COMPARISONS OF STRUCTURE OF INTELLECT DIVERGENT PRODUCTION MEASURES FOR THREE GROUPS OF TEACHERS

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CHAPTER I

INTRODUCTION

Statement of the Problem

If one accepts the premise of a multifaceted view of human intelligence, then the study of specific aspects of intelligence becomes significant. An important challenge is presented in the attempt to identify, describe, and measure given aspects. Of particular interest is the study of creativity as an aspect of human intellectual functioning. This research addresses the relationship between certain divergent production subtests and Structure of Intellect instruction. Divergent production is the "generation of information from given information, where the emphasis is upon variety and quantity of output from the same source; likely to involve transfer" (Guilford, 1967, p. 213).

Understanding the nature of divergent thinking is important to the development of creativity and to overall mental abilities (Guilford, 1967). Furthermore, Guilford (1967) proposes that based on investigations on the "improvement of creative potential we have considerable reason for guarded optimism" (p. 336). Students evidence

more intellectual and creative growth under creative teachers (Torrance, 1967; James, 1967).

Teachers who score high on divergent measures behave more creatively in the classroom (Torrance, Tan, & Allman, 1970). Torrance, et al. (1970) studied verbal originality and teacher behavior in a predictive validity study. Three hundred twenty-five elementary education majors were administered a test of verbal creativity. Eight years later 114 of the original group responded to a questionnaire designed to measure creative activities. The high originals reported significantly more frequent use of role playing, problem solving, panels, experiments, research, and other creative activities than the low originals who reported little or no use of these activities. Torrance, et al. concluded that the high originals seemed to be "more fully involved in their teaching" and behaved more creatively in the classroom (p. 340).

Teachers who receive training in creativity perceive themselves to be more creative than before (James, 1967). Teacher recognition of creative behavior is crucial to the willingness to permit or encourage such behavior (Torrance, 1967). Given these findings, there is a need to train teachers to recognize creative characteristics and the nature of creativity (Torrance, 1967; Reyburn, 1975).

The area of concern of the current study involves assessment and the effects of specific instruction on the divergent production aspect of creativity in teachers. This study will provide insights about how teachers perform on Structure of Intellect (SOI) divergent production measures when they have advanced instruction about the nature of divergent thinking as it is defined by the SOI. Relationships of performance effects on these measures in teachers who have had in-depth instruction have not previously been examined in terms of the Structure of Intellect Learning Abilities Test developed by Meeker (1975).

Guilford conceived the Structure of Intellect (SI) model to demonstrate the large number of distinct abilities that compose intelligence (Guilford, 1977). The SI array of 120 categories of intellectual abilities are derived from specific intersections of three discrete factors, each intersection consisting of an operation, a content, and a product (Meeker, 1969). Meeker made the initial application of the SI, a psychological construct, to educational theory and practice. The SOI test measures twenty-four of these abilities which are critical for learning (Meeker, 1980).

This study focuses on two areas of divergent production in the SOI test. One test is Divergent Production of Figural Units (DFU) which measures creativity in drawing. The other subtest being utilized is Divergent Production of

Semantic Units (DMU) which measures creativity with words. Both subtests are free responsive items that are scored for amount and quality of production.

Statement of the Purpose

The purpose of this study was to examine the relationship between SOI instruction and performance on two SOI divergent production subtests. The investigation involved three groups of Texas Woman's University graduate students who are teachers. The three groups contained: (a) teachers who had had courses in the education of gifted students and specific SOI instruction, (b) teachers who had had courses in the education of gifted students without specific SOI instruction, and (c) teachers who had had neither courses in the education of gifted students nor SOI instruction.

Comparisons were made across all groups and within each group on performance on two SOI divergent production subtests. The following questions were asked. Will there be significant differences among the divergent production scores (DFU and DMU) within and among the three groups? Will there be significant differences in the fluency, set change, transformations, and originality scores, that define DFU and DMU, within and among the three groups?

An additional purpose of this study was to examine the relationship of DFU and DMU performance and self-ratings of

creativity within and among the three groups. The following questions were asked. Will there be significant differences in the self-ratings of creativity among the three groups? Will there be a significant relationship between the self-ratings of creativity and Divergent Production scores?

Research Questions and Hypotheses

This study was designed to determine whether teachers who have had SOI instruction and courses in the education of gifted students perform significantly higher on SOI Divergent Production tests than teachers who have had gifted courses but no specific SOI instruction and teachers who have had neither gifted nor SOI instruction.

A consideration that needed to be addressed was the possible qualitative differences of the groups. Are the teachers who actively seek knowledge about the education of gifted students and ways to assess and enhance the abilities of the gifted qualitatively different from other teachers? The lack of a means for pre-testing and/or an additional measure of creativity independent of the SOI posed difficulties to the discussion of the issue. It was not possible to attempt to determine in a direct manner the homogeneity of the three groups. A measure of self-rating of creativity was used to provide a basis against which the comparison of divergent abilities was made.

Will the data support the expectations that the group with interest and courses in education of gifted students score higher on the Divergent Production tests and Creativity Rating Scale than the group that has not had those emphases? Also, will the group that has had in-depth instruction in SOI and courses in gifted education score higher on the Divergent Production tests and the Creativity Rating Scale than the other two groups? The Creativity Rating Scale data provided additional depth in terms of self-perception in relation to the Divergent Production abilities.

While the effectiveness in the classroom of the teachers was not addressed by this study, there were some indications of their abilities to be effective divergent producers. As previously discussed, Guilford (1967) stated that the understanding of the nature of divergent thinking is important to the development of creativity and to overall mental abilities. Other studies (Torrance, 1967; James, 1967; Reyburn, 1967) supported Guilford in that teachers who score high on divergent measures behave more creatively in the classroom; teachers who receive training in creativity perceive themselves to be more creative than before; teacher recognition of creative behavior is crucial to the willingness to permit or encourage such behavior; students evidence more intellectual and creative growth under creative

teachers. The analyses of the data from the three groups may clarify to some extent the abilities of the teachers to understand, recognize, and encourage Divergent Production behaviors in their students.

Assuming that the instruction was effective, the SOI trained group of teachers (Group I) knew what the two Divergent Production subtests, DFU and DMU, attempt to measure. They had received instruction in the administration and scoring of the subtests. The analyses of the data on the three groups provide insights into the relationship between the knowledge of the nature of Divergent Production and the ability to perform in the areas defining Divergent Production--fluency, set change, transformations, and originality. One group of teachers had received instruction as to the nature of what was expected of them in order to achieve high scores on the Divergent Production subtests. The other two groups had not received information about the tests. The following questions were asked. Will the SOI trained group produce at a higher level in each of the scoring areas than the other two groups? Will the teachers who have had graduate courses in gifted education or the initial commitment to the study of the education of the gifted, Group II, produce at a higher level in each of the scoring areas than those in Group III? Will there be similarities in the scores of the groups on some measures of scoring? Will the

groups be significantly different on other scores? The analyses of the three groups may provide insights into the qualities of the Divergent Production abilities of teachers who have different emphases in their professional development.

Hypotheses

Hypothesis 1: There will be no significant differences on the Creativity Rating Scale scores among the members of three levels of graduate students in the education of gifted students.

Hypothesis 2: There will be no significant relationships between the Creativity Rating Scale scores and the SOI Divergent Production scores among the members of three levels of graduate students in the education of gifted students.

Hypothesis 3: There will be no significant differences on performance of divergent production among the members of three levels of graduate students in education of gifted students.

A. There will be no significant differences on performances of DFU among members of three levels of graduate students in education of gifted students.

1. There will be no significant differences on performances of DFU fluency among members of three levels of graduate students in education of gifted students.
2. There will be no significant differences on performances of DFU set change among members of three levels of graduate students in education of gifted students.
3. There will be no significant differences on performances of DFU transformations among members of three levels of graduate students in education of gifted students.
4. There will be no significant differences on performance of DFU originality among members of three levels of graduate students in education of gifted students.

B. There will be no significant differences on performances of DMU among members of three levels of graduate students in education of gifted students.

1. There will be no significant differences on performances of DMU fluency among members of three levels of graduate students in education of gifted students.

2. There will be no significant differences on performances of DMU originality among members of three levels of graduate students in education of gifted students.

Limitations

Many of the teachers in Group I had been involved in courses concerning the education of gifted students and in specific SOI instruction for several years. There was no treatment applied to these groups by the current researcher. The comparisons of Groups I, II, and III constituted the treatment for this study. Therefore, it was determined that pre-testing would provide no useful information concerning divergent production abilities. Because of this method of studying SOI Divergent Production, this study was conducted as a post hoc analysis.

EDSE 6723, Advanced SOI Applications for Gifted Students, from which the SOI-instructed teachers were obtained, was a unique course. Group II participants, the teachers with no knowledge of SOI, had to be tested immediately at the beginning of their courses before they were exposed to the SOI system.

The administration of the instrument and questionnaire took approximately 45 minutes of students' time and depended on the cooperation of the professors and class members.

Therefore, no measures independent of the SOI were utilized. Consequently, an additional limitation of this study is that it was not possible to determine the homogeneity of the three groups.

In spite of these limitations, this exploratory investigation provides steps in a more systematic study of creativity.

CHAPTER II

REVIEW OF THE LITERATURE

Creativity

One of the concerns of educators is the development and enhancement of creativity, but there has not been a clear, chronological development in defining and delineating the nature of creativity and the creative process (Rothenberg & Hausman, 1976). In the past, creativity has been regarded as a special endowment (Steinberg, 1967). Early discussions centered on the nature of creativity. Plato credited direct divine inspiration as the source of creativity (Rothenberg & Hausman, 1976). Kant (1952) described originality and creativity as the natural gifts of genius that cannot be attributed to learning or schooling and as that which is not possible to learn but can be manifested by the free exercise of cognitive abilities. Freud's (1959) psychoanalytic theories linked creativity to neurosis as expressed by fantasies and wish-fulfillments. Jung (1923) added to the issue by equating creativity and the collective unconsciousness. He defined the process as the "manifestation of the primordial image into the language of the present" (p. 126). Psychologists "first

became interested in art and artistic creation because of motivation, affect, and irrational id processes" (Jung, 1923, p. 194). Blanshard (1976) stated that "invention is the emergence in the mind of novelty under control of system" (p. 102). The creative impulse, according to Rank (1960), springs from the drive to immortalize self. Rank distinguished between the average person, the creative person, and the neurotic person. Kubie (1958), in relating essential relevance of preconscious processes to creativity, defined creativity as the ". . . capacity to find new and unexpected connections . . . ." (p. 147). Maslow (1954) proposed that creativity is based on complete character integration or lack of barriers between the conscious mind and its preconscious areas.

