidence
	Initial rhythm score	Final rhythm score			
Modern dance					
One year or less	36.1	33.8	2.3	1.29	21.10
Five years or more	49.6	44.6	5.0	-1.36	17.43
Total	42.9	39.2	3.7	1.79	8.91
Tap dance					
One year or less	23.2	19.6	3.6	.87	38.44
Five years or more	42.0	35.9	6.1	2.22	5.24
Total	32.6	27.8	4.8	-.90	37.71
Folk and square dance					
One year or less	14.9	24.6	9.7	1.86	8.98
Five years or more	36.6	48.7	12.1	-.77	45.42
Total	25.8	36.7	10.9	-.90	38.14

CHAPTER V

SUMMARY AND CONCLUSIONS

The following chapter is based on a review of the available literature and the results obtained from the present experimental study.

I. SUMMARY

Subjects having had five or more years of musical training made higher mean percentile scores on the initial rhythm perception test when compared with subjects with one or less years of training. According to Seashore's national norms, subjects with more training made fifteen points higher on mean percentile rankings. This was true in all areas of dance.

No significant relationship was found between musical experience and skill in dance. Students with more musical training tended to make approximately the same scores in dance skill as persons with one or less years of music. According to other studies, rhythm perception seemed to be only one of several elements important for a dancer.

There was no statistically significant increase in rhythm perception after dance training. The most significant level of confidence was 5.24, computed from the initial and final rhythm scores of tap dance students with five or more years of musical training.

This group decreased slightly in rhythm perception, as measured by the Seashore rhythm perception test.

II. CONCLUSIONS

Although rhythm is an important component of both music and dance, there seemed to be no significant relationship between musical experience and skill in dance. Persons with more years of musical experience scored higher on rhythm perception tests; however, there is still a question as to whether rhythm perception increases after training or whether the more advanced music students tend to possess this superior capacity. According to this study, there was no significant increase or decrease in rhythm perception after dance training. The ability to score high on a rhythm perception test appeared to be no indication of the ability to be successful in dance.

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APPENDIXES

APPENDIX A

TABLE VI
 INITIAL AND FINAL RAW AND PERCENTILE MEAN RHYTHM SCORES
 FOR MODERN DANCE SUBJECTS WITH ONE OR LESS
 YEARS OF MUSICAL EXPERIENCE

Subjects	Initial rhythm scores					Final rhythm scores				
	1	2	3	Mean	Per cent	1	2	3	Mean	Per cent
1	27	25	28	26.7	50	26	28	27	27.0	55
2	29	25	27	27.0	55	28	26	27	27.0	55
3	29	29	28	28.7	85	27	25	27	26.3	44
4	27	28	25	26.7	50	25	24	25	24.7	25
5	24	25	25	24.7	25	19	20	25	21.3	6
6	27	25	25	25.7	36	24	23	27	24.7	25
7	21	23	25	23.0	12	18	19	22	19.7	3
8	20	20	22	20.7	4	22	19	22	21.0	5
9	22	23	21	22.0	8	23	24	23	23.3	14
10	16	18	18	17.3	1	21	19	21	20.3	4
11	26	29	30	28.3	78	29	30	29	29.7	96
12	27	26	26	26.3	44	26	27	29	27.3	60
13	25	27	26	26.0	39	30	29	26	28.3	78
14	22	22	15	19.7	3	20	22	22	21.3	6
15	24	23	27	24.7	25	27	23	22	24.0	19
16	21	25	24	23.3	14	20	21	21	20.7	4
17	22	20	22	21.3	6	26	23	25	24.7	25
18	25	28	28	27.0	55	29	29	28	28.7	85
19	30	30	30	30.0	99					
20	26	24	23	24.3	22					
21	25	26	28	26.3	44					
22	26	28	30	28.0	73					
23	24	24	26	24.7	25					
24	24	28	22	24.7	25					
25	25	23	26	24.7	25					
26	22	23	23	22.7	11					
27	25	20	27	24.0	19					

M=24.7 M=33

M=22.9 M=31

TABLE VIII
 INITIAL AND FINAL RAW AND PERCENTILE MEAN RHYTHM SCORES
 FOR TAP DANCE SUBJECTS WITH ONE OR LESS
 YEARS OF MUSICAL EXPERIENCE

Subjects	Initial rhythm scores					Final rhythm scores				
	1	2	3	Mean	Per cent	1	2	3	Mean	Per cent
1	28	29	27	28.0	73	27	27	26	26.7	50
2	26	29	23	26.0	39	21	25	28	24.7	25
3	24	22	22	22.7	11	19	19	21	19.7	3
4	24	19	21	21.3	6	21	21	24	22.0	8
5	22	23	26	23.7	17	24	22	22	22.7	11
6	21	25	21	22.3	9	26	20	23	23.0	12
7	26	23	22	23.7	17	15	20	16	17.0	1
8	25	27	25	25.7	36	24	26	22	24.0	19
9	27	20	22	23.0	12	21	18	23	20.7	4
10	24	22	26	24.0	19	25	26	25	25.3	31
11	25	25	25	25.0	28	21	14	24	19.7	3
12	25	26	24	25.0	28	27	28	28	27.7	68
13	21	19	24	21.3	6	28	19	24	23.7	17
14	26	25	24	25.0	28					
15	22	25	22	23.0	12					
16	16	20	24	20.0	3					
17	27	26	27	26.7	50					
18	24	25	25	24.7	25					
19	20	26	23	23.0	12					
				M=23.9	M=23				M=22.8	M=19

