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## An Investigation Of The Relationship Between Creativity And Socio-Economic Status, Race And Sex Of Seventh-Grade Pupils.

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AN INVESTIGATION OF THE  
RELATIONSHIP BETWEEN CREATIVITY AND  
SOCIOECONOMIC STATUS, RACE AND  
SEX OF SEVENTH GRADE PUPILS

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A Dissertation

Presented to

The Faculty of the School of Education  
University of the Pacific

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In Partial Fulfillment of  
the Requirements for the Degree  
Doctor of Education

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by

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July 1973

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AN INVESTIGATION OF THE RELATIONSHIP  
BETWEEN CREATIVITY, SOCIOECONOMIC STATUS, RACE  
AND SEX OF SEVENTH GRADE PUPILS

Abstract of Dissertation

The Problem

This study investigated the relationship between the selected variables of socioeconomic status (SES), race and sex of seventh grade students as measured by the Torrance Tests of Creative Thinking.

Procedures

The Torrance Tests of Creative Thinking, Verbal Form A and Figural Form B were administered to 192 seventh grade students. Forty-eight Asian, 48 black, 48 Spanish surnamed and 48 white students each equally distributed across the SES levels were chosen using a partially stratified random sampling procedure. Half of each group was male. The data were analyzed using a three way analysis of variance procedure.

Findings

This study demonstrated that simple explanations of racial, sexual or SES differences in creative ability are probably not valid. These variables interact in such a way that simple statements that females score better than males or high SES pupils score better than low SES pupils or whites score better than nonwhites must be qualified in terms of how the three variables interact differentially.

a) In the Torrance Figural subtest analyses the following results were shown:

1. Significant three way interactions were noted for Figural Fluency and Figural Flexibility.
2. Significant main effects for race and SES were indicated for Figural Originality.
3. Significant main effects for race were shown on the Figural Elaboration subtest.

b) In the Torrance Verbal subtest analyses the following results were shown:

1. Significant two way interactions among the variables of SES and sex were indicated for Verbal Fluency and Verbal Originality.

2. Significant main effects were noted for all three variables on the Verbal Flexibility subtest.

c) Generally, high SES subjects scored better than low SES subjects; females scored better than males; white and Asian subjects scored better than the black and Spanish surnamed performed at about the same level.

### Recommendations

1. The interrelatedness of the factors of SES, race and sex upon creative thought was dramatic and it is recommended that future studies should not attempt to assess one of these variables without providing for the possible interaction of the other variables.

2. Future studies should replicate this study in the identification and assessment of creativity among different levels of SES for other major racial/ethnic groups as well as black and white groups.

3. This study should be replicated varying the order in which the tests are given as lack of motivation seems to have exerted a strong influence upon the performance of the blacks and Spanish surnamed students on the verbal portions of the Torrance Tests of Creative Thinking.

4. The results of this investigation suggest that studies should be initiated which focus upon the developmental aspects of creativity as affected by the emergence of adolescence.

5. The fact that females scored significantly higher in areas in which males usually score highest suggests that future studies stress the inclusion of sociocultural factors upon sex differences in creative thinking, e.g., the findings related to the Spanish surnamed male and female performances contrasted with the findings of the other three racial groups.

## ACKNOWLEDGMENTS

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## Chapter I

### INTRODUCTION

Within the past fifteen years much has been written about the creative individual . . . his identification, assessment and the utilization of his exceptional talent (Guilford, 1967; Taylor, 1970; Torrance, 1966 and 1969). Brim (1963) states the following as reasons for the increased interests:

We are in an age of exciting explorations in intellectual capacity. Our conceptions concerning the nature, development, and limits of mental functioning are undergoing radical change. A revolution in educational curriculum, method, and philosophy is in the making.... Perhaps the most active ferment is in the area of creative thinking (p. 76).

Smith, (1966) similarly relates that it has only been in recent years that interest has developed in the creative process. This change has largely come about with the realization of the value of creative talent to the democratic way of life in terms of leadership development, economic and social stability and perhaps, survival. Unfortunately, the increased interest in creative thinking has not been matched by an increase in reliable research. In fact, most "knowledge and understanding about creative thinking are yet in a relatively underdeveloped state" (Torrance, 1966, p. 1).

To add to the problem, educators know even less about creative potential in those groups who for cultural and socioeconomic reasons are not in the mainstream of American life. Their talents are neither identified nor utilized. This study will add to the body of information

needed about creative thinking as it affects selected variables of race, sex and socioeconomic status (SES) background.

## THE PROBLEM

### Statement of the Problem

Creativity has been studied primarily as a mental attribute which is equally distributed across all segments of the population, but the tests that are used to assess creative behavior have been normed primarily on white, middle-class elementary school children. It is highly likely, therefore, that the tests are biased and do not fairly assess the creative talents of children of different SES, races, and sex. At the late elementary and junior high levels, it has been shown that creative behavior declines (Torrance, 1964). Since the need for creative thinking increases as our lives become more complex, it is important to know where creative talents are not being developed so that they can be fostered. If the tests presently used to detect creative behavior are biased in terms of race, sex or SES, this information must be obtained to counteract the inhibitory effects that the misinformation would cause.

## RATIONALE OF THE STUDY

### Purpose of the Study

This study was designed to assess whether the Torrance Tests of Creative Thinking were biased against certain racial/ethnic groups, SES groups, or either sex. The population sample for this investigation included 192 seventh grade boys and girls selected from the total Stockton, California and Berkeley, California Unified School District populations. Forty-eight Asians, 48 blacks, 48 Spanish surnamed, and

48 white students each equally distributed across SES levels were chosen using a stratified random sampling procedure. Half of each group were male and half were female. The students were equally represented in each of the two school districts.

The Torrance Tests of Creative Thinking, Verbal Form A and Figural Form B were administered by the investigator to all of the students in this study. Students were tested in groups ranging in size from 22-32 students. Testing took place between January 16 and March 2, 1973. The tests were scored by Personnel Press Scoring Service in Athens, Georgia. All other data was collected by the investigator. The statistical analysis used to assess the null hypotheses was a 2x3x4 analysis of variance.

#### Justification for the Study

The efforts of researchers to identify creative potential in individuals in the inner city schools is a critical problem because the variables are many and often interrelated and the instruments designed to measure this potential lack the ability to provide such children a fair chance to perform in a gifted manner (Torrance, 1971). To complicate this problem further, a number of studies (e.g., Bloom, Davis and Hess, 1965; Frost and Hawkes, 1970; Kennedy, Van de Riet and White, 1963) extending over many years have shown that economically disadvantaged and culturally different groups usually perform quite poorly on most measures of mental functioning such as intelligence tests, measures of cognitive development, and educational achievement test batteries. The conclusions of the research of Deutsch, Katz and Jensen (1968) are representative of those conclusions reached by the longitudinal studies cited above. The results are as follows:

Standardization on a white sample. When one cultural group is administered an intelligence test which has been constructed for and standardized on another cultural group, the former consistently scores lower. When this effect is applied to the present situation, the Negroes would be expected to score below norms on a white sample.

Socioeconomic status and caste systems. A number of studies have shown that people of lower socioeconomic status typically receive lower intelligence scores than those from higher socioeconomic backgrounds. In unison, Negroes as a group not only are of a lower socioeconomic status but also form a separate caste system in many parts of the United States in that they are denied many of the social opportunities available to even the very lowest of Caucasians.

Language. A number of investigators have commented that the language used by many Negroes differs considerably from that used by most American Caucasians. As language is an important part of most intelligence tests and as they are standardized on white samples, the language factor represents a handicap to the Negro subject.

Education. Because education has been identified as an influential factor in intelligence tests, the inferiority of the Negro schools, particularly in the South, has been another great handicap to Negro performance....

Motivation. In line with the evidence that various cultural groups differ in their motivation to perform well on tests, several investigators have observed that Negroes are not as highly motivated or are motivated in different ways than Caucasians (Deutsch, Katz and Jensen, 1968, p. 36-37).

These conclusions raise the question whether tests which purport to measure creative performance are also biased against economically disadvantaged and culturally different groups. Whether such tests are biased or not has yet to be determined by researchers. A survey of the history of creativity tests provides some insight into the problem of test bias. Prior to 1950, scientifically researched studies on creativeness were a rarity (Taylor, 1963). Up until the middle 50's, attention was focused on convergent thinking processes which consisted of memorizing, thinking critically and seeing relationships in terms of a particular culture. The problem with this early research was summarized succinctly in the following statement:



The accepted belief among most educators was that creativity was an intangible quality, found only in a few people, which could not be researched. It was often called "talent" and creative people were thought to be different or queer. Little was known about the divergent thinking processes or about the manner which creative talent was developed. Our intelligence tests such as those developed by Binet were supposed to measure giftedness in children, but creativity is a kind of giftedness and these tests did not identify creative children. The difficulty lies in the fact that all items in the Binet test deal with convergent thinking principals. Every test since the Binet has been validated against it. Consequently, the I.Q. test has continued over the years to measure only convergent thinking processes (Smith, 1966, p. 13).

In addition, the Binet and other I.Q. tests were normed on a white sample population with the larger proportion of the sample group of higher SES background. Differences among various racial/ethnic and SES groups are not reflected in these studies.

Current research in creativity tests was greatly enhanced by the work of Guilford and associates at the University of Southern California. In 1954, Guilford and his associates contracted to do research for the Office of Naval Research. Many new tests were developed and administered to students and military personnel. When the results were analyzed, three factors appeared to be most closely associated with creativity or divergent thinking: fluency, flexibility, and originality (Guilford, 1954). Guilford's new tests included the two new concepts found in Taylor's creativity tests (Taylor, 1947), ideational fluency and word fluency, plus other identifiable factors such as associational fluency (listing as many words as possible that are similar in meaning to a given word), expressional fluency (making as many sentences as possible using a series of four letters) and originality, (uncommonness of response) (Goldenson, 1971; Guilford, 1960). Guilford was able to factor out a total of 15 characteristics of creative thinking, a major breakthrough in the concept of creative

assessment and identification. The difficulty with Guilford's test of creativity was that the scoring procedures were difficult, elaborate and too time consuming.

Recently, Kogan and Wallach, (1965) and Ward, (1971) have conducted studies in the identification of creative talent. The two major factors assessed by their tests were ideational fluency (convergent thinking) and uniqueness (divergent thinking). No significant differences could be noted with regards to pupil performance on either test. However, unlike most of the previously cited studies, Kogan, Wallach and Ward attempted to assess the performance of a wider range of pupil ability, racial/ethnic and sex differences. Upper middle class white students were compared against lower SES black children. They found no significant differences in the performances of the two racial groups when compared against the variables of SES and sex.

Although the previously cited studies did not reveal any significant differences in the performances of pupils as affected by the selected variables of sex, race and SES, they did represent models of the kind of research needed to better understand creative talent. Of all the creativity tests developed, E. P. Torrance's have been subjected to the most sustained research and development effort. They were particularly useful as they were developed as part of a research program focused on experiences that foster creativity in the classroom (Goldensen, 1971). The Torrance tests were selected, for this study, over other test instruments for the following reasons:

1. They represented over nine years of sustained research and development by Torrance and numerous associates (Torrance, 1966, p. 2).
2. The tests could be administered easily as group tests (Torrance, 1966, p. 2).

3. The tests could be used with persons who could not write or who wrote with great difficulty (Torrance, 1966, p. 2).

4. The type of tasks or activities selected and used in the tests were those that could be most easily and economically administered and scored (Torrance, 1966, p. 2).

5. Their tests of reliability and validity were highest while at the same time sampled as many different kinds of representations of creative thinking ability as possible (Torrance, 1966, p. 2).

6. The tests were deliberately designed to obtain a maximum of testing time (Torrance, 1966, p. 3).

7. Torrance (1971) judged his creativity tests to be relatively free of test bias.

The reasons cited above indicate that when we speak of creative thinking today it is not with the same meaning given to that word 30 years ago. Today creativity is viewed in terms of an innate ability found in all people in varying degrees. The major problem is in discovering ways to release it (Smith, 1966, p. xii).

Studies such as this one are therefore needed to provide more insight into how children from different life styles perform in relation to the different variables in order (1) to develop a more humane kind of education that will provide such children greater opportunities to achieve their potentialities; (2) to provide children more options to demonstrate their creative abilities; and (3) to better assess and predict the creative potential of such children (Torrance, 1967).

#### HYPOTHESES

The following hypotheses were selected for investigation:

1. There are significant differences in the creative performance of seventh grade students of different SES as measured by the Torrance Tests of Creative Thinking.

2. There are significant differences in the creative performance

of seventh grade students of different racial backgrounds as measured by the Torrance Tests of Creative Thinking.

3. There are significant differences in the creative performance of seventh grade male and female students as measured by the Torrance Tests of Creative Thinking.

#### Statistical Procedure

This study was designed as an ex-post-facto survey-type study. Measurements of creative thinking ability were collected after the independent variables of SES, race, and sex had exerted their influences upon the selected subjects. A 2x3x4 analysis of variance was used in this study to assess the differences among the various groups. One analysis assessed the independent variables of race, sex and SES with the dependent variable, the Figural Test of the Torrance Tests of Creative Thinking. The other analysis assessed the same independent variables with the dependent variable, the Verbal Test of the Torrance Tests of Creative Thinking.

#### Limitations

1. Since the sample population will be drawn from only two large urban populations, the application of the findings of this study will be generalizable to students from similar environments.

2. No attempt will be made to account for those students who agreed to participate in the study, but for reasons of their own decided not to participate.

3. Only seventh grade students will be measured in this study.

## Definitions

Creativity. The definition of creativity will be assumed to be the same as that measured by the instruments selected. Thus, creativity is viewed as: "a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results" (Torrance, 1966, p. 6).

Fluency. The "ability to produce a large number of ideas" (Torrance, 1966, p. 72).

Flexibility. The "ability to produce a variety of kinds of ideas, to shift from one approach to another, or to use a variety of strategies" (Torrance, 1966, p. 73).

Originality. The "ability to produce ideas that are away from the obvious, commonplace, banal, or established" (Torrance, 1966, p. 73).

Elaboration. The "ability to develop, embroider, embellish, carry out, or otherwise elaborate ideas" (Torrance, 1966, p. 75).

Verbal. The term as used in this study refers to written responses to test items.

Figural. The term as used in this study refers to drawing responses to test items.

Socioeconomic status. This term is used to mean "an individual's position in a given society, as determined by occupation, income, house type, residence, and education" (Warner, 1960).

## SUMMARY

The problem for this investigation was to study the relationship between creativity and the selected variables of sex, race, and SES of seventh grade students. The Torrance Tests of Creative Thinking were used to measure the creative performance of these groups.

Testable hypotheses were derived from the research problem and data on 192 subjects were statistically analyzed by using a 2x3x4 analysis of variance. Data on the relationship of SES, race and sex were controlled statistically to determine the influence of these variables on the scores obtained from the children on the creativity tests. A review of the literature regarding the nature of creativity and the relationship of creativity to the selected variables of this study will be presented in the following chapter.

## Chapter II

### REVIEW OF THE LITERATURE

In this chapter a review of research and related studies in creative thinking will be presented. The first section contains studies regarding the nature of creative thinking. Section two will discuss studies related to the relationship between creativity and socioeconomic status (SES). The third section will review research of the relationship between creativity and racial/ethnic differences. Section four will review the literature on the relationship of creativity and sex differences.

### THE NATURE OF CREATIVE THINKING

#### The Development of Creativity from 1919-1950

"There is no universally agreed upon definition of creativity, and hence there are no measures of it which are in any degree as widely accepted or used as the IQ metric is for intelligence" (Getzels, Dillon, 1973, p. 698). Nonetheless, the interest in creativity has led to the emergence of innumerable studies, articles and books on the subject which provide a basic body of knowledge to explain what is commonly meant when the term "creative thinking" is cited (Smith, 1966). Table I lists bibliographies of the major contributions to the field from 1919-1970. An analysis of this table reveals that most of the research in the area has occurred since 1950. The review of literature cited in this chapter will reflect this change in emphasis over time.

The first major bibliography on creativity (Henry, 1924) listed 453 references including all the literature appearing in the three preceding decades, whereas one bibliography for the decade of the 1950's (Deutsch and Shea, 1958) listed nearly twice that number, and one bibliography for the first five years of the 1960's listed nearly three times that number (Gowan, 1965).

Hutchinson (1931) in an early review of the literature and materials for the study of creative thinking concluded that such research studies and materials did not exist except as related ideas from other fields of study because no one had yet made a significant impact on the field of creativity. This profusion of studies on creativity was not matched by a profusion of findings, for creative potential was still largely defined and assessed in terms of intellectual ability. Osburn and Roban (1931) stated that

The greatest characteristic of capability is the ability to create. This is the highest activity of man...the great heritage of the capable pupil and the chief reason why we can ill afford to neglect him (p. 37).

Osburn and Roban's study represents one of the few earlier studies which defined creative thinking as an ability other than high intelligence. However, it was not until the 1950's that any major departures in the research on the nature of creative thinking took place.