Guilford's presidential address to the American Psychological Association, in 1950, sparked the more recent investigations on creativity (Khatena, 1979). According to Khatena (1979), however, the nature of creativity was certainly of research interest before 1950. Early studies may have been stimulated by Galton's study of hereditary genius, but such interest did not generate or inspire great amounts of information or research activity. "The divergent-production abilities have historically been outside the domain of intelligence tests and conceptions of intelligence" (Guilford, 1967, p. 139). The general

psychological approach to the study of creativity has been based on factor or trait psychology (Rothenberg & Hausman, 1976). Previously, the basic focus of those persons concerned with the study of creativity was definitional in terms of examining the source of creativity. The major emphasis of the factor/trait psychologists was not only to define and delineate, but also to develop ways to measure, predict, and describe creativity, and in the process, provide clarification toward the nurturance of exceptional creativity. Guilford, Torrance, Wallach and Kogan, Getzels, Csikszentmihalyi, Barron, and MacKinnon are mentioned as significant contributors to the factor/trait concepts (Rothenberg & Hausman, 1976). Torrance (1977) defined creativity as "sensing gaps or disturbing missing elements, forming hypotheses, communicating results, and possibly modifying and retesting these hypotheses" (p. 316). Guilford (1977) stated that creativity is "any mental process or set of processes in which an individual generates information he did not have before" (p. 152). Gowan and Demos (1967) propose that "of all the powers of man, that of creativity seems the most unique" (p. 1). It is a new concept that still has some mystical connotations. It is not fixed and unchangeable, but responsive to environmental stimulation, with scientific, artistic, and humanistic components (Gowan & Demos, 1967).

The early investigation of individual differences in intelligence came as a result of Galton's curiosity about genius (Laycock, 1979). Galton proposed that intelligence was hereditary and fixed at birth (Clark, 1979). Based on this concept, Galton was the first to attempt to develop an intelligence test from scientific data. He believed the inability of the test to predict the future person from the present person was a fault of the test construction and not a function of a change in intellectual capacity. This beginning study locked intelligence into a limited concept of measurement (Clark, 1979).

As Terman developed the Stanford-Binet Individual Test of Intelligence, he became interested in how gifted individuals differed among themselves. His subjects, who have been followed for more than fifty years, are still under investigation. Terman conducted the most definitive psychological study ever undertaken (Gowan, 1977). In general, psychologists of Terman's era accepted the definition of intelligence as that which is measured by an IQ test (Gallagher, 1975). Terman recognized the "existence of creative intelligence" in that it had been "glimpsed but never adequately measured" (Torrance, 1977, p. 174).

In a follow-up study to Terman's longitudinal research, begun in 1921, Sears (1980) noted the current findings. Most of the original group of 1528 high IQ subjects became

successful, but none have crossed the barrier to manifestation of true creative genius. This group was in the top one percent in intelligence in the country, but there have been no Nobel awards, few millionaires, and no creative artists. Sears concludes "exceptional intelligence does not preclude ordinary happiness or worldly success" (p. 28). Howeyer, this group is low on "artistic creation" (p. 28). Sears speculated that it is possible that (a) creative genius is too rare to fall in this sample, (b) the test to identify the group was biased toward conventional intelligence and not toward less recognized creative abilities, (c) creativity and intelligence are not the same, while there is overlap, (d) creative genius may have or require something not revealed by an IQ test (Sears, 1980).

Getzels and Jackson (1961) discussed the confusion surrounding the I.Q. concept of intellectual functioning. The three problematic areas were (a) too great a theoretical and predictive burden has been placed on the single number I.Q., (b) the I.Q. test has been considered to represent an adequate sampling of intellectual functions, (c) the I.Q. concept has emphasized the different amounts of intellectual ability and ignored the different kinds of intellectual ability (Getzels & Jackson, 1961).

Getzels and Jackson studied over 500 high school students in two groups. The high I.Q., low creative group

performed with excellence on tasks common to traditional I.Q. tests. This group did not have the same ability for excellent performance on creativity tests. The reverse was true of the high creative, lower I.Q. group. Among the many conclusions drawn by Getzels and Jackson was that the groups were strong in different kinds of intellectual abilities, convergent and divergent thinking, rather than different amounts of intellectual abilities (Getzels & Jackson, 1961).

Guilford demonstrated that there are other dimensions of the intellect that are not represented on I.Q. tests, such as divergent thinking and evaluative thinking (Gallagher, 1975). Guilford (1967) advocated the acceptance of a multivariate approach to intelligence. His three-dimensional model represents both tests of intellectual performance and descriptors of mental abilities (Guilford, 1977). The Structure of Intellect (SI) offers a differentiated conceptualization of intelligence as opposed to the standard global I.Q.

Structure of Intellect (SI) and Guilford

The Structure of Intellect (SI) is intended to give "the concept of intelligence a firm, comprehensive, and systematic theoretical foundation" (Guilford, 1967, preface). His conceptualization is based on an intelligence

that is "composed of a very large number of distinct abilities or functions" (Guilford, 1977, p. xi). It is a myth that intelligence is a "broad unitary ability, and that it is best indicated by degree of success in school work" (p. 2). His major aim is to broaden the concept of intelligence to include factors such as divergent production and transformations that are not included in standard intelligence scales (Guilford, 1967).

The parallel intellectual factors Guilford identified are represented by a three-dimensional model that implies both a hierarchical and morphological relationship of differential factors (Guilford, 1967). The SI array of 120 predicted cells or categories of intellectual abilities defines specific intersections of three discrete factors, each intersection consisting of an operation, a content, and a product (Meeker, 1969). The operations, contents, and products represent a "collection of abilities for processing different kinds of information in various ways" (Guilford, 1977, p. 23).

Guilford (1977) defined operations as ways of processing information. The operations are cognition, memory, divergent production, convergent production, and evaluation. Different kinds of information are represented by figural, symbolic, semantic, and behavioral contents. The products are the "kinds of structures that information takes"--units, classes, relations, systems, transformations,

implications (p. 25).

According to Guilford (1967), the SI structure is morphological in that operations, contents, and products are parallel intellectual functions. Guilford contends that there is no particular dependency among the content categories. Within operations there is an increasing dependence from cognition to evaluation. There is an implied hierarchical complexity in products, ranging from units to implications (Guilford, 1967).

The lack of a theoretical model conceptualizing creativity may have hindered its study (Khatena, 1979). Guilford's SI provided a theoretical base for the study and measurement of creativity within a unified theory of intelligence. SI is frequently cited as sparking the development of more systematic research into the study of creativity (Rothenberg & Hausman, 1976; Gowan, 1979; Khatena, 1979). Divergent thinking and transformations, as defined by Guilford (1977), represent the cognitive components of creativity within the SI construct. They do not attempt to account directly for the affective, motivational and preconscious aspects of creative behavior (Barbe & Renzulli, 1975).

Creative production is the manifestation of the "divergent production category of functions and the functions involving transformations" (Guilford, 1967, p. 467).

Divergent production is a broad search for information with emphasis on variety and quantity of output; transformations involve a change in the structure of information (Guilford, 1977). For the purpose of this study, Guilford's SI divergent and transformation concept of creativity, as adapted by Mary Meeker (1967), will be used.

Guilford (1959) noted that methods that attempted to train the intellect have not been well-received, but that if significant progress in developing higher mental processes of thinking, i.e. problem solving and creative thinking, is to be made, the theory must be modified. Most learning has general and specific components, but the individual's status in each factor of the intellect "is not entirely determined by learning" (p. 201). Since the extent to which each factor is determined by heredity and/or learning is not known, the best approach for educators is to assume that "every intellectual factor can be developed in individuals at least to some extent by learning" (p. 201). Guilford (1959) advised educators to examine their curricula to determine whether any general intellectual skills are being neglected. The critical area of ineffectiveness is in producing creative, resourceful graduates. The need for such individuals is noticed more now because of the great technological and societal demands for inventiveness, the skills of divergent and transformational thinking. These

mental abilities must be practiced in order to be available. Guilford (1959) urged educators to make choices about curricula and methods to accomplish a better balance of creative thinking with convergent, critical, and evaluative thinking. Guilford (1977) proposed that intellectual abilities can be expanded. To accomplish this expansion, it is necessary to know about the kinds of abilities the individual possesses. The Structure of Intellect concept provides a base for differential assessment, curriculum planning, and remediation or enhancement according to individual strengths and weaknesses (Meeker, 1969).

The Structure of Intellect (SOI) and Meeker

Meeker began her work with the research on the SI model as a graduate student under Guilford's supervision. With his consent and support, she made the initial application of the SI, a psychological construct, to educational theory and practice, SOI. Meeker's seminal research between 1963 and 1965 involved analyzing the Stanford-Binet in terms of SOI profiles. The purpose of these analyses was to provide a framework for individualized curricula "rooted in a theory of intellectual functioning" (Meeker, 1969, p. ix). The first indicators of relationships which were related to school achievement came as a result of factor sampling from the Stanford-Binet and Wechsler Intelligence Scale for

Children. These clusters were based on studies done in the areas of reading (Feldman, 1965) and school readiness (Williams, 1965). From her own research and these initial studies, Meeker (1980) isolated "those 24 of the 96 SI abilities which were critical for learning" (p. 61). The 24 intellectual abilities drawn from Guilford's factor analyses became the Structure of Intellect Learning Abilities Test published by Meeker in 1975. The pilot study for the test was conducted as a Title III, ESEA project. The transformation of the SI from psychology to the SOI in education provided the opportunity for a profile of intellectual abilities rather than an IQ number (Meeker, 1963). As Guilford previously proposed, Meeker (1963) advocated the need to modify educational programming to include the assessment and training of mental abilities on an individual basis.

