CREATIVITY: A REVIEW OF THE LITERATURE
AND AN EXPERIMENTAL INVESTIGATION OF SOME FACTORS
ASSOCIATED WITH CREATIVE WRITING ABILITY

A Thesis
Presented to
the Education Department
of the University of Canterbury

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Master of Arts

by
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ABSTRACT

This study reviews selected aspects of the literature on creativity and reports on an investigation of some cognitive, personality, and environmental factors found to be related to creative writing ability in children.

A critical analysis of the status of creativity research is presented. A detailed discussion of definitions of creativity — both as a product and a process — is followed by an analysis of the stages of the creative process. The problems encountered in attempts to measure or identify creativity are outlined, particular attention being paid to the Minnesota Tests of Creative Thinking. The literature on factors found by various investigators to be related to creativity is discussed in detail, selected areas giving rise to hypotheses which are tested in the experimental part of the study.

Based on scores achieved on the criterion measures (two tests of creative writing), 32 Higher Creatives (HC) and 32 Lower Creatives (LC) were selected from a total sample of 189 Form I children from 6 urban Intermediate Schools. Limited data were available for the total sample.

The HC group scored significantly higher on: all subscores of the Verbal Form of the Minnesota Tests of
Creative Thinking, two of the five subscores of the Non-Verbal Form of that battery, intelligence (Otis and WISC), six of the ten WISC subtests, silent reading skills (A.C.E.R. battery), teacher-rated Written Language and Spelling, teacher preference, socio-metric status in peer group, social confidence in interview, number of books read per week, degree of participation in extra-curricular lessons, teacher-rated independence, and degree of initiative and task-motivation in individual interview.

There were no significant differences between the two contrast groups on three of the subscores on the Non-Verbal Form of the Minnesota Tests, socio-economic status, sibling order, four of the WISC subtests, teacher-rated Arithmetic, teacher-rated co-operation, age, and such factors as after-school employment, cinema attendance, television viewing habits, school subject preference, and future occupational preference.

Other findings included moderately high correlations between creative writing and verbal creativity (0.66), WISC intelligence (0.60), reading (0.59 to 0.72). Of the fifteen possible inter-school differences on the criterion measures, ten were significant. Girls were not superior to
boys in creative writing scores. A detailed description of the criterion measures included its test-retest alternate forms reliability of 0.68 and an interrater coefficient of 0.76.

It was concluded that creative writing ability seemed to form part of a syndrome of cognitive abilities and personality attributes that emerges from a favourable concomitance of the individual's own needs and potentialities and the social milieu in which creation takes place.

Limitations of the study — particularly the caution needed when generalizing to more representative populations — some practical implications, and some future research needs are described.
INTRODUCTION

Although the body of research on creativity is relatively small and there are many different opinions held as to its nature, there is wide agreement as to its importance to both society and the individual and of the necessity for educators to understand it. Far from being a mysterious, spontaneous process which defies analysis, then, creativity is increasingly being viewed as an area worthy of study.

In this introductory section the following topics will be discussed briefly:

1. Background to the study.
2. Aims and design of study.

Background to the Study

Several reasons for selecting creativity as a topic for study presented themselves.

Firstly, although creativity has long been recognized as essential to the improvement of man's lot, until recently there has been a dearth of objective research on the topic, particularly at the primary school level.

Secondly, the literature abounds with controversy, speculation, and poorly-designed research, there
being "a crying need for an entirely fresh examination of the subject from top to bottom," according to Burt (1964, p. 15).

Thirdly, it seemed timely for research to be conducted within the New Zealand context in order to establish the generality of findings emerging from a literature dominated by American studies.

The fourth reason for selecting the topic was the writer's personal interest in the field of giftedness. It was hoped that a detailed study of creativity would provide useful guidelines for classroom methodology.

