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KIERNAN, LESLIE JEAN. Motor Creativity, Movement Concept, and Motor Ability of College Freshmen Women with High and Low Motor Ability. (1973) Directed by: Dr. Gail Hennis. Pp. 75.

It was the purpose of this study to investigate the relationship between motor creativity, movement concept, and motor ability of college freshmen women with high and low motor ability. The subjects were randomly selected after being classified as having a motor ability T-score of above sixty-six or below thirty-two, as measured by the Scott Motor Ability Test. Doudlah's Movement Concept Test, based on the Q-sort technique, was administered to measure movement concept. Wyrick's Motor Creativity Test was used as the measure of motor creativity.

Null hypotheses were formulated between and within the groups on the basis of the variables tested. The Pearson product-moment correlation technique, based on raw scores, and the Fisher's t test of significant difference between uncorrelated means were applied to collected data. None of the correlation coefficients or t values was found statistically significant at the .05 level of confidence; thus, all the hypotheses were found tenable.

It was concluded that motor creativity, as measured in this study, is not related to high or low motor ability, nor is it related to high or low movement concept. Data also suggested that all individuals are capable of creatively expressing themselves through movement.

MOTOR CREATIVITY, MOVEMENT CONCEPT, AND MOTOR ABILITY OF COLLEGE FRESHMEN WOMEN WITH HIGH AND LOW MOTOR ABILITY

by

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Approved by

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APPROVAL SHEET

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"...imagination (the ability to think creatively) is more important than knowledge."

Einstein

CHAPTER I

INTRODUCTION

Primitive man enviously watched the free flight of birds, the powerful turbulence of rivers, and scheduled his work to the cycle of the sun. As man has progressed he has found means of flying beyond the birds' domain, he has harnessed the rivers and no longer relies upon the sun to provide him with light. Yet all of man's creations are predicated and dependent upon man's environment. Human progress has been built upon the foundation of man's interaction with his environment coupled with his unique ability to rationalize.

With the increasing complexity of human advancement, various institutions were created by man to help maintain the functioning of his society. The institution of education is assigned three basic roles in today's society; to transfer factual knowledge, to preserve society by acculturating individuals to its social mores, and to provide a stimulus for social progress. Acculturation and the acquisition of knowledge involve a change or shaping of the mental, physical and social behavior of an individual so as to be in accord with society's behavioral norms. Progress also implies change, and change implies some form of creative behavior. Creativity is generally defined as an individualistic process,

influenced by one's environment, which culminates in a product which is regarded as original, inventive, or imaginative according to personal and/or social criteria. Thus, if education is to successfully fulfill its roles and satisfy the needs of society and the individual, it must focus attention upon the whole individual.

Previously, education's focus was on the pursuit of acculturation and transfer of knowledge, leaving the directives of progress up to certain individuals who displayed an uncanny genius for creativity. Recently, however, in an attempt to help all individuals attain their maximal potential, educators have begun to restructure their thoughts in terms of curriculum and methodology, placing more emphasis on the area of creativity. Research in the areas of creativity and the creative process has contributed to the development of curricula and teaching methods which assist the individual in exercising his creative ability. Conclusions resulting from investigations of the relationships of environment, heredity, intelligence and creative accomplishment can be applied to physical education as well as general education. However, the uniqueness of its modality demands further investigation into the facets of physical education which differ from those facets of the verbally-oriented academic world.

The discipline of physical education shares the general educational objectives of social acculturation, acquisition of knowledge and social progress, and seeks to attain

them through the unique modality of movement. In dealing with movement several other factors are introduced. In addition to the skills and abilities with which the verbally-oriented disciplines are concerned, the physical educator must also focus attention upon the student's opinion of himself as a moving individual (movement concept), his ability to perform physical skills (motor ability) and his potential to move creatively (motor creativity). This last factor has traditionally been relegated to the field of dance, an error which is slowly being corrected. The environment of a game situation demands its perception and manipulation by the player, and this interaction is a component part of creativity.

Exploration in stimulating creative behavior has been introduced through the concept of movement education. However, this endeavor has generally been limited to the elementary school level with little continuity into the higher levels of physical education. The exclusion of focus on creativity in more advanced activities should be reconsidered, for Brown and Gaynor (42) reported that creativity is a component element of competitive games and athletics.

Further research is needed to expand our understanding of creativity as it relates to movement. An increased comprehension of the role of motor creativity in an individual's performance of basic movement, skills and games will help physical educators to knowledgeably stimulate the creative potential and expression of their students.

If the discipline of physical education is to maintain its communalism with the objectives of general education in seeking to develop the whole individual, physical educators will also have to expand their professional focus to include the development of creative expression at all educational levels. Then perhaps students will comprehend the envy of primitive man for the flight of birds and turbulence of rivers when they can create for themselves a movement reflecting the freedom of flight performed with controlled power.

CHAPTER II

STATEMENT OF THE PROBLEM

The Problem

This study was undertaken for the purpose of investigating the relationship between motor creativity, movement concept, and motor ability of college freshmen women with high and low motor ability.

The following hypotheses were formulated for study:

1. There is not a significant relationship between motor creativity and movement concept of college freshmen women with high motor ability scores.

2. There is not a significant relationship between motor creativity and movement concept of college freshmen women with low motor ability scores.

3. There is not a significant relationship between motor creativity and high motor ability of college freshmen women.

4. There is not a significant relationship between motor creativity and low motor ability of college freshmen women.

5. There is no significant difference between motor creativity of college freshmen women with high motor ability scores and motor creativity of college freshmen women with low motor ability scores.

6. There is no significant difference between motor creativity of college freshmen women with high movement concept scores and motor creativity of college freshmen women with low movement concept scores.

7. There is not a significant relationship between motor creativity and high movement concept scores.

8. There is not a significant relationship between motor creativity and low movement concept scores.

Subjects for this study were freshmen women enrolled in physical education classes at the University of North Carolina at Greensboro during the second semester of the academic year 1969-70. The subjects were chosen at random from those classified as having high or low motor ability as measured by the three-item Scott Motor Ability Test.

Measures for determining movement concept were based on Doudlah's Q-sort methodology. The measurements constituting motor creativity were based on Wyrick's three-item Motor Creativity Test.

Definitions

For the purpose of this study the following definitions were accepted:

Motor Creativity. As defined by Wyrick (64), motor creativity is the ability to produce many varied motor responses to a given situation or stimulus.

Movement Concept. As defined by Doudlah (60), movement concept is that view an individual has of himself as a physically mobile entity.

Motor Ability. Motor ability is the present acquired or innate ability to perform general or fundamental motor skills.

Assumptions

For the purpose of this study the following assumptions were accepted:

1. That the tests selected are valid measures of the variables investigated.
2. That motor ability had not changed sufficiently during the eight-month interim between testing and grouping to result in a change in classification of high and low motor ability.

Limitations

In this study, subjects were originally classified on the basis of high and low motor ability with fifteen subjects in each group. After testing was completed they were statistically regrouped on the basis of movement concept scores. For the purpose of this study those subjects with scores above .799 were assigned to the high movement concept group, and those subjects with scores below .243 were assigned to the low movement concept group. This reclassification resulted in only ten subjects being placed in the high movement concept group and nine subjects in the low movement concept group.