The SOI divergent production measures used in this research were Divergent Production of Figural Units (DFU) and Divergent Production of Semantic Units (DMU), two subtests of creativity in the Meeker SOI Learning Abilities Test. Divergent Production is the "generation of information from given information, where the emphasis is upon variety and quality of output from the same source" (Meeker, 1969, p. 20). It is "likely to involve what has been called transfer. This operation is most clearly

involved in aptitudes of creative potential" (p. 20). Figural content is perceived information in concrete form (Meeker, 1969). Semantic content refers "to words and ideas where an abstract meaning is so associated in the individual's repertoire of knowledge that its external referent calls up the internally associated stored word" (p. 22). A unit "is a basic kind of product, for while it can stand alone, others are dependent upon it in one way or another" (Guilford, 1977, p. 25). A unit "is any single item, one of a kind" (p. 23). The resulting intersection of divergent production, figural content, and units (DFU) involves "motor and ideational fluency (Meeker, 1979, p. 11). This subtest measures creativity with things and will reveal "talent for drawing or communicating through figural representations or schemes . . . ." (Meeker, 1979, p. 11). Divergent production of semantic units (DMU) defines creativity with words and ideas. It measures "how quickly students write and, within a limited time frame, also have unique ideas" (Meeker, 1979, p. 11). Potential for creative writing can be detected with this subtest.

Findings indicate that effective teachers of the gifted have, among other attributes, qualities of high intellect, humane motives, a sense of humor, curiosity, personal magnetism, flexibility, creativity, sensitivity to others, wide-ranging interests, and enthusiasm for

self-improvement (California State Department of Education, 1979; Iannon & Carline- 1971; Clark, 1979). The highly creative have self-images that are significantly different from the less creative. The most salient difference is "the courage of the mind" or "personal courage to be one-self" (MacKinnon, 1967, p. 27). Among the characteristics of creative people listed by MacKinnon are cognitive flex-ibility, verbal skillfulness, and openness to experience. The Creativity Rating Scale, developed by Meeker, is designed to provide "teachers insight into the nature of potentially creative performances" (Meeker, 1968, p. 186). This observer-rated or self-rated scale of creativity includes sections on fluency, flexibility (set change), and originality.

Taylor (1976) suggested that "most investigators of creativity agree that creativity can be developed through learning in interaction between the person and his/her environment; that given certain opportunities creativity will emerge in some, and will not emerge in those denied these opportunities" (p. 339). Creative teachers are needed, and instruction in creativity is essential for them (Williams, 1967). Williams (1967) added that crea-tivity in students can be "encouraged through subject-matter instruction, but this requires that teachers be trained to recognize and develop creativity and be

innovative themselves" (p. 173). The "clarification of the role of intellectual creativity in education is needed both for our existing corps of teachers and for those preparing to teach" (p. 173). J. P. Guilford's work on the SI has provided stimulation to those attempting to "alleviate some of the confusion concerning creativity" (Williams, 1967, p. 173).

Among the important aspects of creativity instruction is teaching about the psychological events involved (Guilford, 1967). McFee (1964) and Foehand and Libby (1962) found that exercises in thinking were not enough to generate divergent behavior, but that exercises combined with instruction in terms of the nature of creative thinking were effective. The development of divergent thinking in fifth-grade teachers through oral and written language instruction was studied by Reyburn (1967). The teachers were pre- and post-tested on selected tests of Torrance's Minnesota Tests of Creativity. The teachers participated in special in-service training to teach for divergent thinking and then in a five months training program in their own classrooms. The conclusions from this research were (a) a training course in creativity will raise both originality and fluency scores, (b) divergent thinking and creative production can be expected as a result of the training, (c) teacher growth, as well as student growth, in

terms of tolerance for divergent thinking and creative production can be expected (Reyburn, 1967). Guilford (1967) concluded "it would appear that general training in the basic psychological use of information can contribute to intellectual development" (p. 340).

The two measures of creativity found in the SOI-Learning Abilities Test (Divergent Production of Figural Units and Divergent Production of Semantic Units) provide avenues for systematic exploration of creativity. Their merit lies in providing greater objectivity and consistency in this divergent area. Such clarity is particularly important in attempts to study the effects of training and instruction on performance in the area of creativity. Such exploration is considered to be important in leading to the development of more creative teachers. This is a current trend in the field of the education of gifted students.

CHAPTER III

DESIGN OF THE STUDY

Overall Design

This research was a causal-comparative study with three comparison groups. The three groups were (a) Group I, teachers who, as graduate students, had completed courses in education of gifted students and in SOI instruction, (b) Group II, teachers who, as graduate students, were enrolled in courses in the education of gifted students and participated in this research before studying SOI, and (c) Group III, teachers who had had no courses in the education of gifted students and no SOI instruction.

Population and Sample

From the total enrollment of graduate students in education courses at Texas Woman's University during 1981, the students in six sections of four courses were selected as convenience samples. Group I, with 57 subjects, was taken from the two sections of EDSE 6723, Advanced SOI Applications for Gifted Students, in the Spring Semester, 1981. Group II, with 50 subjects, was taken from three sections of three different courses in the Spring Semester, 1981.

EDSE 5513, Teaching Gifted Students, was composed of students who were in their first course for teachers of gifted students. EDSE 5503, Seminar on the Creative and Gifted Child, was also composed of teachers in their first course for teachers of gifted students. EDSE 6903, Diagnostic Planning for Gifted Students, contained students who had had a previous course but who, at the beginning of the course had only nominal knowledge of SOI. Group III, with 34 subjects, was taken from two sections of EDPS 6203, Education Law. A few students in the two sections of the class had studied one or more courses in SOI or in education of gifted students. Those students were excluded from the test population of Group III. The students in Group III were students in Supervision or Administration, seeking the Professional School Administrator's Certificate. None in Group III had studied the education of the gifted or SOI.

EDSE 6723, Advanced SOI Applications for Gifted Students, was a unique course offered to a select group of Texas Woman's University graduate students by Dr. Mary Meeker, Distinguished Visiting Professor of Psychology and Education, in Spring, 1981. Prerequisites for enrollment included previous graduate courses in education of gifted students and EDSE 6903, Diagnostic Planning for Gifted Students or its equivalent. This course included advanced

interpretation of the SOI Test and the planning of applications of Guilford's Structure of Intellect and Meeker's test to the learning and development of gifted students. Questions of enrolled students concerning applications of the test and concerning potentialities and problems of gifted students were answered directly by Dr. Meeker.

EDSE 6903, Diagnostic Planning for Gifted Students, was designed by Dr. Mary Meeker. Each graduate student in the class personally completed the SOI Test. Each scored her own test with the guidance of experienced scorers of the test and according to specifications of the SOI Institute. Dr. Meeker or Dr. Judith Keith, clinical psychologist in private practice with a background of experience in university teaching of psychology, guided students in interpretation of the test. Questions concerning diagnosis of potentialities and problems of gifted students were answered individually.

Instrumentation

The Structure of Intellect Learning Abilities Test consists of tests designed to measure each of 24 cells from Guilford's model. The test requires paper and pencil responses from examinees. Test answers are based on various kinds of responses. There are multiple choice items, memory reproduction, motor production, and free response

items. Divergent Production of Figural Units (DFU) and Divergent Production of Semantic Units (DMU) are free response items in that the instructions are purposely ambiguous so that the examinees are working from their own ideas. There are no right or wrong answers for DFU and DMU.

DFU scores are derived from the number and quality of drawings (ideas) made within a constructed framework of space and time. The drawings (ideas) are scored for (a) fluency--the number of drawings produced within the framework, (b) set change--the number of different ideas produced, (c) transformation--the manner in which the drawings are integrated into the framework, (d) originality--the production of unusual responses. Originality is scored for labeling, three-dimensional, perspective, movement, humor, rarity, elaboration, transformation, and macabre.

DMU scores are derived from stories examinees write which are to be based on any DFU drawing they have made. The stories are scored for fluency--the number of words produced, and originality--unusual ways of using words and ideas. Originality is composed of (a) character name that is a play on words, (b) pun or humorous use of words, (c) personification, (d) unusual theme, (e) story with a moral, (f) poetry, (g) macabre, (h) rare topic, (i) idea that evokes a moving response. Both DFU and DMU tests are five

minutes in length. This scoring format for DFU and DMU is taken from the SOI-LA Test Examiner's Manual (Meeker & Meeker, 1975).

A Rating Scale for Identifying Creative Potential is a self-report or observer response instrument developed by Dr. Meeker. It is organized around five components of creative ability. Those components are unusual sensitivity, fluency, flexibility, originality, and organizational ability and work habits. Twenty-five items are scored high, medium, or low.

Demographic data were collected from each participant in order to clarify the groups and individuals on age, education, professional experience, and current teaching assignment variables. A sample of the instrument designed by the current researcher appears in Appendix A.

Data Collection

Permission for collection of data was granted by the Human Subjects Review Committee of the Texas Woman's University on February 4, 1981 (See Appendix B).

All instruments and the questionnaire were administered during one class session for each class. The instruments and questionnaire were administered to each participant on a group basis during their respective class sessions. The collection of data from the course members,

who constituted Groups I, II, and III, was accomplished during the Spring, Summer, and Fall semesters of 1981.

The two SOI Divergent Production subtests, DFU and DMU, were administered to each individual who was willing to participate. Participants were asked to complete the Creativity Rating Scale and to complete a background questionnaire providing demographic data.

Statistical Tools

All statistical analyses were computed with the SPSS or the BMDP canned statistical series. Repeated measure analysis of variance was applied to the DFU, DFU-originality, DMU, and DMU-originality scores of the three groups. One-way analysis of variance was used to compare the three groups on those DFU and DMU variables which did not have a significant rater effect on the repeated measures analysis. The Newman-Keuls post hoc procedure was used to determine where differences existed among the three groups. Multiple regression procedure was used to analyze the relationship between (a) creativity rating scale scores and DFU/DMU scores, (b) demographic data and DFU/DMU scores, and (c) inter-rater reliability.

CHAPTER IV

ANALYSIS OF THE DATA

In the Analysis of the Data, each relationship that was significant at the appropriate level was briefly interpreted. The relationships that did attain the .01 level of significance are reported in this section.