The study was commenced in 1962, the literature being surveyed during 1962–64. Although some 1965 sources were studied, only the pre-1965 literature was examined with any degree of completeness. The field work was conducted in Auckland during the winter of 1964 under the supervision of Dr W. B. Biley, then lecturer in Education at the University of Auckland, to whom the writer's indebtedness is gratefully acknowledged. The co-operation of the principals and teachers of the six Auckland schools in which the research was conducted is also recorded with appreciation.
Aims and Design of Study

The general objective of this study was to investigate some of the factors that are associated with creativity. To this end the specific aim was to inquire into some of the environmental, cognitive, and personality variables that are associated with creativity as manifested in creative writing ability.

The design of this investigation involved selecting from a top-stream Form I population of over two hundred children from six Intermediate Schools in Auckland, the thirty-two who were judged to have high creative writing ability and the thirty-two judged to low in this ability.

These two groups were then compared with respect to such factors as intelligence, creativity (on the Minnesota battery), school attainment, home background, sociometric status, and personality ratings. In addition to the intensive study of these two contrast groups, limited data were obtained for the total population.

In determining the design and orientation of the investigation, theoretical, methodological, and practical considerations all played major roles and these will be described in Part Three. However, it is appropriate
at this stage to describe the reasons behind the
writer's decision to include a comprehensive review
of the literature on creativity. Taylor's statement
is germane to this issue:

...Currently the literature on creativity is
scattered throughout a great variety of sources,
including unpublished materials. There is no
single, integrated critical review to which the
researcher, educator, or layman can turn for a
useful, succinct overview...

(Taylor, 1964, p.ix).

When creativity was selected as the field of
study for this thesis, the writer rapidly became aware
of the lack of what Taylor termed a "succinct overview"
of the literature on this topic. This fact, together
with the controversial nature of much of the published
material and the paucity of research, led to the con-
clusion that it was both appropriate and necessary to
place the experimental aspect of this investigation in
its broad psychological framework.

The broad aims of this thesis that emerged,
then, were two-fold: firstly, to summarize the
current knowledge of creativity and, secondly, to
investigate the relationships between creativity (as
manifested in creative writing) and various environ-
mental, cognitive, and personality factors.
Organization of Thesis

The remainder of this thesis falls into four major divisions:

1. Creativity in historical and theoretical perspective.
2. Creativity and related variables.
4. Summary and conclusions.

Creativity in historical and theoretical perspective. The four chapters in Part One will review the salient literature on the concept of creativity and will aim at placing the study properly in broad perspective. After a brief review of the status of creativity research — both past and current — a chapter will outline various attempts that have been made to define the concept. A separate chapter will be devoted to an examination of the process of creativity, particular reference being made to Wallas' classic analysis of stages in the creative process. The final chapter in Part One will consider in some detail the problems of measuring and identifying creativity, particular attention being focussed on the Minnesota Tests of Creative Thinking.
Creativity and related variables. The four chapters in Part Two will review some of the literature on factors found by various investigators to be associated with creativity. Chapter V will consider the relationships between creativity and such environmental factors as society, education, and family background. The next chapter will focus on the relationship between creativity and intelligence, while Chapter VII will review the literature on creativity and achievement. Chapter VIII will outline research on personality variables found to be or hypothesized as being related to creativity, the discussion concentrating on social adjustment, interests, and motivational factors. The final chapter in Part Two will outline the relationships between miscellaneous variables such as age and sex.

The chief significance of Part Two lies in the fact that the hypotheses which are tested in the study proper emerge from the literature as reported in this section. These hypotheses will be stated at the end of each section and will be collated at the beginning of Part Three.

Report of the study. The seven chapters of Part Three will describe the methodology and findings of the study. Chapter X will outline the aims and
procedures of the investigation, while Chapter XI will discuss the findings pertaining to the criterion measure employed. The remaining five chapters — XII to XVI inclusive — parallel Chapters V to IX respectively in Part Two and will discuss the relationships found to exist between creativity and environmental, cognitive, personality, and miscellaneous variables. These five chapters will have sections setting out the hypotheses, method, results, and a discussion of the results in the light of evidence presented in Part Two.

