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THE IDENTIFICATION OF CREATIVE
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CREATIVE PROCESSES IN MUSIC AND THE IDENTIFICATION
OF CREATIVE MUSIC STUDENTS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

Edward Arthur Tarrettus, Jr., B.A.E., M.Ed.

* * * * * *

The Ohio State University
1964

Approved by

[Signature]
Co-adviser
School of Music

[Signature]
Co-adviser
School of Music
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VITA

May 7, 1931  Born - Jacksonville, Florida

1953  B.A.E., University of Florida, Gainesville, Florida

1955-1956  Band Director, P. K. Yonge Laboratory School, University of Florida, Gainesville, Florida

1956  M.Ed., University of Florida, Gainesville, Florida

1956-1960  Assistant Professor of Music, Carson-Newman College, Jefferson City, Tennessee

1960-1962  Assistant Instructor, School of Music, The Ohio State University, Columbus, Ohio

1962-1964  Assistant Professor of Music, Northwestern State College of Louisiana, Natchitoches, Louisiana

FIELDS OF STUDY

Major Field: Music Theory

Studies in Music Theory. Professors Norman F. Phelps and William Poland

Studies in Music Education. Professor William B. McBride

Studies in Higher Education. Professor Earl W. Anderson

Studies in Educational Philosophy. Professor H. Gordon Hullfish
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CHAPTER I

INTRODUCTION

Background

Research concerning creativity is a relatively recent phenomenon. Anderson (1959) asserted that in the Old Testament man was not considered to be creative—only God was creative. Until the last two or three centuries the idea that any man could be creative in thought was regarded as blasphemy. Since about 1700 increasing numbers of creative persons have attempted to describe their creative processes.

Research on creativity is largely a twentieth-century phenomenon. The current surge of interest in experimental investigations of creativity dates from about 1950 and has been attributed (Rhodes, 1961) to J. P. Guilford, who stressed, in his presidential address to the American Psychological Association, a need for more research in creativity (Guilford, 1950).

A growing interest in creativity has been noted in persons representing many different fields. In general, scientists are interested in identifying creative research scientists; industrialists, in addition to wanting to find creative scientists for their research laboratories, are interested in the kind of environment that aids in the discovery of new products. Psychologists are interested in discovering and describing
the intellectual aptitudes and the non-aptitude personality traits of creative persons. Educators are interested in discovering creative students and in finding methods of developing creativity. As might be suspected, there have been some efforts toward cooperation in interdisciplinary research.

The investigator was drawn to creativity as a fit subject for research from observations made as a practitioner and teacher in the field of music. It was observed that there were student and adult musicians who might be labeled as more imaginative or original than their peers. They seemed to have a way of looking, thinking, and reacting that was distinctly their own. These qualitative differences seemed to be unrelated to scores on intelligence or academic aptitude tests, performance ability, or formal musical training. It was also observed that traditional educational practice was not altogether meeting the needs of these imaginative persons and, indeed, frequently seemed to stifle the imagination and to penalize such persons. It was further observed that the creative process in music was not really understood and hence not being communicated to neophytes as well as it might be. A thorough investigation was needed to garner some concrete knowledge about the creative process as exhibited in music, and to find means of disseminating that knowledge to students. Yet knowledge alone is not enough. The teacher must also help students to use a knowledge of the creative process as a catalyst to creative behavior.

Beliefs

The above mentioned observations together with related study led to some beliefs which provided impetus and direction for this dissertation.
1. Creativity is not limited to rare gifted individuals; every person is capable of creative action.

Creative thought is a way of looking and forming experience that is central to human living.

The creative musician has something to say about creating that can be passed on to those who are searching for a more creative life.

2. Creative thought in music is not unlike creative thought in the fine arts, literature, and sciences, therefore knowledge of creativity in these fields would help form a basis for understanding creativity in music.

3. The highly creative person has unique qualities which can be identified, and, inversely, the highly creative person can be identified through these qualities.

The early identification of highly creative persons would help in preserving their creative qualities and developing their potentialities.

4. The public school pupil is capable of creative expression, and some are capable of creative expression in music.

To some extent, every music student is capable of creative activity, however, some music students are more creative than others.

One role of the music teacher is to help the students understand and use creative processes.

The teacher should exhibit a creative attitude thereby providing an example for the music student.
Creative activity in music should be an important segment of music education in the public schools and colleges, both for the general pupil and those with a specialized interest in music.

More knowledge about creativity in music could lead to improved curricula and methods, as some music activities are more creative than others.

5. Creativity is amenable to rational understanding and profitable approaches to its investigation can be found. Interdisciplinary research is one profitable means of gathering information and developing concepts about creativity.

6. The highly creative person has work methods which are, in many respects, superior to those of other persons.

7. Environmental conditions can be developed in many realms of society to foster and facilitate creative activity.

8. The semantic problems surrounding creativity can be overcome so as to facilitate communication.

9. The moral and ethical problems concerning creativity can be resolved.

**Purposes**

The above observations and beliefs led the investigator to undertake a dissertation with the following purposes:

1. to present a theoretical framework for understanding creativity;

2. to assemble the results of thinking and research about creativity from the arts and sciences, excluding music, in order to provide a basis
for making contrasts and comparisons with music;

3. to collect enough information about creativity in music to provide an approach to an understanding of the creative process in music;

4. to demonstrate one experimental method of studying the creative person in music;

5. to determine whether the creative aptitudes of creative persons in music are similar to the creative aptitudes of creative persons in other fields, so that they can be identified on a Creativity Battery which contains no musical questions and, therefore, is free of any loading on musical background;

6. to determine if there is any relationship between creativity in music and sex, academic aptitude, college grades, music skills, major instrument, and jazz experience;

7. to suggest hypotheses which could lead to further research in creativity related to music.

Definitions

Creativity, being a relatively new field for experimental investigation, is fraught with definition difficulties. The definitions of essential words (such as creativity, imagination, and originality) frequently change shades of meaning from writer to writer. In this dissertation, the following words will essentially have the definitions given, however the writer of a cited reference may have a different interpretation which should be apparent in the context.

Creative process is defined as

any process by which something new is introduced—an idea or an object, including a new form or arrangement of old
elements. An essential stage of this process is that the new form or gestalt must occur in the mind of some individual. The new combination, moreover, must meet some criterion of logic or esthetics or both. . . . Essentially, the requirement is that the new creation must contribute to the solution of some problem. . . (Harmon, 1955, pp. 42-43).

The creative process is frequently expressed in this dissertation in a very personal yet interacting way. The definition by Rogers expresses that meaning: "... the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people, or circumstances of his life on the other" (1953, p. 75).

A creative person is defined as one who has demonstrated the ability to comprehend the nature of a problem, and to produce a novel, ingenious, original, or beautiful solution in the form of a total, functional, practical, and esthetically satisfying object or idea (Owens, Schumacher, and Clark, 1957).

The creative person may also be defined operationally in terms of stated attributes. The creative person, for purposes of the investigation described in Chapter V, possesses the following attributes: (1) sensitivity to problems, (2) fluency of ideas, (3) flexibility, (4) originality, (5) redefinition and the ability to rearrange, (6) analysis or the ability to abstract, (7) synthesis and closure, (8) coherence of organization (Lowenfeld, 1958), and (9) sense of humor (Getzels and Jackson, 1962).

A creative product is defined as "a novel work that is accepted as tenable or useful or satisfying by a significant group of others at some point in time" (Stein, 1962, p. 86).

Creativity may refer to a creative person or, more usually, be
synonymous with creative process. In this dissertation, creativity usually refers to the total creative setting—the person in his place, sustaining the process, resulting in a product.

Imagination is defined as "an action of the mind that produces a new idea or insight" (Gerard, 1962, p. 116).

Originality is defined as a quality of novelty or unusualness in an object, idea, or person, or newness in that, as well as can be determined, the object or idea never occurred before. Sometimes the object or idea is new only to a specific individual.

Originality may also be defined operationally in terms of stated abilities. In the investigation, discussed in Chapter V, originality is defined as the ability to produce clever, uncommon, and remote responses on certain tests.

Unconscious is defined as "characterizing any activity or mental structure of which a person is not aware. . . . [Unconscious can also be compared to subconscious as] characterizing processes of structures of which one is not clearly aware" (English and English, 1958, p. 569).

In order to avoid the reification of a construct, and since the term mental structure has arisen as part of the definition, the following definition and attendant explanation of mental structure seems appropriate:

Any component of such a whole [organized personality with parts related to each other and to the whole] that is hypothesized to account for recurrent similarities of behavior under varying conditions; a relatively distinct, enduring part of a person inferred as the basis for specific function. These structures are constructs. . . . and have only such properties as must be assigned them to account for the behaviors for which they are the basis (English and English, 1958, p. 530).
Method and delimitation

The method employed in this dissertation was to examine the literature pertaining to creativity: primarily, in the fields of music, psychology, and education; and secondarily, in the other arts and sciences. The literature in the field of music was searched and cited rather extensively, while literature from other fields was cited mainly for purposes of support, contrast, and comparison.

The method of the experimental investigation was that of comparing three groups of music students on the basis of scores on a non-musical creativity battery consisting of tests of creative intellectual aptitudes. Part I of the investigation was conducted to determine the feasibility of the approach. Part II of the investigation involved a larger population, a larger creativity battery, and pre-scores and criterion scores obtained from The Ohio State University School of Music Testing Center.

In limiting the study of creativity in music to composition activities, the writer is not denying the creative aspects of music performing, conducting, or teaching. In fact, he hopes persons involved in these activities will find information which they can apply to their own work and to the training of their successors. The writer, however, chose not to include the creative ramifications of these pursuits in this dissertation because it was felt these aspects warranted study in their own right, and because he felt the composer and the composer's task is the logical beginning place for this type of study.

Organization

Chapter II presents a theoretical framework to help provide a
basis for understanding creativity, along with experimental and anecdotal literature from the sciences, visual arts, and literature. Following the presentation of a theoretical framework the literature is reviewed according to the following topics: the creative process in the sciences and arts, characteristics of the moment of insight or inspiration, moral and ethical considerations, approaches to the study of creativity, qualities of great persons, working procedures of creative persons, and cultural and educational conditions affecting creativity.

Chapter III contains an extensive examination of the literature from the field of music. This literature was organized under three large headings: (1) the musical creative process, (2) the external forces affecting the composer and musical creativity, and (3) the educational setting for musical creativity.

Chapter IV contains an examination of experimental literature, organized under the following topics: intellectual aptitudes [factors] concerning creativity, creativity and its relationship to intelligence, the relationship of aptitude to non-aptitude factors of creativity, and tests of creativity concerned with association and unconscious thinking processes.

Chapter V contains a report of the experimental investigation conducted as part of this dissertation. The preliminary study, Investigation Part I, established a basis for the larger study which is called Investigation Part II. This chapter includes, for both parts of the investigation: questions upon which the investigations are based, test construction and scoring procedures, the basis for the selection and division of the groups, a description of the information obtained from pre-scores and criterion
scores, and the results and discussion of the investigation.

Chapters II, III, IV, and V also contain a summary of the information presented in each chapter and its relationship to the material presented in the other chapters.

Chapter VI contains a summary of the findings of the dissertation. Conclusions are drawn, and implications for educational practice and teacher education are listed. Hypotheses for further investigation are given.
CHAPTER II

CREATIVITY THEORY AND BACKGROUND

Many persons from the arts, sciences, education, and psychology have formulated theories of creativity; described their own experience with creativity; developed a rationale to explain creative processes; proposed methods of studying creativity; studied the qualities and procedures of people held to be creative; or examined conditions which helped or hindered creative people in performing their tasks. This literature provides a base upon which to build a better understanding of creativity in music and is reported in this chapter.

The centrality of creativity

There is a growing feeling among some (Sinnott, 1959; Rogers, 1953) that creative thought is an attribute of the full expanding life, and that to deny the creative is to deny normal growth. They indicate that creative thought is a way of looking at life and forming experience that is central to human living.

Rogers stated:

The mainspring of creativity appears to be the same tendency which we discover so deeply as the creative force in psychotherapy—man's tendency to actualize himself, to become his potentialities. By this I mean the directional trend which is evident in all organic and human life—the urge to expand, extend, develop, mature—the tendency to express and activate all the capacities of the organism to the extent that such activation enhances the organism or the self. This tendency...
exists in every individual, and awaits only the proper conditions to be released and expressed. It is this tendency which is the primary motivation for creativity as the organism forms new relationships to the environment in its endeavor most fully to be itself (1953, p. 75).

To Rogers, creativity is inherent in life. It is the driving force toward self-fulfillment.

Mooney has developed a theory of creativity which views man as potentially creative, living in a universe which operates as a creative system. His theory is so germinal for the study and understanding of creativity that it will be examined in detail.

Mooney proposed what he calls the "four essential conditions of man" (1957, p. 8). These "four essential conditions" are directly related to Rogers' concept of the tendency of man to become his potentiality under proper conditions of relationship to his environment. Mooney believes: "If we are to get much out of man or are to build a science of man, we will have to see him...with respect to his potentialities" (1956, p. 1).

Mooney (1956, pp. 2-4) maintains that man is in and of the universe. Everything he does, or is, or becomes, is synchronous within the total system. Man's existence gives him a time-space spot to be in from which he can perceive, organize, and comprehend the universe. To exist is to have this being, this unique organizing spot which is one's own and no other.

There is a constant giving out and taking in by the organism, and a continuous transacting across the borders of man to give sequential and orderly form to what goes on between, inside, and outside. Reaching out and receiving in cannot be blind. This activity needs to be selective.
Each act has its necessarily specific fittings, according to what man's system then and there allows, invites, and requires, and according to what his environment then and there offers, suggests, and permits.

This constant selecting on the part of a man works toward (a) inclusion within his system of what is needed, (b) exclusion from his system of what is damaging, and (c) toleration of the remainder.

It may then be said that the essential conditions for the existence of man are that he is able to operate with respect to:

1. **Out**...to declare man's extension into his belonging to the whole.

2. **In**...to declare man's centrality in his universe, his being integrative to the whole.

3. **Out-and-In-and-Out-and-In-again-and-again**...to declare man's sequential ordering of his universe, his continual coming to be (becoming) through give-and-take, incoming and outgoing.

4. **Fit**...to declare man's selective ordering of his universe, his continual fitting of specific incomings and outgoings, his rendering potentialities actual in concrete sequential instances (Mooney, 1957, p. 8).

Mooney further stated:

I have looked to see what biologists seem to feel they must cover before they have a well-rounded picture of a living being, and I have found them talking about (1) the environment, (2) the creature, (3) the transactions between the two and (4) the consequent adaptations. Looking into evolution for the progression that men have found in moving from the simplest protozoa to the complexity of man,...there appears...to be a dynamic ladder by which the climbing has been described; i.e., (1) the development of an increasing openness to wider reaches of the environment, (2) an increasing centering of action within the organism, (3) an increasing span of sequential ordering, and (4) an increasing selectivity, all four of these operating as one tension system, a development of one (encouraged by specific environmental circumstances) in turn requiring the
development of the others. Life has thus been able to evolve its increasingly complex forms.

Coming into the assumed peak of evolution at the opposite pole from simplest biological life, I have studied what highly creative people seem to do to cultivate their peak creative experiences. It has seemed to me that they seek (1) to hold themselves open for increasing inclusions within their experience, (2) to focus their experience through self-differentiation and self-realization, (3) to discipline themselves in order both to extend their opening and refine their focusing and (4) to derive significance from their experiencing through dependence upon increasing esthetic sensibilities (1957, p. 9).

Considering the composer as a highly creative person and music composition as a creative activity, Mooney's four essential conditions may be considered to operate in this manner: (1) The composer extends himself into his environment, holding himself open to increased inclusions within his system. He lives many varied experiences and he perceives many things. (2) The composer integrates his experiences within himself to be able to make the experiences into something meaningful and useful to him. (3) The composer develops self-discipline so as to extend himself further into his environment, with increased toleration and openness to experience. (4) The composer increases the importance of his product by the distillation of his experience through the sieve of increased esthetic sensibility. Seeing the composer "with respect to his potentialities," as he continues his more extensive and disciplined living of the "four essentials," his compositions should reflect the increasing experience, translated into adequate musical images, and fitted more selectively into more significant works of art.

The concept of the four essential conditions for the living of
man are fundamental to Mooney's thoughts about life, nature, and man. He is concerned that man understands the universe as creative and himself as potentially creative. Mooney states:

...as a creature of nature, man is creative by virtue of a universe which operates as a creative system. He has a mental structure, however, which gives him a critical measure of independence. Because of this, he can be unaware of his creative composition and can permit his mind to operate in ways which can either run counter to basic creation, leading to illness and death, or run harmoniously with creation and lead to strength and more abundant life. The potentiality is there. The need is to operate consciously so that what man does with himself and his mind is in harmony with his basic creative nature. The issue at stake is man's life.

The problem, then, is how man may act to consciously cultivate a conscious harmony with his creative potential. . . . What of Art? (1959, p. 9).

Mooney believes that "each art... involves, as primary act (1) the projection of an act outward, (2) the reception of a report inward, (3) the sequential orderings of further acts and reports, (4) and consummatory resolution" (1959, pp. 10-11).

Mooney's theory applied to the act of music composition may be said to operate in this manner: The composer writes a theme "out there;" he notes what's happening in relation to things "in here;" he modifies the theme and gets another report, then adds transition material, gets a related report, and so on, adding or deleting material "out there" checking "in here." Thus, "building an increasingly rich and comprehensive whole that esthetically fits, both as process inside and product outside and inbetween" (Mooney, 1959, p. 10).

Mooney states:

In the center of his ceremonial system is the artist, himself. He has the ideas, he sasses the environment, he makes the judgments, etc. His role is that of responsible creator
(within what his mind can comprehend and his actions can accomplish in the objectified medium of his craft). His challenge is to ever greater spans of awareness, ever more sustained discipline in action, ever more fitting and fulfilling esthetic resolution.

Looking into the structure of art products, we can run another test for harmony with life. Since good art products are said to 'contain life' they should be found (according to our theory) to be comparable to other life forms in the very way they are grouped and understood. Are they of the same structure?

Each art seems to have, as basic structure, (1) a field for belongings, (2) a focus for beings, (3) a dynamic transaction for becomings and (4) an esthetic fruition for esthetic be-fittings. Art products appear to have the same basic makeup as other life forms (1959, p. 11).

Mooney's theory has been applied to the composer, as a creative person; the composing act, as a creative process; and can also be applied to a musical composition, as a creative product. It can be said that music has as its (1) field for belonging the medium of performance: piano, chorus, orchestra, etc. Music has as its (2) focus for being the constructional elements: melody, harmony, and rhythm. The (3) dynamic transaction for becoming would be form, and (4) esthetic fruition for esthetic befitting would be the total composition in a performance.

In the act of creating art works, in the works themselves, and in the practices of artists in the cultivation of their higher capacities, we find a situation not unlike that experienced by scientists employing scientific methods. Mooney believes:

**Science and art are together in their main functions for man. They cultivate man's conscious awareness of his own consciousness. They challenge his acceptance of responsibility for his special instruments, his self-reflexive mind, his unique humanity. They heighten his comprehension and active participation in life and creation (1959, p. 12).**

Both science and art project outward into the universe and inward
into man. Science, however, emphasizes the outward environment—the universe—and art emphasizes the inward environment—man. Scientists focus conscious efforts on release of nature's power; artists focus on release of the powers of man. The universe as creator is the scientist's emphasis; man as creator is the artist's emphasis (Mooney, 1959, p.12).

Because of recent political, military and scientific developments, scientists and others sense a need for emphasis on the inward environment. This is not to deny science, but to emphasize the need for man's inward dignity, strength, and trust. Mooney, therefore, believes that the primary role of the artist now "is to communicate man creating his own emergent humanity and to teach the ways by which this may be done" (1959, p. 15).

The idea of the artist communicating creativity leads Mooney to postulate a new role for the artist with a new value on his services.

Mooney says:

The function of art is to render experience into values. The discipline of art is that of the creative process by which such rendering is possible. The center of the artist's art is the nourishment of his creativity. What people want is help in learning how to nourish their creativity. It is not the artist's end products they deeply want, but the artist's process of creating.

This calls for a shift in the artist's conception of his role in society from that of a person who is valued for his end products to that of a person who is valued for his processes. The acceptance of this role means for the artist that he strive to become clear on how he himself creates and that he be able to generalize this process so that he can see it in the lives of other people and in forms of creation other than those to which he has given himself in his own particular medium (Mooney, 1955, p. 10).

All creation is, therefore, an active process with man rendering his own experience into values significant to him. Mooney indicates the
coming stress will be an inward experiencing—releasing the powers of
the individual—and that people are going to want help from the artists
in learning how to do this. He maintains that the common man wants to
be able to handle his creative process better, in a field of endeavor ap­
propriate for himself. If Mooney is right, and if the composer, as a
category of artist, is going to be of value in communicating creativity,
then he needs to develop a generalized awareness of how he perceives,
integrates, translates, and renders his experience into objects of value.
The composer must examine his own process, become clear as to how he
handles himself, and learn to relate this to other persons in their own
terms. The creative product is still very important, but if Mooney's
thesis is right, creators are also going to be valued for their processes
and how they are able to help others develop their own creative potential.

Is every man capable of creative living? Mooney (1955, 1956,
1957, 1959), in his theory built on his four essential conditions for the
existence of man, proposed that creative living is consistent with the
actions of the lowest and highest forms of life. He holds that not only
is every man capable of creative living, but that idea is in harmony with
an inherently and constantly creative universe. He indicates that the
creative person is the most central, the most whole person. "Mooney's
theory is partially sustained by Sinnott (1959), who indicates that creati­
vity is an attribute of life, and Rogers (1953), who finds creativity to be
the same as "man's tendency to actualize himself, to become his poten­
tialities." Fromm's (1959) belief that creativity is the ability to see and
respond is in agreement with Mooney's four essentials. Mooney's theory
based on the four essentials provides a way to study creative processes
so that they become more accessible to more people.

Creative process in the sciences and arts

Currently, there is widespread interest in the creative process. This interest has been demonstrated in science and industry by several conferences and seminars (Gordon, 1956, 1957; Taylor, 1955, 1957, 1959). In addition to scientists and industrialists, these conferences have also been attended by persons representing the social sciences and humanities who were invited to provide a broader point of view. It is in the interest of providing a broad point of view that the creative process in mathematics, science, painting, and literature is examined here. The creative process in music is examined in Chapter III.

Henry Poincaré, the mathematician, cited an instance of mathematical illumination which occurred after fifteen days of seemingly fruitless work on a problem:

One evening, contrary to my custom, I drank black coffee and could not sleep. Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, making a stable combination. By the next morning, I had established the existence of a class of Fuchsian functions, . . .I had only to write out the results, which took but a few hours (1929, p. 387).

It is important to note that this sudden illumination followed a long period of conscious work. Poincaré indicates unconscious work is only possible, and "of a certainty it is only fruitful" if it is preceded and followed by conscious work. The preceding conscious work is necessary to start the unconscious process in operation. The second period of conscious work "is necessary to put in shape the results of this inspiration, to deduce from them the immediate consequences, to arrange them,
to word the demonstrations, but above all is verification necessary" (1929, pp. 389-390).

In an effort to explain why some mathematical possibilities emerge from the working of the unconscious and some do not, Poincaré postulates an esthetic reason:

The useful combinations are precisely the most beautiful, I mean those best able to charm this special sensibility that all mathematicians know, but of which the profane are so ignorant as often to be tempted to smile at.

What happens then? Among the great numbers of combinations blindly formed by the subliminal self, almost all are without interest and without utility; but just for that reason they are also without effect upon the esthetic sensibility. Consciousness will never know them; only certain ones are harmonious, and, consequently, at once useful and beautiful. They will be capable of touching this special sensibility... which, once aroused, will call our attention to them, and thus give them occasion to become conscious (1929, p. 392).

Poincaré admitted that this is only a hypothesis. He offered as further evidence his observation that an illumination which does not stand the test of verification, a false idea, had it been true, "would have gratified our natural feeling for mathematical elegance" (1929, p. 392).

Poincaré seems to be saying that all true ideas are esthetically satisfying, but not all esthetically satisfying ideas are true. However, all genuinely creative ideas, whether they are verifiable or not, are esthetically satisfying. "Thus," Poincaré asserts, "it is this special esthetic sensibility which plays the role of the delicate sieve... and that sufficiently explains why the one lacking it will never be a real creator" (1929, p. 392).

Mawardi (1956) and Sheehan (1960) concur with the concept of the role of esthetic sensibility in the creative solutions of scientific problems. Sheehan also postulates the notion of esthetic expression as being
important in scientific work. "There is a considerable part which might be called 'art' in science, in which the individual is able to express some of his own personality, to find an outlet for his artistic impulses; and this is a very much underrated role of science" (1960, p. 95).

Mathematician Jacques Hadamard, in the Appendix to his book The Psychology of Invention in the Mathematical Field (1954), printed a letter from Albert Einstein which was written in response to some questions by Hadamard. Question 30 stated:

It would be very helpful for the purpose of psychological investigation to know what internal or mental images, what kind of 'internal word' mathematicians make use of; whether they are motor, auditory, visual, or mixed, depending on the subject which they are studying (1954, p. 140).

The following contains selected portions from Dr. Einstein's reply:

The words or the language, as they are written or spoken, do not seem to play any role in my mechanism of thought. The physical entities which seem to serve as elements in thought are certain signs and more or less clear images which can be 'voluntarily' reproduced and combined.

There is, of course, a certain connection between those elements and relevant logical concepts. It is also clear that the desire to arrive finally at logically connected concepts is the emotional basis of this rather vague play with the above mentioned elements. But taken from a psychological viewpoint, this combinatory play seems to be the essential feature in productive thought--before there is any connection with logical construction in words or other kinds of signs which can be communicated to others.

The above mentioned elements are, in my case, of visual and some of muscular type. Conventional words or other signs have to be sought for laboriously only in a secondary stage, when the mentioned associative play is sufficiently established and can be reproduced at will (1954, p. 142).

In response to Hadamard's question: "Especially in research thought, do the mental pictures or internal words present themselves in the full consciousness or in the fringe-consciousness..." Einstein
replys, "It seems to me that what you call full consciousness is a limit
case which can never be fully accomplished. This seems to me connected
with the fact called the narrowness of consciousness" (1954, pp. 141-142).

Golovin (1959), like Einstein, emphasizes the importance of
muscular activity in thought. In addition to muscular tension, Golovin
lists three other attributes of creative scientific thought:

1. **Goals and motives always appear to be involved in the**
thinking process. . . .

2. **Muscular tension appears to be always associated with**
thought and, for each person, there seems to be an opti-
mum level of general muscular tension for efficient
thought. . . .

3. **Trial and error procedures are found in all sorts of thinking**
or problem solving activities. . . .

4. **The thinking process involves both conscious and uncon-

Several writers including Hadamard (1954) and Patrick (1961)
have listed four stages of creative scientific thought: (1) preparation,
gathering material; (2) incubation, recurring mood; (3) illumination,
when incubating idea becomes definitely related to goals; (4) verification,
the testing. These writers hasten to explain that the steps are, in actual
practice, entangled and do not exhibit a fixed order. However, it would
appear from the literature cited that these four steps represent a gross
oversimplification of the creative process.

To contrast and compare with the preceding views on creative
experience in the sciences, the creative experiences of selected artists
and writers will be presented. In a letter to Anton Ridder van Rippard,
Vincent van Gogh wrote:

...as to The Little Winter Gardens, for example, you said
yourself they had so much feeling; all right, but that was not
accidental—I drew them several times and there was no feeling in them. Then afterwards—after I had done the ones that were so stiff—came the others. It is the same with the clumsy and awkward things. HOW IT HAPPENS THAT I CAN EXPRESS SOMETHING OF THAT KIND? Because the thing has already taken form in my mind before I start on it. The first attempts are absolutely unbearable. I say this because I want you to know that if you see something worth while in what I am doing, it is not by accident but because of real intention and purpose (1936, p. 107).

Many artists and musicians find it difficult to express themselves in words concerning either their thought processes while painting or composing, or the purposes and goals of their work. Julian Levi expressed this difficulty when he stated:

I find it rather difficult to write about my painting. Briefly, I am seeking an integration between what I feel and what I have learned by objective criteria; an integration between the tired experienced eye and the childlike simple perception; but above all I hope to resolve the polarity which exists between an essentially emotional view of nature and a classical, austere sense of design. 'In truth, I have painted by opening my eyes day and night on the perceptible world, and also by closing them from time to time that I might better see the vision blossom and submit itself to orderly arrangement.' This quotation from an article by Georges Rouault, which appeared in Verve, is to me rich in meaning and summarizes, with Gallic brevity, precisely what I have been driving at (1955, pp. 62-63).

These painters have stressed the arduous process involved in crossing the bridge between the mental and emotional forming of a work of art and its technical realization. Jean Cocteau, the French writer, indicates that the unconscious forming of an idea develops from a kind of "slumberous" activity, while the realization of the idea demands conscious effort. He (1955, pp. 81-82) maintains that inspiration is "the result of a profound indolence and our incapacity to put to work certain forces in ourselves." Cocteau believes that an inspiration is developed deep within the artist, who
by a thousand ruses, . . . prevents his nocturnal work from coming to the light of day.

For it is at this moment that consciousness must take precedence over the unconscious and that it becomes necessary to find the means which permit the unformed work to take form, to render it visible to all (1955, pp. 81-82).

Coleridge (1912, pp. 295-297) related an incident illustrating the fleeting quality of inspiration. While in a deep sleep (produced by an anodyne [opium] taken on prescription) he composed two to three hundred lines of a poem. Upon awakening, he proceeded to write it down. After writing some ten lines, he was interrupted by a person on business from the nearby town of Porlock, who detained him for about an hour. When Coleridge returned to his work he found that, though he retained a vague recollection of the vision, all except eight or ten scattered lines and images had passed away.

A new idea seems to grow from an arrangement of previous perceptions, which have developed from rich past experience, combined with fresh new perception and thought. The ability and willingness to let the past entwine with the present, forming new connections, is the fertile ground in which creative ideas grow and nourish. It is the responsibility of the thinker to assess these connections and combinations to see which need polishing or adapting, which can serve as the nucleus for further building, and which have the esthetic form and fit to stand as they were first born. Gerrard (1961) supports this idea in his statement that "Form, structure, relationship, organism, part-whole systems, gestalt, or closure is basic for the product of imagination and for its process. . . . imagination only regroups sensory material..." (1961, p. 84). He placed special emphasis on closure. Closure is "the ability to separate a figure from
its ground, to formulate a gestalt, or form, to identify an entity" (1961, p. 84). This imaginative regrouping and closure appear as important acts in the creative thinking process.

It seems likely, from the previous discussion, that the creative process in the arts is not too different from the creative process in the sciences. The differences are principally in materials, technique, and relationship to human experience. Bronowski (1960) helps clarify this relationship:

The act of creation is, I am sure, the same in science as in art. It's a natural, human, living act. Yet, of course, a poem is obviously not a theorem. How does it differ? It has nothing to do with how it is composed. It differs because it matches human experience in a different way. . . . In the arts, it is not possible for the experience of one individual to match that of another, as if it were a blueprint. You don't read a work of art for this purpose; you re-create the blueprint. You explore your own experience; you learn; you live; you expand inside. Now this, I think, is the difference between the arts and the sciences, and it lies not in the process of creation but in the nature of the match between the created work and your own act of re-creation in appreciating it (1960, p. 101).

Golovin (1959) summarized creative thought, as he sees it in operation, in science. In most respects, these activities and characteristics are as appropriate to the arts as they are to the sciences. Golovin believes the creative idea is born in mental and emotional chaos. The transition to clear and conscious understanding is through an automatic and unconscious process. At this time, conscious calculation is almost never present. The germinal idea has three associated characteristics: (1) the idea itself is relatively specific and narrow, (2) it leads to a state of nervous excitement and satisfaction, and (3) it seems to make way for a large number of new associations, connections and suggestions.
One must not push creative effort by will except to determine the background and context of the problem or to follow up the consequences of the idea. The work prior to the moment of insight and subsequent reworking and validation requires self-discipline and management. People make creative discoveries in fields where they have intense commitment, training, and have had considerable prior thought.

In essence, creativity seems to be as Bronowski (1960) has summarized it:

Nature is chaos. It is full of infinite variety, and... there comes a moment when many different aspects suddenly crystallize in a single unity. You've found the key; you've found the clue; you've found the path which organizes the material. You have found what Coleridge called 'unity in variety.' That is the moment of creation (1960, p. 100).