In the tables presented in this chapter, the three groups of subjects are designated as Group I, Group II, and Group III. Group I included teachers of the gifted who had had specific SOI training (EDSE 6723). Group II included teachers in graduate classes concerning education of gifted students without specific SOI instruction. Group III included graduate students in EDPS 6203, Education Law. Students in the law classes who had previously studied any course on the education of gifted students were excluded from this group.

Inter Rater Reliability

The DFU and DMU subtest scores are derived by rater decisions. The variables composing DFU and DMU are judged to be present or not present in subjects' responses. The scorers used for this study were two clinical psychologists and an educational consultant, all of whom had had several

years of experience along with continual training by Dr. Meeker. The scorers were experienced with the SOI test and scoring procedures. Scorer data are presented in Table 1.

The multiple regression procedure was used for the purpose of determining the inter rater reliability coefficients. These coefficients ranged from .96 through .98 and were significant beyond the .01 level. Specifically, the correlation between Rater 1 and Rater 2 was .97, Rater 1 and Rater 3 was .98, and Rater 2 and Rater was .96.

Of particular importance were the inter rater reliabilities of DFU, DFU-originality (DFU-o), DMU, and DMU-originality (DMU-o). The correlation of DFU between Rater 1 and Rater 2 was .84, Rater 1 and Rater 3 was .84, and Rater 2 and Rater 3 was .80. On DFU-o the correlation between Rater 1 and Rater 2 was .66, Rater 1 and Rater 3 was .64, and Rater 2 and Rater 3 was .60. The DMU correlations were Raters 1 and 2, .90; Raters 1 and 3, .90; Raters 2 and 3, .87. For DMU-o the correlations were Raters 1 and 2, .74; Raters 1 and 3, .74; Raters 2 and 3, .71. With the exception of the inter rater reliability between Raters 1 and 3 on elaboration which was .02, all inter rater reliability coefficients on specific DFU/DMU variables were significant beyond the .01 level. These correlations were computed for DFU: fluency, set change, transformations, labeling, 3-D, perspective, movement, humor, rarity, elaboration,

Table 10

Inter-rater Reliability Coefficients for DFU and DMU

	Raters 1 & 2	Raters 1 & 3	Raters 2 & 3
DFU-total	.84	.84	.80
fluency	.99	.98	.98
set change	.73	.75	.76
transformation	.84	.83	.82
DFU-originality	.66	.64	.60
labeling	.60	.87	.64
3-D	.51	.52	.36
perspective	.29	.29	.27
movement	.47	.42	.45
humor	.31	.35	.05
rarity	.32	.54	.33
elaboration	.27	.17	.29
transformation-o	.63	.74	.57
macabre	.27	.25	.25
DMU-total	.90	.90	.87
fluency	.94	.98	.92
DMU-originality	.75	.74	.71
character name	.74	.66	.59
pun or humor	.37	.46	.22
personification	.60	.75	.71
rare theme	.41	.39	.32
moral	.14	.36	.32
poetry	.86	.86	1.000
macabre	.41	.33	.54
rare topic	.40	.49	.39
emotional response	.12	.17	.02

transformation, and macabre. The inter rater correlations computed for DMU were fluency, character name, pun or humor, personification, theme, moral, poetry, macabre, rare topic, and evokes emotional response.

Group Comparisons

A 3 x 3 repeated measure analysis of variance was applied to the DFU, DFU-o, DMU, and DMU-o scores. There were three levels of groups, SOI trained, gifted only, and untrained, and the repeated measure was across raters. The means and standard deviations for these groups by raters are reported in Tables 2, 4, 6, and 8. The summary tables for the repeated measures analyses for DFU, DFU-o, DMU, and DMU-o variables are reported in Tables 3, 5, 7, and 9. Based on this analysis, there were significant group differences between SOI trained, gifted only, and untrained in the predicted direction beyond the .01 level. There was also a significant rater effect. Because of the significant rater effect, the individual variables which compose DFU, DFU-o, DMU, and DMU-o were also subjected to the repeated measures technique. Again, there were three levels of groups: SOI trained, gifted only, and untrained, and the repeated measures were across raters. The means and standard deviations of these variables for the groups by raters are reported in table form in Appendix C. The summary tables for the

Table 2

Means and Standard Deviations of DFU Scores
for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	62.21	31.94	32.65	44.35
2	83.75	49.04	40.15	60.93
3	62.07	38.22	33.85	46.81
Group Totals	69.35	39.73	35.55	50.70
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	All Subjects
1	21.89	13.32	11.40	
2	30.94	26.58	12.87	
3	21.88	14.71	9.31	

Table 3

Analysis of Variance for DFU: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	937206.39056	1	937206.39056	942.52	0.0000*
Group	100900.42806	2	50450.21403	50.74	0.0000*
Error	137221.89818	138	994.36158		
Rater	18363.02238	2	9181.51119	69.38	0.0000*
Rater Group Interaction	3759.29563	4	939.82391	7.10	
Error	36525.47033	276	132.33866		

*p<.01

Table 4

Means and Standard Deviations of DFU-originality Scores for Three Groups of Subjects

	Means			
Rater	Group I	Group II	Group III	All Subjects
1	17.61	9.76	9.06	12.77
2	25.63	17.68	14.35	20.09
3	18.88	12.24	11.29	14.70
Group Totals	20.71	13.23	11.57	15.85
Count	57	50	34	141
	Standard Deviations			
Rater	Group I	Group II	Group III	All Subjects
1	7.63	5.49	5.85	
2	8.39	9.32	7.51	
3	9.43	7.77	5.86	

Table 5

Analysis of Variance for Divergent Production of Figural Units-originality: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	92771.00793	1	92771.00793	751.28	0.0000*
Group	6936.92396	2	3468.46198	28.09	0.0000*
Error	17040.69306	138	123.48328		
Rater	3580.40989	2	1790.20494	62.03	0.0000*
Rater Group Interaction	173.30241	4	43.32560	1.50	0.2020
Error	7966.04510	276	28.86248		

*p<.01

Table 6

Means and Standard Deviations of DMU Scores
for Three Groups of Subjects

	Means			
Rater	Group I	Group II	Group III	All Subjects
1	128.12	107.44	93.82	112.52
2	128.11	110.52	95.53	114.01
3	124.26	107.08	91.79	110.34
Group Totals	126.83	108.35	93.72	112.29
Count	57	50	34	141
	Standard Deviations			
Rater	Group I	Group II	Group III	All Subjects
1	32.35	25.71	27.40	
2	29.75	26.68	26.42	
3	30.24	28.77	27.52	

Table 7

Analysis of Variance for DMU: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	4846663.00108	1	4846663.00108	2163.14	0.0000*
Group	73676.42394	2	36838.21197	16.44	0.0000*
Error	309198.81011	138	2240.57109		
Rater	911.90200	2	455.95100	4.08	0.0179
Rater Group Interaction	196.40095	4	49.10024	0.44	0.7798
Error	30813.20189	276	111.64204		

*p<.01

Table 8

Means and Standard Deviations of DMU-originality Scores for Three Groups of Subjects

	Means			
Rater	Group I	Group II	Group III	All Subjects
1	29.65	12.60	9.41	18.72
2	30.35	17.00	11.47	21.06
3	27.19	13.40	7.94	17.66
Group Totals	29.06	14.33	9.61	19.15
Count	57	50	34	141
	Standard Deviations			
Rater	Group I	Group II	Group III	All Subjects
1	19.27	11.03	10.13	
2	15.35	13.89	10.19	
3	20.07	12.87	10.38	

Table 9

Analysis of Variance for Divergent Production of Semantic Units-originality: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	125885.62096	1	125885.62096	252.07	0.0000*
Group	29575.67756	2	14787.83878	29.61	0.0000*
Error	68917.93946	138	499.40536		
Rater	830.79395	2	415.39697	5.33	0.0054
Rater Group Interaction	221.18997	4	55.29749	0.71	0.5863
Error	21523.49088	276	77.98366		

*p<.01

repeated measures analyses of the variables for the groups by raters are presented in table form in Appendix C. This procedure indicated significant group differences for the following: DFU--transformation, labeling, movement, humor, rarity, transformation-o, macabre, and DMU--fluency, character name, pun or humor, personification, theme, macabre, rare topic, and emotional response. Of these variables, there were also significant rater effects for transformations, labeling, movement, humor, rarity, transformation-o, pun or humor, theme, rare topic, and emotional response. Because of these circumstances, it is impossible to make a definitive statement of significance for those variables which had significant rater effects. This result also indicates that while there was a significant overall reliability among the raters, they were focusing on different aspects of the scoring process.

Following the repeated measures analysis, those variables which were not confounded by a significant rater effect were subjected to a one-way analysis of variance. This was accomplished by collapsing the data across raters and taking the average of the raters' scores. This analysis supported the repeated measures analysis, indicating significant differences for DFU--macabre, DMU--fluency, character name, personification, and macabre. The Newman-Keuls post hoc procedure was used with these four variables to identify

inter group differences. For the variable macabre, the Newman-Keuls indicated that the SOI trained group (1) differed significantly from the gifted only group (2), while there were no significant differences between the SOI trained and the untrained (3) groups, or between groups 2 and 3. On DMU--fluency the untrained group differed significantly from groups 1 and 2, while group 1 did not significantly differ from group 2. For DMU--character name and for DMU--personification, the SOI-trained group was significantly different from groups 2 and 3, while those two groups did not differ from each other.

Another source of information which was felt to be important to this study was A Rating Scale for Identifying Creative Potential. This scale identifies a person's own perception of his/her creativity. Initially, these data were averaged for each subject and subjected to a one-way analysis of variance by group. This analysis revealed no significances among the groups based on their self-ratings. The specific variables which comprise the self-rated creativity average for each subject and the subject's scores on DFU/DMU variables were entered into a multiple regression procedure. The purpose of the multiple regressions was to find those subsets of the variables in the self-rating scale which would predict performance on the DFU/DMU scales and on those components from which DFU and DMU scores were derived.

The results of this analysis are reported in Table 10.