TABLE IX
 INITIAL AND FINAL RAW AND PERCENTILE MEAN RHYTHM SCORES
 FOR TAP DANCE SUBJECTS WITH FIVE OR MORE
 YEARS OF MUSICAL EXPERIENCE

Subjects	Initial rhythm scores					Final rhythm scores				
	1	2	3	Mean	Per cent	1	2	3	Mean	Per cent
1	30	29	28	29.0	90	28	28	24	26.7	50
2	25	25	25	25.0	28	24	26	25	25.0	28
3	29	29	29	29.0	90	25	24	27	25.3	31
4	27	27	27	27.0	55	19	28	26	24.3	22
5	29	24	28	27.0	55	20	24	28	24.0	19
6	25	22	25	24.0	19	21	22	22	21.7	7
7	27	26	30	27.7	68	29	30	30	29.7	96
8	26	25	23	24.7	25	24	25	24	24.3	22
9	21	19	21	20.3	4	23	22	21	22.0	8
10	25	20	22	22.3	9	26	27	25	26.0	39
11	24	24	24	24.0	19	28	27	29	28.0	73
12	27	22	28	25.7	36					
13	18	23	25	22.0	8					
14	25	13	29	22.3	9					
				M=25.0	M=37				M=25.3	M=36

TABLE X
 INITIAL AND FINAL RAW AND PERCENTILE MEAN RHYTHM SCORES
 FOR FOLK AND SQUARE DANCE SUBJECTS WITH ONE
 OR LESS YEARS OF MUSICAL EXPERIENCE

Subjects	Initial rhythm scores					Final rhythm scores				
	1	2	3	Mean	Per cent	1	2	3	Mean	Per cent
1	26	23	24	24.3	22	28	29	29	28.7	85
2	23	22	21	22.0	8	23	28	24	25.0	28
3	22	21	27	23.3	14	24	18	19	20.3	4
4	18	17	21	18.7	2	21	25	18	21.3	6
5	26	26	22	24.7	25	24	27	27	26.0	39
6	25	21	23	23.0	12	21	19	23	21.0	5
7	25	23	24	24.0	19	17	12	14	14.3	1
8	24	24	25	24.3	22	29	28	26	27.7	68
9	24	21	23	22.7	11	21	23	19	21.0	5
10	24	23	23	23.3	14	22	19	22	21.0	5
11	14	25	23	20.7	4					
12	21	20	17	19.3	2					
13	26	23	26	25.0	28					
				M=22.7	M=14				M=22.6	M=25

TABLE XI
 INITIAL AND FINAL RAW AND PERCENTILE MEAN RHYTHM SCORES
 FOR FOLK AND SQUARE DANCE SUBJECTS WITH FIVE
 OR MORE YEARS OF MUSICAL EXPERIENCE

Subjects	Initial rhythm scores					Final rhythm scores				
	1	2	3	Mean	Per cent	1	2	3	Mean	Per cent
1	25	26	20	23.7	17	26	25	26	25.7	36
2	24	28	28	26.7	50	25	25	28	26.0	39
3	27	29	30	28.7	85	29	30	30	29.7	96
4	26	26	27	26.3	44	26	29	29	28.0	73
5	24	24	21	23.0	12	22	26	25	24.3	22
6	26	25	26	25.7	36	27	27	26	26.7	50
7	25	21	23	23.0	12	25	24	25	24.7	25
8	20	26	22	22.7	11					
9	26	24	27	25.7	36					
10	26	28	28	27.3	60					
11	23	23	24	23.3	14					
12	22	21	22	21.7	7					
13	27	25	26	26.0	39					
14	19	13	20	17.3	1					
				M=24.4	M=30				M=26.4	M=39

TABLE XII

FINAL DANCE SKILL RATINGS FOR MODERN, TAP, AND FOLK AND SQUARE
DANCE STUDENTS WITH ONE YEAR OR LESS AND FIVE
YEARS OR MORE OF MUSICAL EXPERIENCE

Subjects	One year or less of musical experience			Five years or more of musical experience		
	Modern	Tap	Folk and square	Modern	Tap	Folk and square
1	—	37	48	41	40	44
2	38	37	44	19	37	44
3	25	25	44	35	28	28
4	19	21	44	25	25	46
5	25	23	46	20	28	42
6	20	31	48	25	34	48
7	15	28	32	25	34	42
8	15	40	40	16	33	42
9	25	25	28	15	31	40
10	15	28	44	15	32	32
11	37	34	48	15	46	36
12	34	44	42	31	31	28
13	38	40	34	25	31	42
14	27	38		25	40	30
15	32	42		20		
16	31	46		20		
17	34	48		36		
18	18	28		40		
19	22	42		33		
20	43			25		
21	15			39		
22	25			45		
23	20			29		
24	25			20		
25	15			18		
26	31			25		
27	50			45		
28				43		
29				15		
30				24		
31				22		
32				15		
	M=26.6	M=34.6	M=41.7	M=26.3	M=33.6	M=38.9

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APPENDIX B

MUSICAL TRAINING QUESTIONNAIRE

Name: _____

Local Address: _____

Phone: _____ Sex: _____ Age: _____

University Status: _____ College: _____ Major: _____

Physical Education Course and Section: _____

In this study musical training refers to the number of years of experience in vocal, instrumental (band, piano, violin, etc.), and high school and college choral music. Check below the statement that refers to you.

A. Musical Training

- _____ 1. No musical training
- _____ 2. Up to one year of musical training
- _____ 3. One-two years of musical training
- _____ 4. More than two years of musical training

Indicate specifically and briefly the type of experience and the number of years: _____

B. Dance training

1. Have you had any dance training? _____
2. How many years? _____
3. What type of dance training? _____

C. Can you read music? _____