The moment of insight

One of the most intriguing phenomena of the creative thinking process is the moment of apparent sudden "inspiration." The sudden appearance of an idea seems to be one of the dominant characteristics of creative thought. Many scientists and artists have reported experiencing sudden "inspiration" as a crucial step in the discovery of new devices or process (infra, p. 19; supra, p. 49), and many others have written to try to account for the "eureka!" moment. Sinnott maintained that it is "common for a new idea to arise almost spontaneously in the mind, often seemingly out of nothing and at a time when a person may be thinking of something quite different..." (1959, p. 23).

If this is the way sudden inspiration appears to the recipient, where and how do these ideas formulate? Sinnott suggested:

... the creative process that must be taking place in the unconscious may not be different from those in the conscious
mind. A scientist, faced with a problem, marshalls all the facts he can find that bear on it... finally, by re-arranging and organizing the facts, he is able to build a consistent pattern of ideas and to form a theory. Many psychologists believe that something not unlike this is taking place in the unconscious when an individual has been pondering a problem and seeking to solve it in his conscious mind... By its (unconscious mind) means, order—intellectual, aesthetic, perhaps a spiritual order—is here distinguished from randomness. Thus the unconscious mind is able to solve problems... (New creations) might have been produced by the conscious mind... but the reason that such a frontal attack often fails seems to be that the free association present in the unconscious, is blocked in various ways and the really new relationships therefore are not seen (1959, p. 25).

The assumption underlying the statements by Sinnott appears to be that the unconscious provides a more fertile ground for the uncommon association of ideas than the conscious. These uncommon associations of ideas are the stuff from which creative solutions to problems are made. The moment of insight or inspiration occurs when these uncommon associations come together to form a unique solution to the problem. Bronowski explained that "... in a way, your mind spends a long time digesting the material; and then the act of creation is an act of finding the right order which expresses the whole of this complexity of things" (1960, p. 100).

To have these uncommon associations, however, one must have developed a considerable background, and immersed himself in the subject. One must also have a strong conscious desire to solve the problem. May put it this way:

... unconscious insights do not come hit and miss. They come only in the areas to which the person is intensively committed in his conscious living... in those areas in which the person has worked laboriously and with dedication in his conscious experience... The deeper aspects of awareness are activated to the extent that the person is committed to the encounter (1959, p. 62).
By way of summary and elaboration, it may be said that ideas are like energy systems in that the old perceptions and experiences are in a constant dynamic state of readiness to be put to use. The old perceptions are continuously linking with new perceptions. May believes "processes of forming, making, building go on even if we are not consciously aware of them at the time" (1959, p. 62).

To form creative linkage the perceptions, past and current, must be extensive. It is important that deliberate conscious effort be expended to add to the experience within the area of interest. The richer the field of experience to draw upon, the greater the possibility of a satisfactory fit.

The conscious effort of the individual, however, can not pull out a creative solution until the experiences have had an opportunity to find a form and fit. Our subconscious is in a constant state of working and re-working, and when the elegant, esthetically satisfying fit is achieved, the new idea bursts forth.

From the above, it would appear that those with the deepest encounter with the subject and with life and who are willing to let the unconscious work without interference are the persons most likely to achieve elegant new ideas.

Moral and ethical considerations

Students of philosophical and social values have raised moral and ethical questions concerning creativity as a force in society. Mooney has identified three different positions which have been expressed. Creativity is considered " (a) a natural phenomenon, unvalued as to good
or bad, (b) a social phenomenon, to be valued as good or bad, depending on social consequences, or (c) as a personal phenomenon, to be valued as good" (1953, p. 104).

Mooney, in viewing these three positions, does not find that there is a conflict among them. He holds to the third position and progressively includes the other two:

Deep in my own life, I take the creative to be good for me...Taking myself as a sample of my species, I also conclude that creativity is good for other people as it is good for me. When I do things which I later judge to have been 'bad,' I see these things as having been bad because they have prevented a more creative experience, in myself or in others. Frequently, I find that my actions which were bad were 'signs' of some regions of myself of which I had not yet become sufficiently aware. Hence, I had not included them in a fitting place in my forming-experience. This has accounted for them 'coming out bad!' (1953, p. 104).

Mooney sees the same problem in other people—"the failure to include enough into the known." For this reason he feels that even those people who interfere with his creativity are not inherently evil, "but that they are, for any number of reasons, inept in opening the doors to the inclusion of the unknown within them" (1953, p. 105). He further believes that extension of creativity in himself and others is mutually good and repression of creativity is mutually bad.

Viewing the example of Hitler and Germany, Mooney states:

... I see that individuals and whole nations can do destructive and dangerous things to other people and to themselves by blind and impulsive commitment to a few lines of action which they mistakenly suppose is 'all' they ever need to include. Such people seek transcendence in a few immediate things, not knowing that 'salvation' is an external and unfolding pursuit. Ignorance of this fact, I see, can go so far as to allow people, in given times and circumstances, to rise up and kill (1953, p. 105).

This leaves Mooney in the position of saying that the pursuit of
the creative is good, but that people can do bad things:

The consequence of thinking this way is that, in working with people who do things I call bad, I seek to accept their inherent struggle as being a good one, i.e., toward greater inclusiveness of the unknown into the known. With that 'acceptance' to join the two of us together in one basically common pursuit, I then try to behave in such a way as to allow others to see that their specific acts are, in truth, doing more to prevent their getting what they 'really' want than to secure what they 'really' want. As they 'clean up' their own views and their own lives, they honor the 'good' that is potentially there in ever increasing measure, and, in so doing, they honor what is also 'good' in me.

I therefore come out at the place where I can call creativity good, and specific acts as being relatively good or bad depending on their contribution to ever increasing creativity (1953, p. 106).

In discussing creativity as a natural phenomenon, Mooney encountered the life problems of death, frustrations, and failures. To him, these things are not inherently bad. They represent the unknowns and can be "one's friends if one can only be strong enough to find ways of including them as such." Mooney believes:

Creativity is a process by means of which things which do not yet belong, come to belong; things which have not yet become, come to become; things which are not yet existent, come to be. It is the assertion of the positive, on-going, ingestive inclusion (1953, p. 108).

Mooney believes that to get inclusion, one must accept the given as good and then extend toward the better. "Life, within oneself, has its inner forming... which comes as a given and which is good; by trying to realize more and more fully this inner forming, one can fulfill one's life better and better" (1953, p. 108).

From all of this, Mooney sees the creative as personally good, goes ahead to see the naturally given as good, and from there out into the world to view the acts of man as relatively good or bad, depending on
their contribution to ever increasing creativity. He believes there is no description apart from personal evaluation, the point from which one starts to move out to structure the world.

Approaches to the study of creativity

The vast amount of time, effort, and money that is being expended on research projects dealing with the creative process, person, and place indicate strongly that people no longer believe creative thought is beyond the realm of human understanding. The emphasis put upon experimental research by Guilford (1950), Rogers (1953), and Thurstone (1962) supports this position. Moreno "postulated that spontaneity and creativity are observable facts and can be subjected to experiments, laboratory studies and systematic analysis" (1955, p. 107). If all this is true, the question of method remains. Is interdisciplinary research a fruitful approach?

Kuhn and Kaplan, concerned with approaches to the study of scientific creativity, state:

Research on the general environmental conditions--cultural, professional, and institutional--conducive to first rate scientific research needs major encouragement. We are aware of no area in the social sciences where research is simultaneously so vitally needed and so much neglected . . . . the joint efforts of sociologists and social psychologists, of economic historians and historians of science, will . . . be required. . . .

. . . we suggest, first, that the techniques of comparative study provide a very powerful tool for the investigation of the effects of environment. . . . To judge what features of the environment promote (or hinder) what sorts of scientific creativity one must necessarily compare scientists with different environments. Systematic examination of the experience of other countries and at other periods will provide an essential tool (1959, pp. 313–314).
Barron (1959) and MacKinnon (1962) [infra, pp. 33-36] reported research on the qualities of creative persons using as subjects creative persons from several different vocational pursuits. Similarly, Guilford (1959) reported research on mental aptitudes employing large numbers of persons from several different disciplines. It would appear from the discussion thus far in this section that there are at least three possible approaches to interdisciplinary research in creativity: (1) persons from two or more areas cooperating on one facet of a problem; (2) persons from one area looking at the creative work and working of persons in another; and (3) persons from one area using the resources and techniques of another to study a problem in their own area.

If creative thought exhibits similar patterns among disciplines so that generalizations may be drawn, and Thomas (1955) for one thinks this is true, then these generalizations may provide a point of reference from which to design interdisciplinary research.

In addition to and in conjunction with interdisciplinary approaches, the study of creativity is being developed along some fairly clear lines. These lines have been determined to a large extent by the solution to the problems of criteria of creativity adopted by investigators. M. I. Stein (1959, p. 179) has identified six approaches which have been used in attacking the problem of criteria. The following list was extracted from his writing:

(1) By Definition: studies devoted to investigating the processes or characteristics of individuals engaged in professions or occupations generally regarded as creative.

(2) Statistical or Test Criteria: studies in which deviation from a
norm or test score is used as a criterion for differentiating between groups of individuals.

(3) Qualified or Expert Judgment Criteria: studies using ratings or awards by persons presumed to be capable of evaluating the creativity of the subjects; also includes biographical studies.

(4) Products: studies using the number of products produced as a basis for differentiation between individuals.

(5) Ultimate Criteria: studies planned to avoid the influence of subjective factors in rating creativity by making explicit the factors involved in it.

(6) Individualized Criteria: studies based upon the assumption that each individual has the potential for creativity or that creativity is a drive within the organism which is manifested in self-actualizing tendencies.

Mooney (1957) also has a framework for structuring research which is based on his "four essentials." He divided the study of creativity into four approaches: (1) the study of the creative person, (2) the place, (3) the product, and (4) the process. Though there is a natural integration of the four approaches, and they are not wholly mutually exclusive, they also provide a point of departure upon which to structure research.

Qualities of creative persons

MacKinnon (Carnegie Quarterly, 1961; 1962) and Barron (1957, 1959) report results of research, investigating many facets of the personalities of creative writers, architects, research work in the physical sciences and engineering, and mathematicians. These persons were
brought to the University of California (Berkeley) for extensive testing and interviews. Excerpts from the studies of MacKinnon and Barron show:

1. Highly creative people usually score well above average on I.Q. Intelligence alone, however, does not guarantee creativity. Above a certain point, the degree of intelligence does not seem to determine the level of one's creativeness.

2. The creative person is given to expression rather than to suppression or repression and thus has greater access to his own experience, both conscious and unconscious.

3. Openness to experience is one of the most striking characteristics of the highly creative person. Although as a group creative persons do not show effeminate tendencies, their relatively high score on femininity indicates an openness to their feelings and emotions, a sensitive intellect, an understanding self-awareness, and wide-ranging interests including many which in the American culture are thought of as more feminine than masculine.

4. Highly creative persons remember their childhood as being relatively unhappy. This unhappiness is hard to verify and mostly they do not seem to have come from homes different from those of their less creative associates. The difference may lie mainly in the quality of their perceptions and memories of their childhood experiences.

5. Creative persons have an unwillingness to deny or repress things that are unpleasant or troubling.

6. Creative persons tend to exhibit a considerable amount of psychic turbulence and reveal that personal soundness is not an absence of problems but a way of reacting to them.
7. The creative person tends to prefer perceiving to judging. The perceptive person is inclined to be interested and curious, open and receptive, seeking to experience life to the full. The creative perceptive person is not stimulus bound but is intuitively alert to that which is not yet realized.

8. Extroverts are in the minority, but they are rated as high on creativity as the introverts.

9. The creative person is not preoccupied with the impression he makes on others and is not overconcerned with their opinion of him. He is, therefore, freer than most to become the person he is capable of becoming.

10. The highly creative are not conformists in their ideas, nor are they deliberate non-conformists. Instead, they are genuinely independent. It is in their creative work that their independence of thought and action are revealed.

11. The interests of creative persons are similar to psychologists, artists and musicians but unlike those of office men, policemen, and morticians. This finding suggests that creative persons are relatively less interested in small details, in facts as such, and more concerned with their meanings and implications, possessed of considerable cognitive flexibility, verbally skilful, and relatively uninterested in policing either their own impulses and images or those of others.

12. For the creative person, the solution of a problem is not sufficient; there is the further demand that it be elegant. The esthetic viewpoint permeates all of a creative person's work. He seeks not only truth but also beauty.
13. The creative person delights in challenging tasks which evoke a
need in him to discover unifying principles for ordering and integrating
the complex and chaotic (MacKinnon, 1962).

14. Early in life, creative individuals show the skills necessary to
be successful in their ultimate careers. But because they also demon­
strate numerous skills, which create a difficult choice, many creative
persons come to their final career late.

15. Creative people are able to tolerate the inner tensions created
by holding conflicting values (Carnegie Quarterly, 1961).

16. Diligence, discipline, and total commitment to the endeavors
were characteristics clearly associated with creative people. Volumi­
uousness of production was the rule (Barron, 1959).

17. Creative persons show more ability to hold many ideas at once,
and to compare more ideas with one another, hence to make a richer
synthesis.

18. In addition to unusual endowment in terms of the ego-in stin cts,
creative people have much sexual drive as well (both pre-genital and
genital), because they are by constitution more vigorous organisms and
more sensitive (nervous) (Barron, 1957).

Even though creative persons are individualistic, it appears that
they do have identifiable characteristics which generalize across occupa­
tional lines. This means that in many respects, creative people from one
field are more like creative people in another field than they are like less
creative colleagues in their own field. If this is true, then it should be
possible to devise methods to identify creative people by their characteris­
tic qualities. The studies cited above plus other studies such as Guilford
(1962, infra, p. 109), Getzels and Jackson (1962, infra, p. 120), Torrance (1962, infra, p. 124), and conference reports such as Taylor (1955, 1957, 1959) are evidence of growing efforts to form concepts of the qualities of creative people so they may be identified and nurtured throughout school, college, and adult life.

**Work ways of creative persons**

If creative persons exhibit unique identifiable qualities, then they should show unique ways of putting these qualities to work. M. I. Stein (Carnegie Quarterly, 1961) reported a study of industrial research chemists, from several different laboratories, from which he drew some conclusions about their work ways:

1. The creative man seems to know when to be disciplined and when not to be disciplined. He is more likely to play, in a sense, with things and ideas. He is willing to allow all kinds of ideas and feelings to enter his mind, and he can accept his own impulses.

2. Highly creative men are not so likely to try to force or pull out a solution. They tend to become part of the problem field, sensing its forces and following its leads, and thus let the problem "solve itself."

3. The more creative workers "work more slowly at first, marshalling resources. Then they move quickly, with an air of certainty, to a synthesis" (Carnegie Quarterly, 1961, p. 6). The less creative work toward a quick synthesis, but then keep checking back, and, hence, are not as efficient or as likely to achieve creative solutions.

Jones (1961) indicated that the ideas and work procedures of creative students come in conflict with the status quo. They need
opportunity for exploring atypical ideas, trying seemingly "absurd" solutions, and postulating "silly" hypotheses. MacKinnon (Carnegie Quarterly, 1961) reported that the creative person resists group work and sets goals for himself which may be in conflict with those set for the class. He added that a time clock is meaningless to the creative person. Perhaps the emphasis of modern education on group work, within neatly packaged units of time which may not provide an opportunity to play with ideas, is contrary to the development of creative thinking.

Cultural and educational conditions

From the above it can be seen that cultural and educational values should have a strong influence on creative activity and the nurturing of creative ability. Bloom (1957) found that one of the reasons for the lack of creativity of the Indian graduate student, scholar, and professional worker was that the dominant religion of India stresses acceptance of one's present fate rather than suggesting that man can or should do much to alter the world in which he lives. Also, the caste system has meant that the forces around one were more powerful in determining the pattern of one's life than were the individual's own activities. Likewise, many of the decisions of importance in life are made by the head of the family, and the young are expected to accept these decisions. Self-denial and submission to the will of the elders are major virtues.

The economic condition of India has been such that the central purpose of most Indians has been to establish some amount of economic stability. The freedom to pursue scholarly activities has been available to only a few.
The Indian educational system was created under the guidance of the English primarily to develop civil servants. One's status is determined by the passing or failing of examinations given at the end of secondary and higher education. The whole of instruction is geared toward passing the examinations and any deviation from the material for purposes of discussion, development of ideas, or problem solving, is rarely done (Bloom, 1957).

Thistlethwaite (1959) reported a study concerned with the relationship between the values and emphases of selected colleges and the number of graduates completing the Ph.D., and the major of the doctorate. He found a distinct relationship between the academic emphasis of the undergraduate college and the Ph.D. choice of graduates.

The reports of Bloom and Thistlethwaite indicate a strong relationship between cultural and educational environment and thought patterns, values and areas of professional interest. Bruner (1961) recognized this relationship when he emphasized intuitive thinking as opposed to analytic thinking and the need to stress intuitive thinking from the earliest grades.

Allen (1957) and Parnes (1959) stressed a need for programs in American education to deliberately develop flexible, fluent, and problem solving thinking.

Bryson (1960, p. 11) believes we must improve every level and aspect of our culture before we can improve the creative productivity of our culture. Everyone must contribute, by participating or appreciating, whichever he can do, to the "betterment of the conditions in which creative work can be done."
These reports indicate that a cultural and educational environment (which places a high value on originality, imagination, resourcefulness and independent thought) is important for the nurturing of creative ability. In all areas of culture, there must be participation in creative endeavors by the general populace. It is through participation that the essential conditions of creative activity—appreciation, encouragement, and freedom of opportunity—will be met (infra, Pressey, p. 79; Torrance, p. 125).

Summary

Rogers (supra, p. 11) said that creativity is the driving tendency to become one's potentialities. Mooney (supra, pp. 12-19) agreed with Rogers when he stressed the necessity of seeing man with respect to his potentialities. Mooney, in his theory based on his four essential conditions for the existence of man (Out, In, Out-and-In-and-Out-and-In-again-and-again, Fit), postulated these four essentials as a framework to help understand potentially creative man in an inherently and constantly creative universe. Mooney believes that science and art are together in their function for man but that science emphasizes the outward environment—the universe, and art emphasizes the inward environment—man. Statements by Bronowski (supra, p. 25) agree with this concept. Mooney maintains that the artist is going to be valued more for his processes than his products. The primary role of the artist, therefore, will be to communicate creativity, that is, become clear on how he creates so as to help others in their creating.

Poincaré (supra, pp. 19-20) in conjunction with scientific and
mathematical creativity, suggested that sudden illumination must be preceded and followed by deliberate conscious work. He also believes that all creative ideas are esthetically satisfying. Therefore, to be a real creator in the sciences as well as the arts, one must have a highly developed esthetic sensibility. Sheehan (supra, pp. 20–21) concurs with Poincaré on the importance of the esthetic in scientific creativity.

Einstein (supra, pp. 21–22), in his reply to a question by Hadamard, indicated that muscular activity was important in the early stages of creative thought, before logical construction or conventional words and signs are imposed. Golovin, (supra, p. 22) in his list of attributes of the thinking process, agreed with Einstein on the importance of muscular tension in creative thought.

Patrick and Hadamard (supra, p. 22) listed four steps in scientific creative thought (preparation, incubation, illumination, verification). These steps do not disagree with Poincaré, Sheehan, Einstein, or Golovin, but do constitute a gross oversimplification of creative processes. These four steps account for conscious work which precedes and follows illumination but do not account for the variations in thought processes which people experience, or the attendant tools such as esthetic sensibility and muscular tension.

Turning from creative activity in the sciences to creative activity in the arts, the painters van Gogh and Levi (supra, pp. 22–23) were quoted. They discussed what they tried to do when painting a picture—which was to make the picture's realization match their own mental and emotional image. Van Gogh, Levi, and Cocteau (supra, pp. 23–24) stressed the arduous process involved in realizing an artistic or literary
Idea. Coleridge (supra, p. 24) suggested that ideas are fleeting and that the conscious realization of an idea must begin immediately or it will be lost.

Gerrard (supra, pp. 24-25) placed special emphasis on imaginative regrouping and closure as important acts in creative processes. Imaginative regrouping appears to be similar to Einstein's experience of "combinatory play," while closure is not unlike the artist's realization of his mental image.

By way of summarizing creative thought, Golovin's views (supra, pp. 25-6) were given. They are in agreement with the views of the scientists and artists cited in this chapter. Golovin and May (supra, p. 27) agree that people only make creative discoveries in fields where they have intense commitment, training, and considerable prior thought.

Sinnott (supra, pp. 26-27) reported that ideas frequently arise spontaneously from the unconscious when one is thinking of something quite different. May's belief that unconscious processes of forming go on even if we are not aware of them, helps account for the spontaneous nature of insight. Sinnott suggested that the unconscious solves problems by providing an order for information and that a conscious attack on a problem often fails because free associations are blocked in various ways and new relationships are therefore not seen.

Stein's report (supra, p. 37) of the workways of creative people showed that they know how to work in cooperation with their unconscious processes. The discussions by Poincaré and Einstein could serve as illustrations of Stein's report. They illustrate creative persons who have found workways which allow them to take advantage of the
formings of the unconscious mind.

Reports by Bloom, and Thistlewaite (supra, pp. 38-39) with concurring statements by Bruner, Parnes, Allen, and Bryson (supra, pp. 39-40), indicated that cultural and educational conditions and values can be in conflict with creativity, thereby stifling creative ability and creativity, or inversely, be in agreement with creativity, thereby nurturing creative ability and fostering creative activity.

Mooney (supra, pp. 28-31) offered a way of answering moral and ethical questions about creativity. Several approaches to the study of creativity (Kuhn and Kaplan; Stein; Mooney; supra, pp. 31-33) were cited. A list of qualities of creative persons (MacKinnon; Barron; supra, pp. 33-36) was also given.
CHAPTER III

CREATIVITY IN MUSIC

The preceding chapter presented a theoretical framework for understanding creativity, along with experimental and anecdotal literature from the sciences, visual arts, and literature. This literature was selected in order to provide a basis for comparison and contrast with musical creativity which exhibits problems similar to those exhibited in other fields. Chapter III contains an extensive examination of literature from the field of music in order to provide an approach to an understanding of musical creativity. Toward such an end this chapter contains reviews of the literature concerned with the musical creative process, the external forces affecting the composer and musical creativity, and the educational setting for musical creativity.

The Musical Creative Process

Composers on the duadic life

The composer's world consists of a union of two parts: one, subjective [emotion and insight]; the other, objective [intellect and technique]. Since the language of music deals with man's emotions, the composer must possess an intense field of emotional activity. He must also possess the intellectual and technical powers to translate his emotional activity into musical symbols. The composer must develop his emotional perceptions and acquire and master a musical vocabulary.
Therefore, from the beginning, the composer's life must be both subjective and objective (Harris, 1942, pp. 25-26).

Harris maintained that "the development of an emotional field of activity within himself and the capacity to perceive it within himself and around himself is perhaps the more important half of the creative musician's life-work" (1942, p. 26). Sessions (1941), in discussing the subjective half of the composer's world, spoke of insights rather than emotions. The composer's point of departure is insight, born of intense and active experience, into the nature of the materials and the creative process of his art. Sessions held that insight is personal and subject to the limitations of personality. The personality of the mature artist is formed partly through reflection on what he sees around him and on what he has experienced within himself.

The objective half of the composer's life demands that from these insights and emotions, the composer must conceive musical ideas and translate them into traditional symbols. The composer's cultural environment will influence the idiom and style of his musical ideas. He must accept the symbols of tradition, yet in each generation, the composer must formulate new idioms, which modify or add to tradition, to express the new and unique of his environment (Harris, 1942, p. 27). To learn and control a large set of symbols requires a great amount of training and skill which makes the objective half of the composer's life a highly intellectual activity (Krenek, 1957).

The two halves of the composer's life complement each other. Symbols and technique must be used imaginatively in order to express human feelings. The composer must have something vital to express.
Simpson said:

... I am interested in the validity of what a composer is actually saying and the skill and judgment with which he controls what arises spontaneously from his mind's ear. Most of all, I am concerned about the human attitude his music reveals to me: it is important to me that he should say 'yes' to life, not 'no' (1959, p. 1035).

Saying "yes" to life implies an open system, a positive attitude towards reaching-out and receiving-in intense experiences. It also means the willingness and ability to conceptualize perceptions into imaginative meaningful musical forms. It means the ingesting into one's system the experiences that life has to offer and translating them into musical compositions that embody the strength vitality and meaning of these emotions, experiences, insights. As Harris put it:

The subjective process of perception and conception as well as the objective processes of technical notation, as practiced by living musicians, constitute the basis of artistic creation in music.

As singers of inarticulate humanity, creative musicians have been the living embodiment of the basis for creation in music. Through them has flowed the emotional experience of their progenitors. By them, those uniquely human attributes are intensified, reaffirmed, released and translated into serviceable idioms of culture. Innately of the past, reflecting the present, they in turn modify the future (1942, p. 28).

Inspiration

The question of inspiration is one which elicits a wide range of responses from musicians concerned with creativity. Their opinions range from the position that no art exists without inspiration to the exact opposite position that inspiration is a useless concept. To others, inspiration has become so encased in romantic fantasy that the word is eliminated in favor of terms such as intuition, imagination, and insight. Never-tha-
less, many musicians (Sessions, 1941; Koepke, 1958; Dorian, 1947) have held that inspiration is the essential first step in the production of a musical work of art.

Since the concept of inspiration is steeped in controversy, yet believed by many to be important, this section will review definitions, opinions, and descriptions of the characteristics and manifestations of inspiration. Two theories concerning the source of inspiration will be presented, together with attendant views and studies.

Many composers have attempted to describe, define, or otherwise find a rationale for inspiration. De Gastyne believed that

Primarily, inspiration is the urge of the inner soul of the artist to exteriorize itself and come into a life of its own.

... [It is] anything which sets in motion the inert potentialities of the imaginative mind; anything which makes us more perceptive to the hidden beauty of life, to the rough gems embedded in prime matter (1959, p. 4).

Carpenter believed that "Ideas or inspirations come from God, or from a Divine Origin" (Cook, 1954, p. 41). To Read,"... inspiration denotes the quickening and the realization of the creative impulse" (1956, p.46). Abraham rejected a theistic view but did "believe in something that may well seem, in fact often has seemed, to the recipient to be Heaven-sent, something from quite outside himself" (1949, p. 428). Milhaud represents the views of a group of contemporary composers who would dispel any romantic or external notions about inspiration. He believed: "Composing is a question of paper and a pen full of ink. ... Broadly, I should say composing is a matter of inspiration, and the source of inspiration is the fountain pen" (Cook, 1954, p. 43).

Aaron Copland, one of the more articulate contemporary
composers, nevertheless had difficulty in ascribing the location of the source of inspiration:

The composer is a kind of magician; out of the recesses of his thought he produces, or finds himself in possession of, the generative idea. . . . the moment of possession is the moment of inspiration. . . . Whence it comes, or in what manner it comes, or how long its duration one can never forecast. Inspiration may be a form of superconsciousness, or perhaps of subconsciousness—I wouldn't know; but I am sure that it is the antithesis of self-consciousness. The inspired moment may sometimes be described as a kind of hallucinatory state of mind: one half of the personality emotes and dictates while the other half listens and notates. The half that listens had better look the other way, had better simulate a half attention only, for the half that dictates is easily disgruntled and avenges itself for too close inspection by fading entirely away.

That describes, of course, only one kind of inspiration. Another kind involves the personality as a whole, or rather, loses sight of it completely, in a spontaneous expression of emotional release. By that I mean the creative impulse takes possession in a way that blots out in greater or lesser degree consciousness of the familiar sort. Both these types of inspiration—if one can call them types—are generally of brief duration and of exhausting effect. They are the rarer kind, the kind we wait for every day (1959, pp. 52-53).

Musical composition is frequently expressed as a duality of inspiration and technique (Bernal, 1955). Peggy Glanville-Hicks concurred with this view when she asserted that:

Certainly the composer's span of awareness embraces two areas: the emerged level of the intellect wherein is cultivated the technical skill and mastery, and another submerged level from whence springs his inspiration, and where an instinctive rather than calculated choice appears to reign (1958, p. 3).

Stravinsky minimized inspiration in favor of work. He stated:

I am inspired by ideas. . . . But there is no way to gauge or measure inspiration. It is not controlled, therefore I cannot be the judge of inspiration. I can only judge of workmanship or that which I have accomplished.
Music... is not made of inspirations, ideas, or spiritual equations, but of notes and a great deal of work (Cook, 1954, p. 43).

Révész (1954) identified two basic theoretical positions concerning the source of inspiration: (1) the metaphysical, and (2) the psychological. Those who hold a metaphysical position regard the unconscious mind of the creator as an original force which brings forth musical ideas in somewhat final form. The musical ideas revealed through the unconscious are then modified in accordance with the composer's intention. The source of inspiration is credited (by adherents to this position) to supernatural, divine, or miraculous origin. Stress is placed on inspiration which bursts forth unexpectedly, suddenly, miraculously, without demonstrable preparation. The accounts of sudden inspiration, which are recounted by many composers, are commonly taken as evidence in support of this position.

In a letter of February 16, 1878, Tschaikowsky wrote: "Generally speaking, the germ of a future composition comes suddenly and unexpectedly" (Griswold, 1939, p. 65). Initial musical ideas came to Berlioz so rapidly that he wrote down his ideas when and where he could. To keep up with his ideas, he wrote rapidly and developed his own musical shorthand (Squires, 1940a). Beethoven believed that he was inspired by a divine source. He was "aware that God is closer to him than to others" (Graf, 1947, p. 31).

The proponents of the psychological position, the second position which Révész (1954) identified, are concerned with the psychological factors on which the ideas or inspirations depend. They question the notion that it is necessary, for the understanding of musical creation, to
assume forces outside the personality which cannot be explained in an empirical way. They believe musical inspiration can be deduced from the creative process and its antecedents, concomitants, and consequents.

To illustrate this position, Révész (1954, p. 199) cited the work of J. Bahle. The work of Bahle is also cited in Farnsworth (1958, p. 208), Abraham (1949, pp. 429-431) and Willman (1944). Bahle asked composers to write songs to poems and keep an accurate and detailed diary of all thoughts they had in regard to the composition until they began to compose. During the actual composition of the song no record was kept, but afterward an account of the process was to be given, including answers to certain questions. Bahle reported that creative work does not begin with inspiration. Before the inspiration, a whole series of circumstances take place which condition the inspiration (such as experience, study, tradition, and experimentation). Real inspiration comes most often as the fruit of an effort of the conscious will, usually exerted some time before the appearance of the idea. While the composer is consciously concerned with a musical problem, the unconscious is working on the problem all the time and eventually erupts with the solution.

Willman (1944) conducted an experiment to determine (1) whether or not a visual design stimulus would suggest to different composers musical themes with similar characteristics, and (2) whether or not the characteristic qualities of these themes were sufficiently similar so that they could be associated with the respective stimulus designs. Four highly dissimilar visual designs were submitted to a group of serious composers, popular composers, and high school students. The subjects were asked to write themes using each of the four designs as a stimulus. The
themes were returned with accompanying statements regarding the connection between the themes and designs.

Certain characteristics of meter, tempo, dynamics, angular or smooth melodic patterns were found generally to be dominant in the themes written to each design. These dominant characteristics were different, and distinct from each other, according to the designs to which the themes were written. There were some differences of key, style, and mood between the themes submitted by the popular composers and the themes submitted by the serious composers. According to Willman, auditors associated the themes with the designs to which they were composed far more frequently than chance would allow even though there was considerable difference between the themes. The circumstances and conditions under which a composer composed, including his feelings, seemed to affect the content of a theme, at least in the cases of the themes judged to have a low relationship to the corresponding design. Willman concluded there was a carry-over from an abstract design to the resultant musical theme, and that this carry-over provided an indication that the creative product is influenced by an abstract design, or possibly some other visual object, when the design or object is used as a stimulus by the creative worker.

Benham (1929) reported some experiments which he conducted to study the physiological and psychological conditions, such as kinaesthetic activity, auditory and visual imagery, which attended the initial appearance of a musical idea. For each experiment, Benham placed himself in quiet surroundings with pencil and paper. The purpose of the initial set of experiments was to record the general conditions facilitating
writing and to try to note the appearance of the initial idea. As the experiments were continued, attention was concentrated on imagery of any kind connected with or immediately preceding the initial idea. Notes were made during and after each experiment. During the composition of some themes, Benham recognized auditory imagery, a sort of singing, which he believed to be a combination of ill defined kinaesthetic and auditory imagery but more auditory than kinaesthetic. He also noted a vague sort of organic activity, "a muscular feeling of a rhythm rising and falling."

For some experiments, he drew a preliminary curve of a melody and then placed the curve out of sight. In later comparison of the curves and melodies he noted similarity in the smaller details of the drawn curve and the corresponding melody. In another set of experiments, he deliberately imposed upon himself certain mood sets, with concomitant physical positions. They were dejection, peace, joy, energy, sorrow, and super-restraint. The mood was set prior to the writing, and in every instance Benham reported that the melody was a consistent expression of the mood desired. He did not report, however, how he established that a particular melody was an expression of a particular mood.