CHAPTER III

REVIEW OF LITERATURE

The products of creative innovation have traditionally undergone close examination and analysis. New machines are disassembled, revised and reassembled, while works of art are critiqued and classified as to media and style. However, the creative process or the method by which these innovations were achieved, had until recently, received little more than an expression of awe or admiration for the creative "genius" of the designer. The disassembly and classification of creativity and the creative process is a relatively new area of research, with many of its facets still unexplored. In an effort to investigate one such facet, the relationship of creativity and movement, the literature was reviewed in five major areas. These areas included creativity, the creative process, measurement of creativity, motor creativity and movement concept.

CREATIVITY

In 1931, Dashiell made a plea for researchers to put concentrated effort into the study of the creative process and the development of tests of creativity. (7:562) Twenty-eight years later Dr. Irving Taylor reported to the Art Directors Club of New York that interest in the study of

1. Preparatory stage--During this initial period the problem is investigated and explored from all directions. The individual collects raw materials from the environment. There is "an abundance and freedom of raw perceptual experiences." (36:62) The quantity of material collected and how it is manipulated will determine the quality and quantity of creative output. Personality factors such as sensitivity to and of the environment, and naivete and gullibility in interpreting objects and events also influence the creative product.
2. Incubation stage--During this stage the individual does not consciously think about the problem. Experiences and perceptions flow freely about. "The dynamic interactions of the milling parts or perceptions in the experience field of the potentially creative individual are largely an unconscious and uncomfortable stage." (36:64) Stein stated that when working on more difficult problems there should be no interference with the operations of the unconscious or partially conscious mind processes, and that mental relaxation may require physical exercise. (31:42)
3. Illumination stage--Commonly referred to as the "Eureka" experience, this stage includes the moment of insight. It occurs when the dissociated parts reorganize, creating a new pattern which is superior

to any of the original or existing parts. Wallas described the moment of insight as:

> The 'subliminal uprush' for which few people are prepared and many may inhibit because of the accompanying emotional upheavals which temporarily disturb feelings of equilibrium or complacency. (36:66)

4. Verification stage--This final stage involves a transformation of the creative product into an objective symbolic form. The validation of the idea is then tested.

Wallas' theory was amplified by Taylor who retitled the stages: exposure, incubation, illumination and execution. He believed the two most significant aspects of the creative process to be perception, essential during the exposure stage, and communication, involved in the execution phase. (36:66)

In 1962, Haefele reported on a theory of the creative process postulated by Alex Osborn which included seven phases. (17:13) These phases were:

1. Orientation which entails the identification of a problem;
2. Preparation which includes the gathering of pertinent data;
3. Analysis which involves the breaking down of the relevant material;
4. Hypothesis which consists of accumulating alternatives in the form of ideas;
5. Incubation which involves a lapse of concentration

on the problem to allow for illumination;

6. Synthesis which entails the reorganization of the pertinent parts into a new organized pattern;
7. Verification which finalizes the process by evaluating the resultant ideas.

Although Osborn included seven stages in his theory of the creative process, the concept is so similar to Wallas' structure that several researchers have accepted the basic theory of preparation, incubation, insight, and verification. (38:IX, 31:41, 17:13, 15, 61:98)

Ghiselin, according to Stein (31:7) distinguished creativity from inventiveness and resourcefulness. Unlike creativity, inventiveness requires little thinking, and is nothing more than the intelligent use of past experience and knowledge. Whereas inventiveness is evaluated by the practicality of the product, creativity is judged in a more complex manner. A creative product is not the created objects, but "the subjective realizations themselves, which the material objects merely embody." (32:141)

Ghiselin made a further differentiation by identifying two levels of creativity. Creative products of the higher level result in an alteration of an idea or product by introducing a new meaning or significance. Creative products of the lower level result in an extension or development of the pre-established meaning by introducing another use. (31:7)

Taylor (64:13) described five types of creativity which amplify Ghiselin's two level concept. Expressive

creativity, which is demonstrated in brain storming. It does not emphasize quality, nor is it concerned with the actual product but is primarily characterized by its quality of spontaneity. Taylor's productive creativity is concerned with technological output. With the emphasis on producing, it is evaluated in terms of the quantity of ideas or products manufactured. The type of creativity which Taylor categorized as inventive, is parallel to Ghiselin's lower level of creativity in which existing ideas are reorganized but no innovative principle results. Innovative creativity falls somewhere between Ghiselin's two levels. It results in a substantial alteration of an existing principle and "requires a great deal of cognitive flexibility." (64:14) Emergentive creativity coincides with Ghiselin's highest level. The product is so dissimilar to the existing one that a new art or science is developed.

Despite a growing interest in creativity, many studies are hampered by misconceptions and insufficient knowledge on the part of the general public. For instance, many people erroneously feel that creativity is inherited and therefore cannot be cultivated. Many of the personality traits associated with creative individuals (those who have developed their creative potential) such as sensitivity, temperament, gullibility, openness, lack of concern with details, involvement with self, and the ability to resist premature decisions (36:53) have been and are still viewed negatively by our

culture. Finally, creativity is often confused with intelligence, logic and the scientific method.

Hallman (49:16) traced the evolution of the theories of creativity which in part have contributed to the continued existence of these erroneous beliefs. Plato perceived creativity to be a result of divine inspiration, thus placing it outside the realm of educational cultivation. Plato's theory was followed by the theory of neuroticism associated with the Freudian school, which concluded that the creative person was insane. The concept of genius, supported by Kant, attributed creativity to a unique intuitive capacity. This theory claimed that some aspects of the creative process (i.e., rules) are teachable but the genius cannot be developed. The current naturalistic theory supported by today's research (49:19, 40:5, 20:154, 48:448, 2:47, 53:38, 61:18) views creative ability as natural, normal, and common to all mankind. According to these investigators, creativity is not initiated by divine intervention or a unique characteristic of madmen or geniuses, but is a universal trait and thereby modifiable by environmental conditions and subject to educative processes.

The premises of the naturalistic theory have initiated the widespread plea for researchers to examine the properties of creative ability so as to provide the educational field with an understanding of how to develop and increase utilization of this ability in students. Anderson (2:49) reported on the relationship of creativity and environment:

> Life is a process of interacting; it can be creative to the extent that the interacting is harmonious. Persons in the environment can facilitate or retard the interacting. To the extent, however, that the interacting is threatening or lacking in harmony, the person becomes defensive and to this extent lacking in his expression of originality.
>
> The infant starts life in a relatively Open System of interacting and of freedom of interplay with his environment. As the child develops in ability to communicate and to extend his mobility, the environment of persons begins to close in on him. The child encounters a complicated (perhaps unnecessarily complicated) system of environmental demands, taboos, socializing and acculturating processes. These early requirements for conformity are climaxed by a school curriculum which also is mostly Closed System learning and from where there is no escape. The environments of most children do not stimulate nor even permit the continuing process of development in creativity.
>
> It is not surprising that in early childhood creativity is universal and that among adults it is almost non-existent.

Taylor (29:55) and Haefele (17:116) also emphasized the need for a creative environment which permits spontaneity and full expression without the restriction of rules and regulations.