In the years 1919-1950 the concept of creativity was thus synonymous with high intellectual potential. This was largely brought about through the development of the intelligence test and its extensive use in an early study of genius (Terman, 1925). This study involved some 1,500 children whose average Stanford Binet IQ was approximately 150. Non-intellectually superior abilities were seldomly scientifically studied, nor did they receive much attention in the fields of education and psychology (Getzels, Dillon, 1973). Other studies (Cox, 1926;



Table I

\*Selected Bibliographies And Reviews On Giftedness, 1919-1970

Compiler	Date	No. of Entries	Earliest & Latest Entry	Special Characteristics
Whipple	1919	124	1873/1918	12 non-English & 7 pre-1900 titles.
Henry	1920	157	1891/1919	11 non-English & 6 pre-1900 titles.
Terman & Chase	1920	95	1913/1919	14 non-English titles; reviews research on genius for 1913-1919.
Henry	1924	453	1891/1923	24 non-English & 206 pre-1920 titles; annotated.
Williams	1925	555	1869/1925	24 non-English & 223 pre-1920 titles; annotated and classified.
Cleeton	1926	24	1911/1924	Reviews research on originality.
Hutchinson	1931	152	1860/1931	43 non-English and 39 pre-1920 titles; reviews materials on creative thinking.
Terman & Burks	1933	126	1869/1932	12 non-English & 35 pre-1920 titles.
Noonan & Norris	1938	125	1916/1936	
Newland	1941	91	1930/1940	Reviews research for 1930-1940.
Norris & Noonan	1941	56	1916/1938	
Woods	1944	22	1940/1944	Reviews research for 1941-1943.
Norris & Hayslip	1950	79	1916/1947	Revision of Norris & Noonan, 1941.
Martens	1951	234	1921/1950	Annotated & classified.
Newland	1953	80	1943/1953	Reviews research for 1944-1953.
Miles	1954	414	1853/1953	42 non-English & 83 pre-1920 titles.
Deutsch & Shea	1958	621	1890/1958	Creativity in science, engineering, business & the arts.
Bristow	1959	303	1926/1959	Education of the gifted.
Fliegler & Bish	1959	251	1953/1959	Reviews research for 1953-1959.
Carter	1960	145	1924/1957	Emphasis on 1947-1957.

Holt	1960	718	1924/1960	Annotated & classified.
Pilch	1960-64	481	1938/1964	Education of the gifted.
Stein & Heinze	1960	340	1870/1959	Creativity; annotated & classified; emphasis on 1950-1959.
Gowan	1961	770	1945/1961	For 1950-1960; annotated & indexed.
Witty & DeBoer	1962	53	1925/1962	Annotated.
Birch & Reynolds	1963	57	1958/1962	Reviews research for 1959-1962.
Goldberg	1965	225	1920/1964	Education of the talented; classified.
Gowan	1965	1169	1940/1964	Giftedness & creativity for 1960-1964; annotated & indexed.
Razik	1965	4176	1744/1964	Creativity; classified; emphasis on 1950-1964.
Gallagher	1966	222	1925/1966	Emphasis on 1960-1966.
Gallagher & Rogge	1966	75	1962/1965	Reviews research for 1963-June 1965.
U.S. Office of Education	1966a	275	1957/1965	Education of the gifted; annotated.
Brunelle	n.d.	1199	1965/1966	Creativity.
Educator's ERIC Handbook	1967a,b	142	1960/1965	Education of the gifted; annotated; abstracts of each entry.
Grotberg	1967	53	1952/1966	Annotated.
Journal of Creative Behavior	1967	94	1966/1967	Creativity.
Parnes & Brunelle	1967	153	1956/1967	Creativity; annotated.
Parnes	1967	117	1954/1966	Creativity; annotated; continues Parnes & Brunelle, 1967.
Arasteh	1968	487	1900/1966	Creativity; annotated.
Frierson	1969	58	1960/1968	Reviews research for 1965-1968.
Gallagher	1969	85	1942/1965	Emphasis on 1958-1965.
Roweton	1970	311	1898/1969	Creativity; emphasis on 1950-1969.

McCloy and Meier, 1939; Hollingworth, 1942) cited during this same period followed Terman's experimental model and came to similar conclusions regarding the nature and characteristics of the highly intelligent person and strengthened the concept that high IQ was synonymous with superior creative ability.

### The Development of Creativity from 1950-1970

The period between 1950-1970 was greatly influenced by the research of Guilford, who in his address to the American Psychological Association (1950) called attention to the fact that less than 0.2 of 1% of publications indexed in the Psychological Abstracts for the preceding quarter-century had dealt with creativity. "Guilford's remarks and his own work sparked an explosion of studies in creativity" (Getzels and Dillon, 1973, p. 692). Beginning with Fliegler and Bish's bibliography, a separate section entitled "Creativity" was added to a review of research on giftedness. In 1962 the subject "Creativity" was moved from the index to the table of contents of the Psychological Abstracts; and in 1967 The Journal of Creative Behavior was founded and now has more subscribers than all other related publications combined (see Table I, Frierson, 1969).

### Guilford and Factors of Creative Thinking

Guilford's influences upon research in creative thinking became more pronounced when he and his associates (1954) factored out 15 characteristics of creative thinking. His research suggested that other characteristics possibly existed. The factor analytic approach of Guilford lead him to conclude that

Creative talent is not a single, broad ability parallel to but

distinct from another single, broad variable of 'general intelligence.' Intelligence itself is composed of numerous abilities, and creative performance draws upon very large numbers of them for different purposes and on different occasions, more uniquely upon abilities in the SI-model categories of divergent-thinking production and transformation (Guilford, 1971, p. 86).

The Structure of Intellect Model was a frame of reference for identifying the various intellectual abilities as specified by its three unique properties: its operation, its content, and its product. It has also served the function of generating hypotheses regarding new factors of intelligence.

These divergent thinking processes were defined by Guilford as habits which an individual adopts that require him to examine new ideas from as many viewpoints as possible. It is the kind of thinking "that goes off in different directions. It makes possible changes of direction in problem solving and also leads to a diversity of answers, where more than one answer may be acceptable" (Guilford, p. 381).

Guilford's matrix of divergent thinking factors, shown in Table II, illustrated the variety of thinking processes involved in creative behaviors. Creative products were classified as units, classes, correlates, systems, transformations and implications. The kinds of content were classified as figural, symbolic or semantic. Guilford (1959) defined the various content factors as follows:

1. Word fluency: The ability to produce rapidly words fulfilling specified symbolic requirements (p. 381).
2. Ideational fluency: The ability to call up many ideas in a situation relatively free from restrictions, where quality of response is unimportant (p. 382).
3. Semantic spontaneous flexibility: The ability or disposition to produce a diversity of ideas when free to do so (p. 383).
4. Figural spontaneous flexibility: The tendency to see rapid alternations in perceived visual figures (p. 383).

TABLE II  
Matrix of divergent-thinking factors\*

Kind of thing produced	Kind of content		
	Figural	Symbolic	Semantic
Units		Word fluency	Ideational fluency
Classes	Figural spontaneous flexibility		Semantic spontaneous flexibility
Correlates			Associational fluency
Systems		Expressional fluency	
Transformations	Figural adaptive	Symbolic adaptive flexibility	Originality
Implications	Elaboration*		Elaboration*

\* Now appears to be one factor but it may be confounding of two, a figural and a semantic factor.

Reproduced from Guilford, Personality, 1959, p. 382.

5. Associational fluency: The ability to produce words from a restricted area of meaning (p. 384).

6. Expressional fluency: The ability to produce organized discourse (p. 385).

7. Figural adaptive flexibility: The ability to give up one perceived organization of lines in order to see another (p. 386).

8. Symbolic adaptive flexibility: The ability when dealing with a symbolic material to restructure a problem or a situation when necessary (p. 386).

9. Originality: The ability or disposition to produce uncommon, remotely associated, or clever responses (p. 388).

10. Elaboration: The ability to supply details to complete a given outline or skeleton form (p. 389).

The product categories in Guilford's matrix of divergent thinking factors were formal designations, whereas the content categories previously cited were substantive. Guilford (1967) defined product categories in the following manner:

1. A unit of information is a thing (p. 238).
2. A class is an abstraction from a set of units that hold membership by reason of common properties (p. 240).
3. Correlates correspond to the number of possible relations (p. 242).
4. Systems connotes a particular structure (p. 242).
5. Transformations refer to redefinition or possible changes (p. 243).
6. Implications refer to expectations (p. 244).

Guilford's Structure of Intellect Model shown in Figure 1 represented a multivariate approach to the assessment of creative talent. On the basis of this kind of assessment individual potential would be profiled in terms of a number of scores rather than the frequently used verbal performance score categories.

The multivariate concept regarding the nature of creative

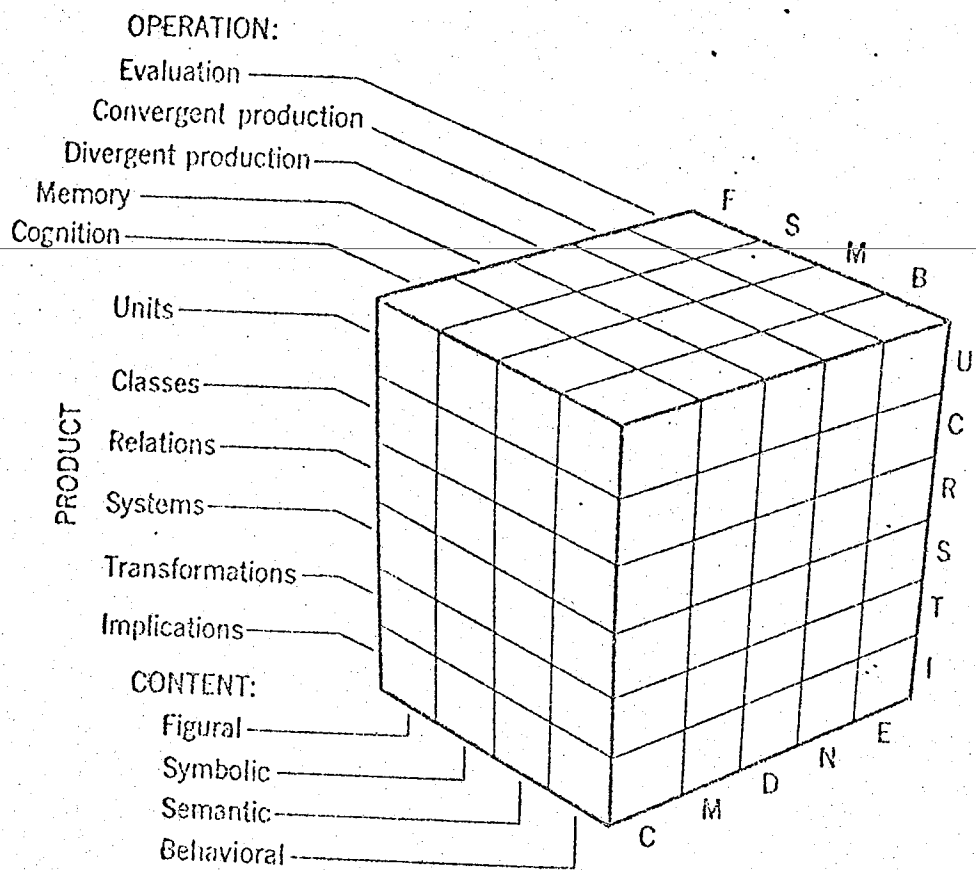


Figure 1 Structure of Intellect Model

Reproduced from Guilford, The Nature of Human Intelligence, 1967.

thinking was shared by C. W. Taylor and his associates (1963, 1964a, 1964b, 1966, 1972). They defined creative thinking as a very complex process. Creative talent, likewise, did not mean the mere accumulation of knowledge and academic grades (Taylor, 1964). To predict creativity reliably one must have obtained measures on a large number of different characteristics and analyzed them collectively to account for a substantial amount of the total creative performance (Taylor, 1972). "No single measure of any characteristic will likely predict as its own distinctive contribution anything as high as 10% of the criterion of creative performance (except in a rare instance)" (p. 149). In addition, the author viewed nonintellectual scores as being more promising as predictors of creative talent than intellectual measures. He stated that intellectual measures were usually too verbal, too speedy and too short to be used as indicators of creativity in less verbal areas (Taylor, 1972).

#### Torrance and Creative Thinking

Torrance (1966, 1972) defined the basic structure of creative thinking as a process consisting of Guilford's (1959) four divergent thinking factors: divergent fluency, flexibility, originality and elaboration in various media (visual, verbal, auditory, kinesthetic and social) in the manner of Guilford (1967). Fluency meant "the ability to produce a large number of ideas" (Torrance, 1966, p. 72). Flexibility was defined as the ability to produce a variety of kinds of ideas, to shift from one approach to another, or to use a variety of strategies (Torrance, 1966, p. 73). Originality referred to "the ability to produce ideas that are away from the obvious, commonplace, banal, or established"



(Torrance, 1966, p. 73). Elaboration was defined to mean the "ability to develop, embroider, embellish, carry out, or otherwise elaborate ideas" (Torrance, 1966, p. 75). Torrance's ideas represented an intuitive approach to the assessment of creative thinking. Guilford's approach represented a statistical approach.

Torrance and Bruch (1972) identified specific differences between creative thinking in children and adults using the same basic structure cited earlier. Children's creativity, according to the two authors, "is qualitatively different in that educators accept as creative that which is new for the child, that which is developmentally en route to a later, more demanding standard of uniqueness, flexibility, or the advanced inferences expected of an adult" (p. 69). As a consequence the identification and measurement of children's creativity is developmentally more difficult to specify than are the creative products of adults. In brief, "tests of creativity in adults may be compared to 'real life' creative productions as artists, scientists, musicians, social scientists, writers, and so forth, but may be compared only to developmentally outstanding creative products by children" (p. 71).

The two authors also viewed creative thinking ability as a quality all persons share. "All children possess some creativity. The creatively gifted demonstrate a better quality or a greater quantity of creative behavior" (p. 69). Strang (1959) concluded the same; "all children and youth have some degree of creativity in one or more of a wide range of activities..and the highly creative person possesses special sensitivity and a superior quality of mind that relates and organizes experiences" (p. 21-22).

The concept that all persons possessed varying degrees of

creative thinking ability represented a sharp departure from earlier concepts of creative thinking which recognized only the highly creatively talented individuals. This view was given a great thrust by the research of Guilford and associates (1954) at the University of Southern California, and its acceptance by other researchers was soon evident (May, 1959, Haefele, 1962).

The Torrance Tests of Creative Thinking reflect the author's concept of ~~creativity as representing a process~~

of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results (Torrance, 1966, p. 6).

Torrance's tests represented a major departure from the factor type tests developed by Guilford and associates (1961). They differed also from the battery developed by Wallach and Kogan (1965) which contained measures representing creative tendencies that were similar in nature. Torrance's tests did, however, retain some of the play qualities developed by Wallach and Kogan (Torrance, 1968).

#### Other Definitions of Creative Thinking

Wallach and Kogan (1965) defined creative talent as a set of mental abilities not distinct from general intelligence. It contained two basic dimensions. First, it involved the ability to produce relevant ideas within some criterion of significance. Secondly, it required the ability to generate many ideas that were unique for the resolution of a given task. Their tests to measure creative ability were structured around these two categories. The first category consisted of convergent

thinking tasks and the latter category of divergent thinking tasks.

William Ward (1971) embraced the model of Kogan and Wallach (1965) and described the nature of creative thinking in terms of fluency and uniqueness of ideas. Fluency was synonymous with the total number of different ideas an individual was capable of producing relative to a given task. Uniqueness referred to the total number of original ideas produced which were both acceptable and given by one and only one individual to a given task. Ward, recognizing that no satisfactory answer could really be given regarding the validity of measures of creativity without external criteria against which to validate them, used the term "ideational fluency" for an explanation of his measures of creative ability. In a study of the creative performance of children (1971) he stated that the tests measured differences in the children's quantity of ideas produced, but not in their quality. The intercorrelation of the performance scores on both of the tests was at .51 for fluency and .46 for uniqueness.

Ward's conclusions regarding the nature of creativity were shared by Mednick, who said that the creative process involved the "formation of associative elements into new combinations which either meet specified requirements or are in some way useful" (Mednick, 1962, p. 221). Consistent with this view was the notion that individual differences in creative talent depended upon differences in the number and relative strength of associations the individual had available that were significantly related to a problem (Mednick, 1962). What this view did not account for, however, was personality and motivational variables.

Guilford's hypothesis that a low correlation existed between intelligence test scores and many types of creative performance (1950)

had a significant influence upon the research of Getzels and Jackson (1962). Like Guilford, Getzels and Jackson rejected the long held concept that the IQ metric measured creative thinking processes or the wider range of mental abilities. The two authors divided intelligence into two categories, convergent and divergent thinking abilities. Convergent ability represented "intellectual inventiveness and innovation" (p. 14). One focused on what was known, the other on what was yet to be known.

The findings of their study with high IQ adolescents and highly creative adolescents showed a low relationship between the IQ metric and measures of creativity as did Guilford's earlier studies. They showed that a relatively high IQ was a necessary but not sufficient condition for high creativity. Adolescents who had high Creativity Quotients had high IQ's, but the possession of a high IQ did not of itself guarantee a high Creativity Quotient.

Although a review of the literature suggested that there was not a commonly agreed upon definition of creativity or measures of it, some salient facts of the research stood out as being most representative of current understandings of creativity. First, the IQ metric and academic achievement were no longer considered synonymous with creativity. Secondly, creative thinking appeared to be a complex process involving many possible mental abilities both convergent and divergent. Thirdly, creative thinking ability was an innate quality all persons shared in varying degrees.

#### THE RELATIONSHIP BETWEEN CREATIVITY AND SOCIO-ECONOMIC STATUS (SES)

SES is a difficult area to research although it is a commonly

accepted view that SES has a significant bearing upon the development and fulfillment of creative potential (Guilford, 1961; Taylor, 1964; Torrance, 1966).

#### Creativity and SES as Reported in Literature from 1919-1950

The period between 1919-1950 found few studies investigating the relationship between creative thinking and SES influences. Terman (1925, p. 64-65) reviewed studies of the origins of superior ability. His research showed that leading American men of science and high positions, French members of scientific academies, and British men and women of genius have come from low SES classes as well as the more advantaged groups. Included in his own group of 1,500 intellectually gifted pupils were children from lower SES. Freud (1922) pointed out that neurosis and genius had common sources in unconscious conflict within the individual. He concluded that the variable that determined which direction human personality would take was one's environment in the early childhood years.

Apart from the studies cited, very little had been researched during the first half of the century regarding the particular effects of social class and caste on creative talent. The period from 1950-1970, sparked by the leadership of Guilford, et al., (1950) revived interest in the study of SES factors upon the identification and cultivation of talent. Joseph H. Douglass (1969), Staff Director of the White House Conference on Children and Youth, cited the loss of potential talent which would never be retrieved and utilized by society as a significant impetus to study the SES and sociocultural factors which influence creative talent. He estimated that some 80,000 of the youth who drop out of high school each year have IQ's within the top 25% of the

population. He also stated that these youth were from varying backgrounds about which little was known. Moreover, "no satisfactory method yet has been devised to discover or predict talent potential among individuals who, for economic and cultural reasons, are not in the mainstream of American life" (Douglass, 1969, p. 7).