Benham concluded from this study that definite evidence can be obtained regarding the preliminary activity in composing, including motor sensations which may be allied with the rhythmical aspects of the music and auditory imagery for which perception is dependent on trained observation. He reported that auditory imagery was strongest at the moment of the emergence of the musical idea. He believed the strength of the imagery lent some credibility to the supposition that the moment of the emergence of the musical idea is the focal point of the intensity of inspiration. The
control of subconscious activity, of mood sets, and the development of an awareness of mood and of imagery would prove valuable to the musician in that it would sharpen his musical ideas.

The studies cited indicate that the composer can exercise a degree of control over the initial stage of the creative process. Abraham (1949, p. 430) proposed that one difference between ordinary people and creative artists is that the creative artist can exercise a degree of control over the appearance and subject of the ideas which are "thrown up" from the unconscious to the conscious mind. Abraham suggested that there is room for effort in summoning creative ideas. However, he cautioned composers that the mere act of writing is not always an efficient means of summoning ideas. There are two dangers: (1) that the writing may exhaust the supply of ideas, or (2) that the inspirations may not have matured long enough to possess vitality. Abraham indicated that the general prerequisite to the generation of first-rate ideas, ideas that may be considered inspirations in the highest sense, is intense mental concentration at some earlier time in order to allow a period of unconscious gestation (1949, p. 430).

Unconscious gestation, or "unconscious cerebration" as Howes called it, is the process of suspending action on a decision until the subconscious mind has had time "to revive the appropriate memories and associations which will determine the answer or decision" (1927, p. 191).

As an example of this phenomenon, Howes reported an experience of the English composer, Sir Charles Stanford:

When he (Stanford) was fourteen years old he tried to set a somewhat long dramatic poem as a song. He wrote the first three verses easily enough, but when the drama began to
become vivid and to require more power of illustration and design than he possessed, he could not progress an inch, and after several miserable attempts he put it away, and forgot all about it. Ten or eleven years later, when he had quite forgotten his early efforts, he opened a book at the same poem, sat down and wrote it straight off without a hitch. But the surprising proof of 'unconscious cerebration' came when, fourteen years after the song was written and published, he found the juvenile attempts in an old box, and the first three verses were, both in melody and harmony, practically identical with those of the completed song. His brain had remembered what he himself had wholly forgotten, and found the way out of the difficulty for him without his being in the least conscious of the process (1927, pp. 192-193).

Many composers have developed their own ceremonies to induce inspiration, and perhaps all have practiced some form of unconscious cerebration. Brahms (Griswold, 1939, pp. 42-43) stated that his inspirations came when he was in a "dream-like state." However, one must stay awake during this process as "it is important to get them [the ideas] on paper immediately." To induce inspiration, Brahms insisted on being absolutely alone and undisturbed and maintaining intense concentration. Brahms used the technique of unconscious cerebration. "I let them [his ideas] germinate, sometimes for years, but I occasionally look at them again. This habit is important, for it engenders the same state of mind that gave birth to them, and in this way the original thoughts grow and expand." Brahms briefly summed up his beliefs about inspiration when he stated: "It [composing] is an intellectual process as far as the mechanics of composition are concerned. It requires patience and much hard work to acquire technical skill, but that has nothing to do with Inspiration, which is a spiritual process" (Griswold, 1939, pp. 42-43).

Gabriel Fauré expressed wonder upon a personal experience of unconscious cerebration:
Whilst I was thinking of a thousand different things of no importance whatever a kind of rhythmical theme in the style of a Spanish dance took shape in my mind. And this theme just went on its own way, so to speak, without bothering me in any way. But the strange thing was that while I was thinking of a thousand other things, this theme developed of itself, became harmonized in many different ways, changed and underwent modulations, in fact it germinated by itself. Obviously, it drew upon the store of my memories ever since I have been in the world—on all those musical textures which have become part of myself. But how strange is this unconscious functioning of the mind, this precise working out of an idea in this way! (Lockspeiser, 1958, pp. 145-146).

The cited remarks of composers largely support the idea of sudden awareness. This phenomenon can be explained by either metaphysical or psychological theories of inspiration. If, however, the evidence which was cited to support the concepts of control of ideas and deliberate germinating of thoughts is valid, then the metaphysical theory is untenable.

Inspiration, as a function of the creative process in music, is then explained by the proponents of the psychological position, as the acquisition of ideas as the result of the culmination of unconscious mental activity (unconscious cerebration) which can, to some extent, be influenced by emotional, motor, and sensory set.

Forms of initial musical ideas

Whittaker (1942, pp. 44-45) held that since music is made of sounds, the musical inspiration or idea will appear as an aural image, not in visual, verbal, or abstract forms. Composers have spoken of musical inspiration as being of two types: the first occurs as a motive, theme, or more vague fragmentary shape; the second occurs as a vision of the whole (Hindemith, 1951; Keopke, 1958; Sessions, 1941).

Beethoven is generally cited as the archetype of composer who
starts with fragmentary sketches, small motives, undeveloped themes, and then develops these initial ideas into large forms (Dorian, 1947; Graf, 1947; Krenek, 1957; Squires, 1936). Engleman (1937) even maintained that each of Beethoven's sonatas or symphonies, throughout all its movements, is developed from a single principal theme.

Anton Dvorak evidently developed some of his compositions from brief themes. Griswold (1939, p. 99) related the incident of Dvorak, on the occasion of his visit to Minnehaha Falls in 1893, writing down a theme, on his cuff, in rapid concrete fashion. Duck (1953, p. 12) also cited Edmund Rubbra as a composer who starts compositions from a single musical idea which he knows is capable of development.

The composer who appears to receive entire compositions as initial ideas illustrates "vision of the whole" type of inspiration. Mozart and Schubert are archetypes of composers who illustrate this procedure of working. Graf related this incident:

Once Mozart had promised the wife of Privy Councillor Bernhard von Keess, in whose house there were concerts twice a week to compose a new song. However, Mozart forgot his promise and also forgot to attend the concert at the Keess home. He was sitting in a tavern when a lackey was sent to fetch him. Then Mozart remembered concert and song. He sat down in the coffee-room and wrote the song then and there, and brought it to the Keess home. Frau von Keess sang it immediately while Mozart accompanied her at the piano (1947, p. 273).

Graf related a similar incident concerning Schubert:

One day Schubert and his friends were sitting in the beer garden 'Zum Biersack' in Poetzleinsdorf. Schubert was reading the drinking song from Shakespeare's 'Anthony and Cleopatra.' Suddenly he exclaimed: 'I just got an idea for a beautiful melody. If only I had some music-paper with me!' One of Schubert's friends drew the staff on the back of the menu, and Schubert immediately wrote down the song (1947, p. 274).
The above examples illustrate the total conception type of initial idea. The writers of songs and other short pieces do not, however, illustrate the only instances of total conception. Hindemith stated: "If you cannot, in the flash of a single moment, see a composition in its absolute entirety, with every pertinent detail in its proper place, you are not a real composer" (1951, p. 31). In this regard, Hindemith made no allowance for length of composition.

Hindemith described this phenomenon as similar to seeing a landscape at the instant of a flash of lightning. "We experience a view, immensely comprehensive and at the same time immensely detailed." Hindemith believed compositions must be conceived in the same way. He did not mean that each small detail is determined in the "very first flash of cognition." If the composer should concentrate, in the first insight, on any small detail, he could never see the whole, but if conception of the totality strikes his mind, all the notes and other means of expression "will fall into line almost without his knowing it" (1951, p. 31).

It follows, then, that when working out his material, the great composer will always have before him the entire picture of the composition. He does not select harmonies or melodies arbitrarily. He fulfills what the conceived totality demands. This, Hindemith contended, is the true reason for Beethoven's constant alteration of his material; a desire not to improve or to change any idea, theme, or harmony, "but to accommodate it to the unalterable necessities of an envisioned totality." (Hindemith, 1951, p. 32).

Hindemith admitted that the retention of the initial vision is very difficult. This ability to retain the vision seems to be one of the
characteristics which the creative genius displays over the merely talented composer. He also stressed the importance of musical skill. "Skill can never make up for lack of vision, but on the other hand a vision will never receive its true materialization if a composer's technique does not provide every means towards this end" (1951, p. 32). To Hindemith, the ideal, which has been fully achieved in only a few masterpieces, is the absolute congruence of vision and technical skill—"the absolute coincidence of intention and realization."

Sessions (1941) would agree with Hindemith on the importance of the "conception" (vision of the whole). Sessions indicated that it takes the form of "concrete musical materials—perceived, however, not in detail, but in foreshortened form." He added the further point that young composers differ from experienced composers in their experience of the "conception." As the young composer "grows in practice and imagination it assumes an ever more preponderant role, and appears more and more to be the essential act of creation" (1941, p. 127).

Sources and stimulation of musical ideas

Max Graf (1947, Chapter 4) placed much emphasis on erotic forces as the life-giving source of musical creation. "The chief impetus of human life... is sensuality. And without sensuality there would be no fantasy and no art, both of which derive their main nourishment from erotic forces" (1947, p. 56).

Graf believed the erotic forces have a dual function:

Together with sensuality... these erotic powers do not merely give the tones their particular color, purity and a richer lustre. They also enhance the mood of the soul and of the collective emotions. They stimulate the memory and
help to create that delirium-like condition in which the soul of the artist becomes more mobile, more flexible and more receptive (1947, pp. 61-62).

Graf indicated that this erotic force must last throughout the composer's productive lifetime. The sensual and erotic drive is one of the characteristics which separates the artist from "the barren business man."

Graf believed that sensuality is the driving, lustre-giving force, but that spirituality and mentality are the forming, shaping forces. He stated:

Anyone wanting to describe artistic creation must analyze it as natural forming and as organizing of all mental powers. It must be considered as spiritual shaping of sensuality which, in the musician, imparts color, light, and lustre to the tones, creates tone figures and, by heating all emotional forces in a white-hot cauldron, as it were, brings all mental raw materials to the melting point. Thus the mental and the spiritual; sensuality and thoughts, emotions, moods, experiences and memories; wishes, dreams and energy are all made to melt in one single mold (1947, p. 76).

Graf (1947, Chapter VIII) and Dorian (1947, Chapter II) stressed the importance of internal and external experiences in the development of the personality of the composer. Every experience that the composer has is added to previous experience and contributes to the reservoir of experiences upon which the composer has to draw. This reinforcement of old experiences by new experiences explains the inner growth of the composer. The outer experiences and inner growth of the composer affect his compositions.

The inner growth of the great composers continues throughout their productive career, and according to Graf "the greater the composer, the longer the road from experience to art production" (1947, p. 193). For example, the religious thoughts which occupied much of Beethoven's
time in his later years had been building most of his life towards the expression in the Ninth Symphony (Graf, 1947, Chapter IX).

The type of external experiences mentioned above constitute "long-run" inspirational sources. Dorian (1947, Chapter III) cited instances of composers drawing this type of inspiration from nature, journeys, and the weather. Whittaker (1942, pp. 43-44) related that in some instances scenery and sea voyages have been of inspirational value. Graf (1947, Chapter VII) cited instances of composers' childhood memories having served as inspiration for a composition. Debussy, in a letter to Andre Messager, September 12, 1903 (in Lockspeiser, 1958, p. 113), discussed writing music containing impressions of the sea which were drawn from early memory.

Musical mood differs from "long-run" inspiration in that the mood is more immediate. Musical mood, sometimes called productive mood, is the composer's mental and emotional set immediately prior to and during the first appearance of a theme or other musical idea. The mood can be of any type and be caused by any one of countless experiences.

Graf (1947, p. 276) related that "Debussy often put himself in productive moods by staring at the flowing water from one of the Seine bridges, and watching the golden reflections cast by the setting sun." Beethoven, Mozart, Richard Strauss, and Igor Stravinsky liked to work in the spring and summer. Debussy worked at night in the quiet and solitude (Graf, 1947, Chapter XI) while Hugo Wolf preferred to work in the morning (Griswold, 1939, p. 133).

Brahms insisted upon being absolutely alone and undisturbed whether in a room or on the walks he liked to take in the country
For Tschaikowsky, absolute quiet and freedom from daily cares was essential for creative activity (Griswold, 1939, pp. 56-60). Igor Stravinsky also demands quiet and solitude while composing (Stravinsky, 1949; Craft, 1951; Cook, 1954). Mozart, however, could carry on a lively conversation and even tolerate background music provided it did not interest him (Griswold, 1939, pp. 126-127). Darius Milhaud, in the matter of working atmosphere, is much like Mozart. He stated: "I can compose anywhere, ... with the radio on or in the midst of a noisy gathering" (Cook, 1954, p. 43).

Many composers have resorted to various actions to establish an atmosphere for creative work and heighten the musical mood. André Gretry, the French composer, would keep his feet on ice while writing, and Rossini would lie down under piles of blankets in order to meditate (Voronoff, 1941, p. 112). Cesar Franck found inspiration in improvising on the piano, gradually playing louder until he reached a deafening noise (Squires, 1938b). Brahms, Beethoven, Handel, Tschaikowsky, and von Weber found that walks in quiet pleasant surroundings, preferably in a wooded area, promoted the flow of ideas (Griswold, 1939, p. 134; Squires, 1938a).

Various beverages have been used as a stimulant by a number of composers. Haydn and Schubert were wine drinkers. Max Reger was an avid beer drinker, and Debussy loved a delicate tea which he brewed himself. Among well-known composers, however, Moussorgsky was the only pathological drunkard. Voronoff (1941, pp. 121-122) concluded, after a discussion of the affects of drugs and alcohol, that they may act as a general stimulant but do not increase the creative power of the user.
Composers have adopted various measures to achieve a mood conducive to the production of ideas. If these ceremonies are helpful, they are helpful only as each composer has found the set of circumstances which work best for him. They are personal and do not seem to generalize.

Creative elaboration

The second stage of the creative enterprise is termed organization or elaboration (Dorian, 1947, p. 13). This is the stage of "musical tectonics," the time for tonal construction. The second stage is an experimental one of testing the tonal materials against the view of the final goal. Dorian believed the second stage of creative work is characterized by a blend of creative impulse and constructive thinking. This blend is "not a romantic rapture, but enlightened procedure, carried safely by laws of composition. . . ." (1947, p. 14).

Koepke (1958) labeled the three stages of the creative process: conception, maturation, and realization. He recognized the important fact that these three stages are not mutually exclusive and may overlap to varying degrees dependent upon the individual composer. Koepke identified two aspects of the maturation stage: "The quest for and development of expressive materials" and the "establishment of continuity." He held that the selection of tonal material should be made with the over-all demands of the composition in mind including the possibilities of development.

The second aspect of maturation, continuity, demands the composer's constant mental review of the work. Koepke believed: "it is vital that the composer experience repeatedly in his imagination the continuity
of his own composition. For if he has not experienced his own work, it can never speak with conviction and authority for him" (1958, p. 18).

Koepke (1958) recognized three aids to composition in the maturation stage. First, tonal memory which enables the composer to sing the work over to himself aiding the development of continuity. Second, effective use of the subconscious which lets the composer defer judgment on problems until he has "slept on them" perhaps achieving a better solution. Third, a command of theoretical techniques which will allow the composer to determine the nature of his problems and aid in the discovery of solutions which will meet the demands of the over-all design of the composition.

Graf (1947) stressed intellectual work in the second stage of musical creation. He believed:

We are too accustomed to consider musicians purely as men of imagination. That great composers are keen thinkers, and that their critical sense is finely polished, is not sufficiently appreciated. High-ranking composers without strong reflection are unthinkable" (1947, pp. 330-331).

According to Graf (1947, pp. 341-342), artistic reflection has three tasks. First, it can precede creative work. Graf mentioned ideas noted in Beethoven's sketches for things to come, e.g. predetermined instrument choices in the sketches to the Missa Solemnis. Second, "reflection accompanies work, and revising, regulating and leading the way is its most important function." Third, "reflection follows work and applies the finishing touches, erases the superfluous, and supplements."

Graf (1947) maintained that one of the composer's principal intellectual functions is condensing and simplifying his musical material to conform to the demands of the larger musical structure. A second
important function, the reverse of condensing and concentrating, is the expanding of tonal ideas and forms. A third and even more important function is the elaboration and intensification of every detail, which means accenting the expressive phrases and clarifying the musical picture by setting the highlights in relief. In reality these three intellectual functions are integrated, and all of this forming and shaping grows from the original musical idea. The harmony and coordination of creative forces (unconscious forming and critical thinking) is a very difficult part of composition. It must be maintained, however, even though the composition is long and the effort is stretched over a long period of time.

Sessions (1941, pp. 126-128) labeled the constructing stage of composing, execution. The process of execution means allowing the music to grow. Any fragment of tonal or rhythmic material may suggest movement, ways for growth, which will lead the composer to other fragments—other motifs, chords, phrases.

Sessions (1941, pp. 128-132) identified three principles of musical structure: association, progression, and contrast. By association, Sessions meant that certain features of the composition (such as theme, motif, or characteristic rhythm) must recur and that they gain their importance through their recurrence. Closely allied to association is the principle of progression:

The gradual and progressive movement towards a clearly envisaged goal, and . . . the steady intensification of effect until this goal is reached. Progression is the development of a single musical impulse to its completion. When the impulse is complete the need for contrast, the third principle of musical structure, arises. The nature of the contrast depends upon the context of the contrast and the scope of the composition in question. The composers vision of the whole and the growth pattern of the composition are inseparable and, in the final rendering, identical (1941, pp. 128-132).
Grant (1951) believed that the composer, as he writes, is confronted with two important problems. "First: the musical material must always emerge from that which has preceded in a manner which is natural, spontaneous, apparently effortless; and second: the fresh material must yet not be obvious, commonplace, predictable" (1951, p. 6).

There exist passages of music in which an effect occurs as a "magnificent surprise," which the listener recognizes as so fitting and natural that he is tempted to believe he knows it as inevitable from the beginning of the composition. Grant termed this "magnificent surprise" the "logical unexpected."

Grant listed several devices which, if they emerge naturally yet do not sound obvious, can become the "logical unexpected." They are sudden fortissimo chords, sudden pianissimo or dimenuendo, unexpected modulation, careful placement of unlooked-for-chords or notes, the general pause, rhythm changes, tempo changes, tone color changes, and discrete combinations of the above. In addition there is the device inherent in the initial outlay of the music such as the unexpected but natural entrance of the voice in a song. Grant warned that "such devices are potent in inverse ratio to their frequency."

Krenek (1957) cited an excellent illustration of Beethoven's preparation for the "logical unexpected." The sketches of the Eroica Symphony, First Movement, show that Beethoven spent much effort to justify the bi-chord dissonance at the end of the development section. This particular striking dissonance occurs in seven of the eight sketches Beethoven recorded in his notebooks. Even in the one sketch in which he did not use the E-flat to B-flat-seventh dissonance in question, he still retained the
idea of doing something unusual: he made a radical key change. He tried first to justify the original startling idea by what would follow, and second, by the material to come before. He even introduced some runs which were later eliminated in this spot but used elsewhere in the symphony. There seems to be an economy in the creative process—material which does not fit one place is frequently used in another. "The various ideas that come up in the creative act are centered about the concept of the whole and eventually everything comes into its own and its right place" (Krenek, 1957, p. 56).

Krenek, quoting the American pianist and conductor, Carl Bricken, said: "The real criterion of the true artistic effect is that it appears unexpected and necessary at the same time" (1957, p. 56). Beethoven's sketches indicate that he was striving towards making this unexpected dissonance sound necessary. He achieved it by building intensification to a climax, followed by a long gradual reduction of intensity terminating in the dissonance.

**Creative synthesis**

The third stage of the creative process is creative synthesis. Dorian expressed the essence of this stage when he stated: "The great creative artists were unifying natures, endowed with the power of synthesis—of that force which binds all separate elements of substance into the wholeness of the art work" (1947, p. 245).

Synthesis, as the final stage of the composing process, pertains to all work following the stages of inspiration and elaboration. It is the putting together of parts, the combining of all parts within the whole, the
total formal organizing of the composition, including the preparation of the final manuscript (Dorian, 1947, p. 245).

Koepke (1958) labeled the third stage of composition realization. For work during this stage, he cautioned the young composer to "use his head more and his pen less. . . ." The first danger of premature realization is the catharsis that some composers experience upon committing a composition to paper. They have a tendency to go to other concerns without polishing. Even if the composer only sets down isolated sections, worked out in detail, he runs the risk of losing continuity. The second danger of premature writing is the tendency to balk at major revisions which would involve lengthy copying. The composer may then convince himself that the passage which he thought to be inadequate was really not so bad.

Koepke (1958, p. 19) believed "...a work should not be committed to paper until the composer feels a sense of urgency and compulsion that cannot be denied." The work should then be written rapidly in sketch form or short score setting down only those passages which meet the demands of the total matrix leaving ample space for unresolved problems. This procedure helps to maintain continuity, and the problems that remain can be viewed in relation to their place in the whole rather than as isolated cases.

In the later stages of composing, Beethoven frequently used previous ideas in conjunction with new ones. The problem of where to place an idea can frequently only be solved in the synthetic stage of creation. Beethoven stated:

The way I am accustomed to write, I always have the whole before my eyes. I carry my thoughts a long time, often very
long before I write them down. Therein my memory remains loyal to me, since I am sure not to forget a theme even after years, once I have conceived it. Some things I change, reject, try all over again until I am satisfied (Dorian, 1947, p. 251).

From Beethoven's words we see that his concept of the whole may give direction to a composer's imagination. He selects, chooses, and rejects, until he finds those ideas which fit his concept of the total work (Dorian, 1947).

Beethoven's statement indicates that he did exactly what Hindemith (supra, pp. 57-58) said great composers do when composing—write to fulfill what the conceived totality demands. Hindemith contended the reason for Beethoven's constant alteration of his material was to fit it to the envisioned totality. Beethoven's statement confirms Hindemith's contention. Hindemith said that the ability to retain the vision of the whole seemed to be one of the characteristics which the creative genius displayed over the merely talented composer. Beethoven's statement confirms that he was able to retain his musical thoughts a very long time. Beethoven's statement coincides with Hindemith's thesis, thereby upholding Hindemith's concept of the vision of the whole.

Frequently, composers make revisions in the manuscript. Beethoven revised and corrected, sometimes changing whole sections, to achieve unity and clarity. Schumann was another composer who constantly revised. He wrote rapidly at first, but many of his major compositions underwent complete revisions, "among them his symphonies, his Piano Sonata in G Minor and his Faust music" (Dorian, 1947, p. 303). Chopin created spontaneously and conceived as a whole. After the initial conception, however, came exhaustive rewriting and refinement.
He was a perfectionist and would spend days and weeks over a single page (Squires, 1940b).

Walker (1959) believed there are items of esthetic significance in a composition of which the composer is unaware. These are usually items of unity such as thematic or rhythmic relationships. To illustrate this phenomena of "unconscious motivation," Walker cited an instance in the work of Schoenberg. During the composition of his Chamber Symphony (Opus 9), Schoenberg

... was so worried by the lack of apparent connection between the two main themes of the work that he seriously contemplated rewriting the second of them, but decided in the end to stand by his initial inspiration. This was wholly vindicated some twenty years later when he discovered for the first time the true nature of the connection. Needless to add, it is a serial connection, although when this work was written Schönberg had not started to develop his twelve-tone technique (Walker, 1959, p. 278).

If the phenomena of musical unity generated by unconscious motivation (Walker, 1959) has validity, it would pay the composer to saturate himself with his material so as to let the unconscious help him achieve better relationship between ideas. Unconscious motivation may, then, be helpful at all stages of creativity but should be of special value in the synthetic stage when the composer is trying to unify the work.

The External Forces Affecting the Composer and Musical Creativity

Music made to order

Questions have persisted concerning the worth of compositions which were occasioned by external circumstances as opposed to compositions initiated by the composer's inspiration. Some persons have held the position that compositions written to satisfy a commission, or wish
of a friend, or publisher were less "inspired" than those written on the composer's own volition. Tschaikowsky stated:

... experience has taught me that the intrinsic value of a work has nothing to do with its place in one or the other of these categories [work initiated by composer or external circumstance]. It frequently happens that a composition which owes its existence to external influences proves very successful, while one that proceeds entirely from my own initiative may, for various indirect reasons, turn out far less well (In Griswold, 1939, p. 59).

Other composers agree with Tschaikowsky. Britten (Duck, 1953, p. 12) believed that "one can be excited into starting work by a commission, or a performer's art, or just an accidental idea." Duck (1953, p. 12) asserted: "The idea that a commissioned work is likely to be less 'inspired' than one undertaken for no particular purpose is another of the fallacious ideas fostered by the nineteenth century." Craft (1951, p. 14) suggested that the working habits of Stravinsky have helped to break down the myth that inspiration is a necessary prerequisite to composition. Stravinsky "composes only on commission and for payment in advance."

Some of the world's great composers, e.g. Haydn and Bach, turned out their finest works because of the demands of courtly patronage or ecclesiastical employment (Duck, 1953, p. 12). In music made-to-order, the composer must create his own inspiration. Some commissioned music turns out well, some rather badly. How the music turns out depends on the level of craft of the composer and the interest and inspiration the composer can muster (Dorian, 1947, Chapter V).

Historically, some of the world's great music has been created as the result of a commission or other external inducement. Perhaps, as Dorian (1947) suggested, the answer lies in the realms of professional
competence of the composer and the interest and excitement the com-
poser can engender for the project. The following statement by Elgar
possibly summarizes the view of the working composer: "When definite
production of his work is assured, a composer will rise to the occasion,
'encouraged, inspired and generally stimulated'" (Duck, 1953, p. 12).

**Working procedures of composers**

Musical composition is laborious work, and perhaps one of the
principal differences between the renowned composers and those of lesser
stature is their organizing ability and capacity to persist at tedious de-
tailed work. Whittaker observed from his teaching experience: "It seems
that those pupils who have exceptional powers for sustained effort are
most likely to be successful, rather than those who have most brilliance
and facility" (1942, p. 47).

Whittaker's observation is supported by the work of Gross and
Seashore (1941, infra, pp. 115-16). In comparing professional composers,
superior student composers, and inferior student composers, they found
that work methods were one of the principal distinguishing characteristics.
The inferior student composers, as a group, depended only upon modd,
"inspiration," for their ideas. The work procedure of both the superior
student composers and the professional composers was characterized by
theoretical planning; they utilized abstract principles, conceived of musi-
cal units within the whole and checked paper work on their instrument.

Rossel (1950) offered to composers several working procedures
which he had found useful. He suggests that the composer have a regular
place of work. The composer should sketch daily and with a purpose.
After studying his earlier work, he should do something contrasting to get himself started. Find a figure, then sketch and develop it in several ways, and afterwards work for a balancing theme. Develop a system of shorthand to hasten the process. Play themes over in their original form and with changes. Rossel suggested musical "fools experiments" [compositional devices which are contrary to logical or traditional procedures] for getting out of a habitual way of thinking. For example, don't be cautious when writing modulations, variations, accompaniments, tempi, and accents.

Decide on a form. The form will indicate the quantity and style of thematic material needed. Use large size paper to reduce page turns, leave blank lines for later work and only write on one side of the paper for easy reference. If it is an instrumental piece, improvise on the themes, if a song, study the lyrics, wait for an unmistakable urge, then write as fast as possible. When working out a composition, be critical. Don't be afraid to eliminate until every remaining note is important. Study the sketch for possible improvements and try to develop the "long line" (Rossel, 1950).

The composer will often find himself working at five levels on the same day: sketching a new piece, working it out, writing pencil drafts, writing an ink score or parts, and marketing. Rossel (1950) suggested that if possible the composer always work on the highest level—with energy. After completing a work, lay it aside. One can often see it differently after a month or two.

Several contemporary composers have explained their working procedures in terms that may be helpful to other composers. Craft (1951)
reported that because of other duties, only a small part of Igor Stravinsky's year is spent in composing. Stravinsky is not a fast composer and may only complete one or two bars a day. He does not plan a work in advance and does not know what form it will take. He explores the possibilities of his material until his ear decides if he has the best solution.

Stravinsky always works alone and always composes at the piano (Stravinsky, 1949). He begins by playing over what he has previously written. When he has an idea, he will work to discover possibilities, with his ear as his only guide. Stravinsky's day is "adaptably routined." He tends to business in the morning and then composes from about 11:00 to 1:00. After lunch he reads, but not about music, and then composes most of the afternoon. In the evening he copies from pencil sketches, or makes a full score, which is not really orchestration since the instrumentation had been decided at the inception of the musical idea (Craft, 1951).

Stravinsky rules his own paper, and his scores are beautifully drawn. He decides the speed of each bar as he writes and, with minute exceptions, the music as it appears in the sketchbooks is the same as the finished score. He will, however, make some changes after a performance as he always writes to facilitate rehearsal and performance (Craft, 1951).

Andrew Imbrie (1952), like Stravinsky, stressed the importance of the ear as the guide for making musical choices. The composer considers himself as the first listener and, for purposes of communication, assumes that his own ear, although possibly more developed, is not essentially different from that of his audience. Before a composition can sound fresh and exciting to anyone else, it must sound fresh and exciting
to the composer. Thus, the composer's choice is determined ultimately by his own ear, which, when used in its broadest sense, includes the composer's past experience, his sense of timing, and his imaginative resourcefulness.

Miquel Bernal (1955) is in accord with Stravinsky and Imbrie on the importance of the ear as a guide while composing, but Bernal stressed the importance of the piano as a check. He indicated that the piano will not teach composition, but is useful for checking ideas before writing them on paper. Bernal believes the "inner ear" [sound memory] is an excellent source of sound if one has heard the sound before but of no use in writing something new because there has been no previous experience. To judge accurately a completely new sound, with which the composer has had no previous experience, the composer needs an external check. Bernal also suggested that the composer can get some excellent chance finds while improvising.

Frederick Jacobi (1949) composes at his desk every day from 9:00 until 1:00 without waiting for inspiration or mood. When beginning a composition, his first consideration is the tonality and the character of the piece. The theme comes from this initial conception. After this beginning, he works for a continuation of the initial idea along with digressions and contrasts. Jacobi sometimes works for days on a single phrase, rewriting it as many as 25 times before getting it right. He proceeds from one phrase to another. After finishing a phrase, he decides whether to continue in the same vein or do something contrasting. Jacobi believes that a "strong and ruthless faculty of self-criticism" is a most important attribute of a composer. Composing is a question of "choosing
at every step the right over the wrong, the better over the less good" (Jacobi, 1949).

Henry Cowell (1926) related that because of his "sound-mind" training, he is able to produce a flow of sounds at will; therefore, he can work at any time. He usually composes around a theme, trying it over mentally in every way. Because he devotes several months to mentally developing the idea to its final form, he rarely changes a note after it is written.

The great eighteenth-century composer W. A. Mozart had a vast musical memory, tremendous power of concentration, and a wealth of ideas. Many of his compositions were developed mentally and then committed to paper. Mozart, unlike Beethoven, left no sketch books, but he did leave some manuscripts which enable one to gain some insights into his working procedures. Hertzmann (1957) has divided Mozart's manuscripts into three classes: sketches, unfinished compositions or fragments, and final autographs.

The limited number of sketches can be divided into two types: hurriedly noted melodic lines for future use, and polyphonic passages. Hertzmann (1957) noted that canons did not come to Mozart easily and cited the canon E nel tuo, nel mio bicchiero from the finale to the second act of Cosi Fan Tutti as an example. Only after three tries did he arrive at the final solution.

Mozart left more than 100 fragments—unfinished compositions in varying degrees of completion. The fragments were often begun in full score, then after a few measures Mozart wrote only the main melodic line, which he distributed among the various instruments, and the
accompanying bass part. He might proceed in this way until he reached a place at which a polyphonic passage necessitated the scoring of other parts. The more mechanical job of filling-in the accompaniment seemed to constitute a secondary phase of his creative process and was postponed until later (Hertzmann, 1957).

In contrast with the sketches which Mozart often wrote in hardly legible script, the fragments are not tentative but are very neatly written, often with indications for dynamics and expression. All of the fragments have one common characteristic. They begin with the melody and bass line, and whether the other parts are fitted in or not, the fragments end with a trailing-off of these two parts. When polyphonic writing is used, Mozart fills in the parts, an indication that polyphonic passages are planned from the first and are part of the initial musical conception (Hertzmann, 1957).

