CREATIVE THINKING ABILITIES IN HIGH SCHOOL BASKETBALL PLAYERS

by

Arthur David Annadale

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STATEMENT BY AUTHOR

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SIGNED: Author David Anselmo

APPROVAL BY THESIS DIRECTOR

This thesis has been approved on the date shown below:

Robert A. Karabinus
Assistant Professor of Educational Psychology

Date 8-14-68
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ABSTRACT

This study attempted to assess the creative thinking abilities of high school basketball players compared to general activity and non-participant students. More specifically, comparisons were made on divergent thinking, motivation, and personality traits of the three groups.

Three major hypotheses were formulated: (1) there is no difference in the creative thinking abilities (fluency, flexibility, and originality) among the high school basketball player, general activity, and nonparticipant groups; (2) there is no difference in motivation among the three groups; and (3) there is no difference in personality traits among the three groups.

The sample of seventy-five male students was selected randomly from three public high schools in Tucson, Arizona.

It was concluded that: (1) there were no significant differences among the three groups in fluency and flexibility; (2) on originality there was a significantly higher mean score for the basketball players in comparison to the nonparticipants; (3) there were no significant differences among the three groups in motivation; (4) there was no significant difference between the basketball players and nonparticipants
in personality traits; and ( 5 ) on these personality measures there was a significantly higher mean score for the combined basketball player and general activity groups in comparison to the nonparticipants.
CHAPTER I
INTRODUCTION

Purpose

The primary purpose of this field study was to investigate certain creative components of the intellect of basketball players. In order to do this two other groups of school activity students were compared to basketball players on tests of creativity, motivation, and personality attributes. The present study was designed for the purpose of investigating the possibility that athletes are more intelligent than I.Q. scores and school performance indicate.

Background

Creativity is thought to be a phenomena or characteristic of man that has evolved and matured on a scale parallel to man's ingenuity in adjusting to his environment and also in remolding it. Such a phenomena is as ancient as the discovery of fire, the invention of the wheel, and the first feeble attempts to communicate through oral and written language. It is as modern as one will permit his imagination to stretch and to extend into the unknown horizons of this world and of the universe.

It was not until the nineteenth century that creativity developed as a concept per se. At that time it received an impetus from Sir Francis
Galton with his *Inquiries into Human Faculty* in 1833 (Taylor and Barron, 1963). After the turn of this century, Henri Bergson (1911) put forth his philosophy of life and man's dynamic role in the universe in *Creative Evolution*. Shortly thereafter, Charles Spearman (1930) developed a formal psychological treatise on the subject in *Creative Mind*. Eight years later at the University of North Carolina Louis Thurstone performed the first factor analysis of reasoning and mental abilities in "Primary Mental Abilities" (1938). In more recent years David Wechsler (1950) postulated the importance of "non-intellective" aspects of intelligence. Later J. P. Guilford (1956) at the University of Southern California carefully refined the many components of intelligence in a factor analysis of "The Structure of the Intellect." About this same time an intensive study on eminent, creative scientists was being conducted by Anne Roe (1951, 1953a) at Harvard University. Her work culminated in *The Making of a Scientist* (1953b) which revealed the importance of motivation and personal involvement in creative productions. Two other prominent researchers; E. Paul Torrance (1963a) at the University of Minnesota and Calvin Taylor (1962) at the University of Utah, have contributed greatly to creative activities with particular emphasis in education. Also, Frank Barron (1957) and Donald MacKinnon (1967) have disseminated a large amount of information concerning creativity and its relation to personality as a result of a seven year study at the Institute of Personality Assessment, the University of California, Berkeley.
Because of the pioneering work of these people, creativity has evolved from a nebulous, philosophical idea to a mature concept which can be operationally defined and empirically justified. Thus, the creative abilities of man have secured a firm foothold in the on-going research in human behavior, particularly in the area of intelligence. However because of cultural lag in utilizing research concepts, various scholars are intensely concerned about implementing knowledge of creativity, and also about valuing the creative person. The historian, Arnold Toynbee (1964, p. 5), has noted: "A democratic society has a moral duty to ensure that the individual's potential ability is given free play. If, on the contrary, society sets itself to neutralize outstanding ability, it will have failed in its duty to its members, and will bring upon itself a retribution for which it will have only itself to blame." In a similar vein of deep concern Carl Rogers (1961) felt that, unless man can readapt to his environment as rapidly as science changes it, our culture and civilization will vanish. According to Ernst Cassirer (1961), culture will exist and progress as long as man does not abdicate his responsibility in refining his form shaping powers. And Ralph Hallman (1963, p. 136) suggested that "the ethical worth of a society must be evaluated in terms of its efforts to develop creative potentials in all members of that society."

After the Russians launched the Sputnik in 1957, creativity could no longer be left to the chance activity of a select few geniuses who live in
the realm of the occult and mysterious. Man had to assert their efforts in all areas and facets of life in the intensive search for creative talent. As a defense reaction to the Russians beating America in the space race, creativity had to be explored in an attempt to regain our stronghold and prestige around the world. It soon became a serious concern of our government, military, and industry. The common man was now interested in elevating his creative powers. Therefore, by necessity, creativity evolved from a unrefined, nebulous concept to a clearly delineated research tool (Razik, 1967).

Fruitful research can now be done on this aspect of intelligence. One implicit assumption shared by many psychologists and educators working with creativity is that creative thinking abilities comprise a constitutional variable in a similar manner that intelligence does. Only with recent developments have the differences and similarities between creativity and intelligence been clearly established and specified (Weisburg and Springer, 1961). Guilford (1967d), Torrance (1963a) and Getzels and Jackson (1962) have stressed the differences between creativity and intelligence, whereas Wallach and Kogan (1965) have illuminated the similarities.

Before 1950 creative ability was a taboo topic in psychology. Consequently, little research was conducted. J. P. Guilford’s stirring, 1950 Presidential Address to the Psychological Association stimulated a wave
of inspired concern about American education and the need for studying this domain of intelligence (Givens, 1963). During this address, Guilford (1950) cited a review of the literature in psychology over the preceding twenty-three year period and reported finding only 0.2 per cent had been in the area of creative thinking. In "The Structure of Intellect" (1956, p. 267) he said:

There has never been developed a comprehensive theory of thinking. In view of the great variety of thinking abilities (and functions) revealed by factor analysis, the time honored concepts of reasoning, induction, deduction, and the like appear even more inadequate than before... Psychologists have taken too restricted a view of the Binet style of intelligence. More attention needs to be given to the human adult – the superior human adult.

After this speech educators and psychologists were moved in the direction of the need for understanding and helping the creative person.

One of the most prominent, productive researchers in creativity is E. Paul Torrance. After nine years at the University of Minnesota and for the past two years at the University of Georgia, his studies revealed that teachers who do not hold values supporting creativeness are unlikely to meet the needs of creative pupils. Torrance (1963b) also has shown that highly creative children are often disliked by their teachers and, consequently, unlikely to be treated fairly. Getzels and Jackson's work (1962) confirmed this.

At the University of Utah Calvin Taylor (1962, p. 175) cited a study made by Jex which suggested that creative teachers may not be appreciated
and valued by some principals. Taylor reported that Jex found a -0.38 correlation between creative teachers as revealed on a battery of innovative tests and administrators' ratings of their teaching performance. In another study Torrance (1963b) reported that Taylor demonstrated that those research workers who publish the most scientific papers and yield the most in productive, creative output are the first ones who will likely be released by their supervisors if cutbacks in personnel have to be made. Hence, it appears that highly creative people may be discriminated against unfairly.