#### Factors Which Influence Studies in SES and Creativity

Many reasons have been advanced for the inability to predict creativity. Guilford has indicated that sampling problems were one cause. The testing and retesting process in a very mobile society also discouraged much research, particularly in urban areas (Guilford, 1961).

The composition of the test was considered to be another significant factor which mitigated against more reliable research. Since most tests were normed on middle class, white, advantaged groups and reflected primarily the experiences of these groups, information regarding other populations, e.g., the poor and minority racial/ethnic groups was often neglected because the tests did not reliably assess these differences, nor did they allow those of different backgrounds equal opportunity to demonstrate their creative thinking potential (Getzels and Dillon, 1973).

Testing conditions were also considered to be another important factor which affected performance of groups from different SES backgrounds (Guilford, 1961; Torrance, 1970, 1971). If a child does not feel motivated to display his potentiality, nor feels psychologically safe in doing so it becomes virtually impossible to assess his abilities with any instrument. Torrance (1968) found that disadvantaged black children performed more creatively in the creative workshop atmosphere than when following the procedures outlined in his Technical Manual (1966). In the workshop no tests were given until there had been time for the

creative feelings of the children to become awakened. No time limits were imposed. The pupils did not have to record their ideas nor rely heavily upon reading skills which many of them lacked.

The issue among researchers regarding the importance of hereditary factors upon creative functioning represented another major area of contention regarding the measure of creative thinking in individuals. Anderson (1959) considered biological factors to be crucial to creative talent development. However, he acknowledged that one's environment could either enhance or restrict creative productivity. On the other hand Heim (1970) stated that the opportunities provided by one's environment were the major influence on the creative performance of different SES groups. C. W. Taylor (1972) similarly concluded that education, training programs and various environmental influences were primary factors affecting the development and stimulation of creative potential. The critical issue was the lack of reliable research to clarify to what degree creative talent was affected by environmental influences and what factors allowed for the greatest creative production (Taylor, 1972).

Family environmental influences were determined by Getzel's and Jackson's study (1962) as having a direct bearing upon pupil educational aspirations, occupational status goals and financial aspirations. In this study the high IQ families, mostly of middle and upper SES background, evidenced a strong tendency toward conformity, whereas, the families of children having high creative quotients were more open and less conforming. The latter characteristic was viewed by some as being more conducive to creative production, the former behavior as more inhibiting to creativity. Torrance (1971) stated that in the near future society will have to depend upon creatively gifted members of

disadvantaged and minority cultures for most of society's creative achievements. His hypothesis, though only partially tested (Torrance, 1971), was predicated on the notion that to be a part of the dominant, advantaged culture, a person frequently had to sacrifice too much of his perception of reality and his search for truth to make much of a creative contribution (Torrance, 1971, p. 209).

Torrance (1971) also stated that the creative achievers of our society were those who accepted only those parts of the dominant culture which were true and who held on to their individuality and their minority or disadvantaged culture. Accordingly, "It will be they who possess the 'different' elements, the divine discontent, and the clearness of vision to see that 'the king wears no clothes'" (p. 209-210). Allison Davis (1968) estimated that ghetto and working-class children "comprise the majority of the children at the highest level of academic aptitude in the United States" (p. 1).

Jensen (1969) in an effort to explain social and racial differences in IQ stated "as far as we know, the full range of human talents is represented in all major races of man and in all socioeconomic levels" (p. 78). The problem was how to recognize them (Jensen, 1969), not only in intellectual abilities as measured by psychometric measures, but in many other talents.

Studies into the relationship between creativity and SES have largely focused on limited population samples which do not satisfactorily assess the wide range of sociocultural and SES differences. Wallach (1964) in his study of risk taking between male and female students used middle class subjects from two private colleges of high academic standing. No comparison could be made to groups of either high or low



SES backgrounds. Similarly, in his study of creative thinking of 151 fifth grade students his population sample consisted of suburban children of an upper class New England community. Guilford (1961) investigated the creative thinking processes of 877 ninth grade junior high school pupils. His subjects were primarily of middle and upper SES. Pupils of low SES were not specifically identified and included in the study. Distinctions in sociocultural backgrounds were also absent in his study.

Ward (1971) endeavored to assess the relationship between creativity and SES of a group of urban, black, elementary school children of low SES. He compared their performances on his modifications of the Kogan and Wallach creativity tests with the performance of middle class white students and concluded that there was no significant difference in the performances of the two groups. Ward reached the same conclusion in two additional studies (1971b, 1972). The first study (1971b) involved fourth, fifth and sixth grade urban boys and girls of a predominantly black elementary school. The latter study (1972) included 95 males and 96 females of an urban, black, low SES school community. Performances by both of the groups on each of the two tests used by Ward indicated no significant variance in the tests. Both tests were also highly correlated with IQ and achievement and strongly suggested that the two tests of creativity did not really measure possible differences in the creative potential of individuals.

#### Torrance and SES

Torrance (1971) cited seven major studies comparing the relationship of creativity to SES as evidence that his tests of creativity were relatively free of the kind of biases usually associated with IQ and

achievement tests. A. O. Solomon (1967) investigated the relationship between creativity, sex, SES, and IQ of 722 first, third and fifth grade children from selected schools in the District of Columbia. Torrance's tests (Figural Form A and Verbal Form B) were administered to all subjects. Solomon found that the Torrance test scores had the greatest relationship to SES when the other variables were held constant at the earliest years of school. These relationships diminished as the age and grade level of children increased and did not follow a consistent pattern. In some instances the advantaged students performed better on Torrance's tests; in other instances, the disadvantaged. The findings of Solomon's study suggest that Torrance's tests were relatively neutral toward SES groups. However, like many studies cited earlier in this chapter, Solomon's study focused only upon two divisions of SES and did not attempt to differentiate possible relationships between the degrees of advantaged versus the degrees of disadvantaged. Nor did this study make a distinction between what socio-cultural influences may have had upon creative expression.

Torrance (1971) cited McNamara's study (1964) as another important study in SES comparisons. Both test batteries of Torrance's tests were administered to 94 rural, Michigan elementary students. Forty-seven students were classified as disadvantaged and 47 were classified as advantaged. Each group consisted of boys and girls of grades fourth, fifth, and sixth. The results of the study indicated that the disadvantaged children did significantly better than the advantaged children in their scores on most of the figural test items. However, no statistical differences were found between the performances of the two groups on the verbal form of the test. McNamara's findings suggest a possible

test bias in favor of children from low SES, which is the opposite of what is usually expected. The study, although carefully documented can only be generalized to similar rural type communities.

Tibbett's study in creative thinking (1969) was also cited by Torrance (1971) as an important study which assessed the relationship between creativity and SES. His sample population consisted of 258 tenth, eleventh and twelfth grade students of a San Francisco Bay Area high school. About 40% of the total sample were middle SES. About 35% were middle SES and 25% were lower SES. Random selection procedures were not used in the selection of this sample and therefore cast doubt as to how representative the sample population was of the total school population.

Tibbett's measuring instruments consisted of selected test tasks from the Getzels-Jackson battery (1962) and the Torrance batteries. The Figure Completion Test, the Circles Test and the Unusual Uses: Tin Cans Tests were selected from the Torrance Tests. The Figure Completion Test and the Circles Test were nonverbal tests. The Unusual Uses: Tin Cans Test was a verbal test. Three tests were selected from the Getzels-Jackson battery: Fables, Word Association and Make-up Problems. All three tests were considered verbal tests.

The results of Tibbett's (1969) study did not indicate any significant differences between the performances of different SES groups on the selected creativity test battery. Since only selected tests of the Torrance tests and Getzels-Jackson tests were utilized, the results could not be generalized to the complete battery of the two tests used.

Ross's study (1963) was also cited by Torrance (1971) as one which validated Torrance's earlier views that his tests were relatively

free of test bias. The sample population consisted of 55 high SES and 62 low SES fifth grade, California children. The test consisted of only the figural form of the Torrance tests. The results of this research indicated no statistically significant differences between the performances of the two groups. However, the findings of this study were limited in two dimensions. First, the SES categories were limited to high SES and low SES. The SES range between these two extreme points was unaccounted for. Secondly, only one of the two Torrance test batteries was used which means that no comparisons of the total performance of the two groups on the full range of creative abilities could be made. The findings of the study could only be generalized to the figural creative abilities of similar populations.

Gezi (1969) conducted a study similar to that of Ross (1963). His study was cited by Torrance as added evidence of the neutrality of the Torrance tests to SES factors. Gezi's sample consisted of 40 fifth and sixth grade students from a middle SES background and 27 fifth and sixth grade students from a low SES background in a medium-sized California town. Like Ross (1963), Gezi administered only the figural form of the Torrance tests to the subjects "because it seemed more appropriate to use with students from low socioeconomic levels who are verbally handicapped" (Gezi, 1969, p. 2). Lower class children scored significantly higher ( $P < .001$ ) on all aspects of the creativity measures used in this study. Gezi hypothesized that this difference was due to the greater amount of unstructured leisure lower class children have to create their own play.

Since Gezi's study was restricted to the Figural form of Torrance's test the findings must also be limited to comparisons of

pictorial expressions of creative potential. This same limitation was also true of comparisons of SES groups since it compared only those who were higher and lower.

Smith's (1965) research study cited by Torrance (1971) assessed the relationship between creativity and the variable of SES influence. The subjects were 359 black and 244 white fifth grade children selected from the elementary schools in Pittsburgh, Pennsylvania. Four SES levels were included in the study. Guilford's Structure of Intellect model was used with eight selected tests of creativity: Word Fluency, Ideational Fluency, Associational Fluency, Unusual Uses, Consequences, Making Objects, Circles, and Seeing Problems. The statistical methods used to analyze the data were covariance analysis and factor analysis. The findings of this study indicated that significant differences existed in the creative thinking potential of the various SES groups. The higher SES child performed better in most verbal areas. The lower SES child performed better in the nonverbal areas. These findings were consistent with the research concerning the influence of various SES conditions on the cognitive development in young children (e.g., Bloom, Davis and Hess, 1965; Deutsch, Katz and Jensen, 1968; Frost and Hawkes, 1970; Kennedy, Van de Riet and White, 1963). The major implication of this study was that more research was needed to determine what specific environmental factors were related to SES circumstance and which directly or indirectly influence performance in the various areas of creative thought.

The findings of the studies cited in this section on the relationship between creativity and SES emphasized the need for the study undertaken by this investigator. Research studies in urban areas have been difficult to initiate and control. Urban communities have highly

mobile populations and were very sensitive to the negative use of data, particularly test data. As a result, it has not been easy for researchers to obtain entry to representative sample populations. By contrast this investigator had access to both an urban-suburban bay area community and a rural-urban community in the San Joaquin Valley for his sample populations whereas the other studies were from primarily upper middle class or university-type communities. A full range of upper middle and lower SES groups was equally represented in each of the two communities. Each community represented in this investigator's study also included a wide cross section of cultural backgrounds, which is essential to increase the understanding and assessment of these differences upon creative thought. It is important to note that existent studies regarding SES and creative thought differ significantly in their findings. Moreover, when the Torrance test battery was used as the dependent variable, only two of the studies cited (Solomon, 1967; McNamara, 1964) administered the complete battery of tests to their subjects. It should be noted that in these two studies the subjects were carefully selected from limited sample populations which restricted the degree to which their findings may be generalized.

#### THE RELATIONSHIP BETWEEN CREATIVITY AND RACE

##### Studies of Racial Factors and Creative Talent 1919-1950

Experimental studies of the relationship between creativity and race are few. During the period of 1900-1950 no major studies were conducted which shed any light upon the existence of possible differences in the creative performances of the major racial/ethnic groups in America. Since the concept of creativity was synonymous with high

intellectual ability (Terman, 1925), it was assumed that creative assessment among various races could be determined by comparing their performances on the IQ metric. It was further assumed that since most racial groups did not perform equally as well as whites, on whom the IQ metric was normed, that they would rank lower in creativity than whites. Such an assumption has yet to be established as fact, although it is generally accepted that minority groups, particularly blacks, score significantly lower than other groups on intelligence tests (Dreger and Miller, 1960; Kennedy, Van de Riet and White, 1961; Klineberg, 1963).

#### Studies of Racial Factors and Creativity 1950-1970

Major research which has compared the performances of racial groups on creativity measures was first initiated in the period from 1950-1970. The first significant study was that of Smith (1965). Subjects for the study included 359 black and 244 white children. All were fifth grade students in the Pittsburgh, Pennsylvania school system. Guilford's Structure of Intellect Model was used with eight selected tests of creativity. The statistical methods used to analyze the data were covariance analysis and factor analysis. The findings of this study indicated significant differences between the two racial groups in creative thought. The white subjects performed better on most of the verbal and nonverbal factors. No significant differences were noted when blacks were compared against each other. A reason for this homogeneity in performance is not clear, although Smith hypothesized that the lack of significant variance within the black group may be related to difficulties experienced in sampling, test bias, caste influences or creative inferiority of blacks. As expected, significant differences occurred within the group of white subjects. Comparisons in the creative

abilities of other racial/ethnic groups was not included in this study.

Torrance's first study (1967) represented the first of two major investigations into the relationship between creativity and race. Black students representing the total population of a segregated black elementary school in middle Georgia (grades 1-7) were administered the complete battery of the figural and verbal subtests of Torrance Tests of Creative Thinking. The scores of the black sample group were compared with white children in an elementary school in an advantaged Minneapolis suburb. The results of this study showed that the black children performed significantly higher than the white advantaged students on measures of figural fluency, flexibility and originality. The white students scored significantly better on the figural elaboration and all of the verbal measures. The results of Torrance's study are therefore limited to black-white comparisons and do not provide comparable data on other racial minority groups. It should also be noted that his study did not account for possible differences related to the segregated experiences of the black subjects compared to the nonsegregated experiences of the white subjects. SES levels were not defined in this study. Therefore, no comparisons could be made within and between each racial group.

#### Torrance's Study in Race and Creativity

Torrance's cross-cultural study (1969) represents another major study of racial comparisons in creative thinking. Subjects in his investigation included children from 11 different racial/ethnic groups from grades one through six. The number of subjects from each group ranged from 500 to 1,500 children. The groups studied included the following:

1. A school representing the advantaged, dominant white culture



of the United States, located in a suburban community in Minneapolis, Minnesota.

2. A segregated, relatively rural school representing the disadvantaged, Negro culture of the U.S. Deep South (middle Georgia).

3. A school system representing a racially mixed, advantaged and disadvantaged culture in the United States, located near Los Angeles, California. Samples were drawn from several different elementary schools in such a way as to represent the system.

4. Six schools in the near-primitive culture of Western Samoa. Three were Christian mission schools in the relatively populated areas of the island and three were isolated Samoan government schools.

5. Seven diverse schools in New Delhi, India, representing an underdeveloped but emerging culture, as well as the Muslim, Hindu, Sikh, Christian mission, and Nationalistic subcultures.

6. Two schools in West Berlin which represent an advanced European culture with a long tradition of creative achievement. One school was located in a workingman's district and the other in a suburban community.

7. Two schools in Norway which represent a second European culture with a reputation for lesser creative achievement, one located in an Oslo suburb and the other in an isolated mountain village in the northern part of the country.

8. Two schools in Western Australia representing an English-speaking culture other than the United States. One school was located in a predominantly agricultural area and the other in a suburban area near Perth.

9. Chinese schools in Singapore representing an old and relatively creative culture in a heterogeneous urban area.

10. Malayan schools in Singapore representing the native culture in this same heterogeneous urban area.

11. Tamil schools in Singapore representing a third culture located in this same heterogeneous urban area (Torrance, 1969, p. 150).

All children were administered Torrance's Figural test and six tests of the Verbal battery. Only the figural tests were administered in the first and second grades. The figural and the first three verbal tests were administered in the third grade. All tests were translated into the native languages of the subjects and administered by native-speaking examiners. The results of this study revealed that black

children in Georgia, lower-class children in Los Angeles, California and Western Samoan children performed significantly better than the other culture groups on the figural than on the verbal tests. Torrance concluded that "apparently the ideals of a culture, reflected in the kinds of behavior encouraged and discouraged in its children, are prime motivators for the behavior of those children" (p. 153). Differences then were viewed as differences between cultural groups and not racial groups.

#### Other Studies of Racial Comparisons in Creative Thought

Check's study (1970) represented another major investigation into racial differences in creative expression. His subjects included 600 black and white students in grades four, seven, and twelve from Wisconsin public and parochial schools. From this original list of 600 pupils 272 were administered both forms of Torrance's Tests of Creative Thinking (verbal and figural). An analysis of variance was used as the statistical measure. The findings of the study showed that there were no significant differences between white and black students on either battery of tests. This study, although carefully researched, limited itself to the traditional black-white comparisons. The study would have had greater significance for developing and improving educational programs had the sample included an equal proportion of other minority groups, e.g., Asians, Spanish surnamed and others who are also in attendance in large numbers in many of our schools.

Richmond's study (1968) compared the performances of 34 black and 36 white eighth grade children in segregated schools in a culturally deprived area of Georgia. The cultural background of all subjects was identified as southern rural. All subjects were administered both

batteries of Torrance's tests. The tests were administered on two successive days by the same examiner. A one-way analysis of variance was used to assess differences between the creative performances of the two groups. The results of the study indicated that white students scored significantly higher than the black students on verbal fluency, verbal flexibility, figural flexibility and figural originality. There were no significant differences between white and black students on verbal originality, although blacks scored higher on figural elaboration.

The implications of Richmond's study were limited and inconclusive. The number of subjects in the sample was small and no distinction was made as to the number of each sex included in each group. Without this specific information it was impossible to assess another source of differences, sex. Another observation regarding this study was that the subjects selected did not represent a cross-section of SES groups and other minority groups. Therefore, the results may not be generalized to many populations other than southern rural, segregated white and black communities.