From the available sketch material, fragments, and autographs, Hertzmann drew the following conclusions. Mozart's themes stand as they were originally conceived. In his primary stage of conception the melody and bass are established first. In the earlier works the accompanying parts were created with the melody, but in the later works (where the inner parts have importance of their own) they are written in a secondary stage of composition. Many of Mozart's compositions were worked out mentally, but for large works he made drafts consisting of melody and bass, leaving the orchestration and details until later. Since contrapuntal writing caused Mozart some difficulty, he frequently wrote these passages separately and then entered them in the score. When completed however, the polyphonic passages exhibit superb craftsmanship (Hertzmann, 1957).
John Cage (1959) described a method of composition, which is in direct contrast to previously discussed compositional procedures. The following procedure is essentially the one Cage used to compose Music for Piano 21–52. A sheet of paper was prepared of four scores each with two staves, one single center line, and ample room for ledger lines. Chance-operations were established to determine the number of sounds per page. A blank transparent paper had its imperfections marked with a pencil. The staves from the master page were transferred to the transparent page causing pitches, or hand noises, to be indicated by the staves and pencil marks. Coin tosses were made to determine which staves were to be bass and which treble. Chance-operations were used to determine whether notes were to be played on the piano normally, muted, or plucked, and whether a tone was to be natural, sharp, or flat. A playing time for the entire piece was given but the duration of the individual notes and sections within the total piece were to be determined by the performer. The dynamics were also left to the discretion of the performer.

Composers of mathematical and chance-determined compositions have developed new premises upon which to work. They have given up control of various musical elements in favor of control of the system. The basic idea is not a theme but the scheme for ordering, or not ordering, the sounds.

The creative years

Révész (1954, pp. 146–149) stated that characteristically creative talent in music asserts itself during the first half of youth, i.e. before
adolescence. A study of the lives of eminent composers reveals scarcely any whose ability emerged after adolescence. Révész noted the early development of Bach, Haydn, Mozart, Beethoven, Schumann, and Mendelssohn. All of these composers (with the possible exception of Beethoven) had written important works before they were twenty. He gives three possible reasons for the early development of composers. (1) Music is more independent of life experience and maturation of the personality than other arts. (2) Music has less to do with the functions of thought and speech than other arts. Music creates its forms and substance from its own material; therefore, the composer needs less knowledge of other subjects. (3) Music is rooted in an emotional world to which youth has access.

Lehman and Ingerham (1939, pp. 431-443) conducted a study to determine the peak creative years of composers. Their study showed that, as a group, composers' quality tends to peak earlier than quantity. Composers as a group tend to write their best known works during a relatively short span of years and before advanced age. During the years from ages 35 to 39, composers produced their best liked operas and orchestral music as well as the bulk of their cantatas and other sacred choral music. For deceased composers, no category of composition was listed for optimum quantity or quality after age 44. The works of contemporary American composers tend to be written later in life (ages 45 to 59, with 50 to 54 being the most prolific period). Quantity does not relate perfectly with quality, so there is no reason to assume that the best works of contemporary American composers are written this late in life. Since Lehman and Ingerham had some difficulty in deciding which compositions,
of contemporary composers, would be placed in the "superior" category. Farnsworth (1958, p. 212) suggested that perhaps their conclusions for this part of the study are less meaningful than those for deceased composers. Farnsworth (1958, p. 212) also pointed out that the peak creative years for composers corresponds to the period of life when neuromuscular coordinations are at their best. He suggested this may be more than coincidence since the phenomenon of maximum creativity and best motor coordination exists in many areas of endeavor. Perhaps the statements by Einstein (supra, pp. 21-2) and Golovin (supra, p. 22) in science, and Benham (supra, pp. 51-3) in music, that muscular and kinesthetic imagery play a role in the early stages of the creative process, helps to explain the relationship between creativity and motor-coordination.

Lehman and Ingerham also made no statement about the increase of life expectancy with its accompanying improved condition of health. It may be that too few 18th and 19th century composers lived long enough to provide a quality or quantity category of composition after age 44. The finding that contemporary American composers tend to compose later in life may only mean that they live longer and in better health. The finding that quality tends to peak earlier in life than quantity may be related to an erotic force which Graf (supra, pp. 58-9) emphasized as being important.

Sociological and economic factors affecting musical creativity

Pressey (1955) held that similar conditions existed in Europe 100 to 200 years ago for the nurturing of precocious musicians as exist in contemporary America for the development of superior athletes. In Europe
of that day, music was the major popular interest reaching to all ages and classes, providing early public acclaim. In present-day America, athletics is in a similar position. Assuming these favorable circumstances, the question remains: What are the similar conditions which have led to the development of these prodigies?

Both situations provided excellent early opportunities with encouragement from family and friends. European musicians and American athletes were provided with early and continuing guidance and instruction. They were also provided with opportunity to practice and develop their skills. The special ability, early apparent, brought a close association with others in the field. The precocious musician or athlete, as the result of many opportunities, had the increased challenge and stimulation of successful experiences. The precocious musicians of the 18th and 19th century in Europe played, not only with facility, but with understanding, developed by the early integration of musical concepts into their central nervous system. It is important to develop interests prior to adolescence so that adolescent energies may flow into an already well developed pursuit (Pressey, 1955).

Nash (1955) studied the personal and professional lives of 23 major living American composers. The data were collected by interview, from other informants, Rorschach Tests, written documents, and personal observation.

The composer has a social function "to produce music for performance to perceivers, i.e., an audience" (Nash, 1955, p. 118). Nash listed several personalities upon whom the composer was dependent for performance of his music: instrumentalists, other artists, conductors,
businessmen-managers, authors-critics, teachers-lectures, audiences. Performance is very important to the composer, the lack of which provides the composer with his outstanding musical complaint.

Nash held that the present American composers were educated in a time of "revolution against nineteenth century music." Therefore, the self-expressive sounds of the last century no longer formed an important part of their musical vocabulary. Value is placed on inventiveness which, in part, explains the enormous gulf which exists between the taste of the American composer and the audience. Since concerts, recordings, and the publication of music are organized mainly around the tastes of the audience, "the American composer becomes a relatively dispensable man" (Nash, 1955, p. 119). This renders the financial position of the composer tenuous at best.

The conductor, as one of the personalities in the music process, is limited in performing new music by the outside pressures on him and by his own musical taste. The performers' need for the composers' work is not great. The publishers, mass-media executives, and concert managers, though admittedly sometimes knowing the difference between good music and salable music, nevertheless always favor the latter. All of these factors establish the composers' dependency (Nash, 1955).

Nash (1955, p. 120) indicated that while the critic has influence on the career of the conductor and instrumentalist, he has only slight effect on increasing the understanding and acceptance of the composer's work. The critic may, however, contribute a valuable service as an influential intermediary between the composer and possible avenues of performance. The teacher is of indefinite, but probably insignificant,
aid to the composer. The only relationship, in the musical process, into which the composer enters which seems mutually rewarding is that with another artist--such as librettist or choreographer.

Nash (1955) reported that composers have adopted two methods to gain greater control of the musical processes. The first is the formation of cooperative associations to promote the performance of contemporary music. The second is role versatility: the assumption of other roles in the musical process, such as conductor or performer, in addition to being a composer. Role versatility increases the composer's control over the destiny of the work by increasing his income, prestige, control over performance, and interaction and communication with those in the other roles of the musical process.

Kraehenbuehl (1958) indicated that the music scholar has an important responsibility to the contemporary composer to reduce the "area of equivocation" between the composer and the listener. The scholar helps the composer to understand "the experience of his anticipated audience, the nature of the abstractions that that audience is likely to draw from experience, and the understanding that that audience has of the conventions of composition." The scholar also helps the listener "to understand as much as he can of these same stages of musical conception" (Kraehenbuehl, 1958, p. 4). It may be that Kraehenbuel has touched upon an area in which the critic, with his access to mass-media of communication, could also help the composer.

The composer must undergo a rigorous training after which only a fortunate few—or those with talent for writing "background" music—can get a job as a composer. So most composers must write in their
spare time. Even this is only one of the composer's problems because after writing a composition, he must copy the parts and more difficult "he must persuade someone to play it, a task which requires an almost superhuman combination of tact, skill and thick-skinned perseverance . . ." (Long, 1949, p. 6). In order to make progress, the composer needs to hear his work performed. The real composer, however, will go on writing, getting a few things performed and waiting until someone is willing to publish the score and parts (Long, 1949).

In addition to performance, interest in the composer's work is important. If there is no demand by the general public, the composer will seek his audience among the "intellectuals" and "progressives" and lose contact with the wider audience. He will be in danger of losing his sense of proportion and assume the minority represents the larger audience (Long, 1949).

Harris (1956, p. 13) believes that to be an American composer is a considerable handicap "because concert performances, publication, radio and recording are built on a profit formula to exploit European music and musicians. . . ." Harris has no answer for breaking into "the carefully guarded sanctum-sanctorum of this Big Time. . . . Each man is on his own."

The above presents the composer with a dilemma. Composers best learn by hearing adequate performances of their works. The time is very limited for performance of new music by first-class musicians, but if the composer only writes for amateurs he will never learn to compose for the professional and, therefore, never get established in the profession (Harris, 1956).
Although it might not help them get into the "Big Time," Powell (1949) suggested that composers might solve part of their performance problem if they would make an effort to meet the needs of publishers, such as writing easy teaching pieces. Penna (1962) encouraged more composers to write with youth in mind.

**The absence of women composers**

Women have excelled as authors, poets, painters, actresses, musical performers, and in other artistic endeavors, but there has never been a first-rank woman composer. There have been, however, first-rank women composition instructors.

Montagu (1958) and Maier (1954), though rejecting them, listed several theories which have been expounded to explain this lack of feminine creativity in music. Montagu (1958, p. 34) mentioned the notion: "Since woman is essentially emotional by nature, she does not experience the necessity of replicating her emotions. . . ." Maier (1954) listed some other ideas: (1) since women are the creators of life, they do not feel the male need for substitute creation; (2) mother-love, which is another great creation, perhaps satisfies her; (3) domestic duties preempt the time for musical creation; and (4) women are too peace-loving to be music creators.

Since both Montagu and Maier reject the above list, they presented theories of their own. Montagu, a social biologist, suggested a theory based on genetic principles. There is a well-known alignment of \(2-X\) chromosomes for females and \(XY\) chromosomes for males. The \(X\) chromosomes are complete, but the \(Y\) chromosomes are very small and virtually
empty. The female has a complimentary set of $X$ chromosomes which usually compensate for each other. The male has no complimentary set of $X$ chromosomes to compensate for a possible deficiency. From this genetic basis, Montagu suggested

\[ \text{. . . that the male is impelled--when possessed by the necessary genius--to utter in music what he is unable to express in himself; that it is, indeed, due to a lack in the male that he is caused to express himself in the only way he can, namely, through the creation of music as a substitute for the expression of those inner harmonies with which the female is naturally endowed (1958, p. 137).} \]

Montagu indicated that with all the possible arrangements of genes, a woman may appear with the necessary arrangement, but it is strongly improbable.

Maier (1954) formulated his position on a historical basis. Until the eighteenth century, all fields of artistic creation were closed to women. He believes that important women composers will come soon, citing women's contributions in the other arts and other phases of music.

Farnsworth (1960) conducted a study to determine the effect of sex role acceptance on musical achievement. He submitted a questionnaire to male and female college students asking them to mark musical activities according to appeal, interests, and attitudes of the two sexes. The results show that men believe creativity in the arts and the jazz area are more closely linked with their own interests than the interests of women. The men believed the more passive activities, viewing and listening and performance were more feminine. The women accepted this picture of their role in artistic endeavor. Women, generally, show an interest in what they regard as feminine. The men do not show this relationship
between interest and what they believe is feminine or masculine. Farnsworth concluded:

Women appear to be so impressed by the dismal picture history has so far given of their contributions to the arts that they picture creativity as an enduring characteristic of the masculine role. So long as they retain this picture of themselves it is likely that relatively few will be willing to put forth the effort essential to sustained creativity (1960, p. 349).

The Educational Setting for Musical Creativity

The education of the composer

There has been a constant disagreement among musicians as to the nature of a composer's education and even to the validity of studying composition. Ernst Toch (1954, p. 39) said that he "stopped teaching [composition] from despair. He who is destined to be a composer will be one in spite of what he is taught.... The only teacher to study composition with, if you have everything else, is life." Toch admitted that a composer needs theory but that composition is different. "You cannot learn to be creative."

Toch's article produced a number of replies from well known composers—most of whom took issue with Toch. In essence, they stated that the young composer needs guidance and an interchange of ideas with a more experienced composer. The young composer also needs a laboratory to provide outlets so that he can learn through experience ("Letters to the Editor," Musical Courier, 1954a, 1954b).

Krenek, Cowell, Piston, and Gershefski (Krenek et al, 1949) agreed that there is definitely a place for the composer on a college faculty as there can be advantages both to the composer and to the students.
Piston (Krenek et al., 1949) held that teaching is a good job for composers who are interested in teaching but a poor one for those who are not. The principal disadvantages are that teaching is mentally exhausting and time-consuming. The advantages are that the university atmosphere is congenial to a composer, the students and colleagues are stimulating, and the security of a permanent appointment alleviates some of the composer's financial worry.

Krenek (Krenek et al., 1949) acknowledged that genius cannot be produced by instruction but composers can teach young musicians that theory and technique are only means to an end. He stated: "In addition to imparting concrete knowledge of technical processes, the composer teaches his pupils attitudes, which in the final analysis may be more important" (Krenek et al., 1949, pp. 1-2).

Gerschefski (Krened et al., 1949) indicated that beginning composition on the college level is too late. To counteract this situation, he believed:

the composer is almost indispensable to the college campus. His most telling contribution to the musical life of his times could well prove to be the sharing with his students of his knowledge of the intricacies that lie between analytical theory, or imitative composition, and self-expression, so that they in turn as composers may go out and do likewise, in the next level down—the public schools (Krenek et al., 1949, p. 2).

Mainwaring (1951, p. 210) believed that in teaching, the student should be encouraged to capture on paper, without any critical modifications, the first musical idea "however vague or ill-formed it may be..." It is also important the student learn to distinguish between the undeveloped imaginative sketch" and the development stage of "applied
craftsmanship." Mainwaring offered some other practical suggestions for teaching composition. The student should be encouraged to improvise on an instrument, write imaginative ideas directly from thought, and make the first sketches simple. Classical dance forms are excellent for teaching balanced structure, rhythmic variety and simple modulations. Every completed work should contain all tempo, dynamic, and style marks, and, if possible, be performed, criticized, and rewritten.

Bush (1952) described his method of composition teaching as a progressive, historical study of styles (with emphasis on analysis and writing) from Gregorian Chant through Beethoven with particular stress on the English Renaissance, Bach, and the Viennese classicists culminating in Beethoven. Bush does not go beyond Beethoven believing that with this preparation the student can search the late nineteenth and twentieth centuries for himself.

Aurelio de la Vega (1962) described a design for training composers which places the emphasis, contrary to Bush, on twentieth century techniques. De la Vega believes that a return to traditional harmony, regardless of how expanded, is impossible. The Schoenberg and Webern influence is so established that it is now the central stream of compositional practice. Since this is so, we are cheating our students if we do not train them to understand, write, and perform in the Post World War II idiom. De la Vega advocates reducing the traditional harmony courses to one or two semesters, thereafter devoting considerably more time to developing skill in the use of contemporary concepts of composition.

Many composers (Cowell, 1954; Dalley-Sa Scarlett, 1952; Vaughan Williams, 1955) have emphasized the importance of a basic compositional
technique including a knowledge of harmony, strict counterpoint, and the various contemporary schools of thought. Dalley-Scarlett placed special emphasis on writing a great number of pieces. He believed that only after much practice is the composer able to judge the value of his compositions.

Piston (1949) pointed out that, for the composer, composition is not the final stage in a series of theory courses but a progressive development that begins from the very beginning of his musical education. "The composer's development follows principally these two lines: on the one hand his original creative efforts, answerable solely to his own individual taste; on the other hand his education in the art of music as it already exists" (1949, p. 6). Although the composer must understand the difference in these two streams of development, there is "intense and continual interaction between the two" (1949, p. 6). A student should seek criticism of his work, but he should weigh the criticism carefully and always seek to express his own musical personality.

Morris (1956) and Rubbra (1957) agreed with Piston that the young composer should know all the styles but seek to express his own integrity, sincerity, and conviction. He should find where his own roots lie and not subscribe to a school of composition that someone else has found right for him. The music of today's composer must express his own inner-development and not reflect the cults and fads of today.

Creative music in the public schools

Stein (1961) advocated a well-balanced curriculum as one of the mechanics necessary to preserve the music program in the public schools.
Creative activity is one phase of the curriculum which needs to be stressed to help achieve the necessary balance in the music education program (Norman, 1962).

In recognition of this need, in 1963 the Ford Foundation (in cooperation with the Music Educators National Conference) started a six-year program to emphasize the creative aspects of music. In addition to a continuation of the young composers project, activities will be designed "to make music a part of the regular growth of young children, and to encourage in them the regular creation of their own music" (Hume, 1963, p. 40).

Davies (1961, p. 245) believed "it is as natural for some children to make original music as it is for others to draw or paint, although this ability is rarely discovered." Writing music is a "creative and natural expressive activity" and does not necessarily mean the child will become a composer.

The purpose of creative music in the public schools, in addition to the identification of special creative ability, is the development of every child through creative activity. Every child, regardless of ability, can find a creative interest at his own level. Canfield (1961) believed that "in his search for creative outlets any child--whatever his gifts--looks further and further into himself and finds there powers of which he may have been unaware. In the process he becomes a better balanced and integrated personality" (1961, p. 51). Specialists must be careful to stimulate and guide creative effort rather than emphasize the creative product. In making an effort to realize his goal, a person learns how to apply himself even through those parts of the task which are less
appealing (Canfield, 1961). Also, by delving into creative music activities, a person will increase his own listening enjoyment (Dello Joio, 1961).

Tolces (1956) agreed with Canfield that every person is capable of creative expression in some form. The unleashing of creative expression can and should be taught. People have a desire to do genuine creative work, but they must be made to study the tools of expression and realize that creative work is not an emotional outburst. The creative act is, however, a unique expression of the individual; therefore, the medium of expression must be chosen with regard for the individual. The creative person lives and works alone in his creating, seeking his material from his own experiences.

The creative teacher teaches students to handle tools and techniques accurately, knowing that students cannot express anything using a medium which is alien to them. The teacher must allow the student to work at his own pace, preferably only working on one project at a time. The teacher must respect the student's need for solitude. He must also respect the student's integrity, give honest criticism when the student asks for it or when the project is complete—being careful not to interrupt the student's thought with premature evaluation. Allow time for the student to share his creative experience and product with classmates and family. The teacher knows that the student's work is not the best of its kind nor necessarily the student's best, but it is unique to the individual creator. He, therefore, gives encouragement and understanding when the student has moments of doubt and despair and helps establish the security and confidence that comes from success (Tolces, 1956).
Dorothea Doig (1941, 1942a, 1942b) conducted a series of explorations in creating music using children's Saturday morning music classes at the Cleveland Museum of Art. There were three separate projects: set melodies to a given text; compose a song, words and music, to a given subject; and write melodies to illustrate a given musical problem. The procedure was the same for all three projects. The children were arranged in seven groups according to age: 6 to 16 years. The melodies were written as a group. Children sang their proposed phrases which were then written on the blackboard and checked, the children indicating whether or not the notation was correct. The same procedure was used for the next phrase with the children voting to decide which musical phrase they liked best for each line of the poem. When they finished the melody, they discussed the piece as a whole, suggesting improvements. The teacher tried to stimulate interest and contributions from all class members.

This study (Doig, 1941; 1942a; 1942b) showed that children from 6 to 16 years of age are able to express themselves through composing music. The opportunity to compose music is definitely of interest to children. The younger children differed from the older children in some aspects of their work. Both the older and younger children showed a strong tendency for scalewise melodies, but the older children also used chordal movement and combinations of chordal and scalewise movement, while the younger children used scalewise movement almost exclusively. Both younger and older children showed a feeling for design and structure. The younger children showed a decided preference for F and C major while the older children used several keys. The younger groups showed no
hesitation to change meter in a melody while the older groups stayed with the same meter. The one interval that was objected to by all was the major seventh. There was some structural irregularity and less freedom when not using a text. In general, all groups tended to accept the familiar as right. The composing, however, was not entirely satisfactory to the children without an opportunity to sing their songs and the songs of the other groups.

Children from all groups developed a concept of tonality, melodic contour, rhythmic figures, and meter. This study indicates that there are developmental differences in understanding musical concepts with a possible corollary to the development of language concepts (Doig, 1941, 1942a, 1942b).

Rudolph (1962) presented a plan she has used for developing songs with elementary school children. This plan has some similarities with the procedure used by Doig in composing melodies to texts. The pupils wrote a poem on a specific topic from which the best was chosen. The selected poem was written on the blackboard under the staff, then the class read the poem many times to get the meter. The pupils sang a first line, and when the tune was agreed upon, it was notated with dots. Each line was written in this fashion after which the lines were rewritten for improvement. When the class was satisfied with the tune, the time signature was determined and accents were marked.

Another procedure is to have children write an appropriate motif for each character in a story. Motif writing has also been used as the basis for studying themes and motifs in the standard repertoire. As each class gained more experience, the melodies, motifs, and songs improved (Rudolph, 1962).
Creative Expression; the Development of Children in Art, Music, Literature and Dramatics, edited by Hartman and Shumaker (1939) contains a number of ideas and examples for creative work in music with elementary age children. Usually creative work is an outgrowth of regular class work rather than a separate project. In addition to writing songs, music can be written for plays, pageants, May festivals, and "little operas" (Davis, 1939; Dykema, 1939; Goodrich, 1939; Potter, 1939; Steele, 1939). Most of the writing is a class effort, but it is sometimes done by individuals or congenial small groups. Group work frequently stimulates individuals to try writing melodies on their own. The individual and small group efforts are often discussed and constructively criticized by the total class. As Doig indicated, an important phase of creative activity with elementary school age children is an opportunity to sing, or hear performances of their melodies (Goodrich, 1939; Newman, 1939).

There is a need for simple ways to tap creative musical expression in first and second grade children. The best approach offered in this book was to let young children improvise little songs about objects and events familiar to them. No effort was made to notate these little songs as they are part of the natural language of young children and the children only need the teacher to provide an opportunity (Davis, 1939). In working with children of all ages, the class atmosphere is very important. Timidity and self-consciousness must be overcome. In making suggestions for improvement, the teacher must always proceed from a knowledge of the student (Goodrich, 1939).

Opportunities for performance encourage young people to write
music. The Tallahassee, Florida, Junior Chorus (grades 4 through 6) sponsors a song writing contest among the Tallahassee school children, with the best songs receiving a performance by the chorus (Schnoor, 1961). The Polk County, Iowa, elementary schools also encourage student compositions. One elementary school had a workshop with a guest university instructor, while another used the student compositions in their student spring music program (Smith, 1960).

Junior and senior high school students also respond favorably to creative music activities. Mills (1963) described a volunteer composition class for a group of children, ages 11 through 14, who had only a classroom music background. They met twice a week, after school, for one hour. The sessions lasted six weeks and covered the basic materials and elements of composition. They studied and wrote examples of rhythm, melody, harmony, and counterpoint in various forms. Mills reports the class was successful because students were able to grasp the concepts of music compositional techniques and use them in creative work.

Bilchick (1951) described a far different procedure, with a composition class of students with good music backgrounds, at the New York City High School of Music and Art. The class began with a detailed study of "the Bach Suites" after which each student composed a piece in a dance form. Next the art song was studied, and each student composed a setting of a Wordsworth sonnet. The students next studied a Beethoven piano sonata, first movement, and then wrote an original first movement to a piano sonata in sonata-allegro form. The final composition was of the students' choice from a list of possible forms. Many of the pieces were orchestrated, and two informal recitals were held.
Regardless of the age or musical background of the student, creative writing can teach him about musical structure, contrast, repetition, and notation. It can help develop a feeling for intervals, an understanding of the relationship between poetry and music, and an appreciation of better music. Original writing helps to awaken and develop the creative spark in children, leading from timidity to unselfconscious expression. Original work demands attentiveness and concentration. The writer must listen to what he hears within, develop a faith in his own creativeness and his ability to use it (Davis, 1939; Potter, 1939; Seymour, 1939).

Summary

Harris (supra, pp. 44-6) stated that the composer's world consists of two parts—one subjective [emotion and insight], the other objective [intellect and technique]. Harris believes that the composer's tradition and culture influences his idioms and style. However, the composer of each new generation must formulate new idioms to express the new in his environment. Sessions (supra, p. 45) also emphasized the subjective part of the composer's life, while Krenek (supra, p. 45) emphasized the objective part, the training and skill necessary to handle music symbols. Simpson (supra, p. 46) added that the two parts must be in balance and the composer must have something vital to express. Harris was in agreement with Simpson when he maintained that through the composer flowed emotional experience which was then intensified and translated into serviceable idioms of culture. This statement by Harris is in agreement with Mooney's theory (supra, pp. 12-19) which emphasizes
that the creative person receives and orders experience, fitting it into expressive objects.

Several composers' (de Gastyne; Carpenter; Read; Milhaud; Copland; supra, pp.47-48) views of inspiration were cited. They expressed a wide range of opinion, from Carpenter "inspirations come from God," to Milhaud, "the source of inspiration is the fountain pen." Bernal and Hicks indicated that composition was a duality of inspiration and technique, which is not unlike the subjective-objective duality expressed by Harris, Sessions, and Krenek.

Révész (supra, pp.49-50) identified two basic theoretical positions concerning the source of inspiration—metaphysical and psychological. Proponents of the metaphysical position hold that the unconscious mind is a force which brings forth ideas in somewhat final form. They stress the belief that inspiration is sudden, miraculous, and without demonstrable preparation.

Proponents of the psychological position question the idea that it is necessary to assume forces outside the personality in order to understand inspiration. An experiment by Bahle (supra, p. 50) showed that creative work need not begin with inspiration, but that inspiration may be conditioned by prior circumstances such as experience, study, tradition, and experimentation. Bahle believed that inspiration is the result of the conscious will exerted sometime before the appearance of the idea. Golovin's (supra, pp.25-6) and May's (supra, p. 27) statements that creative discoveries are preceded by intense commitment and prior thought are in accord with the finding of Bahle.

Willman (supra, pp.50-51) reported a study in which he found
similarities between visual designs and themes which were subsequently written to these designs. He also found a similarity between themes written to the same design by different composers. Willman further reported that circumstances and conditions under which the composer worked, and his feelings, affected the initial theme.

Benham (supra, pp. 51-3) reported experiencing auditory and kinesthetic imagery, and a muscular feeling of rhythm while composing. This report corresponds with the statements by Einstein (supra, pp. 21-22) and Golovin (supra, p. 22) that muscular activity is important in creative thought. Benham also reported a similarity between a drawn curve and a melody written at a later time. He further reported that a mood set prior to the writing of a melody was expressed in the subsequent melody. Even though Benham did not clearly explain how these similarities between curves, mood, and melody were established, it appears that musical ideas can, to some extent, be influenced by activities conducted prior to composing.

The studies of Bahle, Willman, and Benham support each other and concur with the statements of Golovin and May. These studies show that inspiration can be conditioned by: (1) life (experience, study, tradition), (2) visual designs, (3) mood, (4) conscious effort and thought. Abraham (supra, p. 53) is in agreement with the above when he indicates (1) creative people can exercise some control over ideas from the unconscious, and (2) intense mental concentration is a prerequisite to the generation of first rate ideas.

Howes (supra, pp. 53-4) discussed the concept of unconscious gestation or cerebration, which is suspending action on a problem until
the subconscious has had time to work it out. Both Brahms (supra, p. 54) and Fauré (supra, pp. 54-5) reported using unconscious cerebration in their composing.

The idea of sudden inspiration can be explained by either the metaphysical or psychological position. If the research is valid which indicates that sudden inspiration is the result of unconscious mental activity that can be somewhat influenced by emotional, motor, and sensory set, then the metaphysical position is untenable. This research, therefore, lends support to the psychological position.

Whittaker (supra, p. 55) indicated that since music is made of sound, the musical idea will appear as an aural image. Whittaker's indication is not in complete agreement with Benham who noted a kinesthetic imagery and rhythmic muscular activity in addition to auditory imagery.

Composers (Hindemith, Koepke, Sessions; supra, p. 55) indicated that musical inspiration can be of two types: a motive or theme, and a vision of the whole. Beethoven, Dvorak, and Rubbra were cited as composers who worked from a motive or theme. Mozart and Schubert were cited as composers who conceived compositions as a vision of the whole.

Hindemith stressed the vision of the whole when he asserted that a composer should, from a flash of a single moment, conceive a composition in its entirety. The composer then selects his materials to fulfill what the totality demands. Hindemith admitted that composing to meet the demands of the total conception is very difficult. It separates the genius from the merely talented. Sessions would agree with Hindemith but added that young composers can grow in their ability to see the
conception of the whole.

Graf (supra, pp. 58-9) emphasized the erotic forces in music composition which he indicated gave drive and lustre to the tones, and enhanced the mood and emotion of the composition. In addition to erotic forces and spirituality and mentality which are the forming and shaping forces, Graf maintained that the erotic force must last throughout the composer's working lifetime.

Both Graf and Dorian (supra, pp. 59-60) stressed the importance of internal and external experiences in the development of the composer. Old and new experiences explain the inner growth of the composer which in turn affects the quality of his compositions. Inner growth continues throughout the composer's productive career. These statements coincide so directly with Mooney's theory (supra, pp. 12-19) that they might be considered as independent expressions of it.

Examples of sources of "long range inspiration," e.g. nature, travel, childhood memories, were given. Examples of acts composers committed to establish an atmosphere for creative work, e.g. walks, improvisations, drinking various beverages, were also given. If these experiences and ceremonies have any value they are individual and do not generalize.

Inspiration, with its concomitant psychological and physiological manifestations, was given as the first stage of the music composing process. Dorian (supra, p. 62) labeled the second stage of the composing process, elaboration. This is the stage of tonal construction--testing the materials against a view of the final goal. It is a blend of the creative impulse and constructive thinking.
Koepke (supra, pp. 62-63) called the second stage maturation. It is a quest for and development of expressive materials, and an establishment of continuity. Koepke indicated that the composer must constantly make a mental review of his work. He must experience repeatedly in his own imagination the continuity of his composition. Koepke appears to be elaborating upon Dorian's opinion that the composer test the materials against his view of the final goal. Koepke listed three aids to composition: tonal memory, subconscious, and technique.

Graf (supra, pp. 63-64) listed three functions of intellectual work in the second stage of composition. They are: (1) condensing and simplifying to conform to the demands of the musical structure, (2) expanding tonal ideas and forms, and (3) elaboration and intensification of every detail. Graf added that in reality these three functions are not separate but integrated.

Sessions (supra, p. 64) listed three principles of structure in the second stage: association, progression, and contrast. The principle of association demands that certain features of the composition recur. Progression is shown by movement towards a clearly envisaged goal and a steady intensification of effect until this goal is reached. The nature of contrast depends on the context and scope of the composition. Sessions said that the vision of the whole and the growth pattern of the composition are inseparable and finally identical.

The writers cited above (Dorian, Koepke, Graf, Sessions) attest to the importance of the vision of the whole and largely concur with, and elaborate upon, the views of Hindemith.

Grant (supra, p. 65) noted two further aspects that must be
dealt with in the elaboration stage. The material must always appear to be spontaneous, but it must not be obvious or predictable. The device which satisfies these aspects Grant called the "logical unexpected." He gave a list of these devices but warned that they were potent "in inverse ratio to their frequency." Krenek (supra, pp. 65-66) agreed with Grant when he asserted that the true artistic effect appears unexpected and necessary at the same time. Krenek cited an example of the logical unexpected in the first movement of Beethoven's Eroica Symphony.

The third stage of the musical creative process has been called creative synthesis. Dorian (supra, pp. 66-67) believes that the third stage is consummated when the composer puts all the parts together and combines the sections into the whole to form a completed work of art. Koepke (supra, p. 67) warned the composer to use his head as much as possible and write only when he feels a sense of urgency and compulsion.

Dorian indicated that a decision to place an idea can frequently only be solved in the synthetic stage of creation. He believes that the concept of the whole gives direction to the work but that revisions are frequently necessary. He cited Beethoven, Schumann, and Chopin as composers who made extensive revisions of their work.

Walker (supra, p. 69) added that there are frequently items of importance in a composition of which the composer is unaware. These are usually items of unity and relationship which are brought together by "unconscious motivation." If this is so, it would be to the composer's advantage to saturate himself with his material so as to let unconscious cerebration aid the "unconscious motivation."
The vision or concept of the whole, which is a recurring theme throughout the literature on the creative process in music, may be the same thing that Van Gogh and Levi were talking about when they indicated they tried to make their pictorial realization match their mental and emotional image. Composers appear to be doing a similar thing. They try to produce a composition that matches their concept of the whole—their mental and emotional image. Levi, van Gogh, Cocteau, and Hindemith stressed the arduousness of the process.