Studies by Taylor (29:76) implied that non-verbal communication may be more effective in transmitting thoughts and feelings than the verbal form commonly used. This in itself has interesting connotations for an educational branch which uniquely uses the modality of human movement.

Bruner's (43:159) work with highly creative individuals showed a tendency for subjects with a well-developed creative ability to see things in motion when interpreting Rorschach ink blots. Interestingly, these moving things tended to be people.

Summary

Although research appears to be scant on a topic which holds so much relevance to the progress of humanity, there are basic premises which are given strong support by the major researchers in the field. Before reviewing studies which have a direct relation to physical education, it may be beneficial to review these general theories once more. On the basis of the literature studied, this investigator has concluded:

1. Creativity is not inherited, but is a universal ability. Its degree is determined in part by the environment in which the individual lives.
2. Creativity is a unique ability and has little dependency upon intelligence and I.Q.
3. Creativity involves a product which has evolved from the creative process.
4. The creative process does not depend upon the type of product to be conceived, whether it be an artistic or scientific product. It is generally agreed that the process of preparation, incubation, illumination, and verification is applied in reaching the outcome.
5. Creativity can be developed, and the most practical and available place for this development lies within an "Open System" of education.

MEASUREMENT OF CREATIVITY

Evaluating creativity has caused as much controversy among researchers as has the exploration of the nature of the creative process and categorizing the relationship of creativity with personality, environment, and mental capacity. A primary cause of this difficulty is probably due to the imposition of the evaluator's value system upon the creativity of the subject. To avoid subjective judgement, researchers have placed more emphasis upon the creative process rather than the product, using the criterion of originality and fluency of creative responses rather than the functional or aesthetic qualities of the response. Guilford constructed verbally-oriented tests designed to identify cognitive functions that are specific to creative efforts. Questions in the creativity test batteries were contrived to stimulate original responses, large quantities of responses that are unique to the sample being studied. (24:156)

Withers (67:80) attempted to evaluate the creativity of modern dancers through use of Guilford's verbal creativity tests. Her study suggested a possibility that the creative ability of dancers may be measured by verbal tests currently utilized as predictors of creativity in other areas. She also hypothesized that dance technique is a prerequisite for creative expression. However, recognition of her subjects as competent dancers was dependent upon dance performance subjectively evaluated by judges.

Stroup (54:76) described a study conducted by Torrance, who administered the Iowa Revision of the Brace Motor Ability Test and four tests of creative abilities developed by Torrance to ninety-seven sixth grade boys. A product-moment correlation was computed between the Brace Motor Ability and creativity test scores. None of the coefficients were statistically significant, indicating that the characteristics of motor ability and creativity as measured in the study, were independent of each other. Torrance indicated, however, two weaknesses in the study which might have influenced his findings. First, there was a one-year interval between the administration of the motor ability test and the creativity test. Second, both tests represented undefined measures of the qualities for which they were designed.

MOTOR CREATIVITY

The studies cited previously attempted to measure the creativity of subjects in relation to some form of motor performance. The creativity tests used relied upon verbally-oriented responses rather than creative movement responses. Criteria for evaluation of motor performance has generally been based upon the aesthetic quality or functional success of the particular motor performance. In attempting to avoid subjective judgement of the creative aspects of motor performance, Wyrick (64) constructed a battery of three motor tasks. She defined motor creativity as "the ability to produce many varied motor responses to a given stimulus in conjunction

with the ability to produce unique motor responses." (64:103) The creative process was defined as "a reforming of kinesthetic perceptions that have been interacting in the mind-body for an 'incubation period.'" (64:5) The evaluative criteria was modelled after the non-subjective verbally-oriented tests, and included fluency and originality of response. Wyrick's pilot study determined which of the sixteen tests she had designed were most valid. Four motivators were selected, a low balance beam, a hoop, a ball, and two parallel lines. Tests were developed which would stimulate a variety of responses which were not dependent upon a great deal of skill, minimized the fear element, and required the subject's attention to focus on various aspects of movement. Using freshmen college women as subjects, Wyrick sought to explore the relationship of motor creativity with motor ability, intelligence, verbal creativity, and extent of previous movement experience. (64: 77) Scores from the Scott Motor Ability Test, Intelligence Quotient, verbal creativity tests, a movement experience questionnaire and the Wyrick Motor Creativity Test were utilized in the statistical analysis. The highest correlation coefficient was found between motor fluency and the verbal fluency tests; however, this value was not statistically significant. Correlation coefficients between motor creativity and motor ability, intelligence, and verbal creativity were not high enough to be statistically significant. These data suggested that high motor ability is not a prerequisite for

high motor creativity, and also, that verbal creativity tests cannot be equated with motor creativity tests. (64:139) Thus, Wyrick regarded motor creativity as a discrete creative ability, independent of verbal creativity, intelligence and motor ability. The study implied that "every person has the capacity to experience release and expression in movement at any level of motor ability." (64:174) Her study suggested further that investigation be made into the relationship of motor creativity and motor ability as well as various levels of motor skill. (64:174)

A study by Philipp (66:4898) sought to explore the relationships between motor creativity, verbal creativity, figural creativity, selected motor skills, growth factors and intelligence. Sixty-five boys and girls from nine-and-a-half to eleven years of age served as subjects. The Wyrick Motor Creativity Test was used to evaluate motor creativity. The selected motor skills included tests for static balance (stick balance), static strength (grip dynamometer), explosive strength (standing broad jump), and agility (zig-zag run). An analysis of the data collected suggested that creativity was not a generalized characteristic of the nine-and-a-half to eleven year old boys and girls used as subjects, in that the child who succeeded in one type of creativity test might not perform as well in another type. Some tendency toward generalization of creativity was found among the girls, but not the boys, connoting a possible cultural

influence. Motor creativity was also found to have no statistically significant relationship to the motor skills tested, I.Q., or growth factors of age, height, and weight. (66:4899-A)

In a dissertation conducted at the University of North Carolina at Greensboro, Mesenbrink (61) pursued an abstract study of the interrelationship of the creative process and creative personality to activities and methodology in physical education. Utilizing theories derived from Callois' definition of play and games, MacKenzie's theories on knowledges, concepts and understandings of physical education, Mosston's spectrum of teaching styles, and theories on the creative process accrued from numerous researchers, Mesenbrink constructed a mobile in an effort to clarify the relationships between physical education and creativity. Three major concepts emerged from the study:

1. The concept of sequence is inherent in the mental and physical development of the individual, the creative process, the learning process and the teaching process. Therefore, a sequence might also be inherent in educative creativity which could be related to the sequential learning of physical skills.
2. The teacher is of utmost importance in terms of structuring an environment conducive to the development of the creative potential of the

learner.

3. The teaching method or "style is a determinant of the quantity and quality of the creative products emitted from the students." (61:105)

Mesenbrink also concluded that physical education provides fulfillment for individuals who learn most effectively by doing. Physical education is somewhat unique to other educational disciplines in its use of the game situation. After acquisition of basic skills, the game environment can provide immediate verification of creative insights. Thus, assuming transfer of behavior, an individual who has developed or applied his creative potential in physical education, may transfer this intuitive action to other situations. (61:105)

Brown and Gaynor (42) described an action theory of creativity in physical education which requires the individual to create while participating in big-muscle, psychomotor activities. This action theory of creativity was based on the following hypotheses:

1. The creative process can function while an individual is moving his body.
2. The creative process will operate in physical movement in much the same way that it acts in other processes: that is to say, physical movement can exhibit creative expression and responses.