Demographic Data

The demographic variables and each score from DFU and DMU were entered into a multiple regression procedure for the purpose of predicting DFU/DMU scores from demographic data. There were no significant relationships.

The computer print-outs on the multiple regression procedure of the demographic data were examined carefully in consultation with a senior mathematics professor, who is a specialist in research statistics and computer analysis, and with a computer statistician, and with the chairman of the dissertation committee. On the basis of these consultations, no significant relationships were found between DFU and the demographic data or between DMU and the demographic data. The computer data are offered and available to all members of the dissertation commiteee. Any reader desiring further details concerning the lack of significant relationships between the demographic data and DFU and DMU scores may contact the investigator or this dissertation chairman for specific clarification. To conserve space in the dissertation, the lengthy data from the multiple regression procedure between DFU and DMU and the demographic data will not be presented in table form.

Table 10

Multiple Regression: Divergent Production of Figural Units and Divergent Production of Semantic Units against Creativity Rating Scale Scores

	Beta Weights										
	1	6	7	11	15	17	18	19	23	MR	MR^2
DFU	*	.1946	*	*	*	-.26316	*	*	.33594	.44247	.19578
1	.20451	*	*	.21201	*	-.21525	-.21163	*	.23154	.42425	.17999
2	*	*	*	*	*	*	*	*	*	.13286	.01765
3	*	.21031	*	*	*	-.23222	*	*	.25365	.37809	.14295
DFU-o	*	*	*	*	*	*	*	.20731	.26585	.35869	.12866
DMU	*	.20523	.21453	*	.18404	*	*	*	*	.40920	.16745
13	*	*	*	*	.25554	*	*	*	*	.25554	.06530
DMU-o	.16204	*	.29217	*	.23507	*	*	*	*	.39244	.15401

1 = sensitivity to feelings 6 = visual sensitivity 7 = rapid verbal responses
11 = flexibility with numerical problems 15 = many original ideas 17 = motor skills
18 = sense of humor 19 = abstracts meaningful information 23 = high energy level

DFU 1 = fluency DFU 2 = set change DFU 3 = transformation DMU 13 = fluency

Hypotheses

Hypothesis 1: The first null hypothesis is accepted. Based on a one-way analysis of variance and on the Newman-Keuls Procedure, the data show no significant differences among the groups on their self-rating of creativity. The rating scale provides a range of 25, for all low ratings, to a high of 75, for all high ratings. The means for the three groups were (a) Group I, 55.50, (b) 55.85, and (c) 57.09. The groups rated themselves to be relatively equivalent. Furthermore, the ratings are in the medium range between the highest and lowest possible scores.

Hypothesis 2: The second null hypothesis is rejected on certain variables of DFU and DMU and the Creativity Rating Scale. A multiple regression procedure was performed to determine what DFU and DMU scores could be predicted from the rating scale scores. These data are reported in Table 10. The null hypothesis is rejected for the following rating scale items: (a) Sensitivity to feelings correlates significantly with high DFU-fluency and DMU-originality. (b) Visual sensitivity correlates significantly with high DFU-total, transformations, and DMU-total. (c) Rapid verbal response correlates significantly to high DMU-total and DMU-originality. (d) Flexibility in solving numerical problems correlates significantly to high DFU-fluency. (e) Many

original ideas correlate significantly to high DMU-total, fluency, and originality. (f) Motor skills correlate significantly with low DFU-total, low fluency, and low transformations. (g) Sense of humor correlates significantly with low DFU-fluency. (h) The ability to abstract meaningful information correlates significantly with high DFU-originality. (i) High energy level correlates significantly with high DFU-total, fluency, transformations, and originality.

Hypothesis 3: For some sub hypotheses the null hypothesis is rejected; for other sub hypotheses the null hypothesis is accepted.

A. The null hypothesis is rejected. There are significant differences on DFU. Group I is significantly different from Group II and from Group III.

1. The null hypothesis is accepted for DFU-fluency. There are not differences among the three groups.

2. The null hypothesis is accepted for DFU-set change. There were no differences among the three groups.

3. The null hypothesis is rejected for DFU-transformations. Group I produced significantly higher scores from Group II and Group III, who are not different from each other.

4. The null hypothesis is rejected for DFU-originality. Group I has significantly higher scores than Groups II and III, who are not significantly different from each other.

B. The null hypothesis is rejected for DMU. Group I is significantly different from Groups II and III, who are not significantly different from each other.

1. The null hypothesis is rejected for DMU-fluency. Groups I and II are different from Group III.

2. The null hypothesis is rejected for DMU-originality. Group I is different from Groups II and III, who are not significantly different from each other.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This study was conducted in order to examine the relationship between Structure of Intellect (SOI) instruction and performance on two SOI divergent production subtests. The two subtests were Divergent Production of Figural Units and Divergent Production of Semantic Units.

The tests were administered by the researcher to 141 teachers who were graduate students. The subjects were classified into three groups. Group I contained 57 teachers of gifted students who had had two courses that included test administration, interpretation, and application conducted by Dr. Mary Meeker. Group I teachers also had had graduate courses in the education of gifted students. Group II was composed of 50 teachers who had had courses in the education of gifted students but who had not had any SOI instruction. Group III contained 34 teachers who had had neither gifted nor SOI instruction.

The research questions were derived from the three hypotheses. Will the SOI trained teachers perform higher on Divergent Production tests than non-SOI trained teachers?

Will the SOI trained teachers rate themselves to be creative in greater depth than non-SOI trained teachers? Will there be significant relationships between self-ratings of creativity and respective divergent production scores?

The three groups rated themselves to be relatively equivalent in creativity. On 23 of the 26 divergent production scoring variables analyzed, Group I, the SOI trained teachers, performed higher, at the .01 level of significance, than Group II, teachers with gifted instruction, and Group III, teachers with neither gifted nor SOI instruction.

Findings

Group Differences

The discussion on the analyses of group differences is presented with the acknowledgment of a significant rater effect on 13 of the variables where group differences are significant. While the raters may have different means among themselves, there is support for considering the predicted group order of means to be important and present in the findings of this study.

The groups performed on DFU and DMU and the respective internal variables generally as expected. That is, with three DFU exceptions, Group I, the SOI trained, has a higher mean than Group II and Group III. More specifically,

there are only six out of the 26 variables which do not follow the order of Group I, highest mean; Group II, next highest; and Group III, lowest mean. Group I is lower, as well as relative equal with Group II, on DFU-set change, three-dimensional, and elaboration, but the analyses also show non-significant group differences. The set change finding appears to be a result of the scoring system. Higher scores on other variables such as transformations and originality variables require time and detail; therefore the generation of different ideas tends to suffer in an abbreviated time span. Group III, who is not predicted to be slower, just not as trained, produced relatively more ideas than Groups I and II who most likely were concerned with other aspects of the task. The only other order exceptions were Groups I, III, II on DFU-fluency, movement, and macabre. DFU-fluency manifests no significant group differences. This finding may possibly be accounted for by examining the task. Given 16 spaces to fill, it is probable that graduate students have sufficient skills to accomplish this in a short time span; therefore, Group III would have the necessary skills to do so as well as Group II, who could perform as well as Group I. There are no exceptions in group mean order for DMU and its variables. Of the 23 variables, with Group I having the highest mean performance, only four have non-significant group differences. There

were no group differences on DFU-fluency and perspective, and DMU-moral and poetry.

Group I, therefore, was generally more creative than II and III in drawing and story writing. The creative drawing responses of Group I suggest that, in fact, the SOI trained teachers are able (a) to be less inhibited or restricted by a framework (transformations), (b) to be original in using words along with drawing to clarify an idea (labeling), (c) to utilize animation in drawing (movement), (d) to be humorous, (e) to draw unique ideas (rarity), (f) to be unique and wide-ranging within a framework (transformation-originality), and (g) to use macabre ideas in drawings.

Group I, also, is capable of demonstrating greater creativity in story writing. They can (a) produce many words in a short time span, (b) be original in their stories by making their characters stand out with unusual names, (c) use puns or humor, (d) animate the lifeless (personification), (e) produce unusual plot within a story (theme), (f) utilize macabre ideas, (g) develop unique stories (rare topic), and (h) evoke emotional response in the reader.

Although it is impossible to determine whether the production measured in this test is predictive of creativity in other situations, the performances by the SOI trained teachers of gifted students suggest it is helpful to provide

instruction into the nature of divergent production to those individuals who attempt to stimulate creativity in others. The Group I performance further suggests that SOI instruction is beneficial to adults who desire to learn to produce creatively.

With the exception of DFU-fluency, movement, and macabre, Group II has a higher divergent performance than the group with no gifted or SOI instruction. It appears that instruction in or commitment to the education of gifted students produces relatively more divergent performances than not having gifted instruction.

These conclusions are further supported by the self-ratings on the Creativity Rating Scale. The analyses on self-rating of creativity resulted in no significant differences among the three groups. No group perceives itself as being any more or less creative than the other two groups. It is possible, therefore, to infer from these data that SOI instruction and instruction in education of the gifted might produce higher divergent performances in a group of adults who rate themselves in creativity as equivalent to lower performance groups. Further, it appears that since Group I rates itself the same as Groups II and III, there is some support for concluding that the SOI instruction for Group I was effective.

The results of this study provide an additional basis for considering the SOI system and creativity. The five SOI operations, which were defined and described in the Review section of this paper, are Cognition, Memory, Evaluation, Convergent Production, and Divergent Production. This researcher proposes that, based on the findings of this study, it is beneficial to provide instruction into the nature of divergent production. More specifically, each SOI operation can be used to instruct, model, and contrast divergent production. For example, adults such as the SOI trained group (Group I) are presented information through the cognition operation regarding types of responses that contribute to their performance. Although one might consider such responses to reflect convergent production, one can argue that this output, nevertheless, results in increased divergent production at a quantitative level. Even though, by definition, divergent operation is an ability that appears to be unique in that its production does not depend on providing correct or one-right answer responses, the other operations can be used to stimulate it. The SOI system therefore offers a systematic and thorough approach to internalizing and producing divergent responses. As Guilford (1967) proposed and this study appears to support, it is important and effective to provide instruction into the nature of divergent production in order to build

creativity.