Other important investigations in creativity have been conducted at the University of Chicago by the team of Getzels and Jackson (1962). In their study of High I.Q. versus High Creative students, Getzels and Jackson (1962, p. 2) reported that if an intelligence test is used to select top-level talent, about 70 per cent of the persons with the highest 20 per cent of the scores on a creative battery will be missed, and 80 per cent would be missed if the intelligence and creativity scores were completely unrelated. Razik (1967) reported that Torrance confirmed Getzels and Jackson's findings in discovering that above a 120 I.Q. there is no correlation between I.Q. and creativity ability. Guilford (1967d, p. 166) pointed to the low correlation between divergent thinking abilities of creativity and I.Q. scores. Torrance (1963a) estimated that we bypass
70 per cent or more of creative people if ability ratings depend exclusively on I.Q. tests to measure ability.

In short, after Guilford pointed out the deficiency of research in creativity and the narrow concept of intelligence, Torrance, Taylor, and Getzels and Jackson pointed out that the usual procedures in school not only neglect creative talent, but actually debilitate against it.

The word gifted is usually closely connected to current intelligence tests and has often been associated with high academic performance in school activities which are conspicuously lacking in creativity (Taylor, 1962). Lewis Terman's study of 1,000 gifted children over a period of thirty years documented this point. According to Rhodes (1961), Terman found more than two thirds of high I.Q. groups over 140 to be rather low in creativeness. Rhodes believed that Leta Hollingworth observed essentially the same thing with children of 180 I.Q. or higher. In addition, Rhodes noted that Thurstone found creative thinking lacking in a separate study of the Quiz Kids who displayed phenomenal memories for details. With these recent developments into the many ways and methods of uncovering the components of intelligence, two people may have the same intellectual capacity and yet be greatly different as to their total mental endowment and creative functioning (Thurstone, 1962).

In pursuance of these developments, two big questions were posed (Guilford, 1950, p. 445):
1. How can creative potential be discovered in children and youth?
2. How can the development of creative personalities be encouraged?

Jerome Bruner (1960) felt that the answer lies in investigating the nature of intuitive thinking. Torrance (1966, p. 4) argued for "basic studies that will yield a more complete understanding of the human mind and its functioning and development." Stiles (1965, p. 291) reported that the Cooperative Research Program is interested in essentially the same thing by asking, "What is the nature of creative ability, and how may such talent be identified and developed?" In order to try to answer these questions the nature of creativity must be explored.

Much of the literature is replete with studies trying to isolate the creative function in terms of four major components (Gaier, 1967, p. 239):

1. The nature and quality of the product created
2. The actual expression and on-going process during the creation
3. The nature of the creator
4. The environmental factors which best support and foster creativity.

In the dispute of process versus product Guilford (1967b, p. 96) believed that creative thinking can occur even when there is no concrete product:
"There are always some products of thought, and it does not matter whether they are expressed or not." He goes on to say that the elements of the thinking process can be investigated in various indirect, inferential ways:
"If we cannot get a look inside the organism's psychological functioning, it must be remembered that the physicist is no more able to get a look inside the atom; the observation can be as objective in one case as in the other." This study was, therefore, mainly inferential.

**Stages of Creative Thought.** Related to the process-product aspect is the notion that there are stages of creativity. According to Coleman (1960, p. 390), the first stage calls for preparation, the second for incubation, the third for illumination, and the fourth for production. These stages invariably bring up the role of the unconscious and its influence, particularly with reference to incubation. The incubation stage usually requires being prepared or being well informed in a specific discipline or area of knowledge. Then spontaneity and relaxation seem to encourage creative thinking. As a few examples, the French mathematician, Poincare', is said to have developed some of his most ingenuous concepts while taking a relaxing walk or riding on a bus. The chemist, Kekule, while snoozing in front of his fireplace, caught a glimpse of a ring-shaped snake which helped him in discovering the structure of organic compounds (Kubie, 1967). Charles Darwin's theory of evolution spontaneously occurred to him while riding in a carriage (Gerard, 1946). Many of the most productive contributions in art and science have come from people who have been in tune with their irrational unconscious - what Barron (1957, p. 737) called the "capacity for idle, fancy, and non-logical
thinking;" what Maslow (1962) referred to as "primary creativeness;" and what Kubie (1958) called "preconscious thinking."

Perceptual Characteristics. But most of the name calling and arm-chair theorizing about the nature of creativity has not been put to empirical testing. Guilford (1950) offered an explanation for this by pointing to problems of method, measurement, and criteria. Before 1950 much of the difficulty in working in this area centered around trying to operationally define creative intelligence. Then Guilford (1956) produced "The Structure of the Intellect," summarizing the results of factor analyzing intelligence into (1) perceptual relations, (2) perceptual foresight, and (3) perceptual classifications. But before Guilford unlocked these perceptual components of intelligence, Wertheimer (Quoted by Gerard, 1946, p. 483) recognized the importance of closure in reconstructing the perceptual field: "Creative thinking is the process of destroying one gestalt (configuration) in favor of a better one." Also, Thurstone (1944) in "A Factorial Study of Perception" found closure to be an important aspect of thinking.

Closure. The importance of closure as a perceptual factor in thinking creatively is associated with synthesizing and combining several elements to form a new "whole." Frank Barron (1958) at the University of California at Berkeley contended that creative people have the ability to make more productive combinations. He stated that they are born with larger brain capacity, have more potential to hold many ideas at one time,
and can better interrelate them with one another. Pacifico (1967) asserted that all creative thinking involves putting together items or elements into a new combination or synthesis. Simpson (1922) noted that we should be concerned in locating the searching, combining, and synthetic type of person. Torrance (1963a, p. 90) defined creativity as "a process of sensing gaps or needed missing elements; of forming ideas or hypotheses; and of communicating the results, possibly modifying and retesting the hypotheses." By the creative process Kubie (1958, p. 141) referred to it as "the capacity to find new and unexpected connections... to find new relationships in time and space, and thus new meanings."

Therefore, closure is an important perceptual component of intelligence in being related to creative thinking as the ability to synthesize and to form a new relationship or "whole." In reference to basketball Torrance and Kubie's definitions of the creative process are the most applicable.

**Divergent Thinking.** In addition to the perceptual category in thinking creatively, there is a cognitive area where divergent thinking is found. Evidence gathered from the Human Talent Research Project as reported by McQuire (1967) and from Guilford's factor analytical work revealed that divergent thinking continually showed up in computer analysis of intelligence. Guilford (1956) clearly differentiated the divergent thinking abilities from the convergent ones. Divergent thinking moves in unfamiliar, unexpected directions, whereas convergent thinking moves in known,
specified areas. Divergent thinking is called for when many possible alternatives or solutions are explored. It is responsible for releasing a variety of ideas, none of which is necessarily better than the others, whereas convergent thinking involves giving forth of a well-known answer (Torrance, 1963a). According to Guilford (1959), divergent thinking is required whenever there is trial and error behavior. Guilford (1956) factor analyzed the following cognitive components of the intellect and found most of them in the divergent thinking area:

1. **Fluency** - the number of relevant responses per unit of time in answering a question.

2. **Flexibility** - the ability to shift from one category of thought to another.

3. **Originality** - the generation of new and different ideas.

He found four fluency factors: (1) associational, (2) expressional, (3) word, and (4) ideational; and two flexibility factors: (1) spontaneous and (2) adaptive. However, word fluency was first reported by Thurstone (1938) who found it to be a quantitative ability involving the calling forth of a large number of ideas. The fluent person has more ideas per unit of time (Arnold, 1962).

Flexibility, another important component of divergent thinking, calls for making shifts in thinking by shifting thought sequences and changing categories (Torrance, 1966). It affects creative behavior in requiring
that new paths be explored by breaking away from the usual pattern of thought (Simpson, 1922). Lowenfeld (1958) said that flexibility involves the ability to adjust quickly to new situations. Also, Rogers (1965) and Guilford (1967c) stated that it is the nucleus of creativity.