**Summary and conclusions.** Part Four will summarize the study, draw together the conclusions, and make suggestions for further research.
PART ONE

CREATIVITY IN HISTORICAL AND THEORETICAL PERSPECTIVE

The four chapters of this section of the thesis will review the literature bearing on the concept of creativity and its measurement under the following chapter headings:

1. Status of creativity research.
2. Definitions of creativity.
3. The process of creativity.
CHAPTER I

STATUS OF CREATIVITY RESEARCH

Until recently, the study of creativity has either been avoided as being something mysterious and not subject to the laws of nature or has largely been confined to biographies or introspective personal reports of people acknowledged as being creative. However, since 1950 or so, the experimental approach has been brought to bear on the area to an ever-increasing extent and the future appears to hold out considerable promise for an increased scientific understanding of creativity as a psychological, sociological, and educational phenomenon.

The remainder of this chapter will consider the following five topics:

1. Historical review of research.
2. Current conceptions of creativity.
3. The methodology of research.
4. Research emphasis on adults.
5. A critical evaluation of research.
Historical Review of Research

In reviewing the status of creativity in the literature of his time, Putnam (1931, p. 392) found that for the year 1930, only two articles on "creativity" appeared in the Psychological Abstracts and that these were trifling. He concluded that productive thought 'constitutes an island in the sea of psychological lore.' Twenty years later the position appeared to be no better, Guilford (1950), in his landmark address to the 1950 Conference of the American Psychological Association, indicating what he considered to be an appalling neglect of the study of creativity. In a survey he had made of the index of Psychological Abstracts over the preceding twenty-three years, he found that less than two-tenths of one per cent of the articles were indexed as definitely bearing on the subject of creativity. In a later article, Guilford (1962, p. 350) ascribed this neglect to the following:

For centuries the common idea had been that only the exceedingly rare person is genuinely creative and that creativity is a divine gift. As such it was not to be investigated, or at best, there was little hope of understanding it.
In tracing the development of the concept of creativity, H. Taylor (1956, p. 8) looked at the influence of philosophies that have pervaded the more immediate past. He developed the interesting hypothesis that in the eighteenth century in the western world, the quality most prized was the reason and rationality of mankind. By the middle of the nineteenth century, however, the idea of the rational, balanced, and logical man began to fade and was replaced by the romantic, the revolutionary, the one who thrust his personal views upon the world. Thus, to Taylor, the idea of creativity is "part of the romantic movement, the protestant movement, the liberal revolt against authority and a static society."
The philosophy which supported it was that of the latter half of the nineteenth century when philosophers derived the idea of creative evolution, of a profusion of unfolding possibilities of the universe and everything in it.

Surprisingly enough, the more negative features of the positions described by Hutchinson, Guilford, and Taylor are by no means outmoded for, as recently as 1962, MacLeod (1962, p. 178) made the claim that:
The psychologist who insists that creativity can be studied scientifically must bear the burden of proof in the face of centuries of testimony from mystics and artists, and even from ordinary people who claim that at least in his moments of inspiration men are not subject to the laws of nature.

A view similar to that of MacLeod was expressed by Ghiselin (1963, p. 42) who considered that since creative work is essentially the movement of the spirit overpassing old limits, "it is fundamentally understandable and appraisable only as a spiritual advance."

Current Conceptions of Creativity

From the paucity of research prior to 1950 to the current spate of publications has been a rapid step. Much of this growth parallels the expansion of research in psychology in general but it also indicates an increasing recognition of the need to bring objective methods to bear on the study of a socially-valued ability. It represents, too, the growing recognition that creativity is not an esoteric ability possessed by the few, but is, in fact, a potentiality which all people possess to some degree.

The remainder of this section will consider the following three topics:
1. Society's need for creativity.
2. The universality of creativity.
3. Current research emphasis.

Society's need for creativity. There is wide agreement among writers with the sentiment expressed by M. Taylor (1956, p.8) in his explanation of current concern for creativity. Taylor considered that this interest reflected the belief that without creativity "no society or civilization is worth having or is able to sustain itself." This feeling was reflected, for example, in Russell's (1960), Carpenter's (1962), and Burt's (1964) comments to the effect that the nature of creative thinking holds out one of the best of all hopes for the future of mankind. Similar thoughts were expressed by Guilford (1962) when he claimed that if we could somehow raise the level of creativity of the average person, the social consequences would be very great, and by Lowenfeld (1959) who spoke of the growing consciousness of the meaning which the creative spirit has for man's survival provided it is carried by the deep desire to promote human values.