The reported working habits of Tchaikowsky, Britten, and Stravinsky (supra, p. 70) indicate that whether a composer initiates a composition or it is initiated by an external circumstance (commission, friend, publisher) is not a reliable indicator of the worth of the composition. Haydn and Bach, for example, wrote some of their finest compositions because of the demands of their employment. The opinions cited indicate that the worth of a composition depends on the professional competence and interest of the composer.

Perhaps some of the principal attributes of the successful composer are a quality of persistence at detailed work and sustained effort. Gross and Seashore (supra, p. 71) found that work methods were one of the principal distinguishing characteristics between professional composers, superior student composers, and inferior student composers. The professional and superior student composer used theoretical planning, abstract principles, conceived of musical units within the whole, and checked their work on their instrument. The inferior students depended almost entirely on "inspiration" for their ideas.
The working procedures of Rossel, Stravinski, Imbrie, Bernal, Jacobi, and Cowell (supra, pp. 71-75) were given. The chance music composing procedures of Cage were also cited. Hertzmann (supra, pp. 75-6) after an examination of fragments of compositions left by Mozart, drew the following conclusions about his procedures: (1) themes almost always stood as they were originally conceived, (2) many compositions were developed mentally and then committed to paper, (3) contrapuntal writing did not come easy for Mozart, and (4) long compositions were often started in full score and then trailed off to the melody and bass lines. Writing accompaniments seemed to be a secondary process.

Upon comparing the working procedures of composers and the general working procedures of creative persons cited in Chapter II (supra, pp. 37-38) the following characteristics seem to be common: (1) self-discipline—knowing when to be disciplined, (2) exploring the possibilities of musical material, sensing and following its lead—playing with ideas, sensing the forces of the field, (3) working individually, not in groups, and (4) working procedures adaptably routined—a time clock is meaningless to a creative person.

Révész (supra, pp. 77-78) maintained that creative talent in music asserts itself early. He offered three possible reasons: (1) music is more independent of life experiences than are the other arts, (2) composers need less knowledge of other subjects than other creative persons, and (3) music is rooted in an emotional world to which youth has access. The first of these reasons appears to be in disagreement with Graf and Dorian who each stressed the importance of external and internal experiences which affect the growth of the composer, which in turn affect
the quality of his compositions. Many of the statements of writers cited throughout this dissertation support the belief in the importance of life experiences for the composer.

Lehman and Ingerham (supra, pp. 78-79) made a study of the creative years of composers. They found: (1) that quality tends to peak earlier than quantity, (2) that for deceased composers, no category of composition was listed for optimum quantity or quality after age 44, and (3) contemporary American composers tend to write late in life. Farnsworth questioned the data concerning superior contemporary compositions. He also noted that the peak creative years corresponded to the age of best neuromuscular coordination and suggested that this may be more than a coincidence since the relationship of maximum creativity with best motor coordination exists in many fields.

Pressey (supra, pp. 79-80) indicated that similar favorable conditions existed in Europe 100 to 200 years ago for nurturing precocious musicians as exists in America now for developing athletes. Nash (supra, pp. 80-82) found that the composer is dependent on others for the all-important performance of his work. The stress on inventiveness helps widen the gulf between composer and audience, which lessens the demand for the composer's work, making his financial position tenuous at best. The critic and teacher are little help in furthering the composer's career. The composer has adopted two methods to gain greater control of performance; associations and role versatility.

Kraehenbuehl (supra, p. 82) indicated that the scholar can help the composer and the audience. Harris (supra, p. 83) believed that the concert situation is geared to the dead European composers rather
than the living American. Powell and Penna encouraged the composer to write easy teaching pieces with youth in mind which would also meet the needs of publishers.

Three views concerning the absence of women composers were presented (supra, pp. 84-86). Montagu suggested that the male has a biological deficiency which the female does not have, therefore he feels a need to express himself in music composition if he can. Maier noted that only recently in history have women been allowed to create artistically. He, therefore, believes that an important woman composer will come soon. Farnsworth found that both men and women believe that creativity in music is a masculine activity whereas performing and listening are more feminine. Farnsworth concluded that as long as women believe this few will be willing to put forth the effort necessary for sustained creativity.

Toch (supra, p. 86) stated that one cannot teach composition. Many composers replied to Toch and in the main disagreed with him. Krenek, Cowell, Piston, and Gershefski (supra, pp. 86-87) cited the advantages and disadvantages of college teaching as a career for the composer, but concluded that teaching was only a good job for those who were interested in teaching. Composers are valuable to the college because they impart a creative attitude rather than just teach theory.

Mainwaring (supra, pp. 87-88) listed many practical suggestions for teaching composition. Bush (supra, p. 88) indicated that he taught composition through studying musical style up through Beethoven. This contrasted with de la Vega (supra, p. 88) who urged more emphasis on contemporary styles. Cowell, Dalley-Scarlett, and
Vaughn Williams (supra, pp. 88-89) stressed the need for a basic compositional technique. Morris and Rubbra (supra, p. 89) agreed that a composer should know all styles but emphasized that he should always seek to express his own musical personality. Piston (supra, p. 89) urged that composition not be considered as a culmination of theory courses but be developed progressively throughout the composer's training.

Norman (supra, p. 90) cited creative activity as one phase of the elementary and secondary school music program which needs to be stressed. Davies, Canfield, and Tolces (supra, pp. 90-91) held that every person is capable of creative activity and that for some, creative work in music is the most natural creative activity. Canfield said that creative activity helps the child become a better balanced and integrated personality, and that the teacher should emphasize the process rather than the product. Tolces added that the unleashing of creative activity can and should be taught. This is in contrast to Toch who quit teaching composition because he believed one couldn't teach a person to be creative. Tolces also stated that people desire to do creative work but that they must learn the tools of their media of expression under the guidance of a creative teacher. Mooney would agree with Tolces as evidenced by his belief that the principal role of the artist today is to communicate creativity so as to help others in their creating.

Doig (supra, pp. 92-93) conducted some explorations with children in creating music. In addition to giving some classroom procedures for writing music, she concluded that children can express themselves through composing music and that this work helped children develop a concept of tonality, melodic contour, rhythm, and meter.
Rudolph, Davis, Dykema, Goodrich, Potter, and Steele (supra, pp. 93-94) suggested procedures and gave examples of creative music activities with elementary school children. Community projects for providing opportunities for creative work were cited. Mills (supra, p. 95) described creative work with a junior high school volunteer class, and Bilchick (supra, p. 95) described creative work with a class of musically sophisticated senior high school students.

Most of the anecdotal statements and experimental data reviewed in this chapter may be interpreted as supporting Mooney's theoretical framework. No part of this literature is seriously at variance with Mooney's position. Furthermore, there is close agreement between the statements concerning the creative process in music and the procedures of composers with statements and procedures of those in the sciences and the other arts. It may then be said that the qualities and procedures of creative persons seem to be relatively independent of the field in which this creativity is expressed. The experimental literature reviewed in Chapter IV will similarly be found to fit Mooney's theoretical framework and to support the concept that basic creative processes and the qualities of creative persons generalize across occupational lines.
CHAPTER IV

EXPERIMENTAL LITERATURE CONCERNING CREATIVITY

Chapter II presented a theoretical framework for understanding creativity, along with experimental and anecdotal literature from the sciences, visual arts, and literature. Chapter III presented an extensive examination of literature from the field of music in order to provide an approach to an understanding of musical creativity. Chapter IV contains an examination of experimental literature concerned with creativity in order to provide a basis for comparison and contrast with the biographical, anecdotal, and speculative literature cited previously, and with the experimental investigation conducted as part of this dissertation.

Factors of creativity

For several years, J. P. Guilford (1962; 1957c; Guilford and Merrifield, 1960) and his colleagues have been conducting investigations in the area of intellectual aptitudes. They have developed a "theoretical model for the complete Structure of Intellect" (figure 1) as a means of expressing intellectual aptitudes (factors) which they have discovered or verified, and as a method of hypothesizing further intellectual factors. Investigations are directed toward "testing whether unknown unique abilities that are predicted by the model do, in fact, exist as distinguishable unities" (Guilford and Merrifield, 1960, p. 2). The model
Figure 1

Theoretical model for the complete "Structure of Intellect"
(Guilford and Merrifield, 1960, p. 4)
has also generated theories of learning and thinking. Guilford does not consider the model or the placement of factors permanently fixed.

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operation</strong></td>
<td><strong>Content</strong></td>
</tr>
<tr>
<td>Divergent Thinking</td>
<td>Semantic + Relations</td>
</tr>
<tr>
<td></td>
<td>Divergent Thinking + Units</td>
</tr>
<tr>
<td></td>
<td>Divergent Thinking + Classes</td>
</tr>
<tr>
<td></td>
<td>Divergent Thinking + Transf -</td>
</tr>
<tr>
<td></td>
<td>ormation</td>
</tr>
<tr>
<td></td>
<td>Divergent Thinking + Implica -</td>
</tr>
<tr>
<td></td>
<td>tions</td>
</tr>
</tbody>
</table>

The factor called **associational fluency** is regarded as the ability to produce a variety of meaningful correlates. Correlates are units of information that complete a relationship when a type of relationship is specified and another unit of information is given. One test of **associational fluency** requires the production of synonyms for given words. The more synonyms produced, the higher the score.

**Ideational fluency** is interpreted as the ability to produce many meaningful ideas. One measure of **ideational fluency** requires the listing of titles for stories. The more titles produced, the higher the score.

**Spontaneous flexibility** is interpreted as the divergent production of classes. Tests of **spontaneous flexibility** provide an opportunity for the examinee to be flexible even when flexibility is not required to do the test. One test of **spontaneous flexibility** requires the listing of uses for a brick. The more times the examinee changes categories of use, the higher the score.

The factor labeled **originality** is recognized as the ability to
produce a variety of meaningful reinterpretations or transformation. One test of originality asks for the listing of consequences to unexpected happenings. A high score is based on the number of remote consequences listed.

The factor of elaboration is the ability to produce details or implications that contribute to the development of an idea or the variation of an idea. In one test of elaboration, the examinee is told to give the details necessary to put a briefly outlined plan of action into operation. The greater the number of details, the higher the score.

Two creativity factors result from the conjunction of the divergent production and symbolic content categories with two different categories from the third parameter.

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation</td>
<td>Content</td>
</tr>
<tr>
<td>Divergent Thinking + Symbolic + Units</td>
<td>= Word Fluency</td>
</tr>
<tr>
<td>Divergent Thinking + Symbolic + Systems</td>
<td>= Expressional Fluency</td>
</tr>
</tbody>
</table>

Word fluency is the ability to rapidly list symbolic units (words) that have some specified spelling requirement. One test asks for the listing of words beginning with a specified prefix. The more words listed, the higher the score.

The factor of expressional fluency can be interpreted as the ability to produce divergent symbolic systems. One test of expressional fluency requires the writing of four-word sentences when the first letter of each word is given. A high score is determined by the number of sentences completed.
One creativity factor, adaptive flexibility, results from the conjunction of the divergent thinking, figural, and transformations categories. This factor is regarded as the ability to produce divergent transformations (that is, make changes in existing or known information, or in its use) to meet new structural requirements. One test of adaptive flexibility tells the examinee to take away a given number of matches and leave a specified number of squares. To solve the problem, the examinee must not assume limitations that are not stated (such as the squares must be the same size or that one square cannot be inside another). The high score is based on the number of problems successfully completed.

Not all creativity factors are in the divergent thinking category. Three redefinition factors result from the conjunction of the convergent thinking and transformations categories with three different categories from the content parameter. The redefinition factors require "transformations of thought, reinterpretation, and freedom from functional fixedness in the derivation of unique solutions" (Guilford and Merrifield, 1960, p. 11).

<table>
<thead>
<tr>
<th>Categories</th>
<th>Operation</th>
<th>Content</th>
<th>Product</th>
<th>FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Convergent Thinking</td>
<td>Semantic</td>
<td>Transformations</td>
<td>Semantic Re-definition</td>
</tr>
<tr>
<td></td>
<td>Convergent Thinking</td>
<td>Symbolic</td>
<td>Transformations</td>
<td>Symbolic Re-definition</td>
</tr>
<tr>
<td></td>
<td>Convergent Thinking</td>
<td>Figural</td>
<td>Transformations</td>
<td>Figural Re-definition</td>
</tr>
</tbody>
</table>

The factor labeled semantic redefinitions calls for the ability to change the meaning of an object or part of an object in order to adapt it to a different use. One test of semantic redefinition requires the examinee
to name an object that could be made by combining two specified objects. Scoring is based on the number of objects named.

Symbolic redefinition requires the ability to reorganize and assign a new use to symbolic materials (letters or words). One test of this factor asks the examinee to find the names of sports or games concealed in a sentence. Scoring is based on the number of names found.

The factor of figural redefinition is demonstrated by the reorganizing of figural material (pictures or geometric designs) and assigning a new use to the material. One measure of figural redefinition requires the location of hidden faces in a picture. Scoring is based on the number of faces discovered.

Guilford has identified one other factor directly related to creativity: sensitivity to problems. This factor results from the conjunction of the evaluation, semantic, and implications categories and is interpreted as being sensitive to errors or shortcomings. One test for sensitivity to problems requires the examinee to list improvements for a common appliance. Scoring is based on the number of acceptable improvements (Guilford and Merrifield, 1960; Guilford, 1962).

The tests developed by Guilford to measure his creativity factors have been used by other investigators in a variety of research projects. A United States Air Force research team (Mullins, 1959) administered Guilford's Creativity Battery to selected research scientists. Scores on the test were correlated with the two criteria of creativity: supervisor's ratings and number of publications. Scores for four tests were significantly related (.05 level) to the rating criterion. None of the predictor test scores correlated significantly with both criteria. The shrunken multiple
correlations between the predictor scores with the rating criteria ($R = .39$) and publications criteria ($R = .30$) were moderate, but high enough to be of use in certain prediction situations.

For over seven years, Lowenfeld (1958) and others at Pennsylvania State University conducted investigations trying to find criteria which would help them distinguish creative from less-creative people in the fine arts. Although the studies of Lowenfeld and Guilford were independent, they arrived at essentially the same criteria of creativity. Lowenfeld listed eight criteria which distinguish creative from less or non-creative subjects: (1) sensitivity to problems, (2) fluency of ideas, (3) flexibility, (4) originality, (5) redefinition and the ability to rearrange, (6) analysis or the ability to abstract, (7) synthesis and closure, and (8) coherence of organization.

Lowenfeld correlated scores on an art test of creativity with tests from Guilford's Creativity Battery and found high significant correlations between the attributes of creativity tested in the two investigations. This study established several common criteria of creativeness between the fine arts and sciences.

**Creativity and intelligence**

There have been several studies to determine the relationship of intelligence, as measured by various intelligence tests, with creative achievement or creative ability.

Gross and Seashore (1941) selected, by instructors' judgment, the ten best and ten poorest composers from a group of 300 student composers. They also selected ten well known professional composers. This
resulted in three groups: superior student composers \( N=10 \), inferior student composers \( N=10 \), and professional composers \( N=10 \). Gross and Seashore found significant differences between the three groups on scores on the Seashore-Eckerson recognition test of general English vocabulary which they used as an indicator of intelligence. The professional composers scored in the 9th decile, the superior student composers in the 8th decile, and the inferior student composers in the 2nd decile.

The Evanston (Illinois) Community Consolidated Public Schools conducted a five-year longitudinal study of 170 children with I.Q's of 120 or more as measured on the Wechsler Intelligence Scale for Children. The purpose of the study was to investigate methods of curriculum enrichment for bright students. Part of the study involved attempts to measure performance in creative activities in an effort "to determine whether there was a close relationship between intelligence and creativity" (Miller, 1962, p. 488).

In the 5th grade, 493 children, of whom 118 were in the select group (called the Superior Child Enterprise, SCE), viewed a film and were asked to write an original story about the film. The stories were judged and ranked by a committee from the school staff. The following mean scores show a comparison of the mean I.Q's of the children, as measured by the Kuhlmann-Anderson Test, and their rating on the writing test.

<table>
<thead>
<tr>
<th>Category</th>
<th>Total Group</th>
<th>SCE</th>
<th>Non-SCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean I.Q.</td>
<td>Mean I.Q.</td>
<td>Mean I.Q.</td>
</tr>
<tr>
<td>Excellent</td>
<td>127</td>
<td>130</td>
<td>118</td>
</tr>
<tr>
<td>Good</td>
<td>117</td>
<td>126</td>
<td>113</td>
</tr>
<tr>
<td>Average</td>
<td>110</td>
<td>122</td>
<td>107</td>
</tr>
<tr>
<td>Poor</td>
<td>101</td>
<td>117</td>
<td>100</td>
</tr>
</tbody>
</table>
Miller stated:

It will be seen that there is a consistent trend for the children with the highest intelligence to score among the highest in the writing test and for those of lowest intelligence to score lowest on the test. These results seem to show that a positive relationship exists between level of intelligence and creativity in writing as measured by this test (Miller, 1962, p. 489).

The Kahn Test of Symbol Arrangement, called a measure of imagination and flexibility of thinking, was administered individually to pupils in the 5th-grade. The top 25 per cent of the SCE group scored very high on this test. "The SCE children are among the top 20 per cent of their grade in intelligence, and their performance on this test shows some relationship between intelligence and symbolic thinking" (Miller, 1962, p. 490).

Eight-hundred 5th grade children were rated on various attributes of dramatic performance. Miller stated:

The relationship between talent and intelligence was a highly individual matter, with some children of high intelligence rated low and vice versa. . . . Forty-two per cent of the SCE group were rated as Good or Excellent as compared to 23 per cent of the non-SCE. Only 8 per cent of the SCE were rated below average. The indications point toward some correlation between intelligence and creativity in drama (Miller, 1962, p. 492).

Sixth grade teachers selected five students from each class who, in their judgment, showed special ability in music. Forty-three per cent of the 119 musical children were SCE members, although they represent only 21 per cent of the total class population. Also, of the 77 sixth grade children selected to participate in the All-City Orchestra, 33 were SCE members. Miller believed: "These results would seem to indicate that the more intelligent child is also more likely to be musical" (Miller, 1962, p. 492).
The Getzels-Jackson Word Association and Uses for Things tests were administered to all children in the 7th grade. The following data show the number of students, per cent of group (SCE or Non-SCE), and mean I.Q. of those scoring in the top 20 per cent of the class in both Getzels-Jackson Tests.

<table>
<thead>
<tr>
<th>No. of Students</th>
<th>Per Cent</th>
<th>Mean I.Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCE</td>
<td>40</td>
<td>.76</td>
</tr>
<tr>
<td>Non-SCE</td>
<td>33</td>
<td>.05</td>
</tr>
</tbody>
</table>

Twenty-six per cent of the SCE group rated in the top 20 per cent of the class in both tests. They had a Mean I.Q. (all I.Q. scores reported above are from Otis Tests) of 134.95. Only 5 per cent of the Non-SCE group rated high in both tests. They had a Mean I.Q. of 120. Other evidence indicates that 71 per cent of the Non-SCE group were not in the top 20 per cent of the class in either test. Their Mean I.Q. was 103.95.

Miller stated:

It would appear from the data that an average I.Q. makes it highly unlikely that a child would receive a high score on these tests, while an I.Q. in the superior range (120 up) makes a high score much more likely. Creativity is more frequent among the intellectually bright than among those of lower mental ability, although a high I.Q. is not a guarantee of a high score (1962, p. 493).

The following data give Pearson product moment coefficients of correlation (r) between scores on the two Getzels-Jackson tests and scores on the Wechsler Intelligence Scale for Children (WISC), and the Sequential Test of Educational Progress, achievement (STEP achievement).
Miller stated:

It will be seen that the Word Association Test is more closely associated with I.Q. than uses for things and is also more closely associated with achievement. Although the correlations are low, they do demonstrate that intelligence has some relationship to performance on both tests (1962, p. 494).

According to Miller, the following data show the Phi coefficient of correlation which was calculated to determine the intercorrelations of the various tests. Their data includes only 93 of the 170 SCE pupils as only this number took all of the tests. The percentage, next to the correlation coefficients, represents SCE students scoring high in both tests.

<table>
<thead>
<tr>
<th>Getzels-Jackson</th>
<th>Writing</th>
<th>Music</th>
<th>Drama</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing</td>
<td>.09 - 6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music</td>
<td>.12 - 9%</td>
<td>.10 - 5%</td>
<td></td>
</tr>
<tr>
<td>Drama</td>
<td>.11 - 7%</td>
<td>.21 - 7%</td>
<td>.08 - 4%</td>
</tr>
<tr>
<td>Kahn</td>
<td>.06 - 6%</td>
<td>.02 - 6%</td>
<td>.07 - 8%</td>
</tr>
</tbody>
</table>

The only significant coefficient was .21 between Writing and Drama. Sixty-nine per cent of the SCE pupils rated highly creative in one or more of the tests. No pupil rated highly creative in all five tests.

From these data, Miller drew the following conclusion:

There is some correlation between intelligence and giftedness in all areas examined, but not all bright children have talent, and results do not preclude the presence of such talent in youngsters of less intellectual ability. On the other hand, some bright children have talent in several lines of endeavor. Creativity is not necessarily associated with the highest intelligence. . .(1962, p. 495).
This study by Miller is concerned with an important area of investigation, but because of the design, the results are difficult to evaluate. There is a need for someone to conduct a similar study and employ a consistent statistical design, using correlations and tests of group difference with stated significance levels instead of percentages, so one could determine where relationships and differences are real. Also, in regard to creativity in music, there is now evidence (infra, pp. 173-179) to support the idea that the best place to find creative persons is to look at their composing and not necessarily their performing.

Getzels and Jackson (1958; 1962) reported a study of 28 highly intelligent and 26 highly creative adolescents. For their purposes, high I.Q. students were defined as those who scored in the top 20 per cent, out of approximately 500 adolescents on a conventional I.Q. test, but not in the highest 20 per cent on the creativity test. Similarly, the high creative students were defined as those who scored in the top 20 per cent on the creativity test but not in the highest 20 per cent on the intelligence test. There were students who scored high in both creativity and intelligence, but they were not included in the study. The two groups, one of highly intelligent students and one of highly creative students were, therefore, mutually exclusive. The two groups were occasionally compared to the total school population from which they were drawn. This total group included all of the school population except the two experimental groups.

There was a difference of 23 points between the I.Q. scores of the two experimental groups. The mean I.Q. of the high creative group was 127, and the mean I.Q. of the high I.Q. group was 150. The correlations between the creativity scores and the I.Q. score, based on the
scores of the total school population including the experimental groups (N=c. 500), were low. The correlations (r) ranged from a low of .115 to a high of .393.

On two measures of scholastic achievement, verbal achievement, and numerical achievement, the highly creative group and the high I.Q. group could not be differentiated. They were significantly and equally superior to the total school population.

The teachers of these students were asked to rate students on how well they liked each student (enjoyed having the student in class). The results indicate the teachers exhibited a clear preference for the high I.Q. student.

The total school population, experimental groups included, were given the Outstanding Traits Test. This test presents thirteen hypothetical children with an outstanding trait such as highest I.Q., best athlete, and highest sense of humor. The students were asked to rank the traits three ways: (1) the degree they would like to have the trait, termed "self-idea"; (2) the degree to which the child with each trait would succeed in adult life, called "success image"; and (3) the degree they thought teachers would like the child with each trait, labeled "teacher perception."

The total school population, almost without exception, ranked social skills first (as the quality in which they would like to be outstanding) and good looks, high energy level, athletics, and health last. In view of this very high agreement, these traits were omitted, and the remaining eight traits were reranked. The report is based on the reranked data.
The two groups, high creative and high I.Q. students, agreed on what qualities make for adult success (r = 1.00) and what qualities teachers want (r = .98). The groups differed on a correlation of traits preferred for oneself and personal traits believed predictive of adult success (high I.Q. r = .81, high creative r = .10). This data indicates that both groups know what makes for success in adult life, and the high I.Q. students say they want these same traits for themselves. But the high creative students do not use this remote goal as a criterion in the selection of their present aspirations.

The groups differed on a correlation of traits preferred for one's self and personal traits believed favored by teachers (high I.Q. r = .67; high creative r = -.25). The high I.Q. child tends to hold to a self ideal which is consonant with the one he believes teachers will most readily approve. The self ideal of the creative child is not consonant with what he believes to be the teacher-approved model, but rather shows a slight negative relationship.

On the traits reranked for "self-ideal," the high creative students think more highly of emotional stability, a sense of humor, and a wide range of interests than does the high I.Q. group. The high I.Q. group thinks more highly of good marks, I.Q., pep and energy, character, and purposefulness than does the high creative group. On the reranked traits, the high creatives ranked a sense of humor second, just below emotional stability. The high I.Q. group ranked a sense of humor eighth of the eight reranked traits. The high value which the creative adolescent places on a sense of humor, and the low value which the high I.Q. child places on this trait, make a sense of humor the outstanding difference
between the two groups. Indeed, the high value placed on a sense of humor sets the high creatives apart most sharply from all other groups studied.

There are other characteristics which distinguish the high creative from the high I.Q. student. In a measure of verbal fantasy (stories written to various pictures), the creatives emerged as more stimulus free. They would alter the meaning of the picture to allow them to tell the story they wanted to tell. The high I.Q's are more stimulus bound (for example, if the picture concerns airplanes, they tell a story about air travel). The content of the high creatives' stories contain more elements of wit and violence, are more expressive of impulses that are normally inhibited, more playful, and display a more experimental attitude toward conventional objects.

In a measure of non-verbal fantasy (drawing a picture to the topic playing tag in the school yard), the high creatives again demonstrate that they are more stimulus free. They tend to structure the task in their own terms whereas the high I.Q. students use things in conventional terms. The pictures of the high creatives are more fanciful and humorous and portray more aggression and violence and express more personal meaning.

In response to questions about career choices, the highly creative adolescents' choices tend to be in the less conventional areas and show a greater variety in the group. Several creative children were trying to decide between wide disparate fields. The high I.Q. adolescents tend to choose the more conventional professional careers, and there is less variety within the group.
E. P. Torrance (1962) reported research in which he conducted eight partial replications of the Getzels and Jackson study. Five of the replications were conducted in elementary schools, one in a high school, and two in graduate school situations (a University of Minnesota summer guidance institute and a summer graduate class in Educational Psychology). As in the Getzels and Jackson study, Torrance selected as a high creative group those students who scored in the top 20 per cent on a measure of creativity but not in the top 20 per cent on a measure of intelligence. The high I.Q. group were those who scored in the top 20 per cent on a measure of intelligence or scholastic aptitude but not in the highest 20 per cent on a measure of creativity. Those persons scoring in the highest 20 per cent on both the creativity and intelligence tests were eliminated, thus forming two mutually exclusive groups. Intelligence was measured by the test used in that particular elementary or high school. The Miller Analogies Test, Form G, a measure of scholastic aptitude at the graduate level, was used in the two graduate school situations in lieu of an intelligence test. This test is used by many universities in the selection of graduate students and scores were available at The University of Minnesota for these graduate students. Creativity was measured by the Minnesota tests of creative thinking. Some of these tests are adaptations of the Guilford tests suitable for use in the early grades. Most of the others were developed at the University of Minnesota. In 1958 the battery of creative thinking tests included: Uses of Tin Cans, Impossibilities, Consequences, Situations, Problems, and Improvements. The 1959 battery consisted of the following: Product Improvement (toydog), Unusual Uses
In all eight studies there was a significant difference between the high I.Q. and high creative groups on the mean scores of the intelligence or scholastic aptitude tests. In six of the eight situations studied, about 70 per cent of the most creative students would have been eliminated if a "gifted" group had been selected on the sole basis of measures of intelligence. When the measures of I.Q. and creative thinking were correlated, there was a virtual lack of relationship. In four of the eight studies there were no significant correlations. In the other four studied, the correlations were small, the highest being .32.

In six of the eight situations, there was no significant difference between the high creative and high I.Q. groups on measures of scholastic achievement. The findings of Getzels and Jackson were substantiated in the high school group, both college groups, and in three of the five elementary school groups. Torrance concluded that although highly creative individuals tend to learn as much in school as highly intelligent individuals, it is not true in all schools. He offered some possible reasons. Schools differ in their orientation towards learning. Torrance observed that in the two schools where the Getzels-Jackson phenomena was not substantiated, the emphasis was on traditional kinds of learning. Far more signs of creative activity were observed in some of the other schools. Torrance conjectured that possibly creative students learn better in schools where they can learn in a creative way as opposed to schools where they are taught authoritatively and where the emphasis is placed on memory and conformity to behavioral norms.
Another possible explanation concerns the minimum level I.Q. a person must have before high creative ability makes it possible for him to score as high on achievement tests as the person with a high I.Q. Anderson (1960) stated that we can think of ability level in terms of thresholds and ask questions as to the amount necessary to carry on a task and then consider the factors that determine function beyond this threshold. There are cut-off points or levels above which the demonstration of ability in relation to environmental demands is determined by the presence of other factors (1960; Yamamoto, 1961, pp. 1-2).

In the two cases, in the Torrance study, where the high I.Q. pupils scored higher on achievement tests than the high creatives, the mean I.Q.'s of the creatives were the two lowest I.Q. scores of all groups studied. It may, therefore, be that in reference to educational achievement, there is an I.Q. level below which creative students will not do as well as students with a high I.Q. but at which level a high I.Q. makes no difference and the creative thinking abilities become important. Torrance proposed a cut-off point of approximately 120 for I.Q. scores. He indicated that children with an I.Q. of 120, or slightly under, generally achieve quite well. Most of these children, however, would not be considered for gifted child programs where the cutting scores usually begin around 135 (Torrance, 1962, Chapter III).

Torrance suggested another reason why some, but not all, highly creative students score high on school achievement tests. Different kinds of achievements need different kinds of measures. On tasks requiring creative applications of knowledge—decision-making and self-initiated learning—highly creative students do as well and tend to do better than their highly intelligent classmates. The highly intelligent
students, however, tend to perform better on the traditional types of examinations (multiple-choice and completion) requiring primarily recognition and memory (Torrance, 1962, Chapter III).

A study (Yamamoto, 1961) was conducted to investigate the "threshold of intelligence" theory (Anderson, 1960; Torrance, 1962) as an explanation of the Getzels and Jackson (1958, 1962) finding of equal scholastic achievement between highly creative and highly intelligent children. From six of the eight educational situations reported in Torrance's (1962) study, Yamamoto selected the students who scored in the highest 20 per cent on the creativity tests. Treating each situation separately, he divided the high creatives into three groups according to I.Q.: high, 135 or above; middle, 120 to 135; low, below 120. These groups were then compared on tests of scholastic achievement.

In three of the four cases where an intelligence test—not an achievement test—was used as a measure of intelligence, a score of 120 appeared to be the best cut-off score. Creative subjects with an I.Q. of 120 or above did significantly better on achievement tests than those with an I.Q. below 120. However, those with an I.Q. above 135 did not achieve significantly better than those with an I.Q. between 120 and 135. In the fourth case where I.Q. was used, there was no difference between the three groups on achievement scores. For a selected graduate school population in which intelligence was measured by the available Miller Analogies test scores, a threshold point corresponding to an I.Q. of 120 could not be determined.

**Aptitude and non-aptitude factors of creativity**

J. P. Guilford and associates (Guilford, Christensen, Frick,
Merrifield, 1957; Guilford, 1957a) conducted a study of the relations between thinking aptitudes and non-aptitude personality factors of creativity. The creative-thinking aptitudes were measured by the behavior tests which Guilford has developed in his work on intellectual aptitudes (supra, pp. 109-114). The non-aptitude personality factors were measured by scores on 40 inventory variables. Some of the inventory items were developed by Guilford, and some were from other interest, temperament, or opinion surveys. The subjects were Coast Guard, Air Force, and Naval Air Cadets in three samples of approximately 200 each. The main objective "concerned the amount of correlation between certain thinking-aptitude factors on the one hand and certain non-aptitude factors on the other..." (Guilford, 1957a, p. 72). Hypotheses were made as to where relationships might or might not be expected.

Guilford found that those who score higher on the factor of associational fluency are more inclined to risk taking and to be more tolerant of ambiguity. He found that a person tends to score higher in ideational fluency if he is less neurotic, more ascendent, self-confident, and impulsive, and if he appreciates creativity and rigorous thinking. Expressional fluency scores tend to be higher if the person is impulsive and also if he appreciates creativity and rigorous thinking. Scores tend to be higher on spontaneous flexibility for those who are interested in reflective thinking. Scores for originality are higher if the person is self-confident and tolerant of ambiguity, is not meticulous, or does not feel a strong need for discipline, and has an interest in esthetic expression, reflective and divergent thinking.