3. The potential use of the creative process in action is related to the degree of complexity of the action situation.
4. Sports and games are areas of activity in which the creative process can be manifested individually or by the group.
5. The competitive nature of sports and games does not necessarily inhibit the creative processes, but may instead be conducive to them. (42:156)

Thus, Brown and Gaynor placed more stress upon the expression of creativity in the form of non-verbal motor actions and categorized the creation of new rules, games and strategies as verbalized creativity about physical education.

MOVEMENT CONCEPT

In addition to considering the kinesthetic perceptions which Wyrick suggested are inherent in the process of motor creativity, the manner in which an individual views his own movement might also be an influencing factor in the creative outcome. Just as Anderson (2:49) described the environmental effect on the inhibition or motivation of creativity, there may possibly exist a similar personal inhibitory or motivating force for motor creativity.

In a study conducted at the University of North Carolina at Greensboro, Doudlah used the term 'movement concept' to denote "the individual's view of himself as a physically mobile entity." (60:16) The Q-sort technique

was used by Doudlah to measure movement concept. This procedure involved the sorting of a set of seventy-five statements in accordance with how she would ideally like to view her own movement. The movement concept score was obtained by measuring the discrepancy between the self and the ideal-self sort of each subject. Doudlah found a statistically significant relationship between motor ability and movement concept, which would seem to indicate that motor performance (in selected items) is influenced by how the subject perceives herself as a moving being. (60:38)

Nelson (63) conducted a study at the University of Michigan which investigated the relationship between selected aspects of positive mental health, self-cathexis, body-cathexis, movement concept and motor creativity. Her subjects were freshmen college women enrolled in four activity classes, and freshmen physical education majors. Wyrick's test was used to evaluate motor creativity of the subjects. Nelson modified Doudlah's Q-sort to measure movement concept. Nelson concluded that motor creativity was not significantly related to any of the main variables. (63:4898)

Summary

Research on creativity, as it is related to movement, is limited, but several theories have been forwarded. On the basis of the literature studied, this investigator has concluded:

1. Motor creativity is an ability that all persons have the potential to utilize.
2. Motor creativity is independent from intelligence, verbal creativity, movement concept, motor ability and growth factors.
3. Motor creativity is not inhibited by competitive activities.
4. Motor creativity may be developed in the educational environment.
5. Valid tests of motor creativity which can distinguish the quality of creativity must be developed.
6. Further research is needed to study the relationship of motor creativity and various levels of motor skill, movement concept and educational environment.

CHAPTER IV

PROCEDURES

PURPOSE

The purpose of this study was to investigate the relationships between motor creativity, movement concept and motor ability of college freshmen women with high and low motor ability.

SELECTION OF SUBJECTS

The subjects for this study were thirty college freshmen women enrolled in physical education classes during the Spring semester, 1970, at the University of North Carolina at Greensboro. The subjects were randomly selected from the files of the Physical Education Department, after having been classified as achieving a high or low motor ability T-score, as measured by the three-item Scott Motor Ability Test. T-scores falling within the range of 40-60 are regarded as average, those above 60 designate high motor ability and those below 40, low motor ability. To provide a greater definition of high and low motor ability, subjects were chosen from those achieving T-scores of above 66 or below 32. The three-item Scott Motor Ability Test was administered by faculty members of the Physical Education Department to all college freshmen enrolled in physical education classes during the

Fall semester of the academic year 1969-70. One subject was dropped from the study as a result of a discrepancy in her motor ability T-score. A copy of the Scott Motor Ability Test and T-scores appear in Appendix A.

The investigator contacted the subjects by telephone to request their participation in the study. They were not informed of the nature of the study. When the subject expressed an interest in participating in the study, a testing appointment was scheduled for an hour which was convenient for her, and she was requested to wear shorts and a blouse which would not restrain her movement.

TESTING SCHEDULE AND ADMINISTRATION OF TESTS

Subjects were tested during the last week of classes in the Spring semester of the 1969-70 academic year. Subjects reported to the Graduate Office in Rosenthal Gymnasium, where the movement-concept test was administered to them. Immediately after completion of the movement concept test, the motor creativity test was administered in the weight-training room of Rosenthal Gymnasium.

All subjects were tested individually by the investigator. To decrease inhibition of the subject's responses, no observers were permitted during administration of the tests. Following completion of the tests, subjects were informed of the nature and purpose of the study.

Selection and Administration of the Movement Concept Test

One hypothesis in this study sought to investigate the relationship between an individual's concept of how she moves and the individual's creative response in movement. To measure the subject's concept of her own motor performance, the investigator chose to administer Doudlah's Movement Concept Test. Utilizing the Q-sort technique, Doudlah (60) constructed seventy-five movement-oriented statements. This test was appropriate for the study because it was constructed for college women, and the Q-sort technique measures the correlation between the self and ideal self while permitting subjects to make their own interpretation of the test items. A copy of the movement concept test and instructions appear in Appendix B.

Doudlah's test first required the subject to classify seventy-five statements in relation to how she perceived her movement at the time of testing and a second classification in terms of how she would ideally like to move. This classification was based on a nine-point scale with a predetermined number of statements for each point in the scale. The sorting distribution used the first column to denote those statements least like and the ninth column for those statements most like the subject's concept of herself. A restriction on the number of statements acceptable in each column predisposed the subjects responses to follow a normal curve distribution.

The statement sorting distribution was as follows:

LEAST LIKE								MOST LIKE
1	2	3	4	5	6	7	8	9
.	.	.	.	.	.	.	.	.
(2)	.	.	.	.	.	.	.	(2)
	(5)	.	.	.	.	.	(5)	
		(9)	.	.	.	(9)		
			(13)	.	(13)			
				.			Number of	
				(17)			statements	

Subjects were instructed to utilize as much time as was necessary to complete both the self-sort and ideal-sort classification of the statements. Each subject received the following set of materials:

1. Instruction sheet for the Q-sort test.
2. Set of seventy-five Movement Concept statements.
3. Strip of cardboard which indicated the columns and the predetermined number of statements to be classified under each column.
4. White Self-Sort answer sheet.
5. Yellow Ideal-Sort answer sheet.
6. A pencil.

The seventy-five statements were typed on biology filler paper cut to the size of one and one-half inches by two and one-half inches. Each card was numbered in black to match its corresponding number on the self-sort answer sheet and the ideal-sort answer sheet.

Cardboard strips were used to designate the column number headings and the predetermined number of statements for each column. The strips were cut to a size of two inches

by twenty-eight inches. Column headings, one through nine, were printed in black. The appropriate number of statements for each column were printed in red in parentheses below each column numeral.

A white answer sheet was used to record the self-sort and a yellow answer sheet to record the ideal-sort. The answer sheets were numbered from one to seventy-five, corresponding to the numbers on each statement card. After the subject had completed each sort she was instructed to record the results on the appropriate answer sheet by placing the number of the column heading in which each card had been classified beside the statement number on the answer sheet. After each subject had recorded the self-sort the investigator scanned the answer sheet to check for proper comprehension of the recording procedure. Each answer sheet was coded numerically for the purpose of subject identification. Copies of the self and ideal-sort answer sheets appear in Appendix B.