Another study considered important regarding racial comparison in creative ability is that of Covington (1968). The sample population, like Richmond's (1969) cited earlier was limited to lower SES white and black adolescents, ages 13-17 years in grades tenth, eleventh, and twelfth. Only boy subjects were included in the study. Seventy-four black and 109 white males constituted the sample population. The figural battery of Torrance's tests was the instrument used to assess creative potential. Other variables relating to SES, sex and race were not included for comparisons. The results of the study did not suggest any

significant differences between the performances of the two groups.

The results of this study can be generalized to male, black and white population of low SES backgrounds only. Distinctions between sexes, SES levels and other racial and cultural factors are not possible because of the narrow selected sampling used. Since Covington's study was restricted to the figural form of Torrance's test the findings must also be limited to comparisons of pictorial expressions of creative potential. Any other comparisons must be limited to inferences rather than fact.

The study in creativity by Tibbetts (1968) cited earlier in this chapter assessed the variables of race and creativity. The results of his study indicated that the white students scored significantly higher on all the various creative measures than nonwhites. Another finding showed the two highest nonwhite scores were achieved by black male students, whereas, the highest white scores were obtained by females. A difficulty in interpreting Tibbett's study is the fact that he confined his racial groups to two, when in reality the two groups included four racial/ethnic groups. Orientals were listed as whites and Spanish surnamed persons and blacks were labeled nonwhites. Because of these designations it is not possible to assess the finer cultural and racial distinctions among the four groups.

Interest in the cultivation and retrieval of creative talent in minority groups has increased in recent years. Ward's study (1971a) included 191 urban, black elementary school pupils of low SES. Ninety-five were males and 96 were females. Their creative potential was measured by a modification of Wallach and Kogan's creativity tests (1965). The tests were divided into two sections. One part measured

fluency of ideas. The other section assessed uniqueness or originality of ideas. The scores of the black children revealed no significant differences in performances from those of middle class white students on similar tests.

In another study by Ward (1971b) 161 fourth, fifth and sixth grade, urban, black children were measured for creative potential. They were administered two kinds of creativity measures. One included divergent measures and the other convergent measures. The findings of this study did not indicate any significant differences between the performance of these children when compared to that of middle class white children administered the same creativity measures. Another result showed the black pupils' performances were highly correlated with IQ and achievement. Their correlations were .75 and .73 respectively. The convergent and divergent tests performance shared little variance.

The findings of each of the two studies cited by Ward compared only black-white racial groups and children from low and middle SES backgrounds. This limits comparison to other socio-cultural groups and racial groups which is necessary to assess the wider range of possible differences in creative thinking.

The findings of the studies cited in this section on the relationship between creativity and racial/ethnic factors emphasized the need for the study undertaken by this investigator. It is important to note that four racial/ethnic groups were equally included in this study and that these individuals represented a wide range of socio-cultural experience. It should be pointed out that the major studies cited in this section differed significantly in their findings. Moreover, the racial comparisons have been primarily between black and white students

with the exception of Torrance's cross-cultural study (1969). Thus, the broader range of racial and cultural differences have not been subjected to experimental controls to assess possible differences in creative achievement.

### THE RELATIONSHIP BETWEEN CREATIVITY AND SEX

Most major studies into the relationship between creativity and sex tend to be consistent in their findings. In the overall performances of the sexes no statistically significant differences have been noted (Richmond, 1968; Check, 1969; Guilford, 1967; Ward, 1968, 1969, 1971, 1972; Wallach and Kogan, 1965). However, when individual subtests have been analyzed significant differences in performances between the sexes have been shown. Girls have usually performed significantly higher than boys on verbal tasks and boys on nonverbal tasks.

#### Studies of Sex Comparisons and Creativity 1919-1970

Prior to 1950 no major investigations into the relationship between creativity and sex were noted. The studies cited in this section occurred after 1950 when the renewed interest in creative talent assessment was sparked by Guilford (1950).

The research of Wallach and Kogan (1965) represented one of the earlier studies in this area. Subjects included 70 girls and 81 boys. All were fifth grade students of an upper class, suburban, New England community. All of the subjects were white. The overall performances of the two groups revealed no significant differences. However, boys scored significantly higher on the Instances Uniqueness subtest. The authors attributed the difference to the difference in role development.

The study, though significant is limited to the populations to which it may be generalized, namely, white upper class boys and girls.

The study of Richmond (1968) cited earlier in this chapter assessed the performances of 34 black and 36 white eighth grade children in a southern rural Georgia community. All were administered the figural and verbal forms of Torrance's tests. The findings of his study revealed no significant sex differences on either verbal or nonverbal measures. Sex differences were only significant on the figural elaboration.

Females scored higher than males. The results of this study are limited by SES factors as well as the lack of a wider range of racial/ethnic groups for comparisons. The findings cannot be generalized to groups other than low SES, white and black southern rural communities.

Check (1969) hypothesized that males would be more creative than females. However, the findings of his study showed no significant differences in the performances of 272 black and white males and females. Comparisons were made at grades four, seven, and twelve. Although the students were randomly selected from eight schools in Wisconsin and Michigan this study did not make a distinction between SES levels or socio-cultural factors which might have exerted an influence upon the performances of the sexes. Therefore, only very broad generalizations may be made regarding sex differences.

Ward conducted four studies comparing sex and creativity (1968, 1971a, 1971b, 1972). The findings of each study were the same. No significant differences could be distinguished in the performance of either sex. Because of the very limited sampling, his findings may be generalized only to seven and eight year old white males and females.

Torrance and associates (1969) reported few sex differences

below the fourth grade level. After the fourth grade, however, girls have usually excelled boys on all verbal tests and on elaboration in figural tests. Boys, however, have generally scored significantly higher than girls on figural originality and flexibility. Subjects in this study included 59 boys and 59 girls in the fifth grade from three rural Wisconsin counties. All pupils were administered both forms of Torrance's tests. Torrance concluded that the findings of his study were consistent with the greater emphasis in the United States on the verbal development of girls than of boys. Moreover, "most of the masculinity-femininity measures developed in the United States are heavily loaded with verbal factors" (Torrance, p. 55). Torrance explained the female superiority on Figural Elaboration similarly. He stated "In the United States women are expected to make things fancy and work out the details of plans...Boys, on the other hand, seem to be freer than girls to develop their originality, especially in the figural area. Even on the verbal tests, the boys performed comparatively better on originality than on fluency and flexibility" (p. 56). In brief, Torrance stated that his findings of sex differences were directly related to the differential treatment of the sexes and the identification of children with the sex roles of their culture.

This latter view was also shared by Guilford (1967) and was believed by him to be the major cause for the great slump in the creative performances of both sexes at the fourth grade level. This view was stated by Heim (1970) to explain differences in sex performance.

That under present conditions differences exist between men and women in modes of cognition, personality and values seems fairly well agreed-upon. There are more male geniuses, and there are more male criminals, mental defectives, suicides, stutterers, and color-blinds....It is evident that men have been both more



prominent than women and more numerous than women in areas of high achievement, but they have been so by reason of differing opportunities rather than differing abilities. In any case, the issue is not the relative superiority of men or women, but the neglect of talent among those of the female population who are in fact gifted or who may be found to be so (p. 136).

Smith (1965) cited earlier in this chapter represented another experimental study which showed significant differences between the sexes. His study included 359 black and 244 white fifth grade children from Pittsburg, Pennsylvania. A variety of SES levels was studied. His findings indicated that white females consistently achieved significantly higher than white males on all verbal and nonverbal tests of creativity. Black and white females scored significantly higher than the black and white males in all verbal tasks. White males scored significantly higher than black males in nonverbal areas of creativity. White female subjects exceeded the black females significantly in verbal areas of creative ability.

The findings of the studies cited in this section on the relationship between creativity and sex tend to confirm the findings of other studies regarding comparisons of the sexes. When overall scores were compared between the two groups no significant differences were found. The exceptions to this were Smith's and Torrance's study. In their studies when individual scores on subtests were compared, significant differences in performances between the sexes were noted. Females tended to perform significantly better than males on most tests of verbal ability. Males tended to score significantly higher than females on nonverbal measures of creative thought. With the exception of Torrance's cross-cultural study, all of the research cited in this section limited comparisons to the performances of black and white subjects. This investigator's study included Asians and Spanish surnamed subjects as

well as black and white subjects. The inclusion of other racial/ethnic minority groups provided a wider range of cultural differences which, when assessed, may be found to influence sex performances in areas of creative expression.

#### SUMMARY

In this chapter the pertinent literature and research concerning the constructs of this investigation were reviewed. The nature of creative thinking as cited in the literature indicated that there was not any commonly agreed upon definition of creativity or measures of it. However, some salient facts of the research and studies stand out as being more representative of current understandings of creativity. First, the IQ metric and academic achievement were no longer considered synonymous with creativity. Secondly, creative thinking appeared to be a very complex process involving many mental abilities, both convergent and divergent. Lastly, creative potential was an innate quality all persons possessed in varying degrees.

The relationship between creativity and SES as cited in this study pointed out the need for the present study. Experimental studies in urban areas have proven difficult to initiate and control. As a consequence, it has not been easy for researchers to gain access to representative sample populations. Sample populations cited in the studies on SES and creativity represented select populations primarily from upper middle class or university-type communities. A full range of upper middle class and lower SES groups was not represented in the studies cited. These studies did not represent in general a wide cross-section of cultural backgrounds a condition which is necessary to an

increased understanding and the assessment of these differences upon creative thought. It is also important to note that the studies cited on SES differ significantly in their findings.

The relationship between creativity and racial/ethnic factors as stated in the literature emphasized the difficulty researchers have in obtaining access to representative sample populations of the various minority groups who inhabit most large urban areas. It is important to note that racial comparisons have been primarily between black and white groups. The studies between racial comparisons also showed significant differences in their findings.

The results of the studies reviewed tended to confirm the findings of previous studies regarding comparisons of the sexes. When overall creative test scores were compared between the two groups no significant differences in performances were observed. When individual scores on subtests were compared significant differences in performances were revealed. Females tended to perform significantly better than males on most tests of verbal ability. Males tended to perform significantly higher than females on most nonverbal measures of creative ability.

This review has shown that interest in and studies of creativity have increased significantly in the past several years. This increased interest has provided the impetus for the studies, but many of the findings have been either inconclusive or contradictory indicating a need for more research in the area. This study has been designed to provide information which will further clarify the present ambiguous state of research into creativity. Chapter III will include the experimental design and procedures used to carry out this study.

## Chapter III

### METHODS AND PROCEDURES

In this chapter will be presented the sampling procedures, measurement instruments, data gathering procedures and statistical analysis used in this investigation. In the first section the characteristics of the experimental population and sample will be described. The procedures used in the collection of data will constitute the second section, and the third section will include the description of the Torrance Tests of Creative Thinking. The null hypotheses to be tested will be listed in section four, and the statistical treatment which was used will be presented in section five.

#### Demographic Data for Populations

Table III shows the total school population from which the sample in this study was drawn. Subjects for this investigation were 192 seventh grade boys and girls from Stockton and Berkeley Unified School Districts. The city of Stockton is a port city in the Central Valley of California. The major economy of its 117,000 residents rests on agriculture, importing, exporting and food processing industries (Editor and Publisher Guide, 1971). A wide range of socioeconomic (SES) classes as well as different racial/ethnic groups make up this population. The five junior high schools serve 7,244 pupils in grades seven, eight and nine. 52% are white, 9% are Asian, 15% are black, 23% are Spanish sur-named, and less than 1% are American Indian.

### Stockton's Gifted Program

In an interview with Mr. Howard Johnson, Director of Stockton Unified School District's Gifted Minor Program, it was learned that since 1962 most programs for the highly creative pupil have consisted of programs for the academically talented. Special enrichment type activities have been offered during the summer for those students at grades four, five, and six who qualify for certification as gifted minors. At the junior and senior high school levels special courses in academic subject areas are offered to those students identified as academically talented and high achievers. Programs for pupils with high creative potential in nonacademic areas have yet to be developed on a district basis.\*

### Berkeley's Gifted Program

The other city involved in this investigation was Berkeley, California, located across the bay from San Francisco. Its population consists of about 120,000 inhabitants, 67% of whom are white; 25% black; and the remaining 8% Oriental, Mexican-Americans and American Indians. The Berkeley School District's population of 15,500 students reflects the following racial distribution: black, 45%; white, 43%; Oriental, 6%; Mexican-American, 4%; other groups, 2%. School attendance and staffing patterns reflect the racial/ethnic population of the school and community.

The University of California is considered the major industry in Berkeley, although there is a significant industrial complex of more than three hundred firms. The combination of geographic

\* Personal communication with the author, October 3, 1972.

Table III  
Racial and Ethnic Distribution of the Total Population

\* N=7,244 Stockton pupils  
N-2,000 Berkeley pupils

**	Asian	Black	Brown	White
Stockton Junior High Schools	(591) 9%	(1130) 15%	(1718) 23%	(3731) 52%
Berkeley Junior High Schools	(120) 6%	(900) 45%	(80) 4%	(860) 43%

\* These figures represent 99% of the Stockton pupil population and 98% of the Berkeley pupil population.

\*\* Stockton Junior High Schools include grades seven, eight, and nine. Berkeley Junior High Schools only include grades seven and eight. The Berkeley total does not include students enrolled in alternative schools.

location and education-industry provides a rather unique professional people in residence (Foster, 1971, p. 5).

The city of Berkeley became the first American city with a population over 100,000 and a large minority population to completely desegregate its schools. Stockton, on the other hand, is not desegregated and currently has a law suit pending which, if upheld, would lead to the desegregation of its public schools (Stockton Record, 1970).

In an interview with Dr. J. Sink of Berkeley's gifted program it was ascertained that Berkeley's programs for pupils of superior abilities, like most school districts, has largely focused on the academically talented child or "mentally gifted." Berkeley's High Potential Program is different in that the school district has been much more successful in identifying a significantly larger percentage of minority group children who qualify as "mentally gifted." In fact, all racial groups in Berkeley's schools exceed the 3% of students who qualify statewide as "mentally gifted." Pupils K-3 receive special assistance in their regular classrooms. Students in grades 4-6 receive help from a teacher especially assigned to work with those identified as "mentally gifted." Students in grades 7-8 are provided special courses, e.g., computer programming and advanced English. Eligible ninth grade students may attend the Alternative School for the Gifted. Senior High School students also receive advanced course work in a variety of subject matter areas. Programs for pupils with highly creative abilities are being developed to a degree in some of the Alternative Schools, but as yet the school district has not developed district-wide programs for

the students who are very bright in nonacademic areas of ability.\*

The results of this study will be generalized to communities having similar population characteristics.

#### PROCEDURES FOR COLLECTING DATA

##### Selection of Subjects

Subjects were selected from the total student population (see Table III) of Berkeley and Stockton Unified School Districts in grade seven by an initial selection process followed by a stratified random sampling procedure. To guarantee as full a representation as possible in the highest and lowest SES classes, two Stockton schools were identified as having most of the highest SES class students and three Stockton schools were identified as having most of the lowest SES pupils.

In individual conferences with principals of these schools and the seventh grade counselors, five classes from each were selected as representative of a cross section of the seventh grade pupil population. These 25 classes comprised the sample population with one exception. Black and Spanish surnamed students for the upper SES groups comprised such a small N that additional subjects had to be selected from eight other classes within these schools. These classes were chosen by the principals because more black and Spanish surnamed students of upper SES were in those classes.

In the Berkeley schools, the SES groups were evenly distributed due to the school district's total school desegregation and integration policy. The Berkeley schools, unlike the Stockton schools, required some different procedures for gathering data for this investigation.

\* Personal communication with the author, November 10, 1972.



First, the Parent-Teacher Association of each school had to be notified regarding the investigator's research project. Next, approval of the experimental study had to be granted by the Parent-Teacher Association. The arrangements for meeting with the PTA were made by each of the cooperating principals. Approval was granted. Then in individual conferences with each of the principals and the coordinator of staff development, three classes from each of the two junior highs were identified for the sample population. Few students representing the Spanish surnamed group were present in the regular programs. Additional subjects for this group therefore, had to be selected from a class for the bilingual student. This class, together with the six regular classes comprised the sample population from Berkeley. It was necessary in one of the two schools to have letters (see Appendix A) sent home requesting parental permission for the selected students to participate in the study. Conferences were then arranged with those teachers interested in the study to discuss any of their concerns. After the teacher meetings the investigator made visits to selected classrooms to become better acquainted with the pupils prior to the testing situation.

Next the total sample populations from each of the two school districts were divided into four racial/ethnic groups. Then each of these groups was divided by SES and sex as described below.

After the classes were selected, the investigator filled out a small registration form for each student which included name, address, sex, race, house type, dwelling area, and parent's occupation. This information was collected two to four weeks prior to the administration of the Torrance tests to the pupils either from school files or in conferences with the principal and counselor. Since both the sex and race of each pupil had been recorded on the card, only the SES levels had

to be determined.

The SES assigned to the subjects was made using an alternate Index of Status Characteristics (Warner, 1960) based on occupation, house type, and dwelling area. The occupation of the head of each household was matched into one of seven occupational categories and assigned the score for that category. Subjects whose head of the household was the highest occupational category received a score of one and those whose head of the household was in the lowest occupational category received a score of seven. House type and dwelling area were also classified into one of seven categories. Houses considered to be the largest and in excellent condition received a score of one. Houses judged to be the smallest and in poorest condition received a score of seven. Houses in the most desirable areas of each city in this study received a score of one and houses in the least desirable sections of each city received a score of seven. Where there was a question as to house type, the investigator personally examined the structure to insure accuracy.

Using Warner's model assigned scores on Occupation, House Type and Dwelling Area were weighed to obtain a final Index of Status Characteristics score: Occupation score x 5; House Type score x 4; and Dwelling Area score x 3 (Warner, 1960, p. 185). This weighing provided index scores ranging from 12 for the highest SES classification to 84 for the lowest SES classification.