Guilford suggested that the relationship between tolerance of
ambiguity and originality "may mean that the original person is not so very much concerned with uncertainties and even perhaps with inconsistencies in his responses" (Guilford, Christensen, Frick, and Merrifield, 1957, p. 39). The trait of esthetic expression included the composite scores of both creative and interpretative interests. Self-confidence was found to be related to both ideational fluency and originality which "is interesting in that tests of these two factors are probably among those most obviously pertaining to creative abilities. Whether it takes self-confidence to be highly creative or whether knowing one is adequate to creative tasks makes one more confident cannot be said" (Guilford, Christensen, Frick, and Merrifield, 1957, p. 35).

In some instances, relationships were not found where they had been expected. Zero correlations were found between the trait of general activity and all fluency-factor scores. Cultural conformity correlated zero with both originality and spontaneous flexibility. Need for Adventure (risk-taking) correlated zero with both ideational fluency and originality, and Need for Variety correlated zero with both ideational fluency and originality. Two interesting significant negative correlations with originality were Need for Discipline, and Orderliness.

Guilford concluded, from a general survey of the correlations, that there is very little relationship between the aptitude factors and the non-aptitude factors (none of the correlations were higher than approximately .3). Guilford stated:

Taking the correlation coefficients at their face values, we may say that in a highly intelligent normal population not more than six percent of the variance of performance on a test of fluency or originality such as was used in the present investigation can be accounted for on the basis of any one non-
aptitude trait. The more typical determinations, where there is any at all, is of the order of two to four percent... (Guilford, Christensen, Frick, and Merrifield, 1957, p. 39).

Guilford also stated:

Although the low correlations may be due in large part to the quite different methods of assessing the traits—inventory scores in the one case and behavior-test scores in the other—they are not encouraging to the expectation that we shall ever find strong relationships, even with better variables. There is considerable reason, therefore, to describe persons in terms of both aptitude and non-aptitude variables. This may be of some practical importance, for if both kinds of traits are found to be related to practical criteria of success in science or elsewhere, the two sources of information would contribute more or less independently to predictions of performance (Guilford, 1957a, p. 74).

For music schools, Guilford's findings may mean that entrance examinations for schools of music should include personality and interest inventories as well as tests of creativity, theory, and performance. This approach should help locate those students with high aptitude and low interest, and students with high personality qualifications but low ability. A combination of both types of information should add to the reliability of prediction and selection.

Marks, Michael and Kaiser (1961) administered to 204 U. S. Marine Corps officers a set of 21 tests selected from Guilford's creativity battery and ten scales of the Guilford-Zimmerman Survey. They made a factor analysis of the scores and found that the creativity tests do not reflect individual differences in temperament as assessed by self-report inventories. This study supports Guilford's findings (Guilford, 1957a).

Drevdahl (1956) conducted a study in which he compared creative and non-creative student artists and creative and non-creative science students. The population was drawn from advanced undergraduate and
graduate students. These students were tested for intellectual and personality characteristics, and for creativity which was tested by tests from the Guilford battery. Drevdahl found that creative artists were somewhat more radical and self-sufficient than creative scientists or non-creative persons in either group. The art group, creative and non-creative, was more sensitive emotionally and less concerned with the practical. Individuality appeared to be desirable for creativity in the sciences and arts. Drevdahl stated:

...it appears that suspiciousness and interest in the internal mental life, or possibly interoceptiveness, may be associated with creativity in the arts, but that trusting attitudes and interest in external things, or extroceptiveness, may be more associated with creativity in the sciences (1956, p. 25).

Other tests of creativity

Mednick (1962, p. 221) defines the creative thinking process "as the forming of associative elements into new combinations which either meet specified requirements or are in some way useful." Mednick distinguishes original thinking from creative thinking by the criteria of usefulness. Original answers are creative only when they are useful.

In terms of Mednick's associative theory, "any condition or state of the organism which will tend to bring the requisite associative elements into ideational contiguity will increase the probability and speed of a creative solution" (1962, p. 221). Mednick suggests three ways of achieving creative solutions by bringing the requisite associative elements together: serendipity, similarity, and mediation. Regarding individual difference in achieving creative solutions to problems, Mednick stated: "Any ability or tendency which serves to bring otherwise mutually remote
ideas into contiguity will facilitate a creative solution; any ability or
tendency which serves to keep remote ideas from contiguous evocation
will inhibit the creative solution" (1962, p. 222).

Mednick suggested:

The greater the number of instances in which an individual
has solved problems with given materials in a certain manner,
the less is the likelihood of his attaining a creative solution
using these materials. . . . Thus, if a new-comer to a field
has the requisite information, he is more likely to achieve a
creative solution than a long-time worker in the field (1962,
pp. 223-224).

If the above is true, perhaps the music theory teaching tech­
nique of extensive progressive part-writing drill so saturates the student
with the "correct way" of writing music that it decreases the possibility
of his ever relating the materials in a creative way. An agreement with
this supposition is implied in the assertion by Piston (supra, p. 89)
that composition should be stressed from the earliest theory training and
Gerschefski's (supra, p. 87) belief that the composer can share with
his students his knowledge of the intricacies that lie between theory and
self-expression. In light of Mednick's suggestion many teachers may
need to evaluate their methods of developing concepts of music theory
and harmony with young students. They may need to place less emphasis
on part-writing drill and more emphasis on creative solutions to problems.

Mednick devised a test called the Remote Associations Test
(RAT) to test his conception of the creative process. This test lists
several sets of three words. The task is to state a fourth word for each
set which will associate the three given words. For example, the word
which would associate the given words -surprise, line, and birthday is
party.
Mednick reported several studies in which the RAT was employed. The following is a representative sample of studies cited. In one study, student architects were rated on creativity by their instructors. The ratings and RAT scores correlated significantly (r = .70, df = 19, p < .01). In a study where RAT scores were correlated with first and second year undergraduate grades, the correlation was negative (r = -.27, N = 74, p < .05). In another study of college students (N = 34), the correlation was the same but not statistically significant. Other studies have shown a tendency for high RAT scorers to get higher grades from teachers rated as flexible, and for low RAT scorers to get higher grades from teachers rated as dogmatic. In a study of forty eminent architects, the RAT correlated .31 with the Originality (O-I) scale of the IPAR Questionnaire scale, -.31 with the total Conformity score obtained in the Crutchfield Experiment, and -.34 with their reported college-grade-point average.

The RAT was constructed to test Mednick's associative definition of creativity. Many of the positions taken will need more investigation to determine whether they become fact or need revision. The studies cited would seem to indicate that the RAT is measuring some attribute of creativity.

One group of investigators (Springbett, Dark, and Clarke, 1957) has developed a test, called The Lines Test, to investigate the hypothesis that "... 'creative' thinking differs from conventional problem-solving only because it involves a greater sensitivity to unconscious processes" (1957, p. 9). The Lines Test was developed to measure the interaction between conscious and unconscious processes. This test consists of three meaningful figures (obvious pictures) of nine lines each,
three gestalt figures (symmetrical) of nine lines each, and three nonsense figures (no pattern) of nine lines each. Each figure is presented one at a time and progressively one line at a time. The developers of this test assume that for a subject to reproduce the meaningful and gestalt figures, he must use both rote memory and unconscious processes; but to reproduce the nonsense figures, he uses only rote memory. The items designed to elicit interaction between conscious and unconscious processes correlated significantly with tests of reasoning and intelligence while the others did not.

Although the literature cited throughout this dissertation indicates there is little relationship between creativity and intelligence, it does support the concept that creative thinking involves sensitivity to unconscious processes. The qualities of creative persons given by MacKinnon and Barron (supra, pp. 33-36) indicate that creative persons are sensitive to unconscious processes. The working procedures of creative persons reported by Stein (supra, pp. 32-33) strongly suggest that creative people use unconscious processes in their work. Also, since creative thinking, which seems to be a type of reasoning, does involve sensitivity to unconscious processes, it is not surprising that a relationship was found between a test of the interaction of conscious and unconscious processes and tests of reasoning.

Summary

Guilford's investigation of intellectual aptitudes was cited (supra, pp. 109-114) including his theoretical model for the complete Structure of Intellect. Twelve aptitudes (factors) directly related to
creativity were given. Also reported was the location of the creativity factors within Guilford's Structure of Intellect model together with an example of a test of each factor.

Mullins (supra, pp. 114-115) administered tests from Guilford's Battery to research scientists. Scores for four of the tests correlated significantly (.05 level) with two criteria—supervisor's ratings and number of publications.

Lowenfeld (supra, p. 115), while studying art students, arrived at essentially the same criteria of creativity as Guilford. Lowenfeld correlated scores on an art test of creativity with tests from Guilford's battery and found significant correlations between attributes of creativity tested in the two investigations. This investigation established a common basis between science and art for studying creative abilities.

The studies cited above show that creative persons do have intellectual aptitudes, directly related to creativity, which can be identified.

Gross and Seashore (supra, pp. 115-116) reported a study based on three groups of composers: superior student composers (N = 10), inferior student composers (N = 10), and professional composers (N = 10). The professional composer and superior student composer scored much higher on a test of English vocabulary (which they used as an indicator of intelligence) than the inferior student composer.

Miller (supra, pp. 116-120) conducted an investigation with upper elementary school children to study the relationship between intelligence and creativity. Miller found moderate positive relationships between intelligence and creative writing, symbolic thinking, and dramatic
performance. She found that the more intelligent child was more likely
to rate highly in musical performance. The child with an I.Q. of 120 or
higher was more likely to score high on the Getzels-Jackson creativity
tests than a child with an average I.Q. Sixty-nine per cent of the
highly intelligent children rated highly creative on some activity or test.
No child rated highly creative in all five activities or tests. Miller con­
cluded that some relationship exists between creativity and intelligence,
but that not all bright children are creative and some with average intelli­
gence have creative ability.

Getzels and Jackson (supra, pp. 120-123) reported a study of two
groups of adolescents, one highly intelligent (N = 28) and the other highly
creative (N = 26). The highly intelligent group had a mean I.Q. of 127.
Correlation (r) of I.Q. with creativity based upon the total school popu­
lation (about 500) ranged from .115 to .393. On two measures of scholas­
tic achievement the high I.Q. group and the high creative group could not
be differentiated. Both groups were significantly and equally superior to
the total school population. Teachers indicated a clear preference for
the high I.Q. students.

On a measure of outstanding traits, the two groups agreed on
the qualities that make for success in adult life and qualities teachers
like. The high I.Q. student wanted for himself the traits that he be­
lieved make for adult success, while the highly creative students do not
use this trait as a goal. The high I.Q. student tends to hold a self-ideal
consonant with the one he believes teachers will most readily approve.
The high creatives show a slight negative relationship with the traits
teachers approve. The value placed on a sense of humor was the
outstanding difference between the two groups. The creative students placed a high value on a sense of humor while the highly intelligent students ranked this trait last. The highly creative student's pictures and drawings are more stimulus-free, fanciful, humorous, violent, and experimental. The high creative student's career choices are in less conventional order and show a greater variety within the group. Several creative students expressed difficulty in choosing between highly dissimilar fields.

The qualities exhibited by the creative adolescents in the Getzels and Jackson study are similar to the qualities of creative adults, reported in the studies of Barron and MacKinnon (supra, pp. 33-36). Both studies showed that creative persons are above average in intelligence but not necessarily superior. Creative persons are independent in thought and not overly concerned with what others think of them. Both studies reported that creative people are likely to have difficulty in deciding upon a career because of a wide range of ability.

Torrance (supra, pp. 124-127) reported an investigation in which he made 8 partial replications of the Getzels-Jackson study. He found that in 6 of the 8 studies about 70 per cent of the creative students would have been eliminated if the groups had been selected solely on the basis of intelligence. Torrance found a virtual lack of relationship between creativity and I.Q. In 6 of the 8 studies there were no significant differences between the high creative and high I.Q. students on measures of scholastic achievement. Torrance, observed, however, that although high creative students tend to learn as much as high I.Q. students, it is not true in all schools. The creative children learn best where some
value is placed on a creative approach to learning and testing.

Anderson (supra, p. 126) introduced the idea of the threshold of intelligence. Torrance's study indicated that an I.Q. of 120 is the point below which creative students do not perform as well on achievement tests as do high I.Q. students. But creative students with an I.Q. above 120 perform as well on achievement tests as high I.Q. students. It is at the threshold point of a 120 I.Q. that creative ability becomes important and makes up the difference between the I.Q's of the highly creative and highly intelligent student.

The findings of Torrance concerning creativity and intelligence largely support the findings of Getzels and Jackson. The two cases where the findings of Torrance do not support Getzels and Jackson, Torrance noted that the mean I.Q's of the creative groups were the lowest in the study and that the emphasis of the schools was not on creative methods of learning.

Yamamoto (supra, p. 127) studied the creative students from Torrance's investigation. He divided the creative students from each of Torrance's studies into three groups by I.Q.: 135 and above, 120-135, and 120 and below. In three of the four studies, creative students with an I.Q. of 120 or higher perform significantly better on achievement than those below 120. The two groups with I.Q.'s 120-135, and 135 and above, could not be differentiated on measures of scholastic achievement. The fourth study showed no significant difference between the three groups. The findings of Yamamoto largely support the findings of Getzels and Jackson, and the concept of the 120 threshold of intelligence postulated by Torrance and Anderson.
The studies cited above usually show no relationship between creativity and intelligence and where relationships are found they are small.

Guilford (supra, pp. 127-130) found very little relationship between aptitude and non-aptitude factors of creativity. He indicated that the chances of finding high relationships were not good, therefore, there is reason to describe persons in terms of both aptitude and non-aptitude qualities.

A study by Marks, Michael and Kaiser (supra, p. 130) supported the findings of Guilford. They found that creativity tests do not reflect individual differences in temperament as assessed by self-report inventories.

Drevdahl (supra, pp. 130-131) studied groups of creative and non-creative artists and scientists. He found that creative artists are somewhat more radical and self-sufficient than creative scientists. The artists were more sensitive emotionally and less concerned with the practical than were the scientists. Individuality appeared to be desirable for creativity in sciences and art. The finding concerning individuality supports the findings of Getzels and Jackson, MacKinnon and Barron. Drevdahl also reported that creative artists are more introceptive and that creative scientists are more extroceptive. This finding is in agreement with Mooney's belief concerning the function of (1) science and scientists—to emphasize outward environment, the universe, and (2) art and artists—to emphasize the inward environment—man.

Mednick (supra, pp. 131-133) devised a test for measuring remote mental associations. The test shows some relationship with other
criteria of creativity and, therefore, appears to be measuring some attribute of creativity.

Springbett, Dark and Clarke (supra, pp.133-134) developed a test to measure interaction between conscious and unconscious processes. Items designed to elicit interaction between conscious and unconscious processes correlated significantly with tests of reasoning and intelligence while other items did not.

The experimental literature reported in this chapter generally supports the anecdotal, theoretical, and experimental literature reviewed in Chapters II and III. This concurrence is especially noted regarding qualities of creative persons and the importance of unconscious processes. The work of Guilford, and Getzels and Jackson, forms the basis for much of the experimental investigation reported in Chapter V.
CHAPTER V

AN EXPERIMENTAL INVESTIGATION IN THE IDENTIFICATION OF CREATIVE MUSIC STUDENTS

Chapter II presented a theoretical framework for understanding creativity, along with experimental and anecdotal literature from the sciences, visual arts, and literature. Chapter III presented an extensive examination of literature from the field of music in order to provide an approach to an understanding of musical creativity. Chapter IV presented an examination of experimental literature concerned with creativity in order to provide a basis for comparison and contrast with the biographical, anecdotal, and speculative literature cited previously, and with the experimental investigation conducted as part of this dissertation. Chapter V contains a report of the experimental investigation in the identification of creative music students, which was conducted as part of this dissertation. The investigation is divided into two parts. Part I contains the procedure and findings of the preliminary investigation which was undertaken to examine the possibility of a creativity testing study using groups of music students. Part II contains the questions to be answered, a description of the method used, and the presentation of the results of the second, large investigation.
INVESTIGATION PART I

Problem

It was the purpose of Part I of this investigation, which will be referred to as the preliminary study, to determine the feasibility of testing music students using creativity tests of the type developed by Guilford. Guilford (1957b, 1957c, 1962; Guilford and Merrifield, supra, pp. 109-114) and Lowenfeld (1958, supra, p. 115) have identified several factors which significantly differentiate creative from less creative persons. This investigation was based on the hypothesis that the creative process in music is an intellectual process and as such is not unlike creative thought in other fields. Further, the intellectual aptitudes required to sustain the creative process in music are not unlike the intellectual aptitudes required to sustain the creative process in other fields. Therefore, tests designed to identify creative persons by measuring non-musical intellectual creativity aptitudes should identify creative music students.

In view of the investigation of Getzels and Jackson (supra, pp. 120-123) one further hypothesis was made: scores on a creativity battery would not correlate with scores on a test designed to predict academic success.

Method

A test was constructed to measure two of the factors which Guilford and Lowenfeld identified as significantly differentiating highly creative from less creative persons. The two factors selected were ideational fluency and originality. These were selected because it was possible to construct a bi-factor battery and by analyzing scores on each
test three ways to arrive at six scores—three for each test. Scores for both tests were also summed to provide three additional scores. This scoring provided a variety of data and allowed for economy of time in administering the battery.

The test items were based on examples from the Guilford reports (Guilford, Wilson, and Christensen, 1952; Guilford, Berger, and Christensen, 1954; Guilford, Kettner, and Christensen, 1954, 1956). These test items are similar in construction to the Guilford tests but are not identical.

The bi-factor test consisted of two parts: Part I, a consequences test; and Part II, a plot titles test. The consequences test consisted of five questions of a change of unusual nature, which, if imposed, would disrupt the normal state of affairs. For example, "What would happen if all books disappeared overnight?" The examinees were asked to list as many consequences to all five questions as they could in ten minutes.

Part II consisted of four plots for novels or short stories. These plots were adapted from the book 101 Plots Used and Abused by James N. Young (1946). The examinees were asked to list as many titles to all three stories as they could in nine minutes.

The bi-factor battery was administered to one section of freshmen music theory students and a representative selection of graduate students in the School of Music of The Ohio State University. In total, 34 students took the tests; 16 freshmen and 18 graduate students. The graduate students were divided into composer and non-composer groups. The writer investigated the background of the graduate students and designated as composers those with a demonstrated interest in composition and
ability to write a piece acceptable for performance. All other graduate students were rated as non-composers. This resulted in three groups:

<table>
<thead>
<tr>
<th>Group</th>
<th>Basis of Division</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>graduate student composer</td>
<td>7</td>
</tr>
<tr>
<td>NC</td>
<td>graduate student non-composer</td>
<td>11</td>
</tr>
<tr>
<td>Pr</td>
<td>freshmen</td>
<td>16</td>
</tr>
</tbody>
</table>

Part I, Consequences Test, was scored by counting the number of responses given by each individual. These were used as a measure of ideational fluency (Guilford, Wilson, and Christensen, 1952; Guilford Berger, and Christensen, 1954; Guilford, Kettner, and Christensen, 1954, 1956). The consequences were also scored for remoteness. Remote consequences were those which were not obvious answers to the questions or logical next steps, but required two or more steps to arrive at the answer. The consequences judged remote were used as a measure of originality (Guilford, Wilson, and Christensen, 1952; Guilford, Berger, and Christensen, 1954; Guilford, Kettner, and Christensen, 1954, 1956; Mullins, 1959). A ratio score of originality to fluency was also obtained.

Part II, Plot Titles Test, was scored by counting the number of responses given by each individual. These were used as a measure of ideational fluency (Guilford, Kettner, and Christensen, 1954, 1956; Mullins, 1959). The plot titles were also scored for cleverness. Clever plot titles were those which employed a novel turn, such as a play on words, rather than just description. Plot titles judged clever were used as a measure of originality (Guilford, Wilson, and Christensen, 1952; Guilford, Berger, and Christensen, 1954; Guilford, Kettner, and Christensen, 1954, 1956; Guilford, Berger, and Christensen, 1954; Guilford, Kettner, and
Christensen, 1954; Mullins, 1959). A ratio score of **originality to fluency** was also obtained.

Total responses for each examinee were obtained by adding all responses from Part I and Part II of the battery. These total responses were used as a measure of ideational fluency. The remote consequences from Part I, and the clever titles from Part II were totaled to give a measure of originality. A ratio of total original to total fluent responses was obtained.

All judgments as to what constituted a response, a remote consequence, or a clever title were made by the examiner following the rules given above.

In addition, Ohio State Psychological Examination Scores were obtained for 14 of the 16 freshmen examinees.

Throughout this dissertation the statistical technique used to test the difference between means was the analysis of variance. This technique leads to an F test of overall significance of difference between means. For each of the analyses where F was significant at the 5 per cent level, the Duncan Studentized Range Test (1955), as modified by Kramer (1956) for groups of various sizes, was used to test the significance of differences at the 5 per cent level between all pairs of means. Means not connected or underlined by the same line are significantly different at the 5 per cent level. All means are reported to 3 significant figures. All correlations used throughout this investigation are Pearson product-moment coefficients of correlation (r), or multiple coefficients of correlation (R) and they are reported to two decimal places. All statistical analyses were carried out using the IBM computer facilities of the Ohio
State University Numerical Computation Laboratory.

Table 1 gives the results of the statistical tests of difference between means of the responses of the three groups: Non-Composer (NC), Composer (C), Freshmen (Fr). Table 1 shows no significant difference between groups on scores of originality for Part I Consequences Test, Part II Plot Titles Test, or total Parts I and II. There were significant differences between groups on scores for fluency. The freshmen scored significantly higher than the other two groups on the fluency score of the Consequences Test. The freshmen scored significantly higher than non-composers, but not higher than composers on the fluency score of the Plot Titles Test.

Even though composers did not score significantly higher than other music students on the measures of originality, the actual computed means were higher for composers. Upon studying the data it was observed that composers have a higher ratio of original answers to total answers in the two tests; therefore, a ratio score of original answers to fluent answers was obtained for the three groups. By this method, the three groups could be significantly differentiated from each other on both tests with an ordering from low to high: freshmen, non-composers, composers. The correlation of scores on the Bi-factor Battery with scores on The Ohio State Psychological Examination, for freshmen (n=14), was non-significant (r = .07, .08).

The findings of Part I of the investigation indicated areas for further study. The phenomenon of freshmen superiority to graduate students on fluency scores warranted verification. The lack of correlation between creativity scores and a predictor of academic success was in
TABLE 1

SUMMARY OF THE ANALYSES OF VARIANCE OF MEASUREMENTS OF RESPONSES OF THIRTY-FOUR STUDENTS IN THREE GROUPS OF DIFFERENT SIZES

In instances where the F's are significant, the Duncan (1955) Studentized Range Test as modified by Kramer (1956) for unequal numbers may be applied, and it may be said that means not connected or underlined by the same line are significantly different at the 5 per cent level.

<table>
<thead>
<tr>
<th>Bi-Factor Battery</th>
<th>Groups</th>
<th>F (df 2, 31)</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NC n=11</td>
<td>Fr n=16</td>
<td>C n=7</td>
</tr>
<tr>
<td>Part I Orig</td>
<td>4.7</td>
<td>5.8</td>
<td>6.5</td>
</tr>
<tr>
<td>Part II Orig</td>
<td>3.2</td>
<td>3.2</td>
<td>4.9</td>
</tr>
<tr>
<td>Total Parts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I and II Orig</td>
<td>7.9</td>
<td>9.0</td>
<td>11.4</td>
</tr>
<tr>
<td></td>
<td>NC n=11</td>
<td>Fr n=16</td>
<td>C n=7</td>
</tr>
<tr>
<td>Part I Flue</td>
<td>15.8</td>
<td>18.4</td>
<td>23.2</td>
</tr>
<tr>
<td>Part II Flue</td>
<td>11.0</td>
<td>13.2</td>
<td>18.0</td>
</tr>
<tr>
<td>Total Parts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I and II Flue</td>
<td>26.9</td>
<td>31.7</td>
<td>41.2</td>
</tr>
<tr>
<td></td>
<td>Fr n=16</td>
<td>NC n=11</td>
<td>C n=7</td>
</tr>
<tr>
<td>Part I Orig/Flue</td>
<td>.240</td>
<td>.264</td>
<td>.377</td>
</tr>
<tr>
<td>Part II Orig/Flue</td>
<td>.172</td>
<td>.316</td>
<td>.376</td>
</tr>
<tr>
<td>Total Parts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I and II Orig/Flue</td>
<td>.210</td>
<td>.282</td>
<td>.371</td>
</tr>
</tbody>
</table>

* Significant at 5% level
** Significant at 1% level
agreement with other studies but needed elaboration since the relationships were even smaller than might be expected. Since in this sample the actual means for the composer group on the originality scores were higher than for the other two groups, the question arose: "Could significance be achieved with a larger sample?" The ratio score developed in this study proved powerful enough to distinguish composers from other music students even with a small population. The ratio scoring technique needed further investigation with a larger population and by extending the scoring to other tests.

INVESTIGATION PART II

Questions

This investigation of the creative ability of music students was a continuation and expansion of the Investigation Part I. The questions to be investigated in this study were drawn from the beliefs and purposes stated in Chapter I, the problems stated or implied in the related literature, and from the findings of the first part of the investigation. The questions are:

1. Can the three groups (composers, non-composers, freshmen) be differentiated from each other by scores on a Creativity Battery which contains no musical questions and, therefore, is free of any loading on musical background?

2. Can those music students with jazz improvisation experience be differentiated from other music students on the basis of scores on a non-musical Creativity Battery?

3. Will a test of a sense of humor differentiate creative from
less creative music students? (Getzels and Jackson, supra,

4. By testing a larger population, will the ratio score remain as the most powerful discriminator?

5. What are the relationships between the Creativity Battery scores for freshmen and the pre-scores of sex, jazz experience, major instrument; The Ohio State Psychological Examination (OSPE); The Ohio State Music Placement Test Battery, Section I, aural and notational skills (ANS), Section II, music recognition (MR), and Section III, general musical information (GMI); The Ohio State Diagnostic Test Battery, Elements of music theory (EMT), notation speed, notation accuracy, notation output, aural recognition, and visual output?

6. What are the relationships between the Creativity Battery scores for freshmen and the criterion scores of English accumulative point hour, major applied music grades, music theory grades, and total university grades?

7. What are the relationships between the Creativity Battery scores for graduate students and the pre-scores of sex, jazz experience, composer, and major instrument?

8. What are the relationships between the Creativity Battery scores for graduate students and the criterion scores of graduate grades?

Method

A test battery was constructed to measure three of the factors which Guilford (1962) and Lowenfeld (1958) found would differentiate creative from less creative persons: ideational fluency, originality, and spontaneous flexibility. These factors were selected because: (1) ideational fluency and originality were used in the first part of the
investigation and warranted further study, (2) satisfactory paper and pencil tests could be devised which would yield three scores per test, and (3) four tests were all that were needed to yield a variety of data. Shortened forms of the Consequences and Plot Titles tests from the first part of the investigation were used to allow time to add new tests and still not exceed the time of a 48 minute class period. Items which contributed the least information were eliminated. To these tests were added two tests of flexibility: Unusual Uses (which yielded a second score of originality), and Brick Uses (which yielded a second score of fluency). The two flexibility tests, therefore, yielded different ratio scores: originality/flexibility and flexibility/fluency.

Getzels and Jackson (1958, 1962) identified a sense of humor as the outstanding difference between creative high school students and their classmates. In addition to fluency, originality, and flexibility, a test was included in the battery to measure a sense of humor. This resulted in a four factor battery of five tests which, by also analyzing scores on the humor test three ways, yielded a total of 15 scores.

The test items for Parts I, II, III, and IV were based on examples from the Guilford reports (Guilford, Wilson and Christensen, 1952; Guilford, Berger and Christensen, 1954; Guilford, Kettner and Christensen, 1954; Guilford, Kettner, and Christensen, 1956). These test items are similar in construction to the Guilford tests, but with the exception of two coincidental items in Part III (Unusual Uses, shoe and pencil) and Part IV (Brick Uses), the test items are not the same. The humor test was devised by Dr. William Poland, School of Music, The Ohio State University, for use in this study. The test items used in Parts I through
IV of the Creativity Battery were based upon tests which were copyrighted. However, a copy of the Humor Test (black-out cartoon) used in Part V appears in the appendix of this dissertation.

The Quadruple Mental Factors Battery, hereafter called Creativity Battery, consisted of five parts: Part I, Consequences Test; Part II, Plot Titles Test; Part III, Unusual Uses Test; Part IV, Brick Uses Test; and Part V, Black-Out Cartoons. The Consequences Test and Plot Titles Test were described in conjunction with the preliminary study, Investigation Part I. The tests were the same except that only four consequences and three story plots were used in Part II of the investigation.

On the Unusual Uses Test, Part III, six common objects and their usual uses were listed. For example, a bedsheets (to put on a bed to sleep on). The examinees were asked to list as many uses for the six objects as they could in six minutes.

On Part IV the examinees were asked to list as many different uses as possible for a common brick. They were given four minutes for this task.

Part V, Black-Out Cartoons, consisted of a single frame magazine-style cartoon, 3 inches wide and 3 1/2 inches high, which was completely blacked out. In was in fact a black rectangle. The examinees were given five minutes to list as many titles as possible for the cartoon.

The Creativity Battery was administered to freshmen and graduate students in the School of Music of The Ohio State University. The freshman group was obtained by testing all the music majors in the required first year music theory classes (except students who were considerably older than the others). The graduate students were selected at random,
the only criteria being that they were majoring in some music area. In total, 111 students were included in the sample: 77 freshmen and 34 graduate students. The graduate students were divided into composer and non-composer groups. The writer investigated the background of the graduate students and designated as composers those with a demonstrated interest in composition and ability to write a piece acceptable for performance. All other graduate students were considered to be non-composers. This resulted in three groups:

<table>
<thead>
<tr>
<th>Group</th>
<th>Basis of Division</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>graduate student composers</td>
<td>13</td>
</tr>
<tr>
<td>NC</td>
<td>graduate student non-composers</td>
<td>21</td>
</tr>
<tr>
<td>Fr</td>
<td>freshmen</td>
<td>77</td>
</tr>
<tr>
<td>Total</td>
<td>All students in study</td>
<td>111</td>
</tr>
</tbody>
</table>

In some instances, the scores of all graduate students, composers, and non-composers are treated together. This resulted in another group:

Gs    all graduate students        n = 34

The scoring procedures for Part I Consequences Test, and Part II Plot Titles Test are given in conjunction with the preliminary study, Investigation Part I.

Part III, Unusual Uses Test, was scored by counting the number of genuine uses given by each individual on the six items of the test. Uses listed more than once were only counted once. These were used as a measure of spontaneous flexibility (Chorness and Nottelmann, 1957; Guilford, Frick, Christensen and Merrifield, 1957; Mullins, 1959). The responses were also scored for statistical uncommonness. Those
responses given by one-fifth or more of each age and sex group (freshman girls, freshman boys, graduate students) were rated common and given a "0" weight. Responses given by more than one person but less than one-fifth of each group were weighted one, and those answers only given once were weighted two. These weighted scores were judged as a measure of originality (Guilford, Kettner and Christensen, 1954; 1956; Chorness and Nottelmann, 1956, 1957; Getzel and Jackson, 1962). A ratio score of originality to flexibility was also obtained.

Part IV, Brick Uses Test, was scored by counting the number of genuine uses given by each individual. These were used as a measure of ideational fluency (Guilford, Wilson and Christensen, 1952). The brick uses listed by the examinees were also grouped in fifteen categories. A score was obtained by counting the number of different categories each individual used. This score was used as a measure of spontaneous flexibility (Guilford, Wilson and Christensen, 1952; Mullins 1959). A ratio score of flexibility to fluency was also obtained.

Part V, Black-Out Cartoons, was scored by counting the number of captions given by each individual. These were used as a measure of ideational fluency. The captions were also scored for humor. Captions which were judged to contain an element of humor, such as a double meaning, were counted for each individual and used as a measure of a sense of humor. A ratio score of humor to fluency was also obtained.

All judgments as to what constituted a response, a remote consequence, a clever title, a genuine use, a weighted score, a category of use, or a humorous caption were made by the investigator following the rules given above.
After the test was completed, a questionnaire (Appendix p. was given to provide more information about the creative activities of the population. The questions concerned quantity of literary compositions, musical compositions, and arrangements, conducting experience, and jazz improvisation experience.