Inter-rater Reliability

There is strong agreement among the three raters on overall creativity across the 141 subjects. These data are reported in Table 1 on page 35. The inter-rater reliability for total DFU and total DMU combined and across the three groups ranges from .96 to .98. This strength of rater agreement suggests that it is possible for trained persons to agree on what constitutes a creative response on the two SOI measures. The inter-rater reliability measured in the current study further suggests that consensus among trained scorers can be attained when using the SOI to measure divergent production in adults.

While developing an overall sense of the quality of a response is important in terms of test interpretation, the SOI system utilizes DFU and DMU as independent scores rather than as a total combined score. Therefore, it is beneficial to examine inter-rater reliability for DFU and DMU separately. The raters were able to agree on figural creativity (DFU) and on creativity with words (DMU). Rater agreement for DFU and DMU separately is not quite as strong as the reliability for the two combined. The inter-rater reliability on DFU ranged from .80 to .84. For DMU the reliability ranged from .87 to .90. Again, there is healthy rater

agreement on the overall creativity of a drawing and on the overall creativity of a story. Therefore, it is possible to expect some stability among trained raters and, further, to utilize the DFU and DMU score in an individual SOI profile with some confidence in that stability. This stability of scores among raters is important in terms of the practical application of the SOI, specifically test interpretation and recommendations based on the interpretation. The strength of the inter-rater reliability on DFU and DMU observed in this study appears to support the use of trained scorers for these two subjective test items.

A closer examination of the components which comprise DFU-total and DMU-total provides more specific information about scoring creative or divergent responses. The subscroes of DFU-total are fluency, set change, transformation, and originality. The originality scores for both DFU and DMU are further divided into nine scores each. The fluency scores, which are derived from counting the number of spaces used (DFU) and the number of words written (DMU) would be expected to have high inter-rater reliability. All the reliability coefficients for fluency are greater than .90.

The inter-rater reliability on DFU-set change ranges from .73 to .76. Set change is the number of different

ideas produced within the drawing framework. The subjective aspect of scoring creativity appears in set change. Counting spaces or words is an objective process, but agreeing on how many ideas are different within a group is more difficult. It is noted that set change scoring does depend on the scorers' abilities to recognize and distinguish classes of ideas. The reliability coefficients reflect the greater difficulty involved.

Inter-rater reliability on DFU-transformations ranged from .82 to .84. A transformation response is easily detectable, but there are subtle variations that are more difficult to score. The inter-rater agreement indicates a reasonably effective consistency among the scorers. DFU/DMU fluency, set change, and transformations have practical value in the assessment setting. These variables provide global indications of linear (quantitative) and lateral (different sets) ranges of responses produced in a short time span. Respectable inter-rater reliabilities are detected for these subscores.

DFU-originality and DMU-originality scores, with nine components each, provide some measure of what an individual can produce that is significantly unique from the products of his/her peers. It is recognized by this researcher that the SOI test does not present these specific components that comprise the originality totals as independent units

of assessment. While the internal variables are not necessarily of practical significance, there are insights into the nature of creativity and its measurement to be gained by briefly focusing on these internal components.

The inter-rater reliability is lower for DFU-originality (DFU-o) and for DMU-originality (DMU-o) than for DFU-total and DMU-total and for DFU/DMU combined. The raters were more effective in agreeing on overall creativity and divergent production than they were in agreeing on the originality involved. Further, the DFU-o rater reliability is .66, .64, and .60 and the DMU-o reliability is .74, .74, and .71. The scorers were relatively more consistent in semantic originality scoring than they were in figural originality. The categories for DFU-o are labeling, 3-D, perspectives, movement, humor, rarity, elaboration, transformation-o, and macabre. Of these nine DFU-o categories, only labeling has an inter-rater reliability of .60 or greater. The DMU-o categories are character name, pun or humor, personification, theme, moral, poetry, macabre, rare topic, and evokes emotional response. Of these DMU-o categories, character name, personification, and poetry have an inter-rater reliability of .60 or greater. The range of rater reliability of DFU-o is from elaboration (.27, .17, .29) to labeling (.60, .87, .64). The DMU-o rater reliability range is from emotional response (.12,

.17, .02) to poetry (.86, .86, 1.000). It becomes apparent that there is a decreasing inter-rater reliability with increasing specificity in scoring.

The raters are in strong agreement in terms of overall divergent production. They are less able to agree on DFU and DMU. The reliability further declines for DFU-o and DMU-o, and even further for the categories within originality. For practical considerations, the inter-rater reliability holds strong for DFU and DMU as assessment items. There are various implications that arise from the decline in rater reliability. It is possible that while the raters were consistently recognizing DFU and DMU responses, they were less able to agree on what originality categories were involved in divergent production. That creativity or divergent production may be easier to recognize than to classify was discussed in the Literature section. This classifying difficulty is one aspect to be considered in terms of the decreasing internal rater-reliability. Another consideration that is specific to this study involves rater experience with the content of DFU and DMU. It is possible that these raters are more experienced and more comfortable dealing with semantic aspects of creativity than with the figural qualities of creativity. Another area of speculation on the inter-rater reliability that can be examined is the pattern of variation from concrete to abstract. The

counting of the number of incidents (fluency) is obviously much easier and more objective than the decision involved in scoring an emotional response. The rater reliabilities appear to decline with the increasingly abstract nature of a category. The number of different ideas may be easier to agree upon than whether those ideas involve a moral or a macabre idea or a rare theme. The internal categories involve rater decisions that are based on a more personal, abstract, specific, and, therefore, much more subjective level than the more global totals reflect.

In terms of the interpretation of the SOI and its practical application, the inter-rater reliabilities observed in this study support the use of DFU-total and DMU-total as measures of creativity. DFU and DMU can be scored with respectable correlations among trained scorers, and, therefore, can be used in the assessment context with adequate confidence.

Conclusions

The implications from the findings of this study have been discussed and explicated in the Findings section. On the basis of that discussion the following conclusions are stated concerning the research questions and hypotheses. Support for these conclusions is based on the presentation of data in the tables and in the discussion of those data.

Group I was generally more creative than Groups II and III in drawing and story writing. The creative drawing responses of Group I suggest that, in fact, the SOI trained teachers are able (a) to be less inhibited or restricted by a framework (manifested in the transformations sub score), (b) to be original in using words along with drawing to clarify an idea (labeling), (c) to utilize animation in drawing (movement), (d) to be humorous, (e) to draw unique ideas (rarity), (f) to be unique and wide-ranging within a framework (transformation-originality), and (g) to use macabre ideas in drawings.

Group I, also, is capable of demonstrating greater creativity in story writing. They can (a) produce many words in a short time span, (b) be original in their stories by making their characters stand out with unusual names, (c) use puns or humor, (d) animate the lifeless (personification), (e) produce unusual plot within a story (theme), (f) utilize macabre ideas, (g) develop unique stories (rare topic), and (h) evoke emotional response in the reader.

The self ratings of creativity by the three groups do not reflect the basic differences in terms of divergent production responses. The teachers did not perceive themselfes to be highly creative or lacking in creativity; yet their performances on Divergent Figural Production and Divergent Semantic Production generally delineated the depth of

creativity instruction they had received.

DFU-transformations involves changes. The SOI-trained teachers demonstrated that they could re-organize the presented framework into original concepts. This Divergent Production component produced by the SOI group gave their responses qualitatively different aspects.

The originality of the drawings (DFU) was also greater for the SOI-trained teachers. Their ideas were more detailed, as well as more frequently unique in content. By the specific contents of their responses, these teachers evidenced the ability to understand Divergent Figural Production as defined by the SOI test.

The SOI-trained Group I produced significantly greater Divergent Semantic responses. They were more fluent. Since all three groups are teachers and are, by profession, semantically oriented, the performance of Group I suggests that semantic fluency is sensitive to creativity instruction.

In addition, the semantic originality produced by the SOI teachers was greater than that produced by the other groups of teachers. Group I demonstrated greater creativity in story writing. Beyond just the production of words, the SOI teachers were qualitatively more creative than the other two groups of teachers. They were able to use words in ways that gave their stories humor, animation, and

rarity.

The results of this study lend support to the proposal that creativity is sensitive to instruction. If it is accepted that creativity is a critical ability, then there is a need to include specific instruction into the nature of creativity in curriculum planning. While the teachers who had had SOI and gifted instruction did not produce a greater quantity of drawings or ideas than the teachers without such instruction, they did demonstrate more quality of Divergent Production. The trained teachers have skills of originality that could be used to teach more creatively and to teach their students to be more creative.

It is possible that a pilot study to provide practice for the raters might have had an effect on the internal variable inter-rater reliability. However, based on the discussion of the abstract concepts being scored, any pilot study improvement in raters who are well-trained is speculative. A caution is added to rater consistency. There is a consensus among the three raters that the amount of responses (141) scored for this study produced some lower scores on variables that would be affected by desensitization such as humor, rarity, pun or humor, theme, rare topic, and emotional response. The raters suggest that well-trained scorers can be consistent and sensitive when scoring the more normal workload of a clinical practice or classroom.

Recommendations

1. Further study of divergent production and its components is recommended in order to determine the effects of a cognitive approach to teaching divergent thinking. Such research may reveal richer information about the extent to which concrete and abstract concepts can be produced on creative measures.

2. Continued research is also recommended in terms of the effects SOI divergent-trained teachers have on their students.

3. The effects of instruction in divergent production on the other SOI operations of cognition, memory, evaluation, and convergent production should be investigated. Although these five mental operations have been shown to be discrete, clarification needs to be developed concerning the effects of improvement in divergent production on the other four operations. Would a more creative producer improve in cognition, evaluation, or the other operations?

4. Further investigations should be conducted concerning the effects of instruction, clarification, and the development of competency in Structure of Intellect and whether they lead to improvement in thinking.

5. The advantages of the preparation of elementary and secondary-school teachers in SOI should be further investigated.

APPENDICES

APPENDIX A

INSTRUMENT FOR COLLECTION OF DEMOGRAPHIC DATA

Did you participate in:

Meeker course, Summer 1980? _____

Advanced Meeker course, Spring 1981? _____

Creativity course, Summer 1981? _____

Do you have any knowledge of SOI?