This alternate Index of Status Characteristics correlates very highly at .964 with Warner's Evaluated Participation method of classifying social class (Warner, 1960, p. 174). The Index of Status Characteristics score assigned to each student was the operational definition of SES used in this study. These groups represented the

actual stratified populations from which the subjects were selected using a table of random numbers (Edwards, 1969, p. 206-210).

Once these procedures had been determined, arrangements had to be made at each of the school sites for gathering the data. In the Stockton and Berkeley schools this consisted of individual conferences with the principals, the seventh grade counselors, and/or the staff coordinators of the schools. All testing took place in the morning in either the school library or in a classroom designated for testing use. However, there was one exception. The students in the bilingual class in Berkeley met in the afternoon. Schedule conflicts caused the testing of the Spanish surnamed students to occur on two consecutive days. The students were tested in small groups of 22-32 persons. All students were administered the figural test, then the verbal form. A five minute break was provided between tests.

Testing instructions followed those recommended in the administrator's manual (Torrance, 1966, p. 1-7). All testing was administered by the investigator. Actual testing took place between January 16 and March 2, 1973. All tests were hand scored by the Personnel Press Scoring Service of Athens, Georgia.

#### DESCRIPTION OF THE TORRANCE

#### TESTS OF CREATIVE THINKING

The Torrance Tests consist of four batteries of test activities, two verbal and two figural (Torrance, 1966, p. 2). The verbal tests were designed to elicit written responses. The figural tests were designed to bring forth responses that were mainly drawing or pictorial in nature.

Verbal Form A and Figural Form B were used in this study. The

other two test batteries are alternate forms and were not used. Both batteries of tests can be used from kindergarten through graduate school levels; in groups or with individuals.

The verbal tests consist of seven parallel tasks. Each battery requires approximately 45 minutes to administer in addition to the time necessary for giving an orientation, passing out booklets and giving instructions. Each task is believed to deal with different mental processes, yet each requires the subject to think in divergent directions in terms of possibilities.

The figural tests include three activities with an overall administration time of 30 minutes. One activity is designed to stimulate originality, and elaboration. The other two activities were designed to elicit greater variability in fluency, flexibility, originality, and elaboration.

#### Test-Retest Reliability

Although numerous test-retest reliability studies have been conducted with earlier forms of the Torrance Tests of Creative Thinking, only two studies have been made with all four of the complete batteries being administered to the same individuals. The first study involved 118 fourth, fifth, and sixth grade children in St. Croix, Wisconsin; and the other study involved 54 fifth graders in White Bear, a St. Paul, Minnesota, suburban school. The latter contained an experimental and a control group. The alternate forms of both the verbal and figural tests were administered to the first two groups from one to two weeks apart and to the third group eight months apart (Torrance, 1966). The results indicated the test-retest reliability coefficients are generally higher for the verbal tests than for the figural tests (see Table IV).

The reliability figures shown in Table IV are sufficiently high to warrant their use in this experiment.

### Content Validity

Content validity was based on Torrance's selection of activities which sample those creative activities which previous research had shown were the best indicators of creativity (Guilford, 1959; Kogan, Wallach, 1965; Taylor, 1947). The test stimuli, the test tasks, instructions, and scoring procedures were based on a review of all theories and research available in the field of creativity. "Analyses of the lives of indisputably eminent creative people, the nature of performances regarded as creative research and the theory concerning the functioning of the human mind" (Torrance, 1966, p. 24), have been considered in making decisions regarding the selection of the test tasks. The tests are also relatively free of technical or subject matter content and can be administered at all educational levels.

### Construct Validity

Over 50 studies are summarized in the Torrance Tests of Creative Thinking manual regarding the construct validity of the test comparison of the personality characteristics of persons achieving high scores on the tests with those who achieved low scores (Weisberg and Springer, 1961; Torrance, 1962; Fleming and Weintraub, 1962). Many of these studies also utilized extreme groups without assessing the performance of students in the middle (Dauw, 1965; Runners, 1965; Weiser, 1962). Other studies used weak research designs which compared "creative people" with an unselected sample (Wodtke, 1963; Torrance and Dauw, 1965; Yamamoto, 1960). Weisberg and Springer's study (1961) supported

Table IV

Product-Moment Coefficients of Correlation Between  
Scores on Forms A and Forms B of the Torrance  
Tests of Creative Thinking in Three Situations\*

Measure	Coefficients of Correlation		
	Wisc.	Minn. Sub. Gr. 5	
	Gr. 4-6	Exper.	Cont.
Verbal Fluency	.93	.87	.79
Verbal Flexibility	.84	.84	.61
Verbal Originality	.88	.79	.73
Figural Fluency	.71	.50	.80
Figural Flexibility	.73	.63	.64
Figural Originality	.85	.60	.60
Figural Elaboration	.83	.71	.80

\* Torrance, 1966, p. 21

the notion that highly creative children possessed a greater self-image than those of little creative ability. Fleming and Weintraub's investigation of the relationship between rigidity and measures derived from the Torrance Tests of Creative Thinking among a group of 68 gifted elementary school children correlated at  $-.41$  (significant at better than the  $.01$  level). Yamamoto (1963) used a composite measure based on the same tests as used by Fleming and Weintraub to study the relationship between creativity and originality of 20 fifth graders and 20 sixth graders. Coefficients of correlation of  $.49$  and  $.51$  respectively were obtained in this study.

The results of both of the following studies confirm the concept of the highly creative person as one who has a very flexible personality. Lieberman (1965) investigated the relationship between the quality of playfulness in young children's behavior and fluency, flexibility and originality as measured by the Product Improvement Test and Torrance Tests. The result of her study showed playfulness to be a unitary behavior dimension that correlates significantly with these two measures. The coefficients of correlation ranged from  $.21$  to  $.36$ .

In another study conducted by Torrance (1963) the techniques used by the group to control its most creative member and his method of counteraction were observed. The evidence of the investigation revealed that by grade six, the groups in this study had developed a wide repertoire of techniques for controlling the highly creative individual. The highly creative persons had in turn developed many techniques of counteraction. Control techniques included open aggression and hostility, criticisms, rejection and/or indifference. Counteraction techniques included compliance, counteraggressiveness, unusual persistence and

apparent ignoring of criticism.

Although most of these studies utilized only portions of the Torrance Tests of Creative Thinking as well as weak research designs which showed low but positive correlations, the studies do suggest that the Torrance tests measure behaviors consistent with those defined in the literature on creativity (Buros, 1972).

#### Concurrent Validity

Concurrent validity for the Torrance Tests of Creative Thinking consists of limited studies. A study in peer nominations of creative potential at the elementary school level (Yamamoto, 1960-64) did not correlate very highly, but was statistically significant at .24. Teacher nomination studies as concurrent validity have been investigated by Torrance (1962-1963), Yamamoto (1962), and Torrance and Myers (1962). The results of these studies showed that teachers could differentiate students being the most and least fluent, flexible, original and elaborating in their thinking at or above the fourth grade level. Overall, however, the Torrance Tests of Creative Thinking did not indicate any significant relationship to teacher nominations.

#### Predictive Validity

Predictive validity for the Torrance tests was not available at the time of this study although a variety of longitudinal studies are under way. Preliminary results from one such study (Erickson, 1966) suggests that there could be some predictive validity. This fact has yet to be established, however.



## NULL HYPOTHESES

The null hypotheses to be tested by the statistical analysis were as follows:

H<sub>1</sub>. There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Figural Fluency.

H<sub>2</sub>. There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Figural Fluency.

H<sub>3</sub>. There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Figural Fluency.

H<sub>4</sub>. There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Figural Flexibility.

H<sub>5</sub>. There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Figural Flexibility.

H<sub>6</sub>. There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Figural Flexibility.

H<sub>7</sub>. There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Figural Originality.

H<sub>8</sub>. There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Figural Originality.

H<sub>9</sub>. There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Figural Originality.

H<sub>10</sub>. There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Figural Elaboration.

H<sub>11</sub>. There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Figural Elaboration.

H<sub>12</sub>. There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Figural Elaboration.

H<sub>13</sub>. There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Verbal Fluency.

H<sub>14</sub>. There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Verbal Fluency.

H<sub>15</sub>. There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Verbal Fluency.

H<sub>16</sub>. There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Verbal Flexibility.

H<sub>17</sub>. There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Verbal Flexibility.

H<sub>18</sub>. There will be no significant differences in the performances of sexes as measured by the Torrance Tests of Creative Thinking, Verbal Flexibility.

H<sub>19</sub>. There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Verbal Originality.

H<sub>20</sub>. There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Verbal Originality.

H<sub>21</sub>. There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Verbal Originality.

#### STATISTICAL ANALYSIS

A 2x3x4 analysis of variance was used in this study to assess the differences among the various groups. One set of analyses assessed the independent variables of race, sex and socioeconomic status with the dependent variables, being the four subtests of the Figural Test of the Torrance Tests of Creative Thinking. A second set of analyses assessed the independent variables with the dependent variables, being the three subtests of the Verbal Test of the Torrance Tests of Creative Thinking (see Figure 2).

#### SUMMARY

In this chapter the procedures for conducting this study have been described and the null hypotheses to be tested stated. The statistical analyses, needed to test these hypotheses, were also stated. In the following chapter the results of these analyses will be presented.

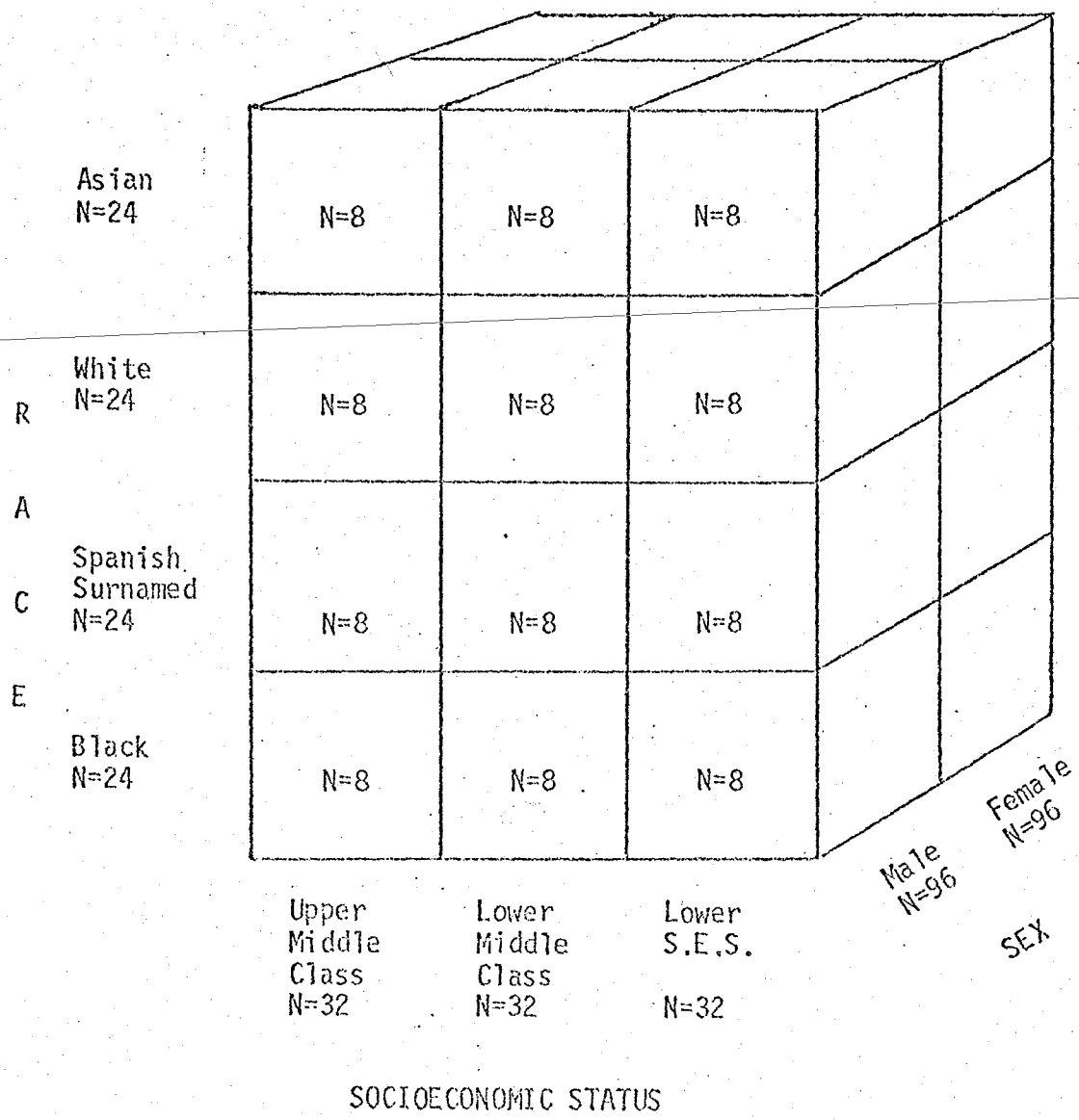


Figure 2. Paradigm For a 2x3x4 Analysis of Variance

## Chapter IV

### ANALYSIS OF THE DATA

In this chapter the statistical results relevant to this investigation will be presented. The independent variables of socioeconomic status (SES), sex and race have been tested against each of the subtest scores of the Torrance Tests of Creative Thinking. Each of the subtests has been used as the dependent variable in the seven separate analyses as follows: (1) figural fluency, (2) figural flexibility, (3) figural originality, (4) figural elaboration, (5) verbal fluency, (6) verbal flexibility, and (7) verbal originality.

#### Torrance Tests of Creative Thinking Figural Subtests

Figural Fluency. Three null hypotheses were stated in Chapter III regarding Figural Fluency and the three independent variables of SES, race and sex. These hypotheses were:

H<sub>1</sub>. There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Figural Fluency.

H<sub>2</sub>. There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Figural Fluency.

H<sub>3</sub>. There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Figural Fluency.

Table V presents summary data relative to the analysis of variance statistic used to test  $H_1$ ,  $H_2$ , and  $H_3$ . The data reported in Table V supports rejection of  $H_1$ ,  $H_2$ , and  $H_3$  as they interact together. The differences between the groups on the variables of SES and sex are large enough to be significant independently; however, the interpretation of these differences must be made in terms of the interaction.

Figure 3 shows that high SES white, black, and Asian subjects scored higher than the middle and low SES white, black and Asian subjects.

However, the opposite was indicated for the Spanish surnamed group. The middle SES Spanish surnamed subjects scored higher than the high SES Spanish surnamed group and significantly higher than the low SES Spanish surnamed subjects. Although a significant "F" score was obtained for SES, this difference must be interpreted in terms of the interaction among the variables which can be seen in Figures 3 and 4. In Figure 3 the high SES groups scored consistently and significantly better than the low SES group, but the low SES white and Asian subjects scored significantly better than the middle SES white and Asian subjects, while the middle Spanish surnamed group scored higher than the high or low SES Spanish surnamed group.

Figure 4 shows that when the variables of sex and race are compared the white, black and Asian female subjects performed significantly better than the white, black and Asian male subjects. Although no significant differences are indicated between the performances of the Spanish surnamed male and female subjects, it is of interest to note that the Spanish surnamed males achieved better than the Spanish surnamed female subjects on figural fluency.

Table V

Summary of Analysis of Variance Results Including Cell, Row and Column Means: SES by Sex by Race with the Torrance Creativity Subtest, Figural Fluency as the Dependent Variable (Post hoc test = Newman-Keuls)

Source	SS	df	MS	F
SES	67.07	2	33.53	3.33*
Race	15.48	3	5.16	0.51
Sex	71.33	1	71.33	7.09*
SES and Race	85.77	6	14.30	1.42
SES and Sex	3.07	2	1.53	0.15
Race and Sex	35.99	3	12.00	1.19
SES, Race and Sex	140.56	6	23.43	2.33*
Error	1691.18	168	10.07	

\* $p < .05$ 

Male					
	White	Black	Spanish Surnamed	Asian	
High SES	$\bar{X} = 32.75$ N = 8	$\bar{X} = 37.38$ N = 8	$\bar{X} = 33.75$ N = 8	$\bar{X} = 32.50$ N = 8	
Middle SES	$\bar{X} = 27.88$ N = 8	$\bar{X} = 34.25$ N = 8	$\bar{X} = 40.88$ N = 8	$\bar{X} = 29.00$ N = 8	Total Male
Low SES	$\bar{X} = 35.50$ N = 8	$\bar{X} = 28.13$ N = 8	$\bar{X} = 25.75$ N = 8	$\bar{X} = 32.50$ N = 8	$\bar{X} = 32.52$ N = 96
Total	$\bar{X} = 32.04$ N = 24	$\bar{X} = 33.25$ N = 24	$\bar{X} = 33.46$ N = 24	$\bar{X} = 31.33$ N = 24	
Female					
	White	Black	Spanish Surnamed	Asian	
High SES	$\bar{X} = 39.25$ N = 8	$\bar{X} = 37.38$ N = 8	$\bar{X} = 34.38$ N = 8	$\bar{X} = 42.75$ N = 8	
Middle SES	$\bar{X} = 38.38$ N = 8	$\bar{X} = 39.50$ N = 8	$\bar{X} = 32.00$ N = 8	$\bar{X} = 32.50$ N = 8	Total Female
Low SES	$\bar{X} = 31.63$ N = 8	$\bar{X} = 35.75$ N = 8	$\bar{X} = 32.00$ N = 8	$\bar{X} = 36.13$ N = 8	$\bar{X} = 35.97$ N = 96
Total	$\bar{X} = 36.42$ N = 24	$\bar{X} = 37.54$ N = 24	$\bar{X} = 32.79$ N = 24	$\bar{X} = 37.13$ N = 24	

High SES	Middle SES	Low SES
$\bar{X} = 36.27$ N = 64	$\bar{X} = 34.30$ N = 64	$\bar{X} = 32.17$ N = 64