Pre-scores and criterion scores

In addition to the Creativity Battery and questionnaire, the following information was obtained, for freshmen, from the records of The Ohio State University School of Music: sex, major instrument family (keyboard, voice, string, woodwind, brass), English accumulative point-hour average, applied music accumulative point-hour average, music theory accumulative point-hour average, and total accumulative point-hour average. Total percentile scores were also obtained for the Ohio State Psychological Examination (OSPE), a predictor of academic success in college. The norms used for the OSPE were those established on freshmen at The Ohio State University. The OSPE has also been used with considerable success at other universities. This examination, an effective predictor of college success, is not an I.Q. test, but is a reliable measure of intellectual ability.

Background information for freshmen (N=77)
Sex male (N=33) female (N=44)
Grades (All grades computed with E=0, D=1, C=2, B=3, A=4)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Mean</th>
<th>Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman Music Theory Accumulative Average</td>
<td>2.7</td>
<td>.9</td>
</tr>
<tr>
<td>Freshman English Accumulative Average</td>
<td>2.2</td>
<td>.6</td>
</tr>
<tr>
<td>Freshman Applied Music Accumulative Average</td>
<td>3.2</td>
<td>.8</td>
</tr>
<tr>
<td>Total Freshman Grades Accumulative Average</td>
<td>2.5</td>
<td>.6</td>
</tr>
<tr>
<td>Ohio State Psychological Examination</td>
<td>63.5</td>
<td>24.6</td>
</tr>
<tr>
<td>Total Percentile Score</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Scores on The Ohio State Music Placement Test Battery were also obtained for each freshman. This battery contains three sections from which a single score can be obtained for each section. Section I, Aural and Notational Skills (ANA), tests knowledge of various aural and notational skills involving scales, intervals, melodic patterns, and rhythmic patterns. Section II, Music Recognition Test (MR), tests the recognition of musical compositions and their composers. Section III, General Musical Information Test (GMI), tests knowledge of musical names, places, dates, and terms (Poland, 1960b).

<table>
<thead>
<tr>
<th>Ohio State Music Placement Test Battery</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section I - Aural and Notational Skills</td>
<td>40.7</td>
<td>5.7</td>
</tr>
<tr>
<td>Section II - Music Recognition</td>
<td>35.6</td>
<td>6.0</td>
</tr>
<tr>
<td>Section III - General Musical Information</td>
<td>31.5</td>
<td>6.9</td>
</tr>
</tbody>
</table>

Scores were also obtained for each freshman on The Ohio State Diagnostic Test Battery, Elements of Music Theory (EMT). This battery investigates performance in three elemental music categories: intervals, scales, and chords. Each elemental category is divided into three subcategories: notation, aural, and visual identification.

Five variables are measured in each elemental category: (1) notation speed, the ratio of the number of notation items attempted to the number of items presented; (2) notation accuracy, the ratio of the number of notation items correct to the number of notation items tried; (3) notation output, the ratio of the number of notation items correct to the number of notation items presented; (4) aural identification, the ratio of the number of aural items correct to the number of aural items presented; and (5) visual identification, the ratio of the number of visual items correct
to the number of visual items presented. Variable five, visual identification, is a recent addition to this battery. However, a description of the remainder of the battery and its use in previous studies is reported by Poland (1960a, 1960b).

<table>
<thead>
<tr>
<th>Ohio State Diagnostic Test Battery</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elements of Music Theory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notation speed</td>
<td>58.6</td>
<td>16.1</td>
</tr>
<tr>
<td>Notation accuracy</td>
<td>57.7</td>
<td>19.3</td>
</tr>
<tr>
<td>Notation output</td>
<td>34.4</td>
<td>17.0</td>
</tr>
<tr>
<td>Aural identification</td>
<td>64.1</td>
<td>15.8</td>
</tr>
<tr>
<td>Visual identification</td>
<td>49.5</td>
<td>18.2</td>
</tr>
</tbody>
</table>

In addition to scores on the Creativity Battery and information from the questionnaire, the following information was obtained for the graduate students: Major instrument family (keyboard, voice, string, woodwind, brass), and an accumulative grade point-hour average in graduate level work taken at The Ohio State University:

<table>
<thead>
<tr>
<th>Graduate Grade Average</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.4</td>
<td>.4</td>
</tr>
</tbody>
</table>

Results and discussion

With a sample of 77 students (freshmen) correlations significant at the 5 per cent level must be equal to or greater than \( t \leq 2.33 \). The correlations found between The Ohio State Psychological Examination and each of the 15 scores on the Creativity Battery ranged from \(-.11\) to \(+.22\). This finding gives an answer to part of question 5 (supra, p. 149) which is concerned with the relationship between the Creativity Battery scores and the pre-scores. This finding supports the finding of the first part of the
investigation which showed very low correlations (.07, .08) between the OSPE and the creativity scores. This lack of relationship between creativity and scores on a predictor of academic success substantiates the findings of Getzels and Jackson (supra, pp. 120-123), Torrance (supra, pp. 124-127), and Yamamoto (supra, p. 127). All of these investigators indicated that there tends to be no significant correlation between creativity and intelligence in high ability populations selected for intelligence and low correlations (.17 to .40) in unselected populations. The freshmen in The Ohio State University School of Music tend to score higher on the OSPE than the average Ohio State freshman. The mean percentile score for the population of this study is 63.5. This score would indicate that the freshmen in this study are a somewhat select population and, as expected, this study shows no significant correlation between this predictor of academic success and creativity. This study does show that creativity tests measure a quality not measured by predictors of academic success, and if colleges are interested in identifying creative students, they must use tests designed to test creativity. In selected population, neither I.Q. tests nor predictors of academic achievement will identify creative students.

The correlations found between the three sections of The Ohio State Music Placement Battery: Aural and Notational Skills (ANS), Music Recognition (MR), General Musical Information (GMI), and the 15 scores on the Creativity Battery, ranged from -.20 to +.17. This finding gives an answer to part of question 5 (supra, p. 149) which is concerned with the relationship between the Creativity Battery scores and the pre-scores. In the present curricular structures and world of music as a fine art,
music knowledge and skills are indispensable. As an analog to 120 I.Q., before it is worth talking about, creativity in students embarked on a professional degree program in music, minimum levels of academic and technical abilities are necessary in order to successfully complete such a program.

The correlations found between Notation Accuracy, Notation Output, Aural Recognition, and Visual Identification from the Ohio State Diagnostic Test Battery (EMT), and the 15 scores on the Creativity Battery ranged from -.20 to +.21. This finding gives an answer to part of question 5 (supra, p.149) which is concerned with the relationship between the Creativity Battery scores and the pre-scores. Music skills and information are necessary conditions to creativity in music because they become the vehicle for creative expression. The lack of relationship between creativity and music skills and information indicate that they are not, however, sufficient conditions. Creativity in music is not synonymous with skill. They are indeed something quite different. These findings indicate that a person may be a skilled musician without being overtly creative.

The correlations found between music theory grades, total first year grades, and the 15 scores on the Creativity Battery range from -.14 to +.22. This finding gives a partial answer to question 6 (supra, p.149) which is concerned with the relationship between the Creativity Battery and the criterion scores. The possible reasons for this lack of relationship between creativity and certain grades may be found in Torrance's observation (supra, pp.125-7) that creative students do better in educational situations where value is placed on creative activity and where
tests are constructed to allow for creative application of knowledge. A positive relationship might be found with the music theory grades if more emphasis was placed on creative music writing in freshman music theory courses. Nevertheless, the lack of relationship between creativity scores and these grades indicate that even though creativity is not rewarded by college grades, there is no evidence that it is penalized.

With a sample of 34 students (graduates) correlations significant at the 5 per cent level must be equal to or greater than $\pm .34$. The correlations found between graduate grades and the 15 scores on the Creativity Battery ranged from $-.31$ to $+.33$. This finding answers question 8 (supra, p. 149) which is concerned with the relationship between the Creativity Battery and the criterion score of graduate grades. This absence of relationship may also reflect Torrance's observation (supra, pp. 125-127) that creative students perform better and, therefore, make higher grades in educational situations where the climate fosters creative work. One might assume that a value would be placed on creative activity in a graduate music school, but if Torrance's observations are valid, then it appears that creative activities are not stressed nor are course tests constructed to measure creative thinking.

Poland stated: "Statistical significance of a relationship is not synonymous with importance. The importance of a significant relationship is a judgment to be made on the basis of experience with the subject matter being tested" (1960a, p. 38). Hoel demonstrated that:

...a correlation coefficient may be interpreted quantitatively by stating that the square of a correlation coefficient is equal to the percentage of variance of $y$ that has been accounted for by the relationship with $x$. ... This interpretation in terms of $r^2$ [or $R^2$] rather than of $r$ [or $R$] has the tendency to curb
unwarranted belief in the strength of relationship between two variables which would arise if \( r \) [or \( R \)] were treated as the quantitative measure of the relationship. ... (1947, p. 84).

Poland added: "The square of a product-moment coefficient of correlation \((r^2)\) or of a coefficient of multiple correlation \((R^2)\) may be multiplied by 100 and read as a percentage" (1960a, p. 39).

In view of this concept, for purposes of this study, a coefficient of less than .30, representing a relationship of less than 9 per cent, will be considered unimportant. It should also be said that things which are potentially important may not achieve significance, and some things which are significant may not be important.

Table 2 contains, for freshmen, the significant coefficients of correlations (.05 level) of the Creativity Battery scores with pre-scores and criterion scores. Table 2 shows low significant negative correlations between the Creativity Battery Part II \(\text{originality} \), Part III \(\text{ratio originality to flexibility} \), Part V \(\text{fluency} \), and sex. Since sex was coded 0 for male and 1 for female, a negative correlation indicates that males are superior to females on the variables under consideration and, conversely, when the correlations are positive, females are superior to males on the variables under consideration. This finding gives a partial answer to question 5 (supra, p. 149) which is concerned with the relationship between the Creativity Battery and the pre-scores. This table indicates a small negative relationship with being female and making high scores on these parts of the battery--the males tend to do better.
TABLE 2

PRODUCT-MOMENT COEFFICIENTS OF CORRELATION (r), SIGNIFICANT AT THE 5% LEVEL, OF CREATIVITY BATTERY SCORES WITH PREVIOUSLY KNOWN SCORES AND CRITERION SCORES

<table>
<thead>
<tr>
<th>Creativity Battery</th>
<th>Male=0</th>
<th>Female=1</th>
<th>Sex</th>
<th>Pre-Scores</th>
<th>DMT speed</th>
<th>Criterion Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I Flue</td>
<td>-</td>
<td>-</td>
<td>Jazz</td>
<td>-</td>
<td>.25</td>
<td>-</td>
</tr>
<tr>
<td>Part II Orig</td>
<td>-.23</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Part III Flex</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.27</td>
<td>-</td>
</tr>
<tr>
<td>Part III Orig</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.26</td>
</tr>
<tr>
<td>Part III Orig/Flex</td>
<td>-.23</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Part IV Flex</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.28</td>
<td>-</td>
</tr>
<tr>
<td>Part IV Flex/Flue</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.38</td>
</tr>
<tr>
<td>Part V Flue</td>
<td>-.27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Part V Humr/Flue</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.32</td>
</tr>
</tbody>
</table>

Table 2 also shows a small significant correlation between the Creativity Battery Part IV flexibility and jazz improvisation experience. This finding gives a partial answer to question 2 which is concerned with the differentiation of students with jazz experience, and question 5 which is concerned with the relationship of the Creativity Battery and the pre-scores (supra, pp. 148-149). The important finding concerning creativity and jazz is not this one instance of a small relationship but the overall lack of relationship where one might be expected.

Table 2 also shows a small significant correlation between the Creativity Battery, Part I fluency, Part III flexibility, and Notation Speed from The Ohio State Diagnostic Test Battery, Elements of Music Theory. This finding gives a partial answer to question 5 (supra, p. 149) which is concerned with the relationship between the Creativity Battery and the
pre-scores. The speed category of the EMT is scored more like parts of
the Creativity Battery than any other EMT category. Part I fluency and
Part III flexibility are the creativity scores which most closely resemble
EMT speed in format and scoring. EMT speed is also the least overtly
musical score of The Diagnostic Test Battery and probably measures a
response characteristic of the person (Poland, 1960a). It is, therefore,
the speculation of the writer that the relationship between EMT speed
and these two creativity scores has less to do with the content of the
two batteries than with the type of thinking ability required.

Table 2 also shows significant correlations between English
grades and three scores on the Creativity Battery: Part III originality,
Part IV flexibility, and Part IV ratio flexibility to fluency. This finding
gives a partial answer to question 6 (supra, p.149) which is concerned
with the relationship between the Creativity Battery and the criterion
scores. There is only one other significant correlation (r=.32) of
creativity with grades in the entire study--Part V ratio humor to fluency
with applied music grades for freshmen. This relationship of English
grades with creativity is especially interesting in that it shows a higher
correlation (r=.38), and a greater number of correlations (3), than the
total of all other correlations of creativity with grades in this study. The
highest correlation (.38), Part IV flexibility, which is measured by cate-
gory changes on the Brick Uses test, represents a relationship of approxi-
mately 14 per cent. A high score on this test requires a person to be able
to see the various properties (size, density, color, texture, etc.) of an
object, in this case a brick, and assign uses accordingly. Perhaps the
relationship with English grades may be accounted for by the fact that
this test calls for the ability to see the various properties of words, and in context assign meaning in a flexible manner.

Table 2 also shows one significant correlation between the Creative Battery, Part V ratio humor to fluency and applied music grades. This finding gives a partial answer to question 6 (supra, p.149) which is concerned with the relationship between the Creativity Battery and the criterion scores. This is the only other significant correlation with grades in the entire study and the only one in which a music grade is involved. Perhaps this particular instance of ratio of humor to fluency relating with applied music grades can be explained as a defense against tension. Musical performers often operate in tension producing situations (Poland and DeBolt, 1962). Those performers who demonstrate a high incidence of humor in their activities may have found humor an effective defense against the tenseness which prevents effective musical performance.

The important finding, however, concerning creativity and music grades is not this one instance of correlation but the otherwise total lack of relationship. This finding is especially illuminating in relation to applied music grades since performance is generally considered by musicians to be a creative activity, or at least a recreative activity. If performance is a creative activity, it is not apparent in the results of this investigation. Perhaps teachers of applied music on the freshman level are so concerned with building repertoire and technical competence that good grades are given for these skills rather than for the creative aspects of performing.

Table 3 contains, for graduate students, the significant coefficients of correlation (.05 level) of the Creativity Battery scores with
TABLE 3
PRODUCT-MOMENT COEFFICIENTS OF CORRELATION (r), SIGNIFICANT AT THE 5% LEVEL, OF CREATIVITY BATTERY SCORES WITH PREVIOUSLY KNOWN SCORES

Graduate Students (GS)  n = 34

<table>
<thead>
<tr>
<th>Pre-Scores</th>
<th>Creativity Battery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Part I Orig</td>
</tr>
<tr>
<td>Sex</td>
<td>-</td>
</tr>
<tr>
<td>Jazz</td>
<td>-</td>
</tr>
<tr>
<td>Composer</td>
<td>.46</td>
</tr>
</tbody>
</table>

pre-scores. Table 3 shows a significant negative correlation between the Creativity Battery Part V ratio humor to fluency and female sex. This finding gives a partial answer to question 7 (supra, p. 149) which is concerned with the relationship between the Creativity Battery and the pre-scores for graduate students. This negative relationship indicates that males do better on this one part of the Creativity Battery. The relationship between this variable and scores on the Creativity Battery are not the same for graduate students as they are for freshmen. The important finding concerning sex differences in this study is the general lack of relationship with the Creativity Battery and the lack of consistency between freshmen and graduate students in the few instances where a relationship is found. In view of this inconsistency, more research is needed before the role of sex in the assessment of musical creativity may be discussed with profit.
Table 3 also shows significant correlation between the Creativity Battery Part I ratio originality to fluency, Part II ratio originality to fluency, Part V ratio humor to fluency, and jazz improvisation experience. This finding gives a partial answer to question 2 (supra, p. 148) which is concerned with the differentiation of students with jazz experience from those without, and question 7 (supra, p. 149) which is concerned with the relationship between the Creativity Battery and the pre-scores for graduate students. A positive correlation between these creativity scores and jazz experience is not surprising if one notes that Table 3 shows that being a composer also correlates with these scores. Since six of the seven jazz playing graduate students are also composers (infra, Table 6, p. 170), they are probably the students who are contributing the most weight to those scores. The relationship between jazz experience and scores on the Creativity Battery is difficult to interpret in view of the finding that for freshmen, jazz experience correlates with a different creativity score than it does for graduate students. As with sex differences, the important finding about jazz in this study is its lack of relationship with the Creativity Battery and the lack of consistency between freshmen and graduate students in the few instances where a relationship is found. Creativity aptitudes which relate to sex differences or jazz improvisation experience have eluded identification using the current test. The question of relationship between creative aptitudes and sex differences or jazz experience needs considerable further investigation.

Table 3 also shows significant correlation between the Creativity Battery Part I originality, Part I ratio originality to fluency, Part II...
originality, Part II ratio originality to fluency, Part V humor, Part V ratio humor to fluency, and composers. This finding gives a partial answer to question 1 which is concerned with the differentiation of the three groups; question 3 which is concerned with the discriminative ability of the humor test; question 4 which is concerned with the discriminative power of the ratio scores; and question 7 which is concerned with the relationship between the Creativity Battery and the pre-scores for graduate students (supra, pp.148-149). Two scores (humor and ratio humor to fluency) of the three scores from the new test—Creativity Battery Part V Black-Out Cartoons—correlate the highest with composers. If this new test does indeed measure a sense of humor, then Getzels and Jackson's finding (supra, pp.122-123) is supported. In reference to question 4, three of the five ratio scores are among the six scores which correlate significantly with being a composer. The ratio score remains a powerful tool in locating creative music students. Whereas there is a general lack of relationship between the Creativity Battery and the criterion and pre-scores, these six correlations of creativity with the composer group are the highest and most numerous correlations of the battery with criterion or pre-scores in the entire study. These findings show that composers are original, have a sense of humor, and show a high incidence of these factors in their activities. The implications of these relationships are discussed in greater detail in conjunction with the findings reported in Table 8 and Table 9.

Table 4, based on scores for freshmen, contains the high coefficients of intercorrelation (r = .60 or above) of Creativity Battery scores. Table 4 shows the six high intercorrelations between various
Table 4 presents the product-moment coefficient of intercorrelations (r) of the Creativity Battery where r is .60 or above, for freshmen (n=77).

<table>
<thead>
<tr>
<th>Creativity Battery</th>
<th>Part I Orig</th>
<th>Part II Orig</th>
<th>Part III Orig</th>
<th>Part III Flex</th>
<th>Part V Humr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I Orig</td>
<td>.88</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Part II Orig</td>
<td>-</td>
<td>.61</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Part III Orig</td>
<td>-</td>
<td>-</td>
<td>.74</td>
<td>.86</td>
<td>-</td>
</tr>
<tr>
<td>Part IV Flue</td>
<td>-</td>
<td>-</td>
<td>.61</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Part V Humr</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.83</td>
<td>-</td>
</tr>
</tbody>
</table>

This finding is not related to any specific question but is a valuable by-product of the computer program used in this study. The high intercorrelations, with one exception (Part IV fluency with Part III flexibility), are between different scores of the same part of the battery. This is to be expected with the ratio scores which correlate with their divisor score. The surprising finding is not these six high intercorrelations, but the fact that there are not more. This indicates that the 15 scores of the Creativity Battery are to some degree measuring different things.

Table 5, based on scores for graduate students, contains the high coefficients of intercorrelation (r=.60 or above) of Creativity Battery scores. This table shows 20 high intercorrelations between various parts of the Creativity Battery. This finding is not related to any specific question but is a valuable by-product of the computer program used in this study.
## TABLE 5

PRODUCT-MOMENT COEFFICIENTS OF INTERCORRELATION (r) OF CREATIVITY BATTERY WHERE r IS .60 OR ABOVE

Graduate Students n = 34
All correlations in this table are significant at the .01 level

---

### Section 1 - Second Factor with Third Factor Same Part

<table>
<thead>
<tr>
<th>Part I Orig/Flue</th>
<th>Part II Orig/Flue</th>
<th>Part III Orig/Flex</th>
<th>Part IV Flex/Flue</th>
<th>Part V Humr/Flue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I Orig</td>
<td>.71</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Part II Orig</td>
<td>-</td>
<td>.70</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Part III Orig</td>
<td>-</td>
<td>-</td>
<td>.78</td>
<td>-</td>
</tr>
<tr>
<td>Part IV Flex</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.71</td>
</tr>
<tr>
<td>Part V Humr</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.60</td>
</tr>
</tbody>
</table>

### Section 2 - Second Factor with Second Factor Different Parts

<table>
<thead>
<tr>
<th>Part II Orig</th>
<th>Part III Orig</th>
<th>Part V Humr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I Orig</td>
<td>.63</td>
<td>-</td>
</tr>
<tr>
<td>Part II Orig</td>
<td>-</td>
<td>-.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.72</td>
</tr>
</tbody>
</table>

### Section 3 - Second Factor with First Factor Different Parts

<table>
<thead>
<tr>
<th>Part III Flex</th>
<th>Part IV Flue</th>
<th>Part V Flue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I Orig</td>
<td>-</td>
<td>.65</td>
</tr>
<tr>
<td>Part II Orig</td>
<td>.62</td>
<td>-</td>
</tr>
<tr>
<td>Part III Orig</td>
<td>.71</td>
<td>.61</td>
</tr>
<tr>
<td>Part V Humr</td>
<td>-</td>
<td>.72</td>
</tr>
</tbody>
</table>

### Section 4 - First Factor with First Factor Different Parts

<table>
<thead>
<tr>
<th>Part II Flue</th>
<th>Part III Flex</th>
<th>Part IV Flue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I Flue</td>
<td>.69</td>
<td>-</td>
</tr>
<tr>
<td>Part II Flue</td>
<td>-</td>
<td>.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.68</td>
</tr>
</tbody>
</table>

### Section 5 - Irregular Factor Groupings

<table>
<thead>
<tr>
<th>Part V Humr</th>
<th>Part V Humr/Flue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I Orig/Flue</td>
<td>.64</td>
</tr>
<tr>
<td>Part II Orig/Flue</td>
<td>-</td>
</tr>
</tbody>
</table>
study. Table 5, Section 1, shows the correlation of the ratio score with the corresponding divisor score for each part of the battery. Table 5, Section 2, shows the high intercorrelations of originality and humor scores. The answer to this finding might be located in the somewhat similar scoring procedures, or humor might be a special sub-class of originality. Table 5, Section 3, shows the high intercorrelations of originality and humor scores with fluency and flexibility. The interesting finding reported here is that the quality and quantity scores of Parts III and V show high relationship within the respective parts, but scores of Parts I, II, and IV do not. This high intercorrelation of quantity and quality scores on Part III is upheld by the freshmen (Table 4, supra, p. 167), but the scores of Part V is not. It may be that further study would indicate that one of these scores for Part III would be sufficient. Table 5, Section 4, shows the high intercorrelations of quantity scores on the different parts of the battery. The answer to this finding might be located in the similar scoring procedures. Table 5, Section 5, shows high intercorrelations between various scores of Parts I, II, and V. The interesting finding here is that humor and originality are the predominant factors—which supports the previous statement that humor may be a special subclass of originality.

Table 6 shows the number of students in groupings according to jazz experience and the size of the other groups in relation to the jazz groupings. This information was not related to a question but was an interesting finding of the investigation. Of the 34 graduate students, 7 have had jazz playing experience. Six of the 13 composers have had jazz experience, whereas only one of the 21 non-composers has had jazz
experience. Fifteen of the 77 freshmen have had jazz experience and 62 have not. It is interesting to note that 20 per cent of the graduate students and, also, 20 per cent of the freshmen have had jazz playing experience. The important finding shown by Table 6 is the high incidence of jazz players in the composer group and the low incidence in the non-composer group. Six of the 13 composers (46 per cent) are jazz players, while only one of the 21 non-composers (< 5 per cent) has had jazz experience. This finding warrants further investigation to see if this high relationship between jazz players and composers would persist.

In the following analyses it was assumed that scores were linearly dependent on sex, major instrument, and jazz experience. On the basis of this assumption the statistical model used accounted for their combined effects where present, leading to an improved estimate of the mean square error term in the analyses of variance. This leads to an F based on 2 and 99 degrees of freedom. Individual relationships of these variables with test scores are discussed elsewhere.

Table 7 gives the analysis of variance of test scores where the
**TABLE 7**

**SUMMARY OF THE NON-SIGNIFICANT ANALYSES OF VARIANCE OF MEASUREMENTS OF RESPONSES OF ONE-HUNDRED ELEVEN STUDENTS IN THREE GROUPS OF DIFFERENT SIZES**

In this table, since there are no significant differences between groups, all means are connected or underlined by the same line.

<table>
<thead>
<tr>
<th>Creativity Battery</th>
<th>Groups</th>
<th>F (df 2, 99)</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NC n=21 C n=13 Fr n=77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part I</td>
<td>Flue</td>
<td>15.4 16.3 18.1</td>
<td>2.26 4.14</td>
</tr>
<tr>
<td>Part II</td>
<td>Flue</td>
<td>10.1 10.7 11.1</td>
<td>.27 4.56</td>
</tr>
<tr>
<td>Part IV</td>
<td>Flex/Flue</td>
<td>.485 .488 .533</td>
<td>.58 .172</td>
</tr>
<tr>
<td></td>
<td>NC n=21 Fr n=77 C n=13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part IV</td>
<td>Flex</td>
<td>5.6 5.7 5.8</td>
<td>.15 2.02</td>
</tr>
<tr>
<td>Part V</td>
<td>Flue</td>
<td>8.6 9.8 11.8</td>
<td>1.70 3.69</td>
</tr>
<tr>
<td></td>
<td>Fr n=77 NC n=21 C n=13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part III</td>
<td>Flex</td>
<td>14.7 15.8 18.1</td>
<td>3.01 4.30</td>
</tr>
<tr>
<td>Part III</td>
<td>Orig/Flex</td>
<td>.503 .571 .624</td>
<td>2.72 .200</td>
</tr>
<tr>
<td>Part IV</td>
<td>Flue</td>
<td>11.1 12.1 12.5</td>
<td>1.03 3.29</td>
</tr>
</tbody>
</table>
group means are not significantly different. This finding gives a partial answer to question 1 which is concerned with the differentiation of the three groups (NC, C, Fr) on the basis of scores on the Creativity Battery; question 3 which is concerned with the ability of the test of a sense of humor to differentiate creative from less creative music students; and question 4 which is concerned with the discriminating power of the ratio scores (supra, pp. 148-149).

Table 7 shows no significant differences in the number of responses given by the three groups for Part I fluency, Part II fluency, and Part IV ratio flexibility to fluency. This finding does not substantiate the finding of the first part of the investigation (Table 1, supra, p. 147). In the first part of the investigation the freshmen scored significantly higher than composers and non-composers on Part I fluency, and significantly higher than non-composers on Part II fluency. Although the order from low to high is the same for both studies (NC, C, Fr), the phenomenon of freshman superiority on fluency was not verified with the larger population. The explanation for this lack of significance may be that these tests were shortened for Part II of the investigation.

There were no significant differences in the number of responses given by the three groups for Part IV flexibility or Part V fluency. There were also no significant differences in the number of responses given by the three groups for Part III flexibility, Part III ratio originality to flexibility, and Part IV fluency. The tests for Part III, Unusual Uses; Part IV, Brick Uses; and Part V, Black-Out Cartoons are the tests which were used only in the large study, not in the pilot study. Although not significant, the order from low to high shows the composer group with the highest mean
on the fluency and flexibility scores for Parts III, IV, and V. Perhaps further study with a larger population or more refined procedures would provide significant differences on some of these scores. Table 7, therefore, shows that the factors of flexibility, fluency, and ratio factors which involve flexibility have not proven valuable, in this study, in differentiating between the three groups of music students.

Table 8 gives the analysis of variance of test scores where the group means are significantly different. This finding gives a partial answer to question 1 which is concerned with the differentiation of the three groups (NC, C, Fr) on the basis of scores on the Creativity Battery; question 3 which is concerned with the ability of the test of a sense of humor to differentiate creative from less creative music students; and question 4 which is concerned with the discriminating power of the ratio scores (supra, pp. 148-149).

Table 8 shows a significant difference in the number of responses made on Part I originality, Part I ratio originality to fluency, Part II originality, Part II ratio originality to fluency, Part V humor, and Part V ratio humor to fluency between composers and the other two groups (Non-Composers and Freshmen). In reference to question 1, composers can be differentiated from other music students on the basis of a creativity battery which contains no musical questions and is, therefore, free of any loading on musical background. The significant scores for originality on Parts I and II also answer the question that arose as a result of the pilot study (with a larger population, could the composer group achieve significance on measures of originality?). The findings indicate that composers demonstrate more originality, even on verbal tasks, than other music students.
TABLE 8

SUMMARY OF THE ANALYSIS OF VARIANCE OF MEASUREMENTS
OF RESPONSES OF ONE-HUNDRED ELEVEN STUDENTS
IN THREE GROUPS OF DIFFERENT SIZES

Since the F's are significant, the Duncan (1955) Studentized Range Test
as modified by Kramer (1956) for unequal numbers may be applied, and
it may be said that means not connected or underlined by the same line
are significantly different at the 5 per cent level.

<table>
<thead>
<tr>
<th>Creativity Battery</th>
<th>Groups</th>
<th>F (df 2,99)</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NC n=21 Fr n=77 C n=13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part I Orig</td>
<td>5.2</td>
<td>5.4</td>
<td>7.8</td>
</tr>
<tr>
<td>Part I Orig/Flue</td>
<td>.294</td>
<td>.336</td>
<td>.490</td>
</tr>
<tr>
<td>Part II Orig</td>
<td>2.6</td>
<td>2.9</td>
<td>4.5</td>
</tr>
<tr>
<td>Part II Orig/Flue</td>
<td>.255</td>
<td>.287</td>
<td>.440</td>
</tr>
<tr>
<td>Part III Orig</td>
<td>7.6</td>
<td>9.3</td>
<td>11.2</td>
</tr>
<tr>
<td>Part V Humr</td>
<td>2.5</td>
<td>2.7</td>
<td>5.6</td>
</tr>
<tr>
<td>Part V Humr/Flue</td>
<td>.259</td>
<td>.326</td>
<td>.530</td>
</tr>
</tbody>
</table>

* Significant at 5% level
** Significant at 1% level
The humor score of the Black-Out Cartoon Test was the most powerful discriminator \( F=18.31 \) of any score in the study. This score supports the finding of Getzels and Jackson (supra, pp. 122-123) that the value placed on a sense of humor is the outstanding difference between creative and less creative students. This score further shows that not only do creative people value a sense of humor; they demonstrate a sense of humor far more than less creative people. In no other place in this study have the composers been so clearly differentiated from other music students. This finding further indicates that the new Black-Out Cartoon test, developed in this study, may be a valuable test for discovering creative people.

The ratio scores of Parts I and II have remained as powerful discriminators. Part V ratio humor to fluency has emerged as a powerful discriminator. The ratio scoring developed in this study indicates that creative music students show a higher proportion of originality and humor in their thinking than other music students, even though their total output, or fluency, is not higher. This finding indicates that the ratio scorings, originality to fluency and humor to fluency, are valuable measures for discovering creative people.

The tests used in Parts I, II, and V of the Creativity Battery employed in this dissertation are powerful discriminators of composers from other music students. This is shown by the large F's which were obtained even with the small population. It is also important to note that the freshmen and graduate student non-composers are not differentiated. The potential value of these tests and their various scoring procedures is, therefore, greater because they discriminate between composers and
all other music students regardless of their educational level or professional interests.

Table 8 shows that composers give more original and humorous responses than other music students. Composers also demonstrate a greater proportion of humor and originality in their thinking than do other music students. A battery employing tests of the type used in Parts I, II, and V of the battery used in this study, should help to identify creative music students.

Table 9 shows the intercorrelation of six selected Creativity Battery scores and the correlation of these scores with composers. These scores are: Part I originality, Part I ratio originality to fluency, Part II originality, Part II ratio originality to fluency, Part V humor, and Part V ratio humor to fluency. These scores were selected because they significantly differentiate composers from non-composers and from freshmen. Table 9 provides additional information for answering question 1 which is concerned with the differentiation of the three groups (NC, C, Fr) on the basis of scores on the Creativity Battery; question 3 which is concerned with the ability of the test of a sense of humor to differentiate creative from less creative music students; and question 4 which is concerned with the discriminating power of the ratio scores (supra, pp. 148-149). The information reported in Table 9 was obtained to see if the six scores which differentiate between the three groups could be used in an appropriate prediction situation to select potential composers. The high multiple correlation (R=.61, 37 per cent relationship; F=10.25) indicates that these scores should be useful for prediction purposes.