Have you taken the SOI test prior to this? Yes____ No___

Age _____

Number of years you have taught _____

Have you taught a class designated "gifted"? _____

Level of education _____

Undergraduate major _____

Present major _____

Number of university courses on gifted education _____

Level of classroom teaching experience (number of years at each level)

Preschool _____ Elementary _____ Secondary _____

Do you think of yourself as a creative person? Yes___ No___

In what areas are you most creative?

APPENDIX B

HUMAN SUBJECTS REVIEW COMMITTEE APPROVAL

TEXAS WOMAN'S UNIVERSITY
Box 23717 TWU Station
Denton, Texas 76204

HUMAN SUBJECTS REVIEW COMMITTEE

Name of Investigator: Lynda G. Burr Center: Denton

Address: 2721 Raintree Circle Date: February 4, 1981

Carrollton, TX 75006

Dear Lynda G. Burr,

Your study entitled A Comparison of Measures of Creativity on Three Groups of Teachers

has been reviewed by a committee of the Human Subjects Review Committee and it appears to meet our requirements in regard to protection of the individual's rights.

Please be reminded that both the University and the Department of Health, Education, and Welfare regulations typically require that signatures indicating informed consent be obtained from all human subjects in your studies. These are to be filed with the Human Subjects Review Committee. Any exception to this requirement is noted below. Furthermore, according to DHEW regulations, another review by the Committee is required if your project changes.

Any special provisions pertaining to your study are noted below:

____ Add to informed consent form: No medical service or compensation is provided to subjects by the University as a result of injury from participation in research.

____ Add to informed consent form: I UNDERSTAND THAT THE RETURN OF MY QUESTIONNAIRE CONSTITUTES MY INFORMED CONSENT TO ACT AS A SUBJECT IN THIS RESEARCH.

_x_ The filing of signatures of subjects with the Human Subjects Review Committee is not required.

____ Other:

____ No special provisions apply.

cc: Graduate School
Project Director
Director of School or
Chairman of Department

Sincerely,

Marilyn Hinson

Chairman, Human Subjects
Review Committee

at Denton

APPENDIX C

TABLES FOR MEANS AND STANDARD DEVIATIONS FOR THREE GROUPS OF SUBJECTS AND ANALYSES OF VARIANCE: SUMMARY

Table A

Means and Standard Deviations of Divergent Production of Figural Units-fluency for Three Groups of Subjects

	Means			
Rater	Group I	Group II	Group III	All Subjects
1	11.86	10.40	11.38	11.23
2	11.77	10.40	11.35	11.18
3	11.98	10.72	11.44	11.40
Group Totals	11.87	10.51	11.39	11.27
Count	57	50	34	141
	Standard Deviations			
Rater	Group I	Group II	Group III	
1	3.52	3.64	3.29	
2	3.52	3.48	3.28	
3	3.56	3.63	3.36	

Table B

Analysis of Variance for DFU-fluency: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	51097.61706	1	51097.61706	1407.39	0.0000*
Group	150.75858	2	75.37929	2.08	0.1293
Error	5010.30998	138	36.30659		
Rater	3.22711	2	1.61355	7.44	0.0007*
Rater Group Interaction	0.99093	4	0.24773	1.14	0.3367
Error	59.84122	276	0.21682		

*p<.01

Table C

Means and Standard Deviations of DFU-set change for Three Groups of Subjects

	Means			
Rater	Group I	Group II	Group III	All Subjects
1	9.98	8.58	10.09	9.51
2	9.16	9.44	11.15	9.74
3	7.77	8.82	9.71	8.61
Group Totals	8.97	8.95	10.31	9.29
Count	57	50	34	141
	Standard Deviations			
Rater	Group I	Group II	Group III	
1	3.52	3.31	3.37	
2	2.82	3.81	3.12	
3	3.47	3.97	3.56	

Table D

Analysis of Variance for DFU-set change: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	35710.12770	1	35710.12770	1182.42	0.0000*
Group	141.99979	2	70.99989	2.35	0.0991
Error	4167.72125	138	30.20099		
Rater	92.67946	2	46.33973	16.30	0.0000*
Rater Group Interaction	99.53582	4	24.88395	8.75	0.0000*
Error	784.81406	276	2.84353		

*p<.01

Table E

Means and Standard Deviations of DFU-transformation for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	22.75	3.20	2.12	10.84
2	37.19	11.52	3.29	19.91
3	23.44	6.44	1.41	12.10
Group Totals	27.80	7.05	2.27	14.29
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	15.67	8.08	7.71	
2	24.73	21.27	9.05	
3	16.76	10.39	5.01	

Table F

Analysis of Variance for DFU-transformation: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	61748.18215	1	61748.18215	110.16	0.0000*
Group	53770.66439	2	26885.33220	47.97	0.0000*
Error	77351.05665	138	560.51490		
Rater	5040.29524	2	2520.14762	30.90	0.0000*
Rater Group Interaction	2572.39442	4	643.09861	7.88	0.0000*
Error	22512.04056	276	81.56536		

*p<.01

Table G

Means and Standard Deviations of DFU-labeling
for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	3.37	2.64	2.35	2.87
2	2.67	1.76	1.29	2.01
3	3.30	2.32	2.24	2.70
Group Totals	3.11	2.24	1.96	2.52
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	1.47	1.91	2.00	
2	1.90	2.01	1.90	
3	1.53	1.99	2.02	

Table H

Analysis of Variance for DFU-labeling: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	2395.48874	1	2395.48874	297.97	0.0000*
Group	103.39734	2	51.69867	6.43	0.0021*
Error	1109.42536	138	8.03931		
Rater	58.64173	2	29.32087	26.72	0.0000*
Rater Group Interaction	2.57971	4	0.64493	0.59	0.6718
Error	302.89547	276	1.09745		

*p<.01

Table I

Means and Standard Deviations of DFU-three-dimensional for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	1.61	1.44	1.88	1.62
2	1.12	1.12	1.41	1.19
3	2.32	2.08	2.71	2.33
Group Totals	1.68	1.55	2.00	1.71
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	1.98	1.94	2.03	
2	1.81	1.81	1.94	
3	1.99	2.02	1.90	

Table J

Analysis of Variance for DFU-three-dimensional: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	1225.97959	1	1225.97959	170.30	0.0000*
Group	12.69254	2	6.34627	0.88	0.4165
Error	993.45404	138	7.19894		
Rater	90.67700	2	45.33850	22.48	0.0000*
Rater Group Interaction	1.38087	4	0.34522	0.17	0.9530
Error	556.61441	276	2.01672		

*p<.01

Table K

Means and Standard Deviations of DFU-perspective for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	1.05	0.72	0.24	0.74
2	1.12	0.96	0.71	0.96
3	0.42	0.64	0.24	0.45
Group Totals	0.87	0.77	0.39	0.72
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	1.78	1.55	0.96	
2	1.81	1.73	1.55	
3	1.24	1.48	0.96	

Table L

Analysis of Variance for DFU-perspective: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	184.81984	1	184.81984	51.86	0.0000*
Group	15.00897	2	7.50448	2.11	0.1257
Error	491.84682	138	3.56411		
Rater	16.64298	2	8.32149	4.93	0.0079*
Rater Group Interaction	6.36355	4	1.59089	0.94	0.4397
Error	465.84449	276	1.68784		

*p<.01

Table M

Means and Standard Deviations of DFU-movement
for Three Groups of Subjects

	Means			
Rater	Group I	Group II	Group III	All Subjects
1	1.68	0.40	0.94	1.05
2	1.68	1.12	1.06	1.33
3	2.04	1.28	1.18	1.56
Group Totals	1.80	0.93	1.06	1.31
Count	57	50	34	141
	Standard Deviations			
Rater	Group I	Group II	Group III	
1	1.99	1.21	1.72	
2	1.99	1.81	1.79	
3	2.02	1.88	1.85	

Table N

Analysis of Variance for DFU-movement: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	644.72518	1	644.72518	103.59	0.0000*
Group	68.96187	2	34.48094	5.54	0.0048*
Error	858.88682	138	6.22382		
Rater	16.16172	2	8.08086	4.15	0.0168
Rater Group Interaction	9.13424	4	2.28356	1.17	0.3234
Error	537.74046	276	1.94834		

*p<.01

Table O

Means and Standard Deviations of DFU-humor
for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	1.47	0.40	0.24	0.79
2	2.18	1.28	1.18	1.62
3	0.42	0.32	0.00	0.28
Group Totals	1.36	0.67	0.47	0.90
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	1.95	1.21	0.96	
2	2.01	1.88	1.85	
3	1.24	1.10	0.00	

Table P

Analysis of Variance for DFU-humor: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	278.68920	1	278.68920	86.62	0.0000*
Group	62.64398	2	31.32199	9.74	0.0001*
Error	443.98486	138	3.21728		
Rater	116.37143	2	58.18572	30.39	0.0000*
Rater Group Interaction	15.99341	4	3.99835	2.09	0.0825
Error	528.38484	276	1.91444		

*p<.01

Table Q

Means and Standard Deviations of DFU-rarity
for Three Groups of Subjects

	Means			
Rater	Group I	Group II	Group III	All Subjects
1	4.21	2.72	2.65	3.30
2	11.60	8.56	6.00	9.17
3	6.53	4.40	4.24	5.22
Group Totals	7.44	5.23	4.29	5.90
Count	57	50	34	141
	Standard Deviations			
Rater	Group I	Group II	Group III	
1	4.87	2.96	3.77	
2	7.62	6.62	4.43	
3	7.04	5.19	4.05	

Table R

Analysis of Variance for DFU-rarity: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	12895.95861	1	12895.95861	248.19	0.0000*
Group	738.93682	2	369.46841	7.11	0.0012*
Error	7170.35869	138	51.95912		
Rater	2125.43198	2	1062.71599	51.12	0.0000*
Rater Group Interaction	199.36314	4	49.84078	2.40	0.0505
Error	5737.32717	276	20.78742		

*p<.01

Table S

Means and Standard Deviations of DFU-elaboration for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	0.21	0.56	0.24	0.34
2	0.84	1.44	2.00	1.33
3	0.28	0.32	0.59	0.37
Group Totals	0.44	0.77	0.94	0.68
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	0.90	1.40	0.96	
2	1.65	1.94	2.03	
3	1.03	1.10	1.44	