	Low SES	Middle SES	High SES
Low SES	--	**	**
Middle SES	--	--	**

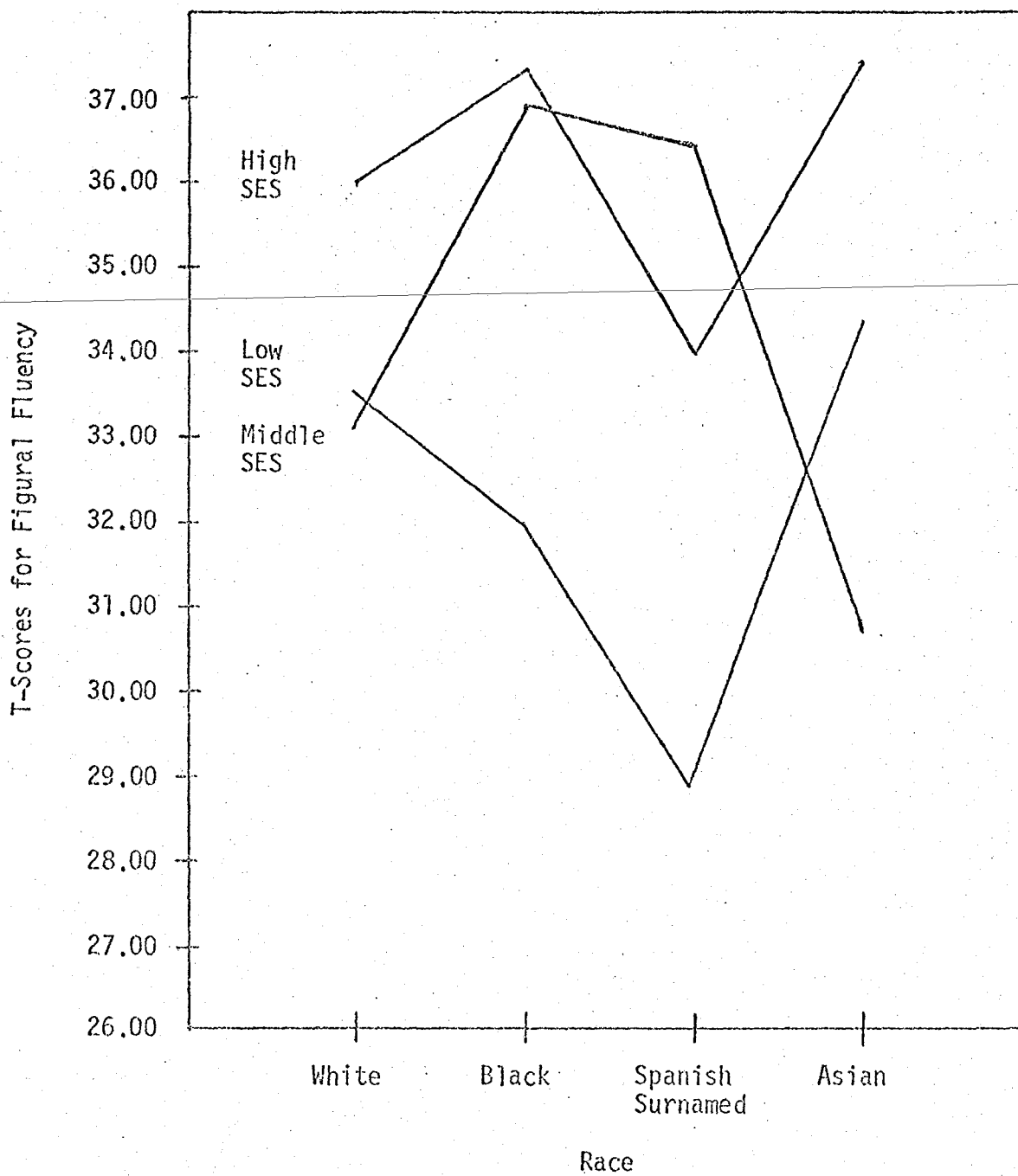


Figure 3

Graph of Mean Scores on Torrance Subtest, Figural Fluency, Showing Race, Sex and SES Differences



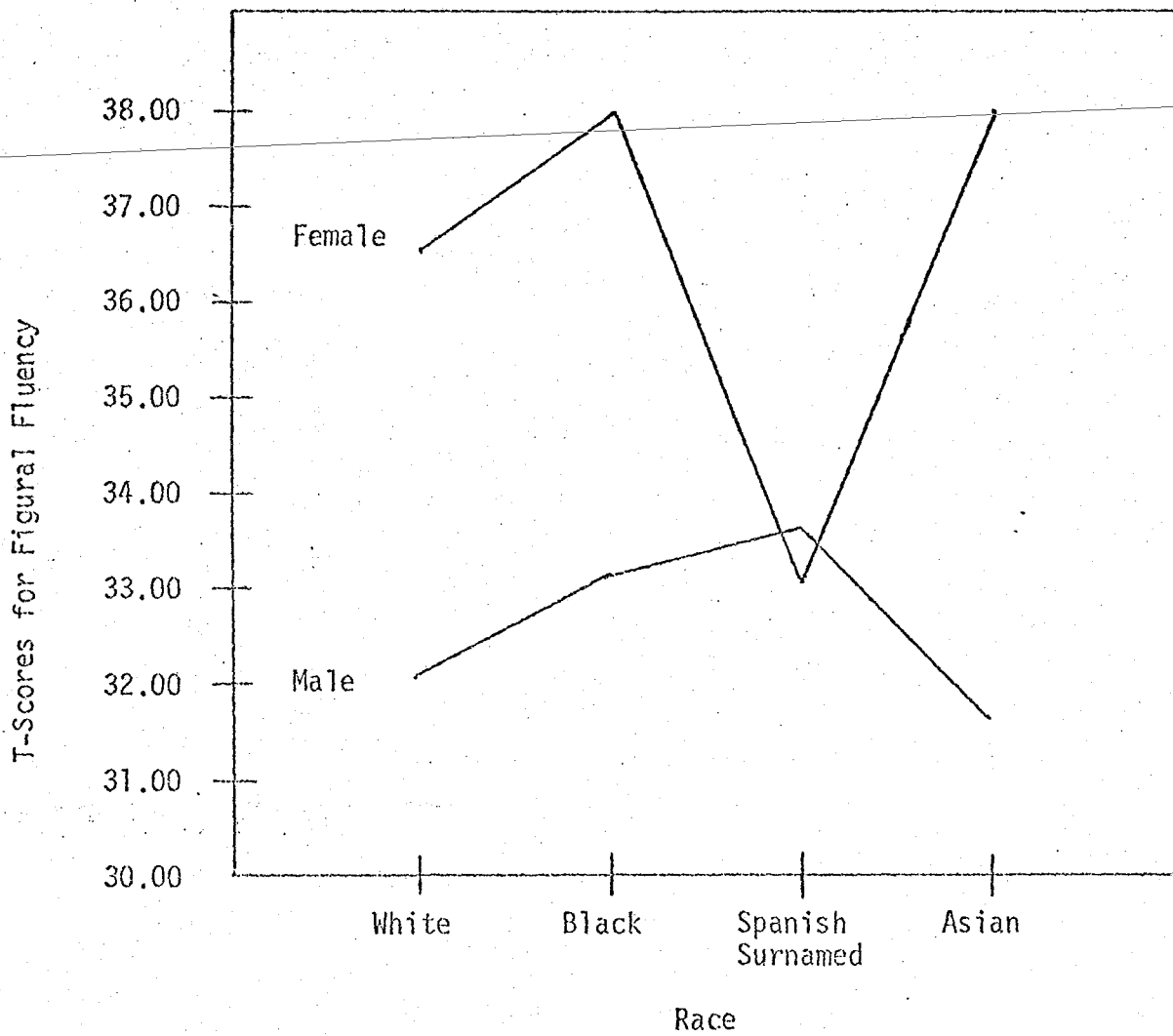


Figure 4 Graph of Mean Scores on Torrance Subtest, Figural Fluency, Showing Sex and Race Differences

Figural Flexibility. Three null hypotheses were stated in Chapter III regarding Figural Flexibility and the three independent variables of SES, race and sex. These hypotheses were:

H<sub>4</sub>. There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Figural Flexibility.

H<sub>5</sub>. There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Figural Flexibility.

H<sub>6</sub>. There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Figural Flexibility.

Table VI presents summary data relative to the analysis of variance statistic used to test H<sub>4</sub>, H<sub>5</sub>, and H<sub>6</sub>. The data reported in Table VI supports the rejection of H<sub>4</sub>, H<sub>5</sub>, and H<sub>6</sub> as they interact together. Although the variance between the groups on the variable of sex is large enough to be significant independently, the interpretation of these differences must be made in terms of the interaction effect. Figure 5 shows an inverse relationship in the performances of the white subjects by SES. Low SES whites achieved higher than middle and upper SES whites and middle SES whites achieved better than high SES whites. However, the differences in the performances of the three groups were not large enough to be of statistical significance. Middle SES black subjects also show an inverse relation to high SES blacks in Figure 5. The difference between the two groups, likewise, was not significant. Middle and high SES blacks achieved significantly higher than the low SES blacks. High and middle SES Spanish surnamed subjects scored higher

Table VI

Summary of Analysis of Variance Results Including Cell, Row and Column Means: SES by Sex by Race with the Torrance Creativity Subtest, Figural Flexibility, as the Dependent Variable

Source	SS	df	MS	F
SES	25.08	2	12.54	1.33
Race	23.59	3	7.86	0.83
Sex	58.20	1	58.20	6.18*
SES and Race	36.83	6	6.14	0.65
SES and Sex	4.13	2	2.07	0.21
Race and Sex	56.66	3	18.89	2.01
SES, Race and Sex	147.21	6	24.54	2.60*
Error	1582.55	168	9.42	

\*p &lt; .05

Male				
	White	Black	Spanish Surnamed	Asian
High SES	$\bar{X} = 34.00$ N = 8	$\bar{X} = 36.63$ N = 8	$\bar{X} = 36.75$ N = 8	$\bar{X} = 31.75$ N = 8
Middle SES	$\bar{X} = 31.38$ N = 8	$\bar{X} = 35.75$ N = 8	$\bar{X} = 39.00$ N = 8	$\bar{X} = 33.63$ N = 8
Low SES	$\bar{X} = 41.75$ N = 8	$\bar{X} = 27.50$ N = 8	$\bar{X} = 32.25$ N = 8	$\bar{X} = 32.13$ N = 8
Total	$\bar{X} = 35.71$ N = 24	$\bar{X} = 33.29$ N = 24	$\bar{X} = 36.00$ N = 24	$\bar{X} = 32.50$ N = 24
				Total Male $\bar{X} = 34.38$ N = 96
Female				
	White	Black	Spanish Surnamed	Asian
High SES	$\bar{X} = 40.63$ N = 8	$\bar{X} = 38.00$ N = 8	$\bar{X} = 35.25$ N = 8	$\bar{X} = 42.13$ N = 8
Middle SES	$\bar{X} = 43.62$ N = 8	$\bar{X} = 39.50$ N = 8	$\bar{X} = 32.25$ N = 8	$\bar{X} = 36.00$ N = 8
Low SES	$\bar{X} = 34.25$ N = 8	$\bar{X} = 35.38$ N = 8	$\bar{X} = 34.63$ N = 8	$\bar{X} = 38.25$ N = 8
Total	$\bar{X} = 39.50$ N = 24	$\bar{X} = 37.63$ N = 24	$\bar{X} = 34.04$ N = 24	$\bar{X} = 38.79$ N = 24
				Total Female $\bar{X} = 37.50$ N = 96

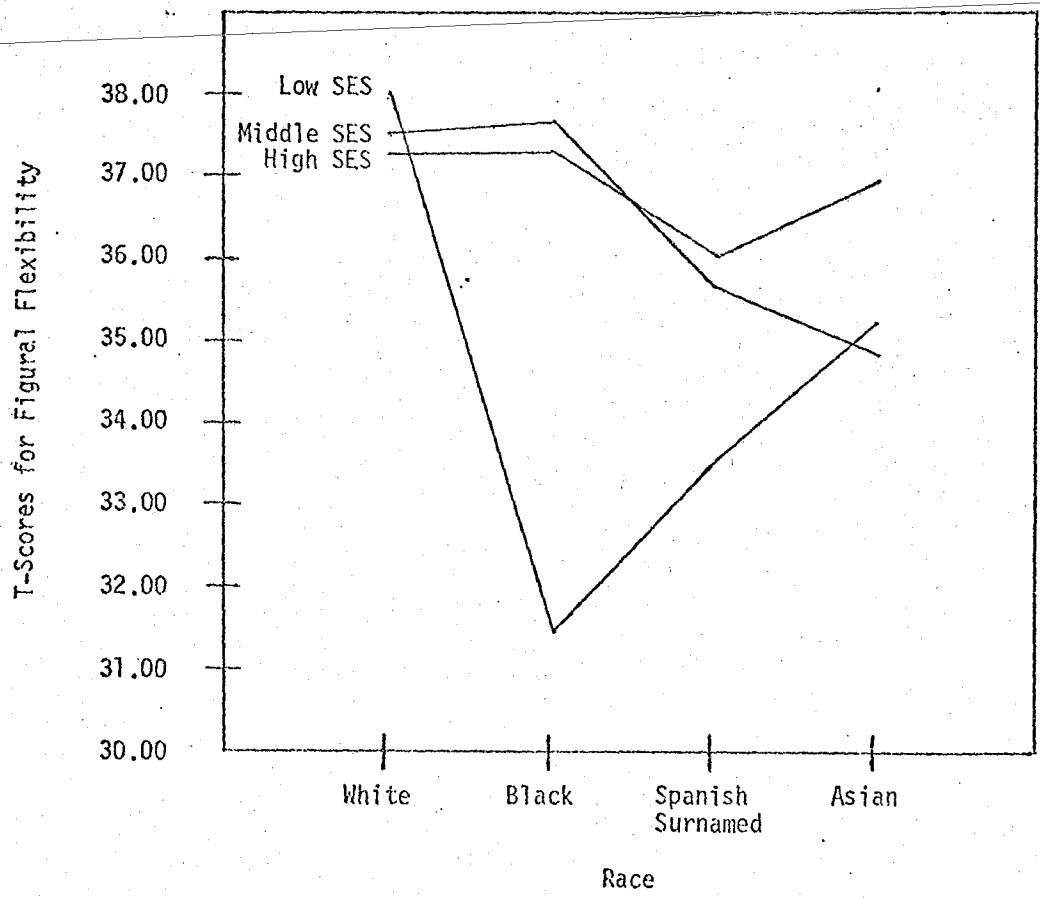


Figure 5 Graph of Mean Scores on Torrance Subtest, Figural Flexibility, Showing SES and Race Differences

but not significantly than low SES Spanish surnamed subjects. High SES Asians achieved higher than both middle and low SES Asians. An inverse relation was also noted in the performances of the middle and low SES Asian subjects, although the difference in performances was not significant.

Figure 6 shows that when the independent variables of sex and race are compared against the dependent variable, figural flexibility, the performances of the groups follow a similar pattern shown in their scores on figural fluency. The white, black and Asian females again achieved significantly higher than the white, black and Asian male subjects, and the Spanish surnamed female and male subjects again showed an inverse relation to the performances of the other racial groups. This difference, however, was not statistically significant.

Figural Originality. Three null hypotheses were stated in Chapter III regarding the relationship between the independent variables of SES, race and sex to the dependent variable of Figural Originality. These hypotheses were:

H<sub>7</sub>. There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Figural Originality.

H<sub>8</sub>. There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Figural Originality.

H<sub>9</sub>. There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Figural Originality.

Table VII presents summary data relative to the analysis of

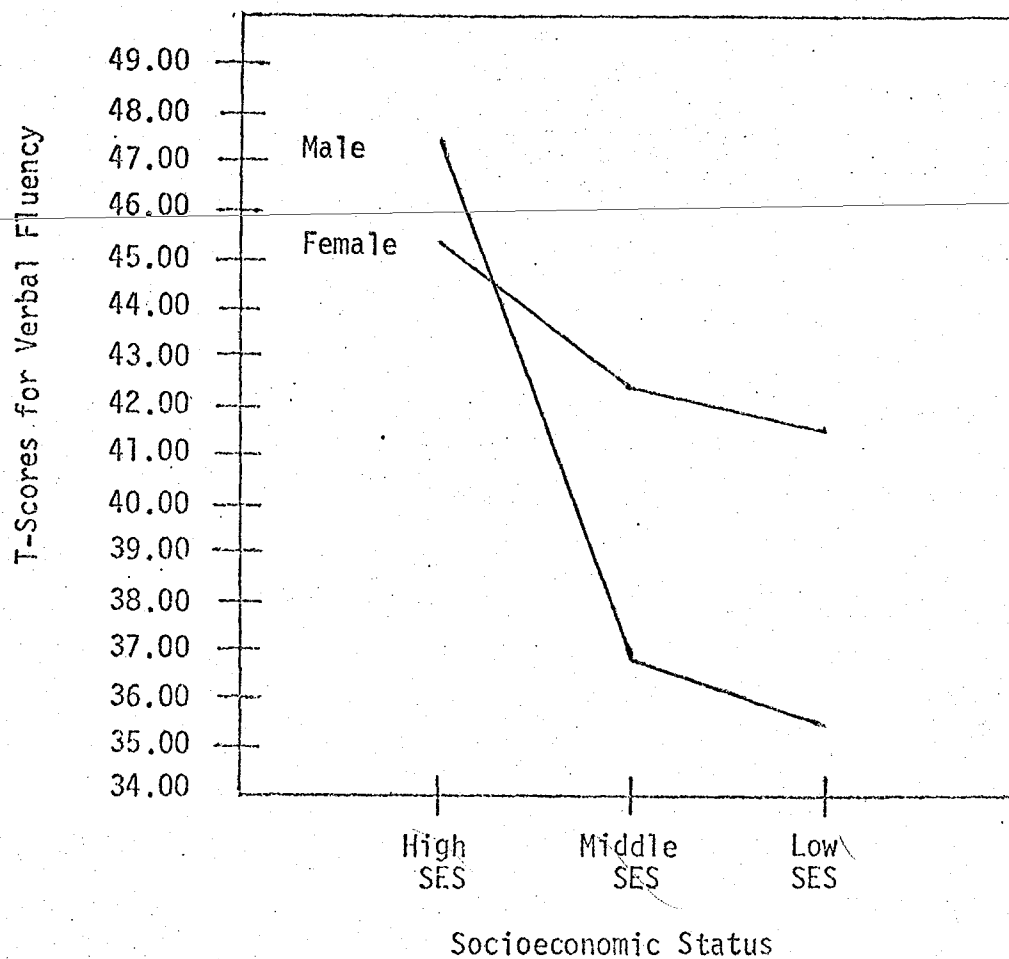


Figure 6 Graph of Mean Scores on Torrance Subtest, Verbal Fluency, Showing Sex and SES Differences

Table VII

Summary of Analysis of Variance Results Including Cell, Row and Column Means: SES by Sex by Race with the Torrance Creativity Subtest, Figural Originality, as the Dependent Variable (Post hoc test = Newman-Keuls)

Source	SS	df	MS	F
SES	548.03	2	274.01	5.53*
Race	426.26	3	142.09	2.87*
Sex	59.78	1	59.78	1.21
SES and Race	90.90	6	15.15	0.31
SES and Sex	139.58	2	69.79	1.41
Race and Sex	28.78	3	9.59	0.19
SES, Race and Sex	311.20	6	51.87	1.05
Error	8329.90	168	49.58	

\*P < .05

High SES	Middle SES	Low SES
$\bar{X} = 64.02$ N = 64	$\bar{X} = 58.34$ N = 64	$\bar{X} = 52.31$ N = 64

	Low SES	Middle SES	High SES
Low SES	--	**	**
Middle SES	--	--	**

White	Black	Spanish Surnamed	Asian
$\bar{X} = 60.25$ N = 48	$\bar{X} = 61.48$ N = 48	$\bar{X} = 50.97$ N = 48	$\bar{X} = 60.19$ N = 48

	Spanish Surnamed	Asian	White	Black
Spanish Surnamed	--	**	**	**

variance statistic used to test  $H_7$ ,  $H_8$ , and  $H_9$ . The data reported in Table VII support rejection of  $H_7$  and  $H_8$ , but fail to permit rejection of  $H_9$ . Pupils of high SES achieved the highest scores of the three groups and were significantly higher than the middle and low SES. Post hoc tests of significance showed that high SES pupils were significantly better than the middle and low SES pupils and the middle SES pupils were significantly higher than the low SES pupils.