Scoring of the Q-sort. The forced distribution requirement of the Q-sort Technique allowed Doudlah to construct a nomograph to determine the correlation coefficients between the self-sort and ideal-sort. This nine-point scale of seventy-five statements was based upon Cohen's nomograph. (44) A copy of the nomograph appears in Appendix B.

To determine the differential between the self-sorts and ideal-sorts of each subject a tabulation sheet was constructed. See Appendix B for a copy of this sheet. Four

vertical columns labelled "S", "I", "D", and "D^2" represented self-sort, ideal-sort, the difference between the self-sort and ideal-sort, and the difference squared. Seventy-five rows numbered down the side coincided with the seventy-five statements. The D^2 total for each subject was then used to determine the correlation coefficient as indicated by the nomograph.

The nomograph was constructed with a range of 0 (0) to K (511) on the left side, representing a positive correlation coefficient, and a range of K (511) to 2K (1022) on the right side, indicating a negative correlation coefficient. If the sum of D^2 fell within the 0 to K range, the nomograph was entered from the left side at the level of the D^2 value. The intersection of the horizontal extension of this level and the diagonal line indicated the correlation coefficient which was read off the bottom (positive) scale. A D^2 sum between K and 2K was entered from the right side of the nomograph and the correlation coefficient was read from the top (negative) scale. A copy of the correlation coefficient for each subject appears in Appendix B.

Selection and Administration of the Motor Creativity Test

The criteria of fluency and originality have been judged to be more valid in evaluating general creativity than the practical success or aesthetic value of the creative product. This form of evaluation avoids partiality by the

test administrator when evaluating the subject's performance. Wyrick's test for motor creativity was selected for use by this investigator on the basis of its assessment technique. The subject's responses are evaluated quantitatively, omitting any qualitative or practical judgement by the examiner.

The motor creativity test developed by Wyrick is composed of three movement tests selected from sixteen tests originally used in her pilot study. In designing the tests Wyrick selected four movement motivators (parallel lines, balance beam, balls, and a hoop) that would effectively stimulate a wide range of movement responses while not requiring a great amount of skill, would minimize the element of fear and require the subject to focus on different aspects of movement. Following a pilot study, Wyrick chose three tests, the parallel line, the ball-wall, and the hoop tests to compose the motor creativity tests.

The Parallel Line Test required the subject to travel between two lines, in as many different ways as possible. At some point in each crossing, the subject incorporated a twisting or turning movement of one or more body parts. The two lines were parallel, two inches in width, six feet long and six feet apart. The lines were marked with masking tape. A time limit of three minutes was set, and was recorded with a stop watch. The watch ran only when the subject was outside the restraining lines and not performing. Test directions were given orally by the investigator and were uniform for each subject. A copy of the test directions appears in Appendix C.

The Ball-Wall Test required the subject to strike or hit a ball from behind a restraining line to a wall, in as many different ways as possible. The ball could not be thrown, nor was accuracy taken into consideration. The restraining line was marked eight feet from the wall. The subject remained behind the restraining line and was permitted to cross it only when a ball went out of control, in which case the subject was allowed to retrieve it and return to her position behind the line. Three balls were available for each subject to use; one regulation volleyball and two playground balls which were eight inches in diameter. The balls were placed on the floor behind the restraining line and to the right of the subject. A three minute limit was placed on the subject's response time. The stop watch ran continuously, as Wyrick had previously found that few subjects could continue responding for the full three minute period. See Appendix C for a copy of the test directions.

The Hoop Test required the subject to raise a hoop partially or totally from the floor, in as many ways as possible. A red hoop, with a diameter of three feet and constructed of one inch plastic tubing, was placed on the floor in front of the subject. The hoop did not have to be raised entirely to be counted as a response. A stop watch recorded the three minute time limit and ran continuously. A copy of the test directions appears in Appendix C.

Scoring of the Motor Creativity Test

Wyrick's assessment technique is a measurement of the subject's motor fluency, which she defined as the "ability to quickly produce motor responses in a situation requiring little restriction and where emphasis is on quantity." (64:79) Each movement problem was scored by enumerating the number of movement responses made by the subject. Accuracy, errors, and form were not recorded. Contralateral repetitions of the same movement were counted as one response. The scores for each of the three tests were then totaled to determine the motor creativity score. A copy of the response tabulation sheet appears in Appendix C.

Treatment of Data

The Pearson product-moment correlation technique, based upon raw scores, was used to determine the degree of the relationship of the variables tested within groups. Fisher's t test of difference between uncorrelated means was used to determine the significance of differences between the groups in reference to the measured variables. The .05 level was set as the critical level for accepting the significance of relationships and the rejecting of null hypotheses.

CHAPTER V

ANALYSIS AND INTERPRETATION OF DATA

This study was conducted to investigate the relationships between motor creativity, movement concept, and motor ability of college freshmen women. The subjects were randomly selected after being classified as having a high or low motor ability score as measured by the Scott Motor Ability Test.

ANALYSIS OF DATA

Movement concept was measured by Doudlah's Q-sort technique as described in Chapter IV. The Q-sort scores for movement concept were converted into correlation coefficients through use of a nomograph utilized by Doudlah and designed by Cohen. (44) These correlation coefficients based upon the self-sort and ideal-sort were treated as movement concept scores rather than correlation coefficients in the statistical analysis of the data. The quantitative scores from Wyrick's Motor Creativity Test and the Scott Motor Ability Test were statistically applied without conversion. Raw scores for each subject appear in the Appendices.

Null hypotheses were formulated with regard to relationships between groups and within groups for the variables measured. In all instances the alternate hypothesis to the null was $M_1 \neq M_2$. A significant difference at the five per cent level of confidence was set as an acceptable standard to reject the hypotheses.

The Pearson product-moment technique, computed from original data, was used to test the relationships between the items in the following hypotheses:

1. There is not a significant relationship between motor creativity and movement concept of college freshmen women with high motor ability scores.

2. There is not a significant relationship between motor creativity and movement concept of college freshmen women with low motor ability scores.

3. There is not a significant relationship between motor creativity and high motor ability of college freshmen women.

4. There is not a significant relationship between motor creativity and low motor ability of college freshmen women.

The correlation coefficients derived from all four of the above hypotheses were not high enough to be significant at the .05 level of confidence. Therefore, all of the above hypotheses were found tenable. These data appear in Table 1.

The Fisher's t test for determining the significance of difference between uncorrelated means was applied to the following hypothesis:

5. There is no significant difference between motor creativity of college freshmen women with high motor ability scores and motor creativity of college freshmen women with low motor ability scores.

TABLE 1

CORRELATION COEFFICIENTS BETWEEN MOTOR CREATIVITY, MOVEMENT CONCEPT, AND MOTOR ABILITY OF HIGH AND LOW MOTOR ABILITY SUBJECTS

VARIABLE	HIGH MOTOR ABILITY GROUP (N=15)	LOW MOTOR ABILITY GROUP (N=14)
MOTOR CREATIVITY: MOVEMENT CONCEPT	.002	.195
MOTOR CREATIVITY: MOTOR ABILITY	-.172	.486

The t value derived from data utilized in testing this hypothesis, 1.639, was not sufficient to be significant at the .05 level of confidence. Thus, the above hypothesis was found tenable. These data appear in Table 2.