Table T

Analysis of Variance for DFU-elaboration: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	208.84355	1	208.84355	71.19	0.0000*
Group	17.75228	2	8.87614	3.03	0.0518
Error	404.82928	138	2.93355		
Rater	101.23752	2	50.61876	32.83	0.0000*
Rater Group Interaction	17.62898	4	4.40724	2.86	0.0240
Error					

*p<.01

Table U

Means and Standard Deviations of DFU-originality-transformation for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	3.58	0.80	0.24	1.79
2	3.79	1.36	0.47	2.13
3	3.30	0.88	0.12	1.67
Group Totals	3.56	1.01	0.27	1.86
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	1.24	1.62	0.96	
2	2.55	1.91	1.31	
3	1.53	1.67	0.69	

Table V

Analysis of Variance for DFU-originality-transformation: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	1051.07724	1	1051.07724	227.88	0.0000*
Group	855.53800	2	427.76900	92.74	0.0000*
Error	636.50928	138	4.61239		
Rater	14.27037	2	7.13519	3.99	0.0196
Rater Group Interaction	2.55816	4	0.63954	0.36	0.8387
Error	493.70661	276	1.78879		

*p<.01

Table W

Means and Standard Deviations of DFU-macabre
for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	0.42	0.08	0.29	0.27
2	0.63	0.08	0.24	0.34
3	0.28	0.00	0.00	0.11
Group Totals	0.44	0.05	0.18	0.24
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	1.24	0.57	1.71	
2	1.47	0.57	0.96	
3	1.03	0.00	0.00	

Table X

Analysis of Variance for DFU-macabre: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	20.36920	1	20.36920	13.78	0.0003*
Group	12.78517	2	6.39259	4.33	0.0151
Error	203.95242	138	1.47792		
Rater	3.64160	2	1.82080	2.27	0.1051
Rater Group Interaction	1.61453	4	0.40363	0.50	0.7332
Error	221.25072	276	0.80163		

*p<.01

Table Y

Means and Standard Deviations of Divergent Production of Semantic Units-fluency for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	98.47	94.84	84.41	93.79
2	97.75	93.52	84.06	92.95
3	97.07	93.68	83.85	92.68
Group Totals	97.77	94.01	84.11	93.14
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	21.86	22.39	22.92	
2	21.53	22.90	22.14	
3	20.97	22.60	22.84	

Table Z

Analysis of Variance for DMU-fluency: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	3410338.41661	1	3410338.41661	2409.21	0.0000*
Group	12095.05903	2	6047.52951	4.27	0.0158
Error	195344.43033	138	1415.53935		
Rater	79.67866	2	39.83933	1.37	0.2555
Rater Group Interaction	18.31363	4	4.57841	0.16	0.9595
Error	8018.52325	276	29.05262		

*p<.01

Table AA

Means and Standard Deviations of DMU-character name for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	3.33	0.40	0.00	1.49
2	3.51	0.80	0.29	1.77
3	3.33	0.20	0.29	1.49
Group Totals	3.39	0.47	0.20	1.58
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	4.76	1.98	0.00	
2	4.81	2.74	1.71	
3	4.76	1.41	1.71	

Table BB

Analysis of Variance for DMU-character name: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	736.58220	1	736.58220	29.64	0.0000*
Group	942.61038	2	471.30519	18.96	0.0000*
Error	3429.49364	138	24.85140		
Rater	6.80197	2	3.40099	0.75	0.4741
Rater Group Interaction	4.89870	4	1.22467	0.27	0.8975
Error	1254.20296	276	4.54421		

*p<.01

Table CC

Means and Standard Deviations of DMU-pun or humor for Three Groups of Subjects

	Means			
Rater	Group I	Group II	Group III	All Subjects
1	2.46	0.20	0.29	1.13
2	4.04	1.60	0.88	2.41
3	3.86	1.40	0.59	2.20
Group Totals	3.45	1.07	0.59	1.91
Count	57	50	34	141
	Standard Deviations			
Rater	Group I	Group II	Group III	
1	4.34	1.41	1.71	
2	4.95	3.70	2.88	
3	4.91	3.51	2.39	

Table DD

Analysis of Variance for DMU-pun or humor: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	1167.77387	1	1167.77387	56.38	0.0000*
Group	690.56947	2	345.28473	16.67	0.0000*
Error	2858.36670	138	20.71280		
Rater	107.38125	2	53.69063	5.20	0.0061*
Rater Group Interaction	16.68091	4	4.17023	0.40	0.8060
Error	2851.40420	276	10.33117		

*p<.01

Table EE

Means and Standard Deviations of DMU-personification for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	3.86	1.60	0.88	2.34
2	3.86	2.40	0.59	2.55
3	2.98	1.60	0.59	1.91
Group Totals	3.57	1.87	0.69	2.27
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	4.91	3.70	2.88	
2	4.91	4.31	2.39	
3	4.62	3.70	2.39	

Table FF

Analysis of Variance for DMU-personification: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	1678.27983	1	1678.27983	44.09	0.0000*
Group	568.00587	2	284.00293	7.46	0.0008*
Error	5253.27073	138	38.06718		
Rater	22.10848	2	11.05424	1.97	0.1412
Rater Group Interaction	22.74665	4	5.68666	1.01	0.4003
Error	1547.46612	276	5.60676		

*p<.01

Table GG

Means and Standard Deviations of DMU-theme for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	7.37	4.20	3.53	5.32
2	4.21	3.00	1.18	3.05
3	4.39	3.00	1.18	3.12
Group Totals	5.32	3.40	1.96	3.83
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	4.44	4.99	4.85	
2	4.98	4.63	3.27	
3	5.01	4.63	3.27	

Table HH

Analysis of Variance for DMU-theme: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	5112.97454	1	5112.97454	148.09	0.0000*
Group	764.59160	2	382.29580	11.07	0.0000*
Error	4764.48641	138	34.52526		
Rater	436.99349	2	218.49674	15.33	0.0000*
Rater Group Interaction	63.05098	4	15.76274	1.11	0.3541
Error	3934.11214	276	14.25403		

*p<.01

Table II

Means and Standard Deviations of DMU-moral
for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	1.05	0.60	0.59	0.78
2	1.40	1.20	0.88	1.21
3	1.93	0.80	0.88	1.28
Group Totals	1.46	0.87	0.78	1.09
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	3.10	2.40	2.39	
2	3.50	3.28	2.88	
3	3.98	2.74	2.88	

Table JJ

Analysis of Variance for DMU-moral: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	434.19388	1	434.19388	29.10	0.0000*
Group	40.67243	2	20.33622	1.36	0.2593
Error	2059.09116	138	14.92095		
Rater	17.15793	2	8.57897	1.20	0.3015
Rater Group Interaction	13.18537	4	3.29634	0.46	0.7631
Error					

*p<.01

Table KK

Means and Standard Deviations of DMU-poetry
for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	0.53	0.20	0.00	0.28
2	0.53	0.00	0.00	0.21
3	0.53	0.00	0.00	0.21
Group Totals	0.53	0.07	0.00	0.24
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	2.25	1.41	0.00	
2	2.25	0.00	0.00	
3	2.25	0.00	0.00	

Table LL

Analysis of Variance for DMU-poetry: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	15.75498	1	15.75498	2.46	0.1194
Group	24.39443	2	12.19721	1.90	0.1533
Error	885.29825	138	6.41520		
Rater	0.39827	2	0.19914	0.84	0.4323
Rater Group Interaction	0.86052	4	0.21513	0.91	0.4592
Error	65.33333	276	0.23671		

Table MM

Means and Standard Deviations of DMU-macabre
for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	1.40	0.40	0.29	0.78
2	1.58	0.40	0.00	0.78
3	1.40	0.40	0.00	0.71
Group Totals	1.46	0.40	0.10	0.76
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	3.50	1.98	1.71	
2	3.68	1.98	0.00	
3	3.50	1.98	0.00	

Table NN

Analysis of Variance for DMU-macabre: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	172.13078	1	172.13078	14.17	0.0002*
Group	148.39709	2	74.19854	6.11	0.0029*
Error	1676.18920	138	12.14630		
Rater	0.65401	2	0.32700	0.08	0.9233
Rater Group Interaction	2.65756	4	0.66439	0.16	0.9573
Error	1130.20296	276	4.09494		

*p<.01

Table OO

Means and Standard Deviations of DMU-rare topic for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	6.67	4.40	3.82	5.18
2	8.25	5.80	5.88	6.81
3	7.37	5.40	4.12	5.89
Group Totals	7.43	5.20	4.61	5.96
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	4.76	5.01	4.93	
2	3.84	4.99	5.00	
3	4.45	5.03	5.00	

Table PP

Analysis of Variance for DMU-rare topic: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	13308.95174	1	13308.95174	331.16	0.0000*
Group	641.08406	2	320.54203	7.98	0.0005*
Error	5546.14998	138	40.18949		
Rater	192.24568	2	96.12284	7.00	0.0011*
Rater Group Interaction	19.00627	4	4.75157	0.35	0.8468
Error	3792.34125	276	13.74037		

*p<.01

Table QQ

Means and Standard Deviations of DMU-emotional response for Three Groups of Subjects

Rater	Means			
	Group I	Group II	Group III	All Subjects
1	2.98	0.60	0.00	1.42
2	2.98	1.80	1.76	2.27
3	1.40	0.60	0.29	0.85
Group Totals	2.46	1.00	0.69	1.51
Count	57	50	34	141
Rater	Standard Deviations			
	Group I	Group II	Group III	
1	4.62	2.40	0.00	
2	4.62	3.88	3.87	
3	3.50	2.40	1.71	

Table RR

Analysis of Variance for DMU-emotional response: Summary

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Tail Probability
Mean	768.84956	1	768.84956	57.76	0.0000*
Group	261.29665	2	130.64833	9.81	0.0001*
Error	1837.04850	138	13.31195		
Rater	141.87915	2	70.93958	6.26	0.0022*
Rater Group Interaction	59.78593	4	14.94648	1.32	0.2634
Error	3129.81218	276	11.33990		

*p<.01

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