The universality of creativity. Many writers have expressed their conviction that, instead of being a very rare capacity, creativity is "manifested in
some way and to some extent in almost everybody."

Murray (1959, p. 100), the source of this quotation, acknowledged that he accepted this proposition as an inference from Whitehead's philosophy of creativity as a metaphysical ultimate. As Whitehead himself asserted (cited by Burnett, 1957), "neither God nor the world reaches static completion...you cannot permanently enclose the same life in the same mould."

William James and John Dewey, too, in their philosophies of creative evolution, also accepted the idea of creativity as the central point of their systems of thought (H. Taylor, 1956). The human mind, for James, was continually creating its own knowledge out of the stuff of human experience. For Dewey, the child who learned about his world and himself by his own experience was acting creatively. Other writers to have provided support for the theory of the commonness of creativity include Guilford (1950), Wilson (1958), Russell (1960), Carpenter (1962), Lebois (1963), Taba (1963), and Hart (1950, p.15), the latter

"Koestler (1964, p.17) has even suggested that creativity is by no means a peculiarly human gift: "it is merely the highest manifestation of a phenomenon which is discernible at each successive level of the evolutionary hierarchy..."
discussing the "integrative tendency" inherent in the creative urge as being common to all living matter.

It would seem, then, that creativity is widely viewed as a common characteristic distributed along a continuum. As such, its study has significance for all men and is a primary imperative for consideration.

Current research emphasis. As a result of the above and similar attitudes towards the study of creativity, research is increasingly being focussed on such areas as the following:

1. the criteria of creativity;
2. the development of objective tests of the ability and the establishment of the longitudinal validity of such instruments;
3. the personality of creative individuals (including cognitive and non-cognitive factors);
4. the effect of various educational and social-cultural factors;
5. the structure of creativity, i.e., a general factor versus specific factors.

It will be noted that many of these areas are, as Thurstone (1952, p.28) observed, "more or less analogous to those which marked the scientific study
of intelligence." Indeed, many of the leading theorists in the field of intelligence, such as Vernon, Cattell, Guilford, Spearman, and Thurstone, have made important contributions to the study of creativity. The many similarities that exist between the two areas of creativity and intelligence have enabled the experiences, knowledge, and procedures derived from the latter to be applied to the study of the former. This association, plus the recent availability of computers which have facilitated the use of large and complex patterns of tests and have made possible large factor and multiple-correlation studies, has meant that researchers in the field of creativity have been able to "short-circuit" some of the problems that were encountered in the study of intelligence. This has resulted, as Taylor and Holland (1962, p.91) have indicated, in some researchers arguing that the burgeoning research movement in creativity "with its broad approach and resistance to premature crystallization" is much healthier than was the intelligence testing movement at a comparable time.

The Methodology of Research

Many different approaches have been employed in the study of creativity. Mooney (1957a) for example,
has identified four different aspects of the problem:

1. the product created,
2. the process of creativity,
3. the person of the creator, and
4. the environment in which creation comes about.

Even within these four categories there has been a range of research orientation. The products studied, for example, have included scientific, artistic, and literary productions as well as performances on so-called tests of creativity. The persons studied have ranged from adults (the rare geniuses of history to shop assistants) to children, from homogeneous to heterogeneous ability groups, and from those of proven creative ability to those in whom creative ability is predicted.

General methods of study, too, have varied. The principal dimensions of this variation include a range from pure speculation to scientific research of varying degrees of quality and breadth of scope, from a psychological to a sociological orientation, and from an emphasis on cognitive variables (aptitudes and abilities) to an emphasis on "affective" variables (temperament and motivation).
The aims of research, too, have been many. Studies have tried to discover the effect on creativity of such influences as heredity, constitution, health, sex, age, race, socioeconomic status, society and culture, family relationships, learning, intelligence, education, temperament, and sociometric status.