Originality, another factor of divergent thought, is almost a synonym for creative production (Guilford, 1965). It is the ability to abandon conventional techniques and to look beyond the obvious. According to Torrance (1966), originality is the ability to produce uncommon responses and is one of the most influential facets of creative thinking. Ray (1967) believed that original thought is an action of the mind which involves recombining old ideas into new elements by association. Torrance (1966, p. 11) asserted that originality can be measured by its statistical infrequency in that the creative mind can more easily make a "mental leap" or departure from what is obvious and prosaic. Apparently, there is an intimate connection between originality and flexibility (Guilford, 1959, p. 148): "There is a growing suspicion that what we call originality is actually a case of adaptive flexibility when dealing with verbally meaningful material."

Thanks to Guilford's factor analytical studies of thinking, intelligence is no longer considered to be one uniform ability, but now circumscribes a large number of contributing abilities and underlying traits. As
Guilford (1967a, p. 449) remarked, "Motivational factors, interests, attitudes, and temperamental qualities are important contributors."

Motivational Qualities. Motivation is strongly proposed as a vital component of creative thinking. Torrance (1963b) postulated that strong determination is an outstanding feature of the creative person. Anne Roe (1951, 1953a), in studying the psychological features of eminent, creative scientists, discovered one preeminent quality which they have in common – the quality of working long, industrious hours. Bloom (1963) reported similar findings in a study of creative versus non-creative scientists: creative people are not satisfied in working a 40-hour week and seem to be continually active. Taylor (1962) viewed the creative person as one who has a high energy level, yields more in productive output, possesses greater curiosity and intellectual persistence, and has a deeper need for recognition and achievement. Buhl (1962, p. 346) also found similar traits in a study of 167 engineering students at Iowa State College where they were administered the A C Test of Creativity. The subjects who scored in the highest 25 per cent were classified as highly creative; those who scored in the lowest 25 per cent were categorized as the low group. The highly creative group differed significantly from the low creative group in motivation and freedom of expression. It appears, as Guilford (1965, p. 3) pointed out that needs – the need for achievement and the need for expression – are propelling forces behind the high energy
level of creative people. In this respect Torrance (1966, p. 32) found significant results in a group of 115 creatively gifted high school seniors who were compared to 100 unselected job applicants: "About 50 per cent of the creative subjects showed high achievement orientation compared to 4 per cent of the unselected group." In studies of childhood backgrounds of eminent scientists Wilson (1960, p. 22) indicated that the one paramount thing which they have in common is a strong interest at an early age in some activity which they carry through into their adult lives with "persistence, intensity, and single-minded purpose." Barron (1958) and Strang (1960) noted that creative people are by constitution more vigorous and have an abundance of psychic and physical energy available to them. The importance of motivating forces in problem solving was pointed out by Guilford (1967b, p. 282): "Interests, attitudes, and temperamental qualities determine to some extent what is related to creative production ... such abilities can be regarded within the intellectual domain."

In analyzing the creative process in the creative person, an interesting question was raised by Stein (1967, p. 110): "Why does the individual create?" Donald MacKinnon (1967) at the University of California Institute of Personality Assessment and Research at Berkeley is trying to answer this question by observing the "Highly Effective Individual." Along with his colleague, Frank Barron, MacKinnon (1967, p. 63) agreed that athletics and competitive play are important indicators in revealing
physical stamina and robust vitality in the high energy person. Therefore, areas outside of the normal intellectual domain are being investigated in the intensive search for creative talent. Such investigations include biographical, sociometric, motivational, and other personality features (Taylor, 1962, p. 176).

**Personality Traits.** Anderson (1965, p. 46) claimed that "behind every creative product is a person." For Hallman (1964) the process of being creative calls for developing oneself as a personality. And Rogers (1961) developed one book on this topic in *On Becoming a Person*. It appears that creative abilities encompass a large variety of intellectual qualities with personality traits and variables. A trait, according to Guilford (1967a, p. 144), is "any distinguishable enduring pattern in which one person differs from another." Thus, personality has many meanings, but in general, it refers to the consistent patterns of behavior which a person shows in a variety of situations (Cratty, 1968).

The importance of personality variables cannot be over emphasized. David Wechsler (1950) was one of the first psychologists who defended the influence of personality on the intellect. Hilgard (1959) found personality qualities very important in solving simple laboratory-type problems which are mainly cognitive. He reported that differences in personality traits yield more valid information than learning studies do. Weisberg and Springer (1961) studied the personalities of highly creative
and less creative fourth grade pupils in which their personalities were observed by psychiatric interviews, Rorschach's, and Draw-a-Family technique. The highly creative children were rated significantly higher on the strength of the self-image. Guilford (1965) suggested that the highly creative person is self-confident because he succeeds in solving difficult problems. Taylor (1967) contended that the best predictors of creative talent in science involve personality qualities of self-confidence and an attitude of autonomy and independence. And Torrance (1966) reported that Wallace found healthy self-confidence related to sales success of department store clerks, and discovered self-determination and self-confidence significantly related to originality and fluency on the Torrance Test of Creative Thinking. It is quite apparent that personality attributes cannot be dismissed in assessing and researching creative talent.

Research in creativity holds diverse possibilities and profound implications for educators revising the old, "cut and dried," stereotyped concept of intelligence and, also, for reorganizing the curriculum at all educational levels. The need for implementing the latest research about creativity into the curriculum cannot be taken lightly. George Counts (1932) boldly asked, *Dare the School Build a New Social Order?* in reorganizing educational techniques in an attempt to help students adjust to the rapidly changing world. Theodore Brameld (1961) advocated a
thorough reconstruction of our society and culture if our schools expect to keep pace with the accelerated technology. And Jencks and Riesman (1968) pointed out that the academic direction which the schools pursue the future has profound social implications for changing the earth's panorama and landscape. These men have signaled out the conflicts, problems, and crucial issues which face America in its educational crises. Consequently, it behooves one to search out and to seek creative ways to try to diminish cultural and educational problems.

**Rationale for the Study**

In considering how the curriculum can be modified in an attempt to meet the kaleidoscopic changes confronting educators, the belief in the "whole man" must be reaffirmed. This brings up an aspect of creativity which the writer calls "recreativity" for recreation and sports. Even though there is much talk about man acquiring more leisure and spare time for recreational activities in today's world of the so-called "shrinking" eight hour day, the opposite trend appears in many of the schools. With technology accelerating the pace of science, society is undergoing rapid transformations to such a degree that the schools appear to be caught in an inevitable conflict of "intellect" versus "leisure." The acutely perceptive social analysts, Christopher Jencks and David Riesman (1968), postulated that in the no-so-distant future (if the trend
continues) the most valued and prized or rewarded person will be the scholar. Just as today's men are status seekers after material wealth and economic gain, so tomorrow's common men will be given increased importance for intellectual skills and scholarly interests. But with the computer and the robot "breathing down the students' throats," today, one wonders if Jencks and Riesman's hypothesized world of tomorrow is not already here.