Since Table 7 (supra, p. 171) has shown that Parts III and IV of
TABLE 9

PRODUCT-MOMENT COEFFICIENTS OF INTERCORRELATION (r) OF SELECTED CREATIVITY BATTERY SCORES AND CORRELATION (r) WITH COMPOSERS

Graduate Students and Freshmen  n = 111
All correlations in this table are significant at the .01 level

<table>
<thead>
<tr>
<th>Creativity Battery</th>
<th>Part I Orig</th>
<th>Part I Orig/Flue</th>
<th>Part II Orig</th>
<th>Part II Orig/Flue</th>
<th>Part V Humr</th>
<th>Part V Humr/Flue</th>
<th>Composer</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Part I Orig</td>
<td>.80</td>
<td>.59</td>
<td>.36</td>
<td>.56</td>
<td>.29</td>
<td>.30</td>
<td></td>
</tr>
<tr>
<td>(2) Part I Orig/Flue</td>
<td>.51</td>
<td>.48</td>
<td>.48</td>
<td>.37</td>
<td>.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Part II Orig</td>
<td>.67</td>
<td>.58</td>
<td>.38</td>
<td>.32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) Part II Orig/Flue</td>
<td>.43</td>
<td></td>
<td>.51</td>
<td>.38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) Part V Humr</td>
<td></td>
<td></td>
<td></td>
<td>.75</td>
<td>.53</td>
<td>.48</td>
<td></td>
</tr>
<tr>
<td>(6) Part V Humr/Flue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Multiple correlation (R = .61)

<table>
<thead>
<tr>
<th>Creativity Battery</th>
<th>Part I Orig/Flue</th>
<th>Part V Humr</th>
<th>Part V Humr/Flue</th>
<th>Composer</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) Part I Orig/Flue</td>
<td>.48</td>
<td>.37</td>
<td>.43</td>
<td></td>
</tr>
<tr>
<td>(5) Part V Humr</td>
<td></td>
<td>.75</td>
<td>.53</td>
<td></td>
</tr>
<tr>
<td>(6) Part V Humr/Flue</td>
<td></td>
<td></td>
<td>.48</td>
<td></td>
</tr>
<tr>
<td>Composer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Multiple correlation (R = .58)

<table>
<thead>
<tr>
<th>Creativity Battery</th>
<th>Part I Orig/Flue</th>
<th>Part V Humr</th>
<th>Composer</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) Part I Orig/Flue</td>
<td></td>
<td>.48</td>
<td>.43</td>
</tr>
<tr>
<td>(5) Part V Humr</td>
<td></td>
<td>.53</td>
<td></td>
</tr>
<tr>
<td>Composer</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Multiple correlation (R = .57)
the creativity battery do not differentiate between the three groups; these parts should be revised or replaced. Table 9, Section 1, shows only moderate correlations between composer and scores from Part II originality, and Part II ratio originality to fluency. Therefore, Part II might also be revised or replaced. It may be that the tests for these parts could be made more discriminating, or it may be that they should be replaced with other tests of these factors or tests for different factors.

Table 9, Section 2, shows a table of intercorrelations of scores on Part I originality, Part V humor, and Part V ratio humor to fluency, and correlations of these scores with composer. In a regression equation, for prediction purposes, the smallest number of scores that will not appreciably reduce the reliability of the prediction is the most practical. Table 9, Section 2, therefore, shows an intercorrelation table based upon the three scores which showed the highest correlation with composers. The multiple correlation (R) is .58 which is high considering that only 3 scores were used.

Table 9, Section 3, shows a table of intercorrelations of scores on Part I ratio originality to fluency and Part V humor, and correlations of these scores with composers. These scores were selected because they showed the highest correlations with composers from Parts I and V. The multiple correlation (R) is .57 which represents a relationship of 32 per cent. This relationship is only 5 per cent less than the relationship based upon all six scores and only 1 per cent less than for the 3 scores.

These high multiple correlations (R=.57, .58, .61) indicate that if an appropriate testing situation were instituted, the tests which produced the scores shown in Section 2 and Section 3 should serve to help
select potential composers from a population of music students. With the addition of other variables, such as those used in The Ohio State University School of Music Testing Program (especially The Ohio State Psychological Examination and the Ohio State Music Placement Test Battery), the reliability of the selection of potential composers should be increased.

This study shows that composers do possess unique qualities, that can be measured, which set them apart from other music students. It is possible to identify existing composers from among a population of music students. Table 9 shows that it also may be possible to select potential composers from such a population. If such a selection procedure were initiated, and potential composers were identified early in their training, it would be possible to structure the educational situation to give them more appropriate training. This structure should provide an economy of educational effort, resulting in greater productivity and satisfaction for both student and teacher. It should also be possible to minimize inhibiting and restricting educational situations and practices thereby helping the student retain his spontaneity and imagination.

Table 9 shows that the ratio scoring developed in this dissertation would be very valuable in an appropriate prediction situation. Two of the three scores shown in Table 9, Section 2, are ratio scores. Without the ratio scores, the high multiple correlation (R) of .58 with only three scores would not be possible. Part I of the investigation (supra, pp. 142-148) showed that small groups could be differentiated with the ratio scores. The larger study showed that ratio scores would make it
possible to use a small number of scores in prediction situations. The ratio scores, therefore, are doubly valuable.

Table 9 also shows that the humor test developed in this dissertation may become the most powerful tool for use in a testing program for selecting potential composers. Two of the three scores in Section 2 are humor scores. Also, these two scores show the highest correlation with composers. Section 3 shows that because of the powerful contribution of the humor scores and the ratio scoring, it is possible to reduce the intercorrelation to only two test scores and still obtain a multiple correlation (R) of .57.

Summary

This investigation found, for freshmen, no significant correlation between scores on the Creativity Battery and a test of academic success—The Ohio State Psychological Examination. This finding supports the reports of Getzels and Jackson, Torrance, and Yamamoto which show that there is little or no relationship between creativity and intelligence.

No significant correlation was found, for freshmen, between scores on the Creativity Battery and tests of music skills and knowledge (The Ohio State Music Placement Battery; The Ohio State Diagnostic Music Test Battery: notation accuracy, notation output, aural identification, visual identification), music theory grades, or total first year grades. For graduate students there was no significant correlation between scores on the Creativity Battery and graduate grades. The lack of relationship between the Creativity Battery and these tests show that tests designed to measure creativity do measure qualities not measured
by the usual college and music school entrance tests. To provide a more complete picture of entering college students, creativity tests should be included. Also, this study shows that creative activity in music requires both music skills and extra-musical creative qualities.

This study found, for freshmen, some significant (mostly small) correlations between various parts of the Creativity Battery and scores on the Diagnostic Music Test, notation speed, English grades, and applied music grades. These correlations were too low, too few, and too scattered (exhibiting no clear pattern) to permit the investigator to form any definite conclusions.

The study found, for freshmen, three low negative correlations between scores on the Creativity Battery and sex. For graduate students there was one negative correlation between the Creativity Battery and female sex. These negative correlations show that the males did better on these parts of the battery. However, the freshmen and graduate students do not show correlations with the same scores, therefore, there is a discrepancy between the findings for freshmen and graduate students. This finding of a slight male superiority on four scores warrants further study.

The study found, for freshmen, one low significant correlation between the Creativity Battery and jazz experience. For graduate students, there were three significant correlations with jazz experience. A relatively high proportion (46 per cent) of the composers have also had jazz experience, whereas only 1 of 21 non-composers had jazz experience. There is a discrepancy between the finding for freshmen and graduate students. They do not show correlations with the same scores. The
The important finding concerning jazz, however, is the high incidence of jazz players in the composer group and the low incidence of jazz players in the non-composer group. If one wants to find jazz players, it seems a group of composers is a good place to start looking.

The study also shows some high intercorrelations between parts of the Creativity Battery. The intercorrelations were not as high or as numerous among the freshmen as they were among the graduate students. The highest correlations were usually between scores from the same parts of the battery. Future investigation may show that some of these scores are not needed.

The study found six scores of the Creativity Battery which differentiate composers from non-composers and freshmen: Part I Originality, Part II ratio originality to fluency, Part V humor, Part V ratio humor to fluency. An intercorrelation of these six scores produced a multiple correlation (R) of .61. An intercorrelation of three of these scores (Part I ratio originality to fluency, Part V humor, Part V ratio humor to fluency) also produced a multiple correlation (R) of .61, while an intercorrelation of only two of these scores (Part I ratio originality to fluency, and Part V humor) produced a multiple correlation (R) of .60. These findings show that composers can be differentiated from other music students on a non-musical test of creativity. The finding that the humor test is a powerful tool in distinguishing composers from other music students supports the finding of Getzels and Jackson (supra, pp. 122-123). The humor test also shows that not only do creative persons value a sense of humor, they demonstrate a high proportion of humor in their total output. The humor test and the ratio scoring are the most powerful discriminators and produce
high multiple correlations for prediction purposes. As far as the writer can determine, the humor test and the ratio scoring technique were used for the first time in this study.
CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

A theoretical framework was presented, as a basis for understanding creativity, which was developed from Mooney's (supra, pp. 12-19) concept of the four essential conditions for the existence of man—out, in, transaction, and fit. Mooney sees man as inherently creative in a creative universe. He stated that art emphasized the inward environment (man) while science emphasized the outward environment (the universe). Mooney indicated that now the primary role of the artist is to communicate creativity to other persons.

Concerning scientific creativity, Poincaré (supra, pp. 19-20) stated that inspiration must be preceded by conscious work, which starts unconscious processes in operation and followed by conscious work, which verifies the idea and shapes the results. He also added that all creative ideas are esthetically satisfying. Einstein (supra, pp. 21-22) mentioned the importance of visual and muscular imagery in creative work before the step of logical construction with conventional signs and symbols.

Levi and van Gogh (supra, pp. 22-23) indicated that in painting they tried to achieve an objective realization of an already formed mental and emotional image.

Coleridge (supra, p. 24) and Brahms (supra, p. 54)
indicated that inspiration had a fleeting quality, therefore, it was important to get the idea on paper immediately.

Bronowski (supra, p. 25) believed that the creative process is the same in the arts and in the sciences; the differences are in the materials, technique, and the relation of art and science to human experience. Bronowski agrees with Mooney that art explores the creator's own experience while science explores outward experience.

Golovin (supra, pp. 25-26) summarized creative thought in science. In most respects these activities and characteristics are also appropriate to the arts: (1) the new idea is born in mental and emotional chaos, (2) the transition to understanding is through unconscious processes, (3) the germinal idea is relatively specific and narrow, (4) the reception of a new idea leads to a state of nervous excitement, (5) it seems to make way for a large number of new associations and suggestions, and (6) self-discipline is important before and after insight. May (supra, p. 27) agrees with Golovin that discoveries are made in fields where the person has intense commitment, training, and prior thought.

May explained that unconscious processes of forming go on even if we are not aware of them, which partially accounts for the spontaneous nature of ideas. Sinnott (supra, pp. 26-27) believes the unconscious provides a more fertile ground for the uncommon association of ideas than does the conscious. Insight, or inspiration, occurs when uncommon associations come together to form a unique solution to a problem, or as Bronowski suggests, when variety suddenly crystalizes into unity.

Mooney (supra, pp. 28-31) answers moral and ethical questions
of creativity by asserting that he finds creativity and the naturally given
to be good but that acts of man can be good or bad, depending upon
their contribution to ever increasing creativity.

Several approaches to the investigation of creativity were re-
viewed (supra, pp. 31-33 ). Interdisciplinary research appeared to be a
valuable approach.

MacKinnon, and Barron (supra, pp. 33-37 ), listed several quali-
ties of creative persons which appear to generalize across occupational
lines. In many respects creative persons from one field are more like
creative people in another field than they are like less creative colleagues
in their own field.

Bloom (supra, pp. 38-39 ) asserted that cultural and educational
conditions can stifle or foster creativity.

Harris (supra, pp. 44-46 ) indicated that the composer's life and
work is a union of two parts, subjective (emotion and insight), objective
(intellect and technique). Brahms (supra, p. 54 ), Berwald (supra, p. 48)
and Peggy Glanville-Hicks (supra, p. 48 ) concur with Harris when
they indicate that composition is a duality of inspiration and effort.

Harris suggested that the composer's cultural heritage and en-
vironment influences his style. Through the composer emotional expe-
rience is intensified and translated into serviceable idioms of culture.
Simpson (supra, p. 46 ) stressed the validity of a composer's thought,
his positive attitude toward life. Simpson's statement implies that the
composer exhibits an open system, which is consistent with Mooney's
theoretical framework. Krenek (supra, p. 45 ) stressed that the neces-
sary training and skill make the objective half of the composer's work
highly intellectual.

The first stage of the musical creative process is called inspiration. Révész (supra, p. 49) identified two theoretical positions concerning the source of inspiration—metaphysical and psychological. According to proponents of the metaphysical view, ideas appear suddenly and miraculously from a divine or supernatural origin without demonstrable preparation. The proponents of the psychological position question the necessity of assuming forces outside the personality in order to understand creativity.

Bahle (supra, p. 50) found inspiration to be the result of the conscious will exerted prior to the appearance of the idea. Inspiration is conditioned by experience, study, tradition, and experimentation. Golovin, May, Poincaré, and Abraham (supra, p. 53) indicated that intense mental concentration and conscious effort are necessary prerequisites to the generation of ideas. Willman (supra, pp. 50-51) found that various circumstances and conditions, in addition to the composer's feelings, have an effect on musical ideas.

Benham (supra, pp. 51-53) noted various things that would affect the quality of a musical idea, including the mood of the composer. Benham also noted kinesthetic, muscular, and auditory imagery in conjunction with the initial appearance of the musical idea. Benham's statements are in agreement with Einstein who noted muscular imagery in the early stages of scientific creativity, but at variance with Whittaker (supra, p. 55) who suggested that the musical image could only be aural.

Howes (supra, pp. 53-54) mentioned the concept of unconscious gestation, or cerebration, which is suspending action on a problem until
the subconscious has had time to work on it. Both Brahms and Fauré (supra, pp. 54-55) indicated they used the process of unconscious cerebroation.

The research cited above supports the psychological position which holds that inspiration is the result of unconscious mental activity, which in turn can be somewhat influenced by emotional, motor, and sensory set.

Two types of musical inspiration were reported: (1) a motive, theme, or fragmentary idea, and (2) the vision of the whole. Hindemith (supra, pp. 57-58) stressed the vision of the whole type of initial musical idea. He said that a composer who writes from a vision of the whole: (1) sees the total composition from the initial inspiration, (2) selects musical material to fulfill the demands of the totality, (3) retains the initial vision throughout the composition of the piece, and (4) possesses the skill to realize the composition. Sessions (supra, p. 58) added that young composers can grow in their ability to see the vision of the whole.

The composer who writes from a vision of the whole seems to be doing the same thing as the painter, i.e., makes the realization match their concept or image of the whole.

Graf (supra, pp. 58-59) maintained that the erotic force, or sensuality, is the driving lustre-giving force, while spirituality and mentality is the forming, shaping force. He emphasized that the erotic force must last throughout the composer's lifetime.

Graf and Dorian (supra, pp. 59-60) suggested that the composer's experience, which is translated into inner growth, affects the quality of
the musical composition. This is in accord with Mooney's theoretical framework.

Several sources of long range inspiration and ceremonies for establishing an atmosphere for creative work were reported. If these sources and ceremonies have value, they are valuable only as each composer has found the circumstances which work best for him. They are not rules for the production of art products.

The second stage of the creative process is called creative elaboration. This stage is a blend of creative impulse and constructive thinking (Dorian, supra, p. 62).

Koepke (supra, p. 63) gave three aids to composition in this stage: tonal memory, the subconscious, and technique. Graf suggested three intellectual functions of composition in this stage: condensing and simplifying, expanding, elaboration, and intensification. Sessions listed three principles of musical structure: association, progression, and contrast. Grant (supra, p. 65) mentioned the "logical unexpected," which is a compositional device that sounds needed and spontaneous but not obvious.

The third stage is creative synthesis. This is the stage where all of the parts are combined in the whole. The concept of the whole gives direction to the work. Walker (supra, p. 69) mentioned the process of "unconscious motivation." This is the process by which the composer writes into a piece items of unification and relationship of which he is unaware.

Whether a composer initiates a composition or it is written as the result of prodding by external circumstances is not a reliable
Indication of the worth of the composition. The worth of a composition depends upon the professional competence and interest of the composer. The ability to persist at detailed work and the ability to sustain effort are necessary qualities for the successful composer. Gross and Seashore (supra, p. 71) found that superior student composers and professional composers: (1) employed theoretical planning, (2) used abstract principles, (3) conceived of musical units within the whole, and (4) checked their work on their instrument.

Hertzmann (supra, pp. 75–76) found that Mozart's composing procedures were characterized by the following: (1) themes almost always stood as they were originally conceived, (2) many compositions were developed mentally and then committed to paper, (3) contrapuntal passages were written out in detail, (4) long compositions were often started in full score and then trailed off to the melody and bass lines. Writing accompaniments seems to be a secondary process.

Upon comparing the working procedures of composers and the general working procedures of creative persons cited in Chapter II, the following characteristics seemed to be common: (1) self-discipline—knowing when to be disciplined, (2) exploring the possibilities of the material, sensing and following its lead—playing with ideas, sensing the forces of the field, (3) working individually, not in groups, and (4) working procedures were adaptably routined—a time clock is meaningless to a creative person.

Révész (supra, pp. 77–78) stated that creative talent in music asserts itself early. Lehman and Ingerham added: (1) compositional quality tends to peak earlier than quantity, and (2) works of contemporary
Americans are written later in life than the works of deceased composers who were studied.

Pressey (supra, pp. 79-80) stated that conditions existed in Europe 100-200 years ago for developing musicians as exist now in the United States for developing athletes. Nash (supra, pp. 80-82) found, in concurrence with Pressey, that the composer's place in society is precarious. The composer is dependent on others for performance. The stress on inventiveness widens the gulf between the audience and the composer, which makes the composer dispensable and renders his financial position tenuous. Composers have adopted methods to gain control of performance: (1) associations, and (2) role versatility. Harris found the composer's situation much as Nash did. Harris maintained that the American concert situation is geared to dead Europeans rather than living Americans.

Montagu, Maier, and Farnsworth (supra, pp. 84-86) each cited possible reasons for the absence of first rank women composers. Montagu suggested that the male has a biological deficiency which the female does not have, and, therefore, has a need to express himself which the female does not have. Maier cited the historical fact that women have only recently participated in the creative arts. He believed a woman composer of stature will be forthcoming. Farnsworth found that women believe that creative activity in music is a masculine activity. Farnsworth maintained that as long as women believe this few will put forth the effort to do creative work in music.

The statement by Toch (supra, p. 86) that one cannot teach composition presents one-half of a long argument. Others (supra, pp. 86-7)
have held that there is a place for a composer on a college faculty for the composer who is interested in teaching. The composer can exemplify a creative attitude as well as teach theory. He can help college students learn self-expression.

Various positions have been expressed concerning approaches to teaching composition (supra, pp. 87-89). Some teachers have students study and write in various historical styles, others emphasize contemporary techniques. Many teachers stress that students know all the styles and have a basic composition technique, but that they express their own musical personality. Some composition teachers stress that learning composition is a progressive development and not the culmination of theory courses.

Writers cited (supra, pp. 89-96) generally agree that every public school child is capable of some creative activity and that some of these children can best express themselves in music. Creative activity can and should be taught. Also, in music, creative activity can help teach theoretical concepts. Projects and procedures for working with elementary, junior, and senior high school students were reported.

Guilford (supra, pp. 109-14) has conducted an extensive investigation of intellectual aptitudes. Several of these aptitudes are related to creativity. Numerous studies have been conducted using the tests Guilford developed to identify his creativity factors.

Lowenfeld (supra, p. 115), in a study of art students, found essentially the same criteria of creativity as Guilford did. Lowenfeld also found significant correlations of scores on an art test of creativity with Guilford's tests. This study established a relationship
between aptitudes of creativity for persons in the sciences and fine arts.

In a study of upper elementary school children, Miller (supra, pp. 116-120) found some relationship between creativity and intelligence. However, not all bright children are creative and some with average intelligence have creative ability.

Getzels and Jackson (supra, pp. 120-123), in a study of highly creative and highly intelligent adolescents, found that correlations of tests of creativity with intelligence tests were non-significant or small. The highly creative and highly intelligent students could not be differentiated by scores on an achievement test. Both groups were equally superior to the total school population. Getzels and Jackson also found that the value placed on a sense of humor by the highly creative students was one of the most important differences between the two groups. The finding concerning the lack of relationship between intelligence tests and creativity tests, and the value placed on a sense of humor were verified in the experimental investigation reported in this dissertation.

Torrance (supra, pp. 124-127) conducted replications of the Getzels and Jackson study which largely support their findings. Torrance found a virtual lack of relationship between creativity and intelligence. Torrance and Anderson presented a "threshold of intelligence" concept which suggested that highly creative students with an I.Q. of 120 or more will perform just as well on achievement tests as highly intelligent students, but creative students with an I.Q. below 120 will not perform as well. Yamamoto (supra, p. 127) conducted a study which largely verified the "threshold of intelligence" concept.

The information reported concerning creativity and intelligence
Indicate that highly creative people are usually well above average in intelligence but that they are not necessarily superior in intelligence to their less creative colleagues. A population of students selected solely on the basis of high intelligence will miss a number of the highly creative students. Many persons are highly intelligent without being highly creative, some persons are highly creative without being highly intelligent, but a number of persons are both highly creative and highly intelligent.

Intelligence tests measure convergent thinking while creativity tests largely measure divergent thinking. These two types of tests therefore measure two different types of thinking ability which partially explains the lack of relationship found between scores on these two types of tests.

Creative ability complements and aids intelligence in performing certain tasks. A person, however, must have an I.Q. of approximately 120 before creative ability will provide the difference and allow one to score as high in a scholastic achievement test as a highly intelligent person. In our educational system a person with an I.Q. of less than 120 will not learn as much, as shown by achievement test scores, as a person with an I.Q. of 120 or more, regardless of his creative ability.

Intelligence complements and aids creativity. In the practical modern world, in order to practice creative thinking in complex areas, a person must have a level of intelligence high enough to enable him to learn the necessary skills. A person with average intelligence may possess an amount of creative ability but he is not likely to master the skills necessary to function in highly complex tasks. He may, however, exercise his creative ability in areas commensurate with his intelligence.
Guilford (supra, pp. 127-130) found very little relationship between aptitude and non-aptitude factors of creativity. He suggested that there is reason, therefore, to describe persons in terms of aptitude and non-aptitude traits of creativity. A study by Marks, Michael, and Kaiser supported the findings of Guilford.

Mednick (supra, pp. 131-133) constructed a test to measure remote mental associations. He found that scores on this test correlated with other criteria of creativity. Springbett, Dark, and Clarke (supra, pp. 133-134) constructed a test to measure the relationship between unconscious and conscious processes. They found some relationship between scores on this test and tests of reasoning and thinking.

The results of the experimental investigation reported in Chapter V showed no significant correlation between any of the fifteen scores on the Creativity Battery and: (1) a measure of scholastic aptitude (OSPE), (2) tests of music skills and knowledge, (3) music theory grades, (4) total university grades, and, for graduate students, (5) graduate grades.

The results of the study showed, for freshmen, some significant (mostly low) correlations between various parts of the Creativity Battery and scores on the Diagnostic Test Battery, notation speed, freshmen English grades, and applied music grades.

The study found four low significant negative correlations between scores on the creativity battery and female sex. This finding indicated that males did slightly better on these factors.

The study found, for freshmen, one low significant correlation between scores on the creativity battery and jazz experience. There
were three significant correlations, for graduate students, between scores on the creativity battery and jazz experience. This finding can be accounted for by the high number of composers with jazz experience. There was only one non-composer graduate student who was also a jazz player.

Six scores were found which significantly differentiated composers from the other music students in the study: Part I Originality, Part I Ratio Originality to Fluency, Part II Originality, Part II Originality to Fluency, Part V Humor, Part V Ratio Humor to Fluency. Intercorrelations of these scores produced a multiple correlation (R) of .61. Intercorrelations of three of these scores produced a multiple correlation (R) of .58, while an intercorrelation of only two of these scores produced a multiple correlation (R) of .57. These multiple correlations are high and should be of considerable utility in a proper prediction situation. This finding shows that composers can be differentiated from other music students on a non-musical test of creativity.

The humor test developed in this study supports the findings of Getzels and Jackson. This study further shows that creative persons actually possess a sense of humor and demonstrate a high incidence of humor in their total output.

As far as the investigator could determine, the ratio scoring technique was used for the first time in this dissertation. This technique discriminates creative from less creative persons in situations where a total quantitative measure does not.

Both the humor test and the ratio scoring technique are powerful tools for purposes of discriminating creative from less creative students,
and help produce high multiple correlations (R's) for prediction purposes.

Conclusions

Most of the information presented in this dissertation will fit within the framework developed by Mooney. Those references which stress the importance of openness to experience, and the role of depth experience in the formation of creative products, are especially in close agreement with Mooney's theoretical position.

Creative persons from different fields exhibit similar creative thought processes. The differences which exist are due to the differences in materials and technique, and the relation of the field to human experience. Because creative persons from different fields tend to show similar creative thought processes and personal qualities, the working procedures of creative persons also show some similarity between fields. The qualities and actions of creative persons tend to be more like creative persons in other fields than like their less creative colleagues in their own field.

The cultivation of unconscious processes are important for the production of uncommon associations of ideas. Uncommon associations are important in forming unique solutions to problems or receiving creative ideas. Unconscious processes are not dependent on whim but can be influenced by mental, motor, and sensory activity.

There is a place for a composer on a college faculty if he likes to teach. He can provide an example of a creative musician at work—a person expressing himself with music materials. He should be able to provide guidance for young musicians in their work with musical creative processes.
Creative activities in music help introduce the public school students to creative processes. Creative activities help the student satisfy a need and a desire to express himself, as well as aid in the discovery of musical creative talent.

Due to the differences in the thinking abilities being measured, scores on creativity and intelligence tests usually do not show significant correlations. Creative people, therefore, cannot be selected on the basis of high intelligence. Since creativity and intelligence tests measure different aptitudes, there is reason to describe persons in terms of both creativity and intelligence.

Guidance counselors and college entrance officials would do well to include selected persons with high creative ability in special programs and classes, for there is evidence that many highly creative persons perform just as well as highly intelligent persons in certain academic situations. The abilities of creative persons need to be developed to the fullest, for their own sake and for the betterment of society. New solutions to problems, new inventions, new art products, will only be forthcoming from persons who have high creative ability as well as the requisite intelligence, not from those with high intelligence alone.

Composers have creative aptitudes which significantly differentiate them from other music students. These creative aptitudes are in addition to musical aptitudes that composers must demonstrate, and can be measured by non-musical creativity tests. The multiple correlations (R's) produced by scores on the creativity battery used in this dissertation are high enough to lead one to believe that a testing program could be initiated in a university school of music which would identify creative
music students upon entrance. Such a program could result in guidance and placement procedures that would be valuable both to the student and to the school.

The humor test and ratio scoring technique developed in this study are valuable tools for use in creativity testing. The scores on the humor test concur with previous studies which show that a sense of humor is valued by creative persons. This study, however, goes a step further and shows that not only is a sense of humor valued by creative persons but it is an attribute which permeates their thinking. Creative persons not only value a sense of humor, they possess a sense of humor.

Creative persons are not only more original and humorous than other persons in a total quantitative sense, but the ratio scoring technique shows that they demonstrate a higher incidence of originality and humor in their total output. The responses a creative person gives will show a higher percentage of original and humorous responses among the total responses than will those of a less creative person. The ratio scoring technique may prove to be a most efficient and reliable tool for discovering creative persons because it discriminates in situations where a straight quantitative measure does not.

Implications for Educational Practice

1. Creative activities for public school students should be initiated or increased to include: (1) individual and group work in music composition including the composing of songs, motifs for story characters, and instrumental pieces; (2) improvising songs in the early grades, recording the best of them for subsequent notation; and (3) performance of
the original pieces by school or community groups.

2. Music classes for secondary school students should include activities in music composition.

3. Creative activity in music should be a part of college level music classes for non-music majors. This activity could include: (1) individual and group work, both teacher and student notated; (2) improvisation and composition, recording the work on a tape recorder; and (3) composition of electronic music by science and mathematics oriented students.

4. Creative work should be an integral part of music theory instruction for music majors.

5. A program of creativity testing should become a regular part of the entrance testing program of music schools.

6. Persons who are responsible for selecting students to programs for the gifted should consider highly creative students even though their I.Q. may not quite meet the minimum score.

7. The value of creative ability should be recognized by instituting special programs for the highly creative student.

Implications for Teacher Education

1. Elementary school classroom teachers should receive training in creative activities in music in order to be able to conduct these activities in the classroom.

2. Guidance and testing personnel should receive training in the administration and scoring of creativity tests.

3. Public school music teachers should experience creative
activity in music as part of their training to help them lead public school students in these activities.

4. Prospective teachers of college music theory should receive training in music composition so that they can introduce and guide creative activities as an integral part of the work of the music theory class.

5. A composer should be a regular member of the college music staff so as to provide an example and guidance for creative music students.

Hypotheses

The following statements are hypotheses, generated by the findings or implications of this dissertation. Suitable research procedures could be found to test their validity.

Inspiration

1. The behavior which is frequently labeled inspiration is the result of unconscious mental activity which can be somewhat influenced by mental, emotional, motor, and sensory set.

2. The initial idea of the musician is like the mental and emotional image of the painter, and the realization process of the musician's idea and painter's image is similar.

Cultural and educational considerations

1. Comparative study of cultural and educational conditions affecting creativity can be made which will show an optimum environmental setting for creative activity.

2. At some point in the elementary school, many children begin to conform to the demands of society so rigidly that they begin to lose their creative outlook.
3. Creative activities with the general public school student can become a useful and regular part of the school music program.

4. Creative activities in music can be a useful part of the general music education of the college non-music major.

5. The creative process in music can be communicated to music students so that they can apply principles of creativity in their work.

Attributes of creativity

1. The non-aptitude qualities of creative musicians can be studied which will show them to be like creative persons in other fields.

2. Creative persons have thinking processes and working procedures which can be identified, codified, and made available to other workers.

3. Similar attributes of the creative process between the arts, and between the arts and sciences, can be demonstrated.

4. There is a relationship between muscular tension and creativity which is in turn related to optimum age for creativity.

5. There is a relationship between a person's decreasing erotic drive and decreasing quality of art products.

Creative thinking processes

1. Unconscious processes can be studied in a manner which will result in useful information that can be transmitted to others.

2. Conscious work which precedes and follows unconscious processes can be studied in a manner that would render the attendant unconscious processes more useful.

3. The best composers receive initial ideas as a "vision of the
whole" and retain this mental picture throughout the composition of a piece.

Creativity testing

1. Creative musicians are usually above average in intelligence but not necessarily superior to other musicians.

2. Freshmen superiority on measures of fluency could be found if the instrument were more refined.

3. Creativity testing would show similar intellectual aptitudes between creative persons in the fine arts and music.

4. The ratio scoring of humor to fluency and originality to fluency will increase the reliability of creativity testing in music and other areas.

5. The humor test (black-out cartoons) will remain as a powerful tool in discovering creative persons in music and can be established as a powerful tool for the selection of creative persons in other areas.

6. A test of esthetic sensibility could be constructed which would be useful in selecting creative persons.

7. Other creativity factors, besides originality and humor, can be found which will differentiate creative from less creative musicians.

8. A creativity testing program can be instituted as part of a university school of music testing program for purposes of selection and guidance.

9. The correlation of aptitude and non-aptitude traits of creative musicians would be found to be low.

10. A higher significant correlation between the score, ratio humor to fluency and applied music grades will be found for upper division school of music students.
11. Further studies of graduate student composers and non-composers will continue to show a high incidence of jazz players in the composer group and a low incidence of jazz players in the non-composer group.
APPENDIX
PART V BLACK-OUT CARTOONS

On this test you are asked to list as many titles as possible for a blacked-out picture.

Example:

1. Romeol Romeol  
2. Edgar, why don't you just write your stories?  
3. Anyone can do it with the top down!

On the examiner's signal, turn the page and list as many possible titles for a similar picture as you can. You will have five (5) minutes.
1. Have you ever written an original poem, short story, play, or essay which was published, given a public reading, or received a prize? _______ (yes or no)

2. If yes, how many? poems______, short stories______, plays______, essays______.

3. Have you ever written an original musical composition which was published, performed, or given a reading? _______ (yes or no)


5. Have you ever written an arrangement of a musical composition which was published, performed, or given a reading? _______ (yes or no)


7. Have you ever conducted in public? _______ (yes or no)

8. Have you had satisfactory experience in the field of jazz improvisation? _______ (yes or no)
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