Not surprisingly, many specific research methods have been employed, these including such approaches as environmental surveys, descriptive psychometrics, personal histories, behavioural rating scales, and many others.

This diversity of approach to the study of creativity is both a sign of strength and the source of its greatest weaknesses. Thus, while research has been and is proceeding on a broad front — often on the margins between fields of study — this admirable quality has inevitably made for a paucity of research coverage in some areas and difficulties in integrating and evaluating findings in others.

**Research Emphasis on Adults**

While significant progress has been made in describing creativity in adults — particularly the adept — relatively less work with children has been conducted. As Borland (1964) observed, most of the
research has concentrated on professional, technical, scientific, and armed forces personnel, forty-five out of a total of fifty-nine reports in Farnes and Harding's (1962) compendium of research on creativity being concerned with this type of student.

With the chief exception of the work of Torrence and his associates at the University of Minnesota, there are very few major studies of creativity at the primary school level and even fewer investigations of creative writing ability at this level.

A Critical Evaluation of Research

In addition to the range of approaches to the problem and the paucity of research in some areas, the whole topic of creativity has become cloaked in an aura of controversy. As will become apparent in the course of this review of the literature, this has arisen as a result of many factors. Chief of these would be the predominantly speculative nature of much of the available literature, the difficulty in dealing with the problem of establishing criteria and validity for tests of creative ability, and the methodological weaknesses of some of the reported investigations. Indeed, in a critical review of the status of the research into this area, Burt (1964, p.20) went so far
as to claim that

apart from a few unconvincing speculations varying with the prepossessions of each writer, there is as yet no sound psychological basis either for the theorist or the practitioner.

Specific criticisms of research and reporting procedures, of course, are many and varied. The detailed critique of Getzels and Jackson's (1962) study, presented elsewhere in this thesis, illustrates the vulnerability to technical criticism of much research conducted in this area. Gallagher (1965, p.103), in a review of Torrance's (1963) "Education and the Creative Potential", is another to have raised serious questions about the quality of some research into creativity. In his critical article, Gallagher castigated Torrance for adopting the methods of "the advocate rather than the scientist," for sacrificing careful analysis of specific problems for breadth of coverage, for insufficient attention to the matter of validating his tests of creativity, for his unquestioning acceptance of Getzels and Jackson's procedures and findings, for research which "has the appearance of haste and incompleteness in execution," and for a casual approach to the presentation of data. Similarly scathing criticism of Taylor's (1964) "Creativity: Progress and Potential" was contained in Nichols' (1965, p.104) review of that book.
He made the comment that the reader's first impression of Taylor's book is that "he is at a brainstorming session where evaluation is suspended and all ideas are considered good." Nichols also criticised the lack of attempt to integrate and evaluate ideas and pointed to the confusion that results from the author's failure to differentiate between the different conceptions of creativity.

It is little wonder, then, that Burt (1964, p. 15) has written that there is a "crying need for an entirely fresh examination of the subject from top to bottom."

Summary and Conclusions

After a brief historical review of the status of creativity research, this chapter went on to discuss some current conceptions of the field of creativity, the wide variety of methodological approaches employed in its study, and the research emphasis on adults. A final section made brief mention of some of the more controversial aspects of research conducted to date.

Although the past decade or so has witnessed a marked increase of interest and publication in the general field of creativity, it remains an area dominated by a paucity of well-controlled or integrated studies. Nevertheless, research on creativity, in its
infancy in U.S.A. and hardly begun in Britain and elsewhere, holds out considerable promise for enlarging our understanding of our resources of human potential and the environmental circumstances that favour its expression. Certainly, no longer can it be said that the dimension of creativity has been "ignored, minimized, or allocated to the arts..." (Givens, 1963, p.128). For a while at least, however, we may have to learn to live with "imperfections, inevitable incompleteness, a poignant sense of unrealised intentions" (Taylor and Barron, 1963, p.372) as research into this area assumes a greater maturity.
CHAPTER II

DEFINITIONS OF CREATIVITY

The word "creative" has become so worn with use that it is now used to identify almost anything or anyone of which we approve.