After the Soviets defeated the United States in the space race with the launching of the first space craft in 1957, our schools seem to have undergone an about-face transformation. This is true especially in respect to the intense emphasis on the hard-core scientific and mathematical subjects. Situated in an increasingly complex society, the schools must become more sophisticated in keeping up with the latest innovations, technological advances, and trends. Therefore, it is inevitable that as the culture changes and becomes more complex and specialized, the schools' curricula undergo revision. From knowledge about cybernetics and systems theory of the machine-like workings of man's mind, today's students on all educational levels are, perhaps, unmercifully challenged with a parallel phenomena of being "overloaded" and "shortcircuited"—what Kubie (1967) called "educational input overload" and what Miller (1960) referred to as "sensory information input overload."
If educators really hold Self-Realization as a cardinal principle of educational practices, then man - not technology - will be the nucleus and main reason for the existence of educational institutions. This entails the philosophy of creativity which considers the whole person and his concomitant total developmental processes and stages of life. In effect, this calls for recognizing that we live in an hour of history when man threatens to create a self-image of an automaton or robot. As a consequence, there is a justifiable need and place for the "lesser" school subjects. This brings up athletics, a sometimes questionable activity - especially in light of the time, equipment, and money involved. More specifically, this study will concentrate on one area of sports, namely basketball, in its competitive, interscholastic framework.

In discussing the thought processes of the mind, Thurstone (1953, p. 35) felt that "it would be a mistake to look for creative talent exclusively in the cognitive or intellective domain." Alex Osborn (1957) believed that playing games such as solving puzzles and participating in various sports help develop the imagination. James Coleman (1960) held that physical prowess and psychomotor agility contribute to the person's growth potential and personality in what he calls "physical competence." Metheny (1965, p. 15) has helped precipitate special concern and research into the cognitive aspects of sports and the relationship of physical movement to intelligence: "Movement is too much like thought
to be less than thinking." Simpson (1922, p. 243) wrote that the whole process of thought and the imagination are influenced by visual images which expand into "scraps of kinesthesia...and organic references."

Guthrie (1935) asserted that in order for a thought process to be sustained it must stimulate the sense organs. Rhodes (1956) acknowledged the value of sensory motor functions and kinesthetic movement in relation to the mind and body working as one unit. Hunt (1964) and Nash (1964) documented similar positions in affirming the close connection between "muscles" and "mind."

Today, it appears that the mind-body dualism is a language fallacy in order, perhaps, to facilitate and to streamline communication. Language is a tool which abstracts units and concepts out of reality. In the process much of life and reality is distorted. In short, language, like man, has its limits and shortcomings, particularly with this "mind-body" dualism in its relation to the basketball player.

Including the whole organism, intelligence is multidimensional and does not confine itself exclusively to the cranium. At the University of Arizona Physical Education Department, Donna Miller and her staff have been doing research in kinesthetic and movement aspects of intelligence. Dr. Miller (1960) studied the psychomotor skills and related perceptual abilities of selected, champion athletes in comparison to non-champions and found significant differences in their mental processes.
and physical dexterity. Similar studies have been continually advocated by Abraham Maslow (1959) who hypothesized that clues to understanding the highly creative person may be found in the superior athlete and "self-actualizer." Carl Rogers (1961) has argued for studying the "fully functioning" person who is "open to his experiences." Gutman (1967, p. 30) summarized well the point being made here: "The creative process is made possible by a unification of all the functional departments of the organism in which the mind becomes identified with the totality of the organism." Surely, then, physical movement skills exert a dynamic effect on a person's creative potential.

Psychologists are beginning to fully realize the profound influence which early psychomotor exercise has on the ability to improve mental functioning. Frank (1968) cited psychological studies in which learning ability increased in infants who were given special opportunities for early sensory stimulation and muscular development. Torrance (1963a) and Rossman (1964) believed that young children have a passionate tendency to manipulate and explore objects, and this probably is the beginning of curiosity and playfulness. For young children manipulation, apparently, supplies much exercise which is necessary for developing the imagination.

Basketball is a game which requires bouncing, dribbling, passing, and shooting the basketball - types of manipulation. The game also
calls for perspicacity, quick mental processing, innovative thinking and learning. Clarence Duncan (1964, p. 67) suggested that there is a direct relationship between sports participation and the learning process. For him, body movement in basketball constitutes the essentials of inductive reasoning in discovering generalizations by trial and error: "Body movement is the end product of deductive reasoning." Lawrence Kubie (1967, p. 42) has an interesting amplification of this:

The athlete has a freedom to move and to put new movements together into new combinations. He does this with confidence, with bodily imagination. He is like the gifted artist who barely glances at something casually, and then with a piece of charcoal produces it automatically and faithfully. He can go further by taking it apart into fragments, elaborating out of the initial stereotyped and literal image a new production out of the free play of his own creative fancy.

Concerning basketball, the creative process may be at its highest intensity during this sport. According to Duncan (1964, p. 68) how the mind of a basketball player evaluates and reevaluates a sports situation from instant to instant requires problem solving of the "highest intellectual order." It is one sport which demands a judicial amount of creative thinking abilities.

Nature of the Game. Basketball is a swiftly moving game, involving two five-men teams competing against one another. Usually, two players bring the ball up the court to join the other eight players who are already set and waiting. The five players with the ball pass it to and fro among them, at the same time maneuvering in, out, and around
their opponents until a play is executed. Generally, the essence of a
successful play requires passing the ball to a teammate who is open for
a clear (good) shot close to the basket, getting an open shot near the
"hoop," or finding an open path to the basket for making a lay-up shot
under the basket. Each player has to constantly evaluate multitudinous
actions and movements of the other nine players as each player separately
responds and each team collectively reacts. As Duncan (1964, p. 68)
mentioned, "he must guide his own movements not only by what the other
player is doing, but also by what the other player believes he will do."
Hence, a keen intellect plus superb motor coordination are helpful in
trying to outmaneuver one's opponent. This is where physical dexterity,
spontaneous and adaptive flexibility, mental alertness, speed, and
originality are called for. The endless strategies involved and the com-
plex, minute problems to be continually solved are limited only by the
players' movements, skills, and imaginations.

Much of the time the game appears to be in a state of flux, chaos,
and confusion. But as the players move quickly around and swiftly pass
the ball back and forth, they have a general concept about what they are
momentarily striving for. This apparent confusion continues until - all
of a sudden - an opening is perceived, a player pursues the gap by
shooting, passing off, or driving in toward the basket for a lay-up shot.
But even after a shot is taken, the play is not officially over. As
the ball is shot, all of the players instantaneously have to readjust their bodily positions by trying to abruptly outmaneuver and quickly outwit their opponents in attempting to grab the rebound in the event the attempted shot misses the basket. In contesting for the rebound, spontaneous and adaptive flexibility are valuable, creative assets. Each time the ball is shot the outcome of the game can be mathematically predicted on the basis of which team gets the most rebounds in attempting to reset for another shot or for another play (Kyber, 1967). Thus, readapting and readjusting are extremely important in playing basketball.

Some important perceptual, cognitive, and psychomotor abilities required in this sport are as follows:

1. Visualizing, foreseeing, and generating ideas which may be related to the speed of processing information, a perceptual ability.

2. Closure - looking for an opening or gap in reconstructing the perceptual field:
   a. another open teammate to pass to:
   b. clear shot to take.
   c. open path for a drive-in lay-up.

3. Quick and adaptive decisions involving spontaneous, and adaptive flexibility.
a. shifting the balance of the body and feet in dribbling, shooting, and in guarding one's opponent:
   (1) forwards
   (2) backwards and
   (3) sideways

b. abruptly changing speed by having to:
   (1) stop
   (2) start running
   (3) pass or
   (4) shoot.

4. Top physical condition - "fully functioning" (Rogers) person required.

Creative problem solving and the nature of a basketball game are similar in that both call for analysis and synthesis. It is much like the rational method scientists employ in formulating hypotheses, testing, and retesting them, confirming, modifying, and rejecting. The analytical mind of a basketball player sizes up the situation, evaluates his opponent's strengths and weaknesses, formulates split-second hypotheses, and moves accordingly in forming tentative conclusions by testing and retesting them with mental alertness, physical agility, and bodily movements. The resultant perceptual, cognitive, and kinesthetic elements are synthesized in "putting together" a play. Perhaps, the creative mind
does much the same, except that the end product is usually an idea instead of a play. The product may be different, but the cognitive process is essentially the same. The whole process by which the mind of a basketball player thinks is remarkably similar to Osborn's "Thinking Mind" in Applied Imagination (Osborn, 1957, p. 26).