Significant racial differences were also obtained by post hoc tests. Blacks obtained the highest scores and Spanish surnamed subjects scored the lowest. Although no significant differences were noted among blacks, whites and Asians, these groups scored significantly higher than the Spanish surnamed subjects.

Figural Elaboration. Three null hypotheses were stated in Chapter III regarding the relationship between the independent variables of SES, race and sex to the dependent variable of Figural Elaboration. These hypotheses were:

$H_{10}$ . There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Figural Elaboration.

$H_{11}$ . There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Figural Elaboration.

$H_{12}$ . There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Figural Elaboration.

Table VIII presents summary data of the analysis of variance statistic used to test  $H_{10}$ ,  $H_{11}$ , and  $H_{12}$ . The data reported in Table



Table VIII

Summary of Analysis of Variance Results Including Cell, Row, and Column Means: SES by Sex by Race with the Torrance Creativity Subtest, Figural Elaboration, as the Dependent Variable (Post hoc test = Newman-Keuls)

Source	SS	df	MS	F
SES	16.03	2	8.02	0.40
Race	425.03	3	141.68	7.14*
Sex	34.14	1	34.14	1.72
SES and Race	122.20	6	20.37	1.03
SES and Sex	19.11	2	9.56	0.48
Race and Sex	76.14	3	25.38	1.28
SES, Race and Sex	131.97	6	21.99	1.11
Error	3335.20	168	19.85	

\*p &lt; .05

White	Black	Spanish Surnamed	Asian
$\bar{X} = 53.67$ N = 48	$\bar{X} = 44.54$ N = 48	$\bar{X} = 43.46$ N = 48	$\bar{X} = 50.48$ N = 48

	Spanish Surnamed	Black	Asian	White
Spanish Surnamed	--	--	**	**
Black	--	--	**	**
Asian	--	--	--	**

VIII supports rejection of  $H_{11}$ , but fail to reject  $H_{10}$  and  $H_{12}$ .

Table VIII indicates significant differences between racial/ethnic subjects on the Figural Elaboration subtest. Post hoc tests showed that the white pupils performed significantly better than all the other groups, but both Asians and whites achieved significantly better than black and Spanish surnamed subjects. Black and Spanish surnamed students performed similarly with no important differences noted.

#### Torrance Tests of Creative Thinking Verbal Subtests

Verbal Fluency. Three null hypotheses were stated in Chapter III regarding the three independent variables of SES, race and sex and their relationship to the dependent variable of Verbal Fluency. The hypotheses were:

$H_{13}$ . There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Verbal Fluency.

$H_{14}$ . There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Verbal Fluency.

$H_{15}$ . There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Verbal Fluency.

Table IX presents summary data relative to the analysis of variance statistic used to test  $H_{13}$ ,  $H_{14}$ , and  $H_{15}$ . The data in Table IX supports rejection of  $H_{13}$  and  $H_{15}$ , but fail to support rejection of  $H_{14}$ . The significant "F" value for the interaction between SES and sex requires that the interpretation of the differences be made in terms of

Table IX

Summary of Analysis of Variance Results Including Cell, Row and Column Means: SES by Sex by Race with the Torrance Creativity Subtest, Verbal Fluency, as the Dependent Variable  
(Post hoc test = Newman-Keuls)

Source	SS	df	MS	F
SES	298.19	2	149.09	11.12*
Race	82.24	3	27.41	2.04
Sex	48.88	1	48.88	3.65*
SES and Race	25.66	6	4.28	0.32
SES and Sex	82.22	2	41.11	3.07*
Race and Sex	7.19	3	2.40	0.18
SES, Race and Sex	22.23	6	3.72	0.28
Error	2252.23	168	13.41	

\*P &lt; .05

	High SES	Middle SES	Low SES	Total
Male	$\bar{X} = 47.28$ N = 32	$\bar{X} = 36.66$ N = 32	$\bar{X} = 35.25$ N = 32	Total Male $\bar{X} = 39.73$ N = 96
Female	$\bar{X} = 44.91$ N = 32	$\bar{X} = 41.91$ N = 32	$\bar{X} = 40.94$ N = 32	Total Female $\bar{X} = 42.58$ N = 96
Totals	$\bar{X} = 46.09$ N = 64	$\bar{X} = 39.28$ N = 64	$\bar{X} = 38.09$ N = 64	

	Low SES Males	Middle SES Males	Low SES Females	Middle SES Females	High SES Females	High SES Males
Low SES Males	--	--	**	**	**	**
Middle SES Males	--	--	**	**	**	**
Low SES Females	--	--	--	--	**	**
Middle SES Females	--	--	--	--	**	**
High SES Females	--	--	--	--	--	**

the interaction effect. Post hoc tests and Figure 6 show that high SES males scored significantly better than the high SES females, and middle and low SES females scored significantly higher than middle and low SES males.

Verbal Flexibility. Three null hypotheses were stated in Chapter III relative to the three independent variables of SES, race and sex and their relationship to the dependent variable, Verbal Flexibility. The hypotheses were:

H<sub>16</sub>. There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Verbal Flexibility.

H<sub>17</sub>. There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Verbal Flexibility.

H<sub>18</sub>. There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Verbal Flexibility.

Table X presents summary data related to the analysis of variance statistic used to test H<sub>16</sub>, H<sub>17</sub>, and H<sub>18</sub>. The data in Table X supports rejection of all three null hypotheses. Significant differences for SES, race and sex were noted for each of these variables. It can be seen from an observation of the row totals that females performed significantly better than males. The results of post hoc tests of significance showed that high SES students scored significantly better than middle and low SES students and middle SES students scored significantly better than low SES students. Post hoc tests for race showed that white and Asian subjects scored significantly higher than black and Spanish

Table X

Summary of Analysis of Variance Results including Cell, Row and Column Means: SES by Sex by Race with the Torrance Creativity Subtest, Verbal Flexibility, as the Dependent Variable (Post hoc test = Newman-Keuls)

SES	579.06	2	289.53	14.29*
Race	173.57	3	57.86	2.86*
Sex	263.35	1	263.35	13.00*
SES and Race	49.74	6	8.29	0.41
SES and Sex	68.66	2	34.33	1.69
Race and Sex	6.33	3	2.11	0.41
SES, Race and Sex	40.50	6	6.75	0.33
Error	3403.97	168	20.26	

\*P &lt; .05

High SES	Middle SES	Low SES
$\bar{X} = 55.45$ N = 64	$\bar{X} = 46.50$ N = 64	$\bar{X} = 44.02$ N = 64

	Low SES	Middle SES	High SES
Low SES	--	**	**
Middle SES	--	--	**

White	Black	Spanish Surnamed	Asian
$\bar{X} = 51.60$ N = 48	$\bar{X} = 45.27$ N = 48	$\bar{X} = 46.79$ N = 48	$\bar{X} = 50.96$ N = 48

	Black	Spanish Surnamed	Asian	White
Black	--	--	**	**
Spanish Surnamed	--	--	**	**

Male	Female
$\bar{X} = 45.34$ N = 96	$\bar{X} = 51.97$ N = 96

surnamed subjects, but no significant differences were noted between the achievement of the black and Spanish surnamed subjects or between white and Asian subjects.

Verbal Originality. Three null hypotheses were stated in Chapter III regarding the relationship between the independent variables of SES, race and sex to the dependent variable of Verbal Originality. The hypotheses were:

H<sub>19</sub>. There will be no significant differences in the performances of the various SES groups as measured by the Torrance Tests of Creative Thinking, Verbal Originality.

H<sub>20</sub>. There will be no significant differences in the performances of the various racial/ethnic groups as measured by the Torrance Tests of Creative Thinking, Verbal Originality.

H<sub>21</sub>. There will be no significant differences in the performances of the sexes as measured by the Torrance Tests of Creative Thinking, Verbal Originality.

Table XI presents summary data relative to the analysis of variance statistic used to test H<sub>19</sub>, H<sub>20</sub>, and H<sub>21</sub>. The data in Table XI supports rejection of H<sub>19</sub>, H<sub>20</sub>, and H<sub>21</sub> as they interact together. There were significant differences between racial/ethnic groups on post hoc tests. Asians and whites showed no differences in performance and both scored significantly better than the black and Spanish surnamed. No differences were noted between blacks and Spanish surnamed. The main effects for SES and sex are large enough to be significant independently; however, the interpretation of these differences must be made in terms of the interaction effect. Figure 7 shows that there were no significant differences between males and females of high SES, but middle and low SES

Table XI

Summary of Analysis of Variance Results Including Cell, Row and Column Means: SES by Sex by Race with the Torrance Creativity Subtest, Verbal Originality, as the Dependent Variable (Post hoc test = Newman-Keuls)

Source	SS	df	MS	F
SES	398.11	2	199.06	11.98*
Race	126.62	3	42.21	2.54*
Sex	94.01	1	94.01	5.66*
SES and Race	50.14	6	8.36	0.50
SES and Sex	77.23	2	38.61	2.32*
Race and Sex	11.00	3	3.67	0.22
SES, Race and Sex	46.36	6	7.73	0.47
Error	2791.57	168	16.62	

\*p &lt; .05

Male					
	White	Black	Spanish Surnamed	Asian	
High SES	$\bar{X} = 62.88$ N = 8	$\bar{X} = 58.13$ N = 8	$\bar{X} = 52.25$ N = 8	$\bar{X} = 56.88$ N = 8	
Middle SES	$\bar{X} = 48.88$ N = 8	$\bar{X} = 42.25$ N = 8	$\bar{X} = 46.13$ N = 8	$\bar{X} = 50.38$ N = 8	Total Male
Low SES	$\bar{X} = 41.38$ N = 8	$\bar{X} = 46.00$ N = 8	$\bar{X} = 41.63$ N = 8	$\bar{X} = 46.48$ N = 8	$\bar{X} = 49.43$ N = 96
Female					
	White	Black	Spanish Surnamed	Asian	
High SES	$\bar{X} = 60.13$ N = 8	$\bar{X} = 53.88$ N = 8	$\bar{X} = 51.88$ N = 8	$\bar{X} = 60.13$ N = 8	
Middle SES	$\bar{X} = 57.75$ N = 8	$\bar{X} = 50.38$ N = 8	$\bar{X} = 48.25$ N = 8	$\bar{X} = 53.88$ N = 8	Total Female
Low SES	$\bar{X} = 53.50$ N = 8	$\bar{X} = 49.13$ N = 8	$\bar{X} = 50.50$ N = 8	$\bar{X} = 51.25$ N = 8	$\bar{X} = 53.39$ N = 96
Total White	$\bar{X} = 54.08$ N = 48	Total Black	$\bar{X} = 49.96$ N = 48	Total Spanish Surnamed	$\bar{X} = 48.44$ N = 48
				Total Asian	$\bar{X} = 53.15$ N = 48

High SES	Middle SES	Low SES
$\bar{X} = 57.02$ N = 64	$\bar{X} = 49.73$ N = 64	$\bar{X} = 47.47$ N = 64

	Low SES Males	Middle SES Males	Low SES Females	Middle SES Females	High SES Females	High SES Males
Low SES Males	--	**	**	**	**	**
Middle SES Males	--	--	**	**	**	**
Low SES Females	--	--	--	--	**	**
Middle SES Females	--	--	--	--	**	**

	Spanish Surnamed	Black	Asian	White
Spanish Surnamed	--	--	**	**
Black	--	--	**	**

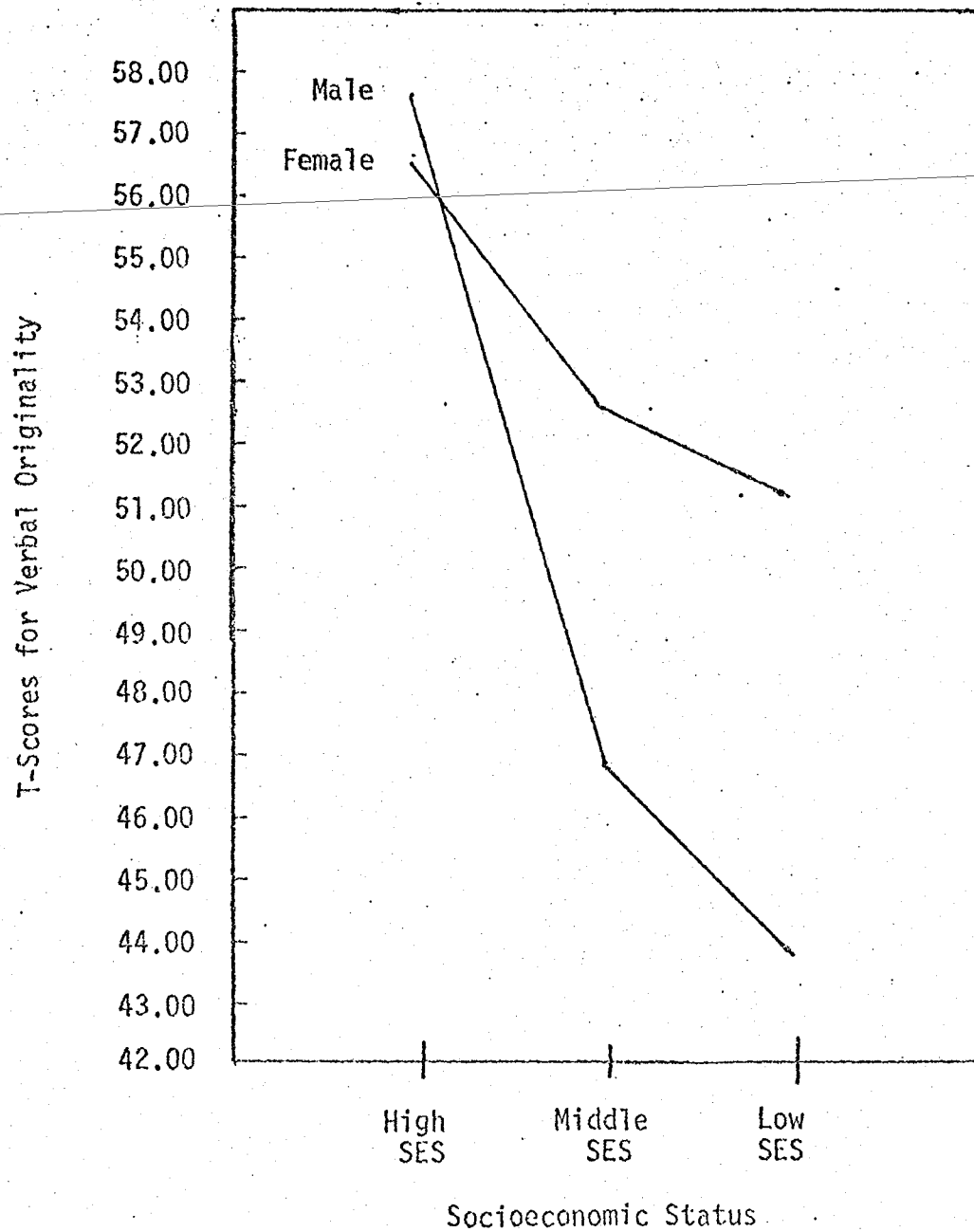


Figure 7 Graph of Mean Scores on Torrance Subtest, Verbal Originality, Showing Sex and SES Differences



female subjects scored significantly better than middle and low male SES subjects. No differences were noted between females of middle SES and females of low SES.