After investigating the above hypotheses, in which the subjects were grouped according to motor ability scores, the investigator then regrouped the subjects on the basis of movement concept scores. These scores ranged from .989 to -.458. Seeking equally sized groups, allowing for average scores and considering the natural breaks, two groups were formulated. One group included those subjects who attained scores of .800 or higher, and the other group included those subjects who attained scores of .242 or lower. Those subjects whose scores fell within the .243 to .799 range were considered average and were omitted. The following hypotheses were then tested:

6. There is no significant difference between motor creativity of college freshmen women with high movement concept scores and motor creativity of college freshmen women with low movement concept scores.

7. There is not a significant relationship between motor creativity and high movement concept scores.

8. There is not a significant relationship between motor creativity and low movement concept scores.

Fisher's t test of significance of difference between uncorrelated means was again applied to the sixth hypothesis.

TABLE 2

SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS OF MOTOR CREATIVITY SCORES FOR THE HIGH MOTOR ABILITY GROUP AND THE LOW MOTOR ABILITY GROUP

GROUP	N	M	t
HIGH MOTOR ABILITY	15	21.33	1.639
LOW MOTOR ABILITY	14	16.57	

The obtained t value of .395 did not surpass the 2.101 needed to reject the hypothesis. Therefore, the hypothesis was found tenable. These data appear in Table 3.

The Pearson product-moment correlation technique, based upon raw scores, was again used to test the seventh and eighth hypotheses. The correlation coefficients derived from these data were not high enough to be of significant value. Thus, the seventh and eighth hypotheses were also found tenable. These data appear in Table 4.

INTERPRETATION OF DATA

The statistical findings of this study tended to support the conclusion that Wyrick reported concerning the relationship of motor creativity and motor ability. Motor creativity seems to be a discrete entity, not related to, or dependent upon an individual's motor ability, as measured by the Scott Motor Ability Test. Findings also supported the hypotheses that motor creativity and movement concept are independent factors. For example, an individual may have low levels of motor ability and movement concept and at the same time display a high degree of motor creativity.

The fact that every subject was capable of responding to the motor creativity test also suggests that all individuals have the potential to creatively express themselves through movement. However, as Wyrick pointed out, the quality or level of creativity measured by her test is unknown. (64:172)

TABLE 3

SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS OF MOTOR CREATIVITY SCORES FOR THE HIGH MOVEMENT CONCEPT GROUP AND THE LOW MOVEMENT CONCEPT GROUP

GROUP	N	M	t
HIGH MOVEMENT CONCEPT	10	231.6	.395
LOW MOVEMENT CONCEPT	9	242	

TABLE 4

CORRELATION COEFFICIENTS BETWEEN MOTOR CREATIVITY AND MOVEMENT CONCEPT OF HIGH AND LOW MOVEMENT CONCEPT SUBJECTS

VARIABLE	HIGH MOVEMENT CONCEPT GROUP (N=10)	LOW MOVEMENT CONCEPT GROUP (N=9)
MOTOR CREATIVITY: MOVEMENT CONCEPT	.308	.151

CRITIQUE AND SUGGESTIONS FOR FURTHER STUDY

The investigation and understanding of the facets of motor creativity are at a rudimentary stage, leaving broad areas available to research:

1. One essential need for continued research in this area is the development of a measuring instrument capable of determining the quality level of motor creativity attained by subjects.
2. Further study should be made of the relationship between motor creativity and movement concept. In this investigation, the regrouping of subjects on the basis of high and low movement concept scores decreased the number of subjects to nineteen. A research study including a greater number of subjects with varying levels of movement concept and utilizing a measuring device as described in the previous suggestion, might satisfy this need.
3. Contemporary research on the theoretical aspects of play has indicated that play is characterized by a:

> ...mixture of relaxation and arousal within the self-managed constraints... probably the euphoric state that we call fun. (55:32)

Play is also referred to in terms of "novel behaviors, novel combinations, and novel consequences." (55:32) This terminology tends to

coincide with that used in describing creativity and the creative process. It may be worthwhile to explore the type of relationship play has to the creative process and motor creativity.

4. Finally, it would be of inestimable value for every educator to analyze his or her own teaching methodology with regard to its effectiveness in allowing for an open environment for the development of the creative potential of his students. For it was found in a study undertaken at Columbia University that:

> ...it takes about 15 years for a new teaching concept to reach 3 per cent of the nation's schools, and 50 years for it to reach all of them. (24:20)

CHAPTER VI

SUMMARY AND CONCLUSIONS

It was the purpose of this study to investigate the relationship between motor creativity, movement concept and motor ability of college freshmen women having high and low motor ability. The thirty subjects were randomly selected from the files of the Physical Education Department after being classified as having motor ability T-scores of above sixty-six or below thirty-two, as measured by the Scott Motor Ability Test. Doudlah's Q-sort test was administered to determine movement concept. Wyrick's three-item test was used to measure motor creativity. The tests were individually administered to the subjects at the University of North Carolina at Greensboro during the second semester of the 1969-70 academic year. Subjects were not informed of the nature of the study until they had completed the tests.

The following null hypotheses were tested:

1. There is not a significant relationship between motor creativity and movement concept of college freshmen women with high motor ability scores.

2. There is not a significant relationship between motor creativity and movement concept of college freshmen women with low motor ability scores.

3. There is not a significant relationship between motor creativity and high motor ability of college freshmen women.

4. There is not a significant relationship between motor creativity and low motor ability of college freshmen women.

5. There is no significant difference between motor creativity of college freshmen women with high motor ability scores and motor creativity of college freshmen women with low motor ability scores.

6. There is no significant difference between motor creativity of college freshmen women with high movement concept scores and motor creativity of college freshmen women with low movement concept scores.

7. There is not a significant relationship between motor creativity and high movement concept scores.

8. There is not a significant relationship between motor creativity and low movement concept scores.

The Pearson product-moment technique, based upon original data, was applied to hypotheses 1-4 and 7-8. The correlation coefficients derived from the testing of each of the hypotheses were not high enough to be of significant value at the .05 level. The Fisher's t test for significance of difference between uncorrelated means was applied to hypotheses 5 and 6. The t values derived were not large enough to permit rejection of the hypotheses tested. Therefore, all of the hypotheses were found tenable.

In view of these data, it was concluded that neither motor ability nor movement concept are related to motor creativity, as these were measured in this study. Furthermore, every individual has the potential capability to express himself through the modality of movement. Further research in the area of motor creativity is needed to develop an understanding of the facets of motor creativity, thereby allowing its incorporation into the physical education setting and thus helping to promote the development of the whole individual.