In addition to the innovative, flexible thinking demanded, basketball is a sport which serves as a cathartic in releasing pent-up emotions and in alleviating psychological pressures. The importance of such a therapeutic activity cannot be overstressed as Huxley (1964, p. 80) emphasized:

Educators must find a place in the curriculum for courses in the indispensable art of letting off steam. It is obvious that we must take a hint from the Greeks and provide ourselves with physical safety valves for reducing the pressure of our negative emotions. No ethical system which fails to provide such physical safety valves, and which fails to teach children and their elders how to use them, is likely to be effective.

Therefore, basketball can be justified on more grounds than just being a complex, problem solving sport. More than that, it contributes to raising the general level of mental health in coping with life's stresses and in maintaining one's sanity by helping one to be flexible, pliable, and resilient. Basketball demands concentration which serves as a healthy, temporary "escape hatch" from the pressures and cares of the world. But in doing so, this athletic activity gives one the opportunity to replenish oneself with a fresh supply of adaptation energy, to
momentarily throw off the threatening image of man as a robot, and to affirm oneself as a renewed person. The need for living as a spontaneous, fully functioning, healthy organism is becoming increasingly necessary. Quoting Gardner Murphy, Huxley (1964, p. 76) agreed about the value of relaxation gained in play and its relation to creativity: "Creative intelligence springs from the mind that is not strained to its pitch, but is utterly at ease."

Several scholars (Guilford, 1965; Kubie, 1958; Ojemann, 1968; Maltz, 1960; Moustakas, 1967, and Torrance, 1965a) have spoken favorably for the need of understanding creative abilities in how they are related to sound mental health. Athletics - in particular - basketball - may serve as an excellent area to probe and investigate.

In addition to its mental health value, basketball, being a predominately male game, may shed light upon personality differences between the sexes. Barron (1957, p. 737) identified the creative act as a "kind of giving birth," and pointed out that the creative heritage is notably lacking in female products: "Men bring forth ideas, paintings, literary and musical compositions, organization of states, inventions, etc., while women bring forth the new 'generation.'" Barron's thesis was born out by Crutchfield (1960) in a study of "Male Superiority in Intuitive Problem Solving." This leaves implications for understanding and
researching personality differences in creative thinking and problem solving dealing separately with either sex. Basketball is, in general, one such activity.

**Definitions and Limitations**

*An Operational Definition of Creativity.* This study attempted to assess certain creative components of the intellect, namely three divergent thinking abilities factor analyzed by Guilford (1956):

1. **Fluency** - the ability to call up from memory a certain amount of ideas per unit of time.

2. **Flexibility** - the ability to change categories and shift from one sequence of thought to another.

3. **Originality** - the production of statistically infrequent responses and ideas.

From the studies of eminent scientists, Roe (1951, 1953a) isolated the ability to work long, industrious hours:

4. **High Energy Level (Motivation)** - the quality of working with persistence and perseverance without getting easily fatigued.

Also, from the laboratory studies of Hilgard (1959) who found several personality variables important in simple problem solving activities, and from the biographies of over five hundred, eminent, creative scientists,
Taylor (1967) discovered personality traits of self-confidence and independence as biographical predictors of creative scientists:

5. **Personality Traits, Qualities, and Variables** - consistent patterns of behavior which help define the individual's thought processes, mannerisms, and style of life.

All other aspects and fringe areas of creativity are not relevant to this investigation.

**School Groups Defined.** This study focused on the creative thinking abilities of three groups of all male students in grades nine through twelve in three public high schools situated in three separate school districts in Tucson, Arizona. The students' ages range from 15 to 19 years. The groups were defined as follows:

1. **Basketball Players** - those students who were regular members of the freshman, junior varsity, or varsity basketball team in their respective high schools during the academic year of 1967–68.

2. **General Activity Students** - those who participated regularly in at least one or more school leadership functions or extracurricular activities during the 1967–68 school year. Any sport, with the exception of basketball at the high school level, was considered in this group.
3. **Nonparticipants** - those students who did not participate regularly in any leadership or extra school activity during the academic year of 1967-68.

**Limitations of the Study.** As in most research the conclusions arrived at from this investigation are limited by the characteristics of the sample and the nature of the test instruments. In the first instance, a larger group for each school activity group might have been used. Initially, this research attempted to have thirty-six students in each group. However, because of absentees, class exams, rehearsals and school assemblies, only twenty-seven basketball players, thirty-one general activity students, and twenty-five nonparticipants were available for testing. Also, the sample was limited by the definitions and criteria of each group. Basketball players were not in just one specific activity. Many of them were in two, three, and more school functions, and, thus, resemble the general activity group. In the second instance, the **GEEE Questionnaire** has not been subjected to a great deal of research on its validity and reliability in comparison to the extensive research done on the other two instruments used in this study.

**Hypotheses**

It was hypothesized that basketball players would be more creative on the five components of the intellect as operationally defined in.
this study in comparison to the general activity and nonparticipant school groups. Therefore, the following three major null hypotheses were formulated in an effort to guide and direct this investigation:

**Hypothesis 1.** There is no difference in the creative thinking abilities (**fluency, flexibility, and originality**) of the high school basketball player, general activity, and nonparticipant groups as measured by the *Torrance Test of Creative Thinking* (1966).

**Hypothesis 2.** There is no difference in motivation (**high energy level**) of the high school basketball player, general activity, and nonparticipant groups as measured by the *Brown-Holtzman Survey of Study Habits and Attitudes* (1964).

**Hypothesis 3.** There is no difference in personality traits of the high school basketball player, general activity, and nonparticipant groups as measured by the *CREE Questionnaire* (Thurstone and Mellinger, 1959).
CHAPTER II

INSTRUMENTATION AND METHODOLOGY

Sampling Procedure

Three school districts in Tucson, Arizona, were involved in the sample. A proposal of the investigation was presented to the superintendent of one school district who authorized the researcher to contact the principal of the school which was randomly selected in that district. Three other principals from two other districts were contacted directly by letter, and with the exception of one principal, all principals cooperated fully in assisting this study.

From ten public high schools in Tucson, three were randomly selected. Each student was selected on the basis of filling out a submitted, check-list questionnaire (Appendix) concerning extra-curricular activities and school leadership functions. Initially, thirty-six members from each group were randomly chosen, but only twenty-seven basketball players, thirty-one general activity students, and twenty-five non-participants were excused from classes to be tested. After considering the statistical analysis and technique to be used, the three uneven groups were randomly cut down to twenty-five members each per group.

The sample was selected because it provided:
1. a large enough proportion of the schools to give all of the high schools in Tucson an equal chance to participate.

2. a representative sample of high school age students who were at a similar developmental stage and level of growth.

3. inclusion of all schools from varied geographic, ethnic, community, and socioeconomic background.

**Procedures Used in Gathering and Scoring Data**

**The Sample.** Three public high schools were randomly selected from a total of ten public schools in Tucson. After contact was made with the principals, the basketball coach in each school served as a liaison, public relations person between the writer, the faculty, and students. From the teachers' mail boxes in their respective schools, names were randomly selected, and twenty questionnaires concerning extra school activities were placed in twelve teachers' mail boxes evenly divided through grades nine to twelve. A brief mimeographed statement explaining the project (for the teachers' confidential information) accompanied the questionnaires. The students were only to be told that the questionnaires concerned a survey. Nothing was to be mentioned about creativity. All male students receiving the questionnaires in their home room class filled them out and turned them in to their teachers who, in turn, submitted them to the basketball coach. Later, the basketball coach gave the questionnaires to the researcher who randomly
selected thirty-six names for each of the following three groups: (1) basketball players, (2) general activity, and (3) nonparticipants.