#### SUMMARY

Chapter IV presented a statistical analysis of the data pertinent to this research. These results showed consistent patterns across the various subtest analyses. Generally, high SES subjects scored better than low SES subjects. Females scored better than males. White and Asian subjects scored frequently better than the black and Spanish surnamed subjects. Whites and Asians were similar in achievement and blacks and Spanish surnamed performed at about the same level. This kind of interaction was pervasive throughout all the analyses. In two of the four Figural subtest analyses, Figural Fluency and Figural Flexibility, significant three way interactions among the variables were noted. In another of the Figural subtest analyses, Figural Originality, significant main effects for two of the independent variables, race and SES, were indicated. In the last of the Figural subtest analyses, Figural Elaboration, significant main effects for one of the variables, race, were noted.

In two of the three verbal subtest analyses, Verbal Originality and Verbal Fluency, significant two way interactions among the variables of SES and sex were shown. In the third of the subtest analyses, Verbal Flexibility, significant main effects were noted for all three of the independent variables.

Chapter V presents the investigator's interpretation of the findings reported in this chapter and recommendations for further study

based upon the findings of this investigation.

## Chapter V

### CONCLUSIONS AND RECOMMENDATIONS

This chapter is organized into two major sections. The first section discusses the conclusions and interpretations relative to the data reported in Chapter IV regarding the relationship of the three independent variables of socioeconomic status (SES), race and sex to the seven Torrance subtests, the dependent variables. The second section presents recommendations for further study based on these conclusions and interpretations.

### CONCLUSIONS

#### Torrance Tests of Creative Thinking, Figural Subtests

Figural Fluency. Null hypotheses one, two and three were rejected indicating that SES, race and sex did have an impact upon creative thinking as measured by the Torrance Tests of Creative Thinking, Figural Fluency. The variables did not show consistent significant differences across these three variables, but interacted differentially. Specifically, for three of the racial/ethnic groups, white, black and Asian, the high SES scored significantly better than the middle and low SES groups but the middle SES Spanish surnamed scored as high as the high SES group and significantly better than the low SES Spanish surnamed. These findings are consistent with those of Bloom, Davis and White (1963), Frost and Hawkes (1970), Kennedy, Van de Riet and White (1963) and Deutsch, Katz and Jensen (1968) which showed that children from economically

disadvantaged and culturally different backgrounds generally performed poorer on most measures of mental functioning than children of economic and cultural advantage. These studies did not deal specifically with creativity, but with other measures of mental functioning such as IQ and achievement.

When compared with earlier studies using the Torrance test, however, those of McNamara (1964), Gezi (1969) and Smith (1965) showed that low SES subjects scored significantly higher on Torrance's Figural subtests than the middle and upper SES groups. This investigator's data was also inconsistent with the findings of Solomon (1967), Tibbetts (1969) and Ross (1963) which indicated no significant differences in the performances of the various SES groups on Torrance's Figural subtests.

The findings of this study relating to race and Figural Fluency also contradict the findings of Smith (1965), Torrance (1967) and Tibbetts (1969) which showed that whites performed better than blacks and Check's study (1970) which showed no significant difference between the performances of black and white subjects on Figural Fluency.

An interesting finding of this study is the relation to sex differences. Females generally score significantly higher in verbal activities and males usually score significantly higher than females on nonverbal measures. The findings of this study showed the opposite relation. Females scored significantly higher than the males on Figural Fluency. The only exception was noted when the sexes were compared by race. In this instance, Spanish surnamed males and females showed no differences in their performance on Figural Fluency, whereas all the other groups showed a significant difference. This study analyzed test data with a more complex analysis and demonstrated that simple

explanations of racial, sexual or SES differences are probably not valid. These variables interact in such a way that simple statements that females score better than males or high SES score better than low SES must be qualified in terms of race. In this particular subtest the Spanish surnamed males did score better than their female counterparts, for example.

The most obvious explanation for the discrepancies between the findings of the previously mentioned studies and this investigator's findings is in the absence of interaction in their studies between the variables of SES, race and sex. Another important factor which may have contributed to this difference of results could have been the differences in the sample populations assessed by this investigator and those of the other studies cited earlier in this section. This investigator had access to both an urban-suburban community and a rural-urban community which reflected a wide cross-section of cultural backgrounds. This was not so with the other studies cited.

Another factor which might have contributed to the differences in results of this study and previous research was that this study assessed only seventh grade pupils. Apart from Check's study (1970) which included fourth, seventh and twelfth grade public and parochial students, the other major studies concentrated on grades first through sixth, and eighth through twelfth. The fact that this sample population was limited to two California communities may also account for some of the differences in findings, although the sampling population is probably representative of the California school population.

Another important factor to consider is that in the major studies on creativity the factors of IQ and achievement were kept constant

between the groups measured. In this study they were not.

Figural Flexibility. Null hypotheses four, five and six were rejected indicating that the variables of SES, race and sex did have an effect upon creative thought as measured by the Torrance Tests of Creative Thinking, Figural Flexibility. The variables of SES, race and sex showed significant differences in terms of their interaction together. White subjects, for example, showed an inverse relation in their performance by SES. Low SES whites achieved higher than middle and upper SES whites and middle SES whites achieved better than high SES whites. The differences, however, in the performances of the three groups were not large enough to be of statistical significance. Middle SES black subjects also showed an inverse relation to high SES blacks, although the difference was not significant. Middle and high SES blacks achieved significantly better than low SES blacks. High and middle SES Spanish surnamed subjects scored higher than low SES Spanish surnamed subjects. High SES Asians achieved higher than both middle and low SES Asians and low SES Asians scored better than middle SES Asians. These results, like the findings of the data for Figural Fluency are also supported by the research cited in the preceding section. In like manner it contradicts those studies contradicted by the data from the Figural Fluency subtest.

The results of this study regarding race and Figural Flexibility contradict the findings of Richmond (1968) which showed that whites performed significantly better than blacks on Torrance's subtest, Figural Flexibility. The findings of Tibbetts' study (1969) which showed that whites performed significantly better on both verbal and nonverbal creativity measures were also contradicted by this study as were the

findings of Ward (1971a, 1971b) and Covington (1968) which showed no differences between the performances of blacks and whites by race or sex.

It should also be observed that the same pattern of sex differences indicated in the performance on the Torrance subtest, Figural Fluency was shown on the subtest, Figural Flexibility. The female subjects scored significantly higher than the male subjects except that the Spanish surnamed males and females showed no differences in their performances on Figural Flexibility.

Both Figural Fluency and Figural Flexibility contained a main interaction effect. Since the patterns of responses on both subjects were essentially the same it is assumed that the explanations for the discrepancies between the findings of the investigator and those of the studies cited on Figural Flexibility will be the same as those stated for Figural Fluency.

Figural Originality. Null hypotheses seven and eight were rejected by the data in Chapter IV indicating that the variables of SES and race did have an important influence upon creative thinking as measured by the Torrance Tests of Creative Thinking, Figural Originality. However, hypothesis nine was confirmed as no significant differences were noted. The findings of hypothesis seven indicated that one's SES made a significant difference in the performance on the Torrance subtest, Figural Originality. High SES pupils achieved significantly higher than middle and low SES pupils and middle SES pupils scored significantly higher than low SES pupils. These results are consistent with the findings of the studies cited for the Figural Fluency and Figural Flexibility subtests, which showed that high SES children generally performed better than lower SES children. On the other hand, the findings of this

investigation contradict the creativity studies of Ward (1971a, 1971b), Solomon (1967), McNamara (1964), Tibbetts (1969) and Ross (1963) whose studies showed no significant differences between SES groups on various nonverbal creativity measures.

One possible explanation for this discrepancy in findings regarding SES groups may be due in part to the differences between the sample populations. This investigator's population sample was limited to seventh grade pupils from a California Bay Area urban-suburban community and a rural-urban community of the San Joaquin Valley, whereas the other studies cited were more restricted to either a rural, urban or a suburban community.

The results of data related to hypothesis eight indicated significant differences in the performances of the racial groups on the Torrance subtest, Figural Originality. Black subjects scored the highest while Spanish surnamed subjects scored the lowest. Although no significant differences were noted among blacks, whites and Asians, these groups scored significantly higher than the Spanish surnamed. These findings are inconsonant with the findings of the following research: (1) Torrance (1967) who showed that blacks performed significantly better than whites on Figural Originality; (2) Check (1970), who showed no significant difference between the performance of blacks and whites on Figural Originality; and (3) Richmond (1963), who indicated that whites achieved significantly higher than blacks on Figural Originality.

The results of this analysis of data affirm the conclusions reached on the Figural Fluency and Figural Flexibility subtests, that simple explanations of racial or SES differences are not likely valid and that caution should be taken when interpreting complex data analyses.



related to these variables. The differences in the findings of this investigator's study and those just cited may reflect sampling differences. Whereas most of the studies cited relating to race differences assessed highly select groups of blacks and whites, this investigator's study included four racial groups equal by numbers, SES groupings and sex, thereby increasing the number of variables by which differences might be assessed.

Figural Elaboration. The findings of the data in Chapter IV rejected null hypothesis 11, but verified hypotheses 10 and 12 as measured by the Torrance Tests of Creative Thinking, Figural Elaboration. These findings indicated that whites performed significantly better than all the other groups. Asians and whites also achieved significantly better than black and Spanish surnamed subjects. Black and Spanish surnamed students performed similarly with no differences noted. These findings are similar to Torrance's findings (1967) that white students performed significantly better than black students on Figural Elaboration. It is this investigator's judgment that the differences between the performances of the two groups are likely a cultural difference or bias and not a race difference. This view was also shared by Torrance (1969) who stated that differences in behavior between races were consistent with whatever ideals were encouraged and discouraged by the culture of the races.

#### Torrance Tests of Creative Thinking, Verbal Subtests

Verbal Fluency. Null hypotheses 13 and 15 were rejected and hypothesis 14 was substantiated by the data in Chapter IV as measured by the Torrance Tests of Creative Thinking, Verbal Fluency. There were no significant differences between male and female subjects in the high SES group, but middle and low SES females scored significantly higher

than middle and low SES males. The findings related to SES differences are similar to the results of the Smith (1965) and Tibbetts (1969) studies which showed that students of high SES achieved significantly better than students of lower SES groups. The results of the findings related to sex differences on the Verbal Fluency subtest are consistent with the findings of Torrance (1969) that girls scored significantly higher than boys on Verbal Fluency. Smith's study (1965) showed that black and white females achieved significantly better than black and white males on the Verbal Fluency subtest.

An interesting and reoccurring finding of this overall study in creativity is evident in the results of the findings on Verbal Fluency. Although females generally score significantly higher in verbal creative measures than males, there were no significant differences noted on Verbal Fluency between males and females of high SES. The best explanation for this continuing contradiction between this investigator's findings and those of major studies cited in this section is the absence of interaction in their research data between the variables of SES, race and sex to the dependent variables. A second explanation might be that the higher SES females are reacting in the same manner as those in Terman's (1925) study of genius in that they are deliberately but unconsciously not trying to excel the males. The variables which contribute to creativity are numerous and complex and require comprehensive and complex analyses.

Verbal Flexibility. Null hypothesis 16 was rejected indicating that the variable of SES did have a significant effect upon creative performance as measured by the Torrance Tests of Creative Thinking, Verbal Flexibility. As noted on the Torrance subtests of Figural Fluency, Figural

Flexibility, Figural Originality and Verbal Fluency, high SES pupils generally performed significantly better than pupils of lower SES. These findings are consistent with Smith's findings (1965), but are entirely incongruent with the findings of McNamara (1964), Solomon (1967) and Tibbetts (1969) whose studies showed no significant differences in creative achievement when compared by SES. These results are, however, congruent with Heim (1970) and Taylor (1972) who maintained that the opportunities provided by one's environment were the major influence on the creative performance of different SES groups. This finding is also similar to research in other areas of mental abilities which have demonstrated that persons from economically disadvantaged and culturally different backgrounds generally perform poorer on most measures of mental functions such as intelligence tests and achievement tests (e.g., Deutsch, Katz and Jensen, 1968; Bloom, Davis and Hess, 1965; Frost and Hawkes, 1970).

Null hypothesis 17 was rejected indicating that race had a significant impact upon creative thinking as measured by the Torrance Tests of Creative Thinking, Verbal Flexibility. The results showed that white and Asian subjects scored significantly higher than black and Spanish surnamed subjects, but no significant differences were noted between the achievement of the black and Spanish surnamed subjects on Verbal Flexibility. These findings are similar to the conclusions of major research by Richmond (1963), Torrance (1967), Smith (1965) and Tibbetts (1969) which showed that whites performed significantly better than blacks on Verbal Flexibility.

Perhaps the most reasonable explanation for this similarity in findings may be related to a lack of motivation on the part of black and

Spanish surnamed students. The subjects in this investigation, with very few exceptions, demonstrated a high level of interest throughout the testing session on the Figural subtests. This was not so for all of the groups on the Verbal performance of the Torrance Tests of Creative Thinking. Many of the black and Spanish surnamed students required additional encouragement to continue working on the subtest items. This pattern was not so for the white and Asian students. Another possible reason for the difference in performance between the two groups may be related to a deficiency of writing skills on the part of the black and Spanish surnamed pupils which might have limited their creative responses and perhaps created a sense of inadequacy which depressed their performance.

Null hypothesis 18 was rejected by the data in Chapter IV indicating that sex difference had a significant influence upon creative thought as measured by the Torrance Tests of Creative Thinking, Verbal Flexibility. Females performed significantly better than males. The findings are consonant with the findings of Smith (1965) and Torrance (1969) that females performed significantly better than males on Verbal Flexibility.

The result is best related to the findings of Torrance (1969), Heim (1970) and Guilford (1967) who concluded that sex differences were directly related to sex roles encouraged and fostered in American culture. Therefore, sex differences are more likely a reflection of a cultural bias than a sex difference.

Verbal Originality. Null hypotheses 19, 20 and 21 were rejected indicating that SES, race and sex did have an important effect upon creative thinking as measured by the Torrance Tests of Creative Thinking, Verbal

Originality. As cited in the preceding data on Figural Fluency and Figural Flexibility the variables did not evidence consistent significant differences across these three variables, but interacted differentially. There were no significant differences between males and females of high SES on Verbal Originality. This similarity in performance was also noted on Torrance's subtest, Verbal Fluency. These findings are congruent with the findings of Smith (1965) whose study showed that high SES white females scored significantly better than low SES male whites on Verbal Originality. Although high SES males and females showed no significant differences in achievement on Verbal Originality, the middle and low SES female subjects scored significantly better than middle and low SES male subjects. No differences were indicated between females of middle and low SES. The findings of this study related to race and Verbal Originality indicated that Asians and whites performed similarly and both scored significantly better than the black and Spanish surnamed. No differences were observed between blacks and Spanish surnamed.

These results, like the findings for Figural Fluency and Figural Flexibility cited earlier in this chapter contained a main interaction effect and did not present a consistent pattern of significant differences across the three variables. This study analyzed test data with a more complex analysis and demonstrated that simple and absolute explanations of racial, sexual or SES differences are doubtful and extremely risky.

The difference between this investigator's findings and those of Smith (1965) can be attributed to the absence of interaction in Smith's study between the variables of SES and sex. Another possible factor might have been a difference in the sample populations. Smith's

population sample consisted of black and white urban, fifth grade children from Pittsburg, Pennsylvania, and this investigator's population sample consisted of blacks, whites, Asians and Spanish surnamed pupils from an urban-suburban and rural urban communities. Smith's subjects were randomly selected and this investigator's were selected using a stratified random sampling procedure.

#### RECOMMENDATIONS FOR FURTHER STUDY

1. The interrelatedness of the factors of SES, race and sex upon creative thought was dramatic and it is recommended that future studies should not attempt to assess one of these variables without providing for the possible interaction of the other variables.
2. Future studies should replicate this study in the identification and assessment of creativity among different levels of SES for other major racial/ethnic groups as well as black and white groups.
3. This study should be replicated varying the order in which the tests are given as lack of motivation seems to have exerted a strong influence upon the performance of the blacks and Spanish surnamed on the verbal portions of the Torrance Tests of Creative Thinking.
4. The results of this investigation suggest that studies should be initiated which focus upon the developmental aspects of creativity as affected by the emergence of adolescence.
5. The fact that females scored significantly higher in areas in which males usually score highest suggests that future studies stress the inclusion of sociocultural factors upon sex differences in creative thinking, e.g., the findings related to the Spanish surnamed male and female performances contrasted with the findings of the other three

racial groups.

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ADMINISTRATIVE OFFICES  
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Richard L. Foster  
~~XXXXXXXXXXXXXXXXXXXX~~  
SUPERINTENDENT OF SCHOOLS



WILLARD JUNIOR HIGH SCHOOL  
TELEGRAPH AVE. AND STUART ST  
~~XXXXXXXXXXXXXXXXXXXX~~  
Levi H. Poe, Principal

February 23, 1973

Dear Parents:

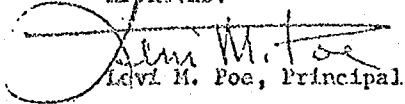
On February 26, 1973, a selected number of students from Willard Junior High School will be invited to participate in some activities in creative thinking. This activity is a part of a research project designed to gather information which will increase teacher effectiveness in both identifying various types and degrees of creativity in youngsters, and to provide a basis for more effective planning for the wide range of student ability levels.

If you have strong objections to your child's participation in this important activity, please indicate by so stating this fact below and returning same to school not later than Monday, February 26, 1973.

Your kind cooperation is most appreciated.

WYNIS MCDANIELS, Graduate Researcher

APPROVED:

  
Levi H. Poe, Principal

Appendix A



TEACHER CORPS

## UNIVERSITY OF THE PACIFIC

SCHOOL OF EDUCATION

Stockton, California Founded 1851

95204

May 23, 1973

Dr. J. Paul Guilford  
Professor of Psychology  
University of Southern California  
Los Angeles, California

Dear Dr. Guilford:

I am a doctoral candidate at the University of the Pacific in Stockton, California. I would like to request permission to use copies of your Structure of Intellect Model and your Matrix of Divergent Thinking Factors paradigm in my doctoral dissertation. Both models are copyright by McGraw-Hill Incorporated.

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Sincerely,

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Administrative Assistant  
University of the Pacific  
Teacher Corps

Appendix B