(H. Taylor, 1956, p.7)

Ten years later, Taylor's somewhat cynical comment continues to hold a large degree of truth. No single definition of creativity has yet been advanced that suits all workers in the field, the study of the concept being complicated by the multiplicity of meanings that have been attached to a profusion of terms used to describe it.

In an attempt to impose some degree of order in a confused area, this chapter will consider the literature bearing on the following five topics pertaining to the definitions of creativity:

1. Kinds and levels of creativity.
2. The wide range of definitions.
3. Definitions emphasizing the creative product.
4. Definitions emphasizing the creative process.
5. Definitions emphasizing both process and product.
Kinds and Levels of Creativity

Is creativity the same wherever it is found? While Thurstone (1951, p. 55) answered this question in the affirmative, several writers have contended, like Carpenter (1962, p. 392), that there are "many types of creative thinking and acting, or many individualized processes for achieving creative results."

Ghiselin (1963, p. 42), for example, described his conception of two levels of creativity, one lower and one higher. The former kind, he described as functioning by initiating wider use of an already-developed meaning. Creativity of the higher (primary) sort, on the other hand, restructures the universe of meaning itself by introducing "some new elements of meaning or some new order of significance..." A more elaborate breakdown was proposed by Lebois (1963) who differentiated between "macroscopic" creativity (man developing as a human being) and "microscopic" creativity (man engaged in a particular act of creation). Lebois further differentiated creativity in terms of levels of intensity. At the initial "spontaneous-expressive" level, factors such as spontaneity and self-expression are dominant. At the intermediate "technical-inventive" level, the process is dominated by deliberateness, aesthetic order, and realistic thinking.
At the highest level, referred to as the "integrative-emergentive" level by Lebois, spontaneity fuses with deliberateness, aesthetic order, and realism, resulting in the emergence of the creative product.

With a slightly different orientation to the above writers, Maslow (1958, p. 239) submitted that there is evidence of two kinds of creativity — primary and secondary. The former type — transcending both of Ghiselin's (1957) "levels" of creativity — includes "the source of new discovery, of real novelty, of ideas that part from what exists at this point." This category resembles what Lebois described as the "spontaneous-expressive" level of creativity (see above). Secondary creativity, on the other hand, Maslow considered to be a more rational productivity which requires the patience of a deliberate and analytical-minded scientist (cf., Lebois' intermediate and "integrative-emergentive" levels).

Givens (1963, p. 129) adopted an approach which is slightly different again when he postulated the existence of two kinds of intelligence — adaptive and creative. Adaptive intelligence — corresponding to our present notions of intelligence as measured by current tests — is analytical and problem-oriented. Creative intelligence, however, Givens considered to be a category of behaviour
which emphasises synthesis, originality, divergent thinking, and spontaneous expression. Similar problem-solving/creative continuums were advanced by Newell et al (1962) and by Russell (1956).

Many writers, too, have distinguished between literary, scientific, and artistic fields of creative endeavour, claiming that the commonality they share is outweighed by the different abilities and personality attributes required for each.

It would seem, then, that although the general term "creativity" is employed widely, it should not be permitted to obscure the diversity and complexity of behaviours considered to fall within its rubric. It is therefore important for researchers to define clearly what they mean by creativity, so that the extent of its generality is clear.

The Wide Range of Definitions

As recently as 1965, Yamamoto felt constrained to point out that studies in creative thinking have been beset by ambiguities in definitions and that creativity, for the moment, "would seem to be used as a generic term." Terminology in this area has ranged from nomenclature such as "creative thinking" and "creative ability" to "originality," "imaginativeness,"
"productiveness," "ingenuity," and "inventiveness."
Such a profusion and confusion of terms is both a symptom
and a cause of the lack of precision that has so far
characterized much of the research in this area. This
lack of a precise taxonomy has, of course, made the task
of integrating the findings of different researchers a
very difficult one.

What reasons are there for this confusion?
Vinsonke (1952, p.238) ascribed it to the failure on the
part of the investigators "to differentiate between the
product of creation and the mental process which precedes
it." Others, such as Anderson (1959b), Carpenter (1962