**Testing Procedure.** For each test a standardized, written set of instructions was read to the examinees before taking each test. The time of the year varied from May 15 to June 2, 1968, in order to complete the testing. The total testing time at each school took approximately ninety minutes. The three tests which were used in this research were administered in the same sequence to all of the subjects. All of the examinees were tested in the same room or place at approximately the same time of day from 9:30 to 12 o'clock on various school days, Monday through Friday. Most of the testing was uniform in that the subjects were gathered together at the same time and place in each respective school. There were not many class conflicts or extraneous distractors because of the cooperation of the administrators and teachers in excusing the students from classes.

**Scoring of the Tests.** The raw data consisted of the following tests from seventy-five male, high school students.

1. **The Torrance Test of Creative Thinking.** This instrument had seven parts, but only four were considered pertinent and relevant to this study: Parts 1. Asking; 4. Product Improvement; 5. Unusual Uses (Tin Cans); and 7. Just Suppose. This test was hand scored by the writer
and another independent scorer with the following interscorer reliabilities computed: fluency (0.994), flexibility (0.934), and originality (0.929).

2. The Brown-Holtzman Survey of Study Habits and Attitudes. This test had seven scales, which were subtests for the 100 questions of the instrument. There are five possible responses or answers for each question: (1) rarely (0 - 15 per cent of the time), (2) sometimes (16 - 35 per cent of the time), (3) frequently (36 - 65 per cent), (4) generally (66 - 85 per cent), and (5) almost always (86 - 100 per cent). The raw scores were derived by weighting the separate columns of four scales: (1) Delay Avoidance, (2) Work Methods, (3) Teacher Approval, and (4) Education Acceptance. Three other scales were derived by summing scales one and two to get a score for (5) Study Habits. Scales three and four were added to get a score for (6) Study Attitudes, and finally a seventh scale, (7) Study Orientation, was computed by summing scales five and six. The tests were all hand scored by the writer. The assigned scores of each subpart were totaled and then divided by the number of students in each group (25) in determining the mean score. This is understood to be the raw score for each subtest.

3. The CREE Questionnaire. Of 145 questions which can be answered by "Yes," "?," or "No," the raw score for this instrument is the number of answers the subject has which match those given by creative engineers as indicated on the answer sheet. The raw scores are
readily converted into standard scores by using the test manual which lists standard scores parallel to raw scores. Therefore, the range of the test is between 20 - 80 with a mean of 50 and a standard deviation of 10 (Thurstone and Mellinger, 1959). This test was also hand scored by the writer.

Tests Administered

The following three tests were considered appropriate for this study on creativity.

The Torrance Test of Creative Thinking, Verbal Form B (1966). Representing the culmination of nine years of research on children, adolescents, and adults, this paper and pencil test was used in an attempt to measure three aspects of divergent thinking: (1) Fluency, the production of many ideas; (2) Flexibility, the ability to shift category and thought sequences; and (3) Originality, the ability to think up new and different solutions and ideas. The total testing time took 45 minutes to complete. Much research has been done on this instrument by Torrance and his associates. The manual reported a .77 test-retest reliability average for twenty-one different administrations. There are numerous studies which seem to substantiate construct, content, concurrent, and predictive validities (Torrance, 1966). However, none of them are very concrete. In short, the validities appear very nebulous.
The Brown-Holtzman Survey of Study Habits and Attitudes, Form H. This survey instrument was developed after eight years of research. It measured aspects of motivation, persistence, and attitudes toward school. This test was divided into seven subscales as follows: (1) Delay Avoidance, (2) Work Methods, (3) Study Habits, (4) Study Attitudes, (5) Teacher Approval, (6) Education Acceptance, and (7) Study Orientation. It took 20 - 25 minutes to complete and has a published test-retest reliability of .95 (Brown and Holtzman, 1964). Using the KR21 formula (Gulliksen, 1950, p. 226), the computed reliability for this study was found to be .989 as measured on the Study Orientation scale, which is a combination of all the other six subscales. Standardized on 772 boys and 698 girls enrolled in the seventh grade at four medium-size, Texas community, junior high schools, the Brown-Holtzman Survey, Form H, was revised from Form C for college students. For the 772 male junior high students the concurrent validity was .41, using one-year grade point averages as criteria (Brown and Holtzman, 1964).

The CREE Questionnaire (1959). Developed by Thelma Thurstone and J. J. Mellinger at the psychometric laboratory at the University of North Carolina, The CREE measured personality variables and traits of known creative scientists. It was developed in researching the personality attributes and qualities of 283 engineers, of whom 142 were known to be creative on the basis of number of patents, inventions, and
ingenious ideas. The other 141 were believed to be "uncreative" on this criteria (Thurstone and Mellinger, 1959). This instrument has 145 questions which are answered by "Yes," "No," or "?" and took about 25 minutes to finish. It has no published reliability or validity figures. However, in this investigation, using the KR$_{21}$ formula (Gulliksen, 1950), the reliability for this questionnaire was found to be .826.
CHAPTER III

ANALYSIS OF THE DATA

The Test of the Hypotheses. In order to test the first hypothesis in regard to divergent thinking, as measured by the Torrance test, the means for the three groups for fluency, flexibility, and originality were determined:

<table>
<thead>
<tr>
<th></th>
<th>Fluency</th>
<th>Flexibility</th>
<th>Originality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basketball Players</td>
<td>39.6</td>
<td>34.6</td>
<td>34.9</td>
</tr>
<tr>
<td>General Activity</td>
<td>36.4</td>
<td>31.8</td>
<td>29.6</td>
</tr>
<tr>
<td>Nonparticipants</td>
<td>36.8</td>
<td>31.4</td>
<td>24.7</td>
</tr>
</tbody>
</table>

In testing the significance of the difference between the means for the three groups, an analysis of variance (Downie and Heath, 1959) was computed on the three scales:

1. Fluency Scale: $X_T = 37.6$

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>$F$ - test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>152.0</td>
<td>2</td>
<td>76.0</td>
<td>$0.5 p &gt; 0.05$ (Not Significant)</td>
</tr>
<tr>
<td>Within</td>
<td>11,282.4</td>
<td>72</td>
<td>156.7</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>11,434.4</td>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Flexibility Scale: $\bar{X}_T = 32.6$

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>152.0</td>
<td>2</td>
<td>76.0</td>
<td>$.8 p &gt; .05</td>
</tr>
<tr>
<td>Within</td>
<td>6,564.8</td>
<td>72</td>
<td>91.2</td>
<td>(Not Significant)</td>
</tr>
<tr>
<td>Total</td>
<td>6,716.8</td>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Originality Scale: $\bar{X}_T = 29.7$

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1,323.9</td>
<td>2</td>
<td>662.0</td>
<td>4.2 p &lt; .05</td>
</tr>
<tr>
<td>Within</td>
<td>11,386.7</td>
<td>72</td>
<td>158.1</td>
<td>(Significant)</td>
</tr>
<tr>
<td>Total</td>
<td>12,710.6</td>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The only significant difference among the three groups on these scales was on originality. The Scheffe technique (Edwards, 1967, p. 266) was used to test various combinations of means. The following comparisons were made:

a. Basketball Players versus General Activity group.

\[ t = 1.1 (p > .05, \text{Not Significant}) \]

b. Basketball Players versus Nonparticipants.

\[ t = 2.9 (p < .05, \text{Significant}) \]

c. General Activity group versus Nonparticipants.