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APPENDIXES

APPENDIX A

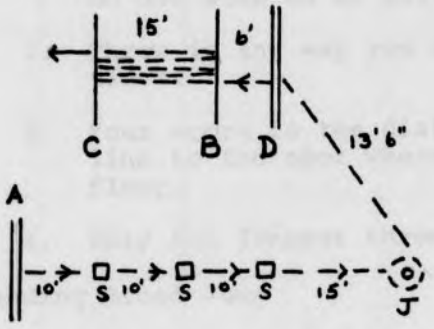
MOTOR ABILITY DATA

Directions for the Motor Ability Test

I. Obstacle Race

A. Equipment:

The space needed is fifty-five feet by twelve feet. Three jump standards and a cross bar with a minimum length are set up in the following manner:



A=starting line
B=line for shuttle
C=finish line
D=cross-bar (18" high)
J=jump standard
S=square (12" x 18")
---=path of runner
Distance from end of crossbar to the path of the runner from A to J = 4'4"

B. Instructions:

1. Start in a back-lying position on the floor with the heels at line A.

2. On the signal, "Ready, Go!" get up and start running toward J, the jump standard.

3. As you come to each square on the floor, step on it with both feet.

4. Run twice around J, turn back to D, go under the cross bar, get up on the other side, run to line C and continue to run between lines B and C until you come to C for the third time.

5. Your score is the number of seconds (to the nearest .1 second) that is required to run the course.

II. Basketball Throw for Distance

A. Equipment:

The space required is approximately eighty feet long and twenty feet wide. A throwing line is marked about eight feet from the end of the course and parallel lines are marked every five feet. Three regulation basketballs.

B. Instructions:

1. Start anywhere behind the throwing line, but do not step on or across the line when throwing.

2. Throw in any way you wish, three consecutive times.

3. Your score is the distance from the throwing line to the spot where the ball touches the floor.

4. Only the longest throw counts.

III. Standing Broad Jump

A. Equipment:

This test requires mats at least seven and one-half feet long, marked in two-inch intervals, and a solid board at least two feet long (beat boards are recommended) placed against the wall to prevent slipping.

B. Instructions:

1. Stand on the take-off board, toes may be curled over the edge of the board.

2. The take-off is from both feet. Jump as far forward on the mat as possible.

3. Your score is the distance from the edge of the take-off board to the nearest heel (or to the nearest part of the body if balance is lost).

4. The best of three trials will be counted.

Motor Ability Scores

Subject	T-score	Raw Score*	Subject	T-score	Raw Score*
1H	73	223.7	1L	31	100.8
2H	70	210.1	2L	31	101.9
3H	69	206.6	3L	31	101.3
4H	70	214.6	4L	25	88.3
5H	70	210.4	5L	20	77.3
6H	69	208.3	6L	22	80.0
7H	70	211.3	7L	31	99.7
8H	67	198.9	8L	30	95.7
9H	71	219.1	9L	28	90.6
10H	68	205.4	10L	30	96.7
11H	71	218.5	11L	19	70.3
12H	67	198.7	12L	31	101.3
13H	67	198.0	13L	25	88.2
14H	68	203.1	14L	30	97.3
15H	70	211.2			

*Used in Treatment of Data

APPENDIX B

MOVEMENT CONCEPT DATA

Q-Sort Instruction Sheet

You have in your possession the following materials:

1. A set of 75 statement cards.
2. A strip of cardboard with columns labeled 1 through 9.
3. A White Self-Sort answer sheet.
4. A Yellow Ideal-Sort answer sheet.
5. A pencil.

Please sort the 75 statement cards into 9 piles (under the 9 columns on the cardboard strip) according to the degree to which each statement characterizes you. The 9 columns on the cardboard strip represent a 9-point scale, with the left-hand side labeled "least like" you and the right-hand side labeled "most like" you.

You will see a red number in parentheses under each column. This number indicates the number of cards to be placed in that column. Therefore, looking in column 1, you will see that you are to place the 2 statement cards which you feel are "least like" you under that column; and looking in column 9, you will see that you are to place the 2 statements that are "most like" you in that column. You will then place the remaining statements into columns 2 through 8 (in the numbers indicated in red) according to the degree to which each statement characterizes you.

You will sort the statement cards twice. The first time, please sort the statements from the point of view of how you see yourself as a moving person at the exact moment in time.

After you have sorted all 75 cards into the 9 columns, please record the results on the White Self-Sort answer sheet. Each answer sheet is numbered 1 through 75, corresponding to the black numbers on each statement card. Record by writing the number of the column in which each statement card has been placed after each statement number on the answer sheet. When completed, you should have a column number written after each of the 75 numbers on the answer sheet.

After recording all of your answers from the first sort, collect your cards to do a second sorting. This time you will follow the same procedure to sort the statements from the point of view of how you would ideally like to be as a moving person. After completing the sorting, record your answers on the Yellow Ideal-Sort answer sheet.

If you need any assistance in following the procedure, please raise your hand.

Q-Sort Statements

Movement Concept

1. I am able to push a heavy object (like a piano) without difficulty.
2. My movements are described as slow.
3. Hanging by my arms is difficult for me.
4. I cannot keep up with the class when we do situps.
5. Fine movements (like typing) are difficult for me.
6. Modern dance scares me.
7. I have difficulty getting my arms and legs to work together when I swim.
8. I like to move to music.
9. I take average size steps when I walk.
10. I have difficulty with balance when standing on one leg.
11. I doubt my ability to make baskets when playing basketball.
12. I feel discouraged about my physical ability.
13. I like to do stretching type exercise.
14. I try to get out of physical activity.
15. I have stiff joints.
16. Physical activity has always been important to me.
17. I feel hopeless when playing a game.
18. I am afraid to swim in deep water.
19. I fatigue easily.
20. I judge my physical performance by the best players in the class.
21. I can move as well as anyone.
22. I feel adequate when playing volleyball.
23. I really don't move well.
24. Sports scare me.
25. I feel confident about being able to learn new physical activities.
26. I feel embarrassed when doing exercises.
27. I am able to do heavy physical work.
28. I prefer doing things with my hands.
29. I like difficult physical tasks.
30. Jumping is no problem for me.
31. Physical fitness is unimportant to me.
32. I learn physical skills easily.
33. I throw a ball with accuracy.
34. I am able to meet the physical demands of everyday living.
35. I can be described as an energetic person.
36. I like to do big sweeping movements.
37. I usually use the handrail when going down the stairs.
38. I have difficulty climbing up a rope.
39. I stumble a lot when walking.

40. I have no difficulty carrying a wooden chair.
41. I like to do flowing kinds of movements.
42. I have difficulty with exercises which require me to move my arms and legs at the same time.
43. I like to swim.
44. I have fun playing on a team.
45. I like people who are active.
46. I make strong physical demands on myself.
47. I feel good when I move.
48. I am usually not able to do as well as others on the team.
49. I am physically fit.
50. I am easily discouraged when learning new movements.
51. I have difficulty catching large objects.
52. I can bounce a ball with ease.
53. I am interested in knowing how I perform physically.
54. I am really a good player.
55. I drop things.
56. I have trouble remembering dance steps.
57. I feel awkward when carrying large objects.
58. I perform best when doing small coordinated movements.
59. I like sports where I play against one other person.
60. I usually lose at sports.
61. I bowl with ease.
62. Controlling the ball in bowling is no problem for me.
63. I am a good swimmer.
64. I am afraid of falling.
65. My movements are inhibited.
66. I am average in physical skill.
67. I like to do hard physical work.
68. I like to be active.
69. I frequently bump into things.
70. My movements are brisk and sharp.
71. I have no difficulty keeping time with the music when I dance.
72. I feel helpless when faced with a physical task.
73. I have always been proud of my physical ability.
74. Physical activity bothers me. I would rather do something else.
75. I am well coordinated.