\[ t = 1.3 (p > .05, \text{Not Significant}) \]
d. Basketball Players and General Activity groups combined versus Nonparticipants.

\[ t = 2.5 \ (p < .05, \text{Significant}) \]

Of these four comparisons two were found to be significant. The basketball players surpassed the nonparticipants in originality at the .05 level of significance. There is a strong possibility that basketball is a sport which helps develop original thinking. Perhaps the basketball players were more relaxed, more in tune with their subconscious mental processes, and, consequently, less inhibited in expanding their imaginations. Also, there was a higher mean score for the combined basketball player and general activity groups in comparison to the nonparticipants at the .05 level of significance. The combined basketball player and general activity groups showed a significant difference from the nonparticipants possibly because there was much similarity between the former two groups. The basketball players were not in just this one activity, but many were in several additional school functions. Furthermore, there is a possibility that the basketball player and general activity students were more intelligent, could assimilate more input into their systems, and thus, had a greater probability of thinking up more innovative ideas. In addition, there is the possibility that the basketball players and general activity groups had experienced more success in school and could more readily venture forth mentally in making a "mental leap" by synthesizing more imaginative and original concepts.
In summarizing the status of the first hypothesis (that there was no significant difference in the creative thinking abilities, i.e., fluency, flexibility, and originality of the high school basketball player, general activity, and nonparticipant groups as measured by the Torrance Test of Creative Thinking), the writer found that even though the basketball players had the highest mean raw scores on the fluency and flexibility scales, the hypothesis could not be rejected. However, the basketball players showed a significantly higher mean difference from the nonparticipants on the originality scale. Perhaps, originality calls for more creative strength with a greater complexity demanded of the imagination than does the fluency and flexibility scales. Guilford (1967d, p. 338) felt that fluency and flexibility may not be able to be measured as well as originality. He suggested that originality is more readily developed and influenced by training, whereas fluency and flexibility may not be as easily increased. Also, it could be that intervening or unknown variables were operating.

In order to test the second hypothesis in regard to motivation as measured by the Brown-Holtzman Survey, the means for the groups for the following three scales were determined:

<table>
<thead>
<tr>
<th></th>
<th>Study Attitudes</th>
<th>Study Habits</th>
<th>Study Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basketball Players</td>
<td>47.2</td>
<td>36.0</td>
<td>83.6</td>
</tr>
<tr>
<td>General Activity</td>
<td>46.1</td>
<td>36.5</td>
<td>78.6</td>
</tr>
<tr>
<td>Nonparticipants</td>
<td>40.4</td>
<td>30.4</td>
<td>70.8</td>
</tr>
</tbody>
</table>
In testing the significance between the means for the three groups, an analysis of variance for the three scales was performed:

1. Study Attitude Scale: $X_T = 44.6$

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F - test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>666.2</td>
<td>2</td>
<td>333.1</td>
<td>1.2 p &gt; .05</td>
</tr>
<tr>
<td>Within</td>
<td>20,165.4</td>
<td>72</td>
<td>280.1</td>
<td>(Not Significant)</td>
</tr>
<tr>
<td>Total</td>
<td>20,831.7</td>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Study Habits Scale: $X_T = 34.3$

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F - test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>574.5</td>
<td>2</td>
<td>287.2</td>
<td>1.2 p &gt; .05</td>
</tr>
<tr>
<td>Within</td>
<td>17,629.9</td>
<td>72</td>
<td>244.8</td>
<td>(Not Significant)</td>
</tr>
<tr>
<td>Total</td>
<td>18,204.4</td>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Study Orientation Scale: $X_T = 77.7$

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F - test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>2,080.8</td>
<td>2</td>
<td>1,040.4</td>
<td>1.1 p &gt; .05</td>
</tr>
<tr>
<td>Within</td>
<td>70,019.3</td>
<td>72</td>
<td>972.5</td>
<td>(Not Significant)</td>
</tr>
<tr>
<td>Total</td>
<td>73,100.1</td>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There were no significant differences at the .05 level among the three groups on motivation for any of the three scales: Study Attitudes, Study Habits, or Study Orientation. Even though there were considerable differences in the mean raw scores for the three groups on the Study
Orientation scale, a large amount of error variance was operating and distorted the superficial differences among the three groups. The differences among the means may reflect differences in minority group customs, attitudes, and fundamental motivations. Guilford (1967d, p. 408) has noted that small groups within a broad cultural context may show significant variations in several ways.

In summarizing the status of the second hypothesis (that there was no significant difference in the high energy level and motivation of the high school basketball player, general activity, and nonparticipant groups as measured by the Brown-Holtzman Survey of Study Habits and Attitudes), the writer found no significant differences among the three groups on the motivation component of creativity. However, since the basketball players showed a noticeably higher mean raw score on the three scales than the nonparticipants, another study with a larger sample might show a significant difference. On the other hand, extraneous, uncontrollable variables might have accounted for the apparent differences among the means.

In order to test the third hypothesis in regard to personality traits as measured by the CREE Questionnaire, the means for the three groups were computed:

- Basketball Players 59.2
- General Activity 61.4
- Nonparticipants 51.9
An analysis of the variance between the means was calculated:

\[
\overline{X} = 57.5
\]

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F-test</th>
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<tbody>
<tr>
<td>Between</td>
<td>1,236.5</td>
<td>2</td>
<td>618.2</td>
<td>3.4 p &lt; .05</td>
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<tr>
<td>Within</td>
<td>12,994.5</td>
<td>72</td>
<td>180.5</td>
<td>(Significant)</td>
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<tr>
<td>Total</td>
<td>14,231.0</td>
<td>74</td>
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There was a significant difference at the .05 level among the three groups. The Scheffe method was used to test various combinations of means:

a. Basketball Players versus General Activity group.

\[ t = .6 \ (p > .05, \text{ Not Significant}) \]

b. Basketball Players versus Nonparticipants.

\[ t = 1.9 \ (p > .05, \text{ Not Significant}) \]

c. General Activity group versus Nonparticipants.

\[ t = 2.5 \ (p < .05, \text{ Significant}) \]

d. Basketball and General Activity groups versus Nonparticipants.

\[ t = 2.5 \ (p < .05, \text{ Significant}) \]

Of these four comparisons the latter two were found to be significant.

The general activity group surpassed the nonparticipants in personality traits at the .05 level. Also, there was a significant difference at the .05 level between the combined mean scores of the basketball players and general activity groups in comparison to the mean of the nonparticipants. This suggested the possibility that the personalities of the
former two groups more closely resembled the personalities of creative engineers on the CREE Questionnaire than did the nonparticipants. Creative engineers, according to Thurstone and Mellinger (1959, p. 8), are restless, often get bored easily, and have a wide spread of interests. This may help explain the diversity, vitality, restlessness, and competitiveness of creative people in that they seem to have a need to be continually active. This may suggest a clue to understanding why the nonparticipant does not get involved in extra school functions. He apparently does not have a need to express his personality in this way. This may suggest that the nonparticipant is less versatile and not as "well rounded" as the basketball player and general activity student. Also, one reason why the basketball players were not significantly higher than the nonparticipants on personality may be related to the nature of extra-curricular activities. It could be that the basketball players were not in as much extra school functions as the general activity group. The general activity student may have a greater opportunity for social interaction, leadership role playing, peer and self appraisal, and, thus, possibly a better chance to grow and to develop a more versatile personality.