SELF-SORT ANSWER SHEET SUBJECT #____

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IDEAL-SORT ANSWER SHEET SUBJECT #____

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MOVEMENT CONCEPT TABULATION SHEET

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1					26					51				
2					27					52				
3					28					53				
4					29					54				
5					30					55				
6					31					56				
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12					37					62				
13					38					63				
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22					47					72				
23					48					73				
24					49					74				
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Total D^2____ Total D^2____ Total D^2____

ΣD^2____

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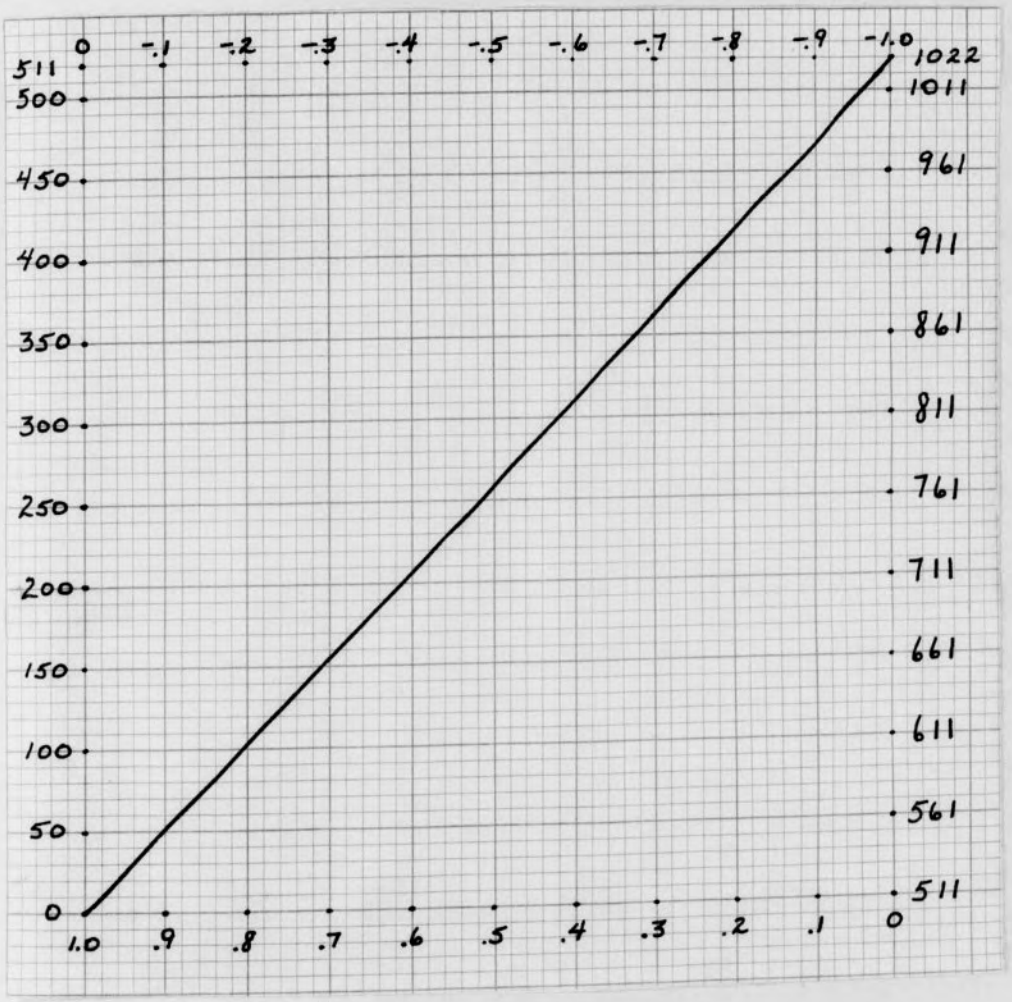
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Movement Concept Scores

Subject	ΣD^2	Correlation Coefficient	Subject	ΣD^2	Correlation Coefficient
1H	8	.989	1L	469	.083
2H	146	.717	2L	244	.520
3H	244	.520	3L	473	.075
4H	155	.692	4L	640	-.255
5H	20	.960	5L	230	.548
6H	84	.835	6L	668	-.313
7H	98	.809	7L	407	.204
8H	60	.880	8L	634	-.245
9H	114	.774	9L	285	.440
10H	276	.459	10L	521	-.020
11H	242	.523	11L	99	.805
12H	86	.829	12L	744	-.458
13H	222	.565	13L	386	.242
14H	96	.914	14L	102	.800
15H	8	.989			

APPENDIX C

MOTOR CREATIVITY DATA

Directions to the Motor Creativity Test

This is a group of three tests designed to see how many ways you can solve various movement problems. You will have three minutes in which to respond to each movement problem. Your answers will be exclusively movement and you should feel free to attempt any movement that you feel will solve the movement problem. Errors, accuracy, or form are not recorded.

Directions to the Parallel Line Test

Move in as many different ways as you can from one line to the other, so that at some point in your movement you include a twisting or turning movement. Begin at line 1 and perform a movement that incorporates a turn or twist at some point in it until you reach line 2. Upon reaching line 2, return to line 1 with a different turning or twisting movement. Continue moving between the lines, each time with a different turning or twisting movement, until time is consumed. Do you have any questions? Ready? Begin.

Directions to the Ball-Wall Test

Move a ball to the wall in as many different ways as you can either by striking or hitting the ball. It makes no difference where on the wall the ball lands as long as it reaches the wall. Be sure to strike or hit the ball in a different way each time. You may not go over the restraining line. Accuracy is not important. Continue moving the balls to the wall until the time is consumed. Do you have any questions? Ready? Begin.

Directions to the Hoop Test

Pick the hoop up from the floor in as many different ways as you can. The entire hoop does not have to leave the floor in order to count as "picked-up". When you have gotten all or most of the hoop off the floor, you may replace it and demonstrate a different method of picking it up. Continue picking the hoop up and replacing it until the time is consumed. Do you have any questions? Ready? Begin.

Motor Creativity Test Score Sheet

Subject #	Parallel Line	Ball-Wall	Hoop	Total
1H	8	6	9	23
2H	4	6	4	14
3H	4	8	4	16
4H	4	5	7	16
5H	12	21	12	45
6H	5	5	3	13
7H	3	9	4	16
8H	6	7	6	19
9H	7	5	7	19
10H	7	14	10	31
11H	4	9	5	18
12H	4	6	6	16
13H	13	11	10	34
14H	10	10	6	26
15H	2	7	5	14
1L	9	6	6	21
2L	14	6	9	29
3L	5	2	5	12
4L	2	2	7	11
5L	8	7	6	21

Subject #	Parallel Line	Ball-Wall	Hoop	Total
6L	2	6	3	11
7L	8	6	5	19
8L	3	8	8	19
9L	5	4	4	13
10L	9	10	6	25
11L	3	2	4	9
12L	6	3	5	14
13L	2	2	5	9
14L	7	5	7	19