In summarizing the third hypothesis (that there was no significant difference in the personality traits of the high school basketball player, general activity, and nonparticipant groups as measured by the CREE
Questionnaire), the writer found that the general activity group excelled the nonparticipants at the .05 level of significance. Also, the combined basketball player and general activity groups surpassed the nonparticipants at the .05 level. It may be that certain personality qualities undergo change and growth as a result of regular participation in creative problem solving sports.
CHAPTER IV
SUMMARY AND IMPLICATIONS

Summary

After reviewing the literature on creativity, the author surmised that basketball is a game which may involve complex problem solving closely related to the creative processes of the imagination. Three major hypotheses were formulated in attempting to measure five components of creativity: (1) fluency, (2) flexibility, (3) originality, (4) high energy level (motivation), and (5) personality variables. These hypotheses were as follows:

Hypothesis 1. There is no difference in the creative thinking abilities (fluency, flexibility, and originality) of the high school basketball player, general activity, and nonparticipant groups as measured by the Torrance Test of Creative Thinking.

Hypothesis 2. There is no difference in high energy level (motivation) of the high school basketball player, general activity, and nonparticipant groups as measured by the Brown-Holtzman Survey of Study Habits and Attitudes.

Hypothesis 3. There is no difference in personality traits of the high school basketball player, general activity, and nonparticipant groups as measured by the CREE Questionnaire.
Participants in the study were seventy-five male students divided into three groups of twenty-five basketball players, general activity, and nonparticipant students. These students represented three public high schools in Tucson, Arizona.

An analysis of the data from the Torrance test of the first hypothesis suggested the following conclusions: (1) there were no significant differences among the three activity groups for the fluency and flexibility scales; (2) on the originality scale there was a higher mean score for the basketball players in comparison to the nonparticipants at the .05 level of significance; and (3) there was a higher mean score for the combined basketball player and general activity groups in comparison to the nonparticipants at the .05 level of significance. Thus, the first null hypothesis was rejected in part for certain comparison of the originality scale. However, the first null hypothesis could not be rejected for the fluency and flexibility scales.

An analysis of the data from the Brown-Holtzman Survey of the second hypothesis warranted the following conclusion: There were no significant differences among the three high school groups in high energy level (motivation) as measured by the Study Attitudes, Study Habits, and Study Orientation scales. Therefore, the second null hypothesis was not rejected for any of the three motivation scales for the three activity groups.
An analysis of the data from the CREE Questionnaire of the third hypothesis suggested the following conclusions: (1) there was a higher mean score for the general activity group in comparison to the nonparticipant group on certain personality traits at the .05 level of significance; and (2) there was a higher mean score for the combined basketball and general activity groups in comparison to the nonparticipants at the .05 level of significance. Thus, the third null hypothesis was rejected in part for these two comparisons.

Implications of the Study

Many of the basketball players who participated in this study are involved in additional school activities. Therefore, it is recommended that, if possible, a separate study of "pure" basketball players who are in no other activities or who are limited to only one or two additional activities be compared separately to the general activity group. There appeared to be much overlapping of these two groups in this research. In addition, another study might be done on one group of basketball players whose main recreational interests are in other sports in comparison with another group of basketball players whose main avocational interests are in intellectual activities.

Intelligence is an important contributing factor in eliciting creative expression. It is generally agreed by most researchers such as Guilford, Getzels and Jackson, and Torrance that above an I.Q. of 120
there is no correlation between intelligence and creativeness. However, an average intelligence or above is usually needed to demonstrate effective creativeness. Since this study was limited by not administering a conventional intelligence test to the three groups, the administration of such an instrument would reveal if the three groups have an equal mean intelligence. The nonparticipants might have significantly lower intelligent quotients than the basketball player and general activity groups. Another way of approaching this would be to correlate the intelligence tests with the creativity scores of the three groups in order to determine what, if any, relationship exists between intelligence and creativity of the three groups.

Two logical questions to ask at this juncture of the study are as follows: Did the basketball players develop qualities of originality and creative personality measures as a result or end product of the sport, or were their physical movement skills and creative assets responsible? This dilemma suggests the possibility of a longitudinal study beginning in grade school and carried through to high school. Two things would be needed: first, determination of physical dexterity and mental alertness of certain students in predicting successful basketball players; and, second, administration of a selected creativity test in grade school and later in high school.
Similar results of this investigation may be found in other sports which seem to require similar cognitive, psychomotor, and perceptual abilities of basketball, e.g., soccer, lacrosse, field and ice hockey.

There appears to be some relationship of original thinking and personality measures to one's participation in extra-curricular activities. Divergent thinking is intimately connected with the process of acquiring information. As more information is stored, there is a higher probability of diversity and originality in problem solving. As an example of this, Guilford (1965) illustrated how a large vocabulary enhances the chances of a writer being more creative. In this research the data on originality and personality measures suggested the possibility that the basketball player and general activity groups had available more related input in their storage systems than the nonparticipants and, therefore, could express more output in this sport and extra-curricular functions. Thus, it appears that participation in any extra school activity may help enhance one's creative output.

Educators might seek ways to allow the nonparticipants to develop and to express more of their creative abilities, whatever these high school students' reasons, motives, and abilities are for not wanting to become involved in any extra school activity. Thorndike (1927, p. 7) proposed that originality, initiative, and self-reliance be developed in passive, indifferent students by permitting them to do rewarding projects on their
own. This might encourage them to become more active, energetic, and independent thinkers. Furthermore, it could instill in them a feeling of success, accomplishment, and competence. Eventually, such satisfying and rewarding creative projects might be instrumental in helping the non-participants to acquire wider interests in other learning activities and extra-curricular functions.

Self-realization is a cardinal objective in education. However, too often the individual and his creative potential are diminished in being relegated with the masses in the educative machinery.
APPENDIX

SCHOOL ACTIVITY QUESTIONNAIRE

Name__________________________Grade____

Directions: Check the box beside each activity in which you are a member and have participated in regularly this school year.

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<td>1.</td>
<td>Did not participate in any extra school activity program.</td>
<td>17.</td>
<td>Biology club</td>
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<td>2.</td>
<td>Baseball team</td>
<td>18.</td>
<td>Physics club</td>
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<td>3.</td>
<td>Football team</td>
<td>19.</td>
<td>Spanish club</td>
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<td>4.</td>
<td>Basketball team</td>
<td>20.</td>
<td>Latin club</td>
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<td>5.</td>
<td>Wrestling team</td>
<td>21.</td>
<td>French club</td>
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<td>6.</td>
<td>Cross country team</td>
<td>22.</td>
<td>German club</td>
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<td>7.</td>
<td>Track team</td>
<td>23.</td>
<td>Math club</td>
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<td>8.</td>
<td>Golf team</td>
<td>24.</td>
<td>Rifle club</td>
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<td>9.</td>
<td>Student government</td>
<td>25.</td>
<td>Bowling team</td>
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<td>10.</td>
<td>Debate team</td>
<td>26.</td>
<td>Future Teachers of America</td>
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<td>11.</td>
<td>History club</td>
<td>27.</td>
<td>Future Farmers of America</td>
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<td>12.</td>
<td>Journalism club</td>
<td>28.</td>
<td>Future Doctors or Nurses of U. S.</td>
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<td>13.</td>
<td>School newspaper</td>
<td>29.</td>
<td>Geography club</td>
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<td>15.</td>
<td>Art club</td>
<td>31.</td>
<td>Cheerleaders</td>
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<td>16.</td>
<td>Science club</td>
<td>32.</td>
<td>Pom Poms</td>
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</table>
☐ 33. Swimming club
☐ 34. Dance band

Other activities not listed please write below (if participated in):

☐ 35. ______________________
☐ 36. ______________________
☐ 37. ______________________
☐ 38. ______________________
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Counts, George S. *Dare the School Build a New Social Order?* New York: The John Day Company, 1932.


Torrance, Ellis P. **Constructive Behavior: Stress, Personality, and Mental Health.** Belmont, California: Wadsworth Printing Company, 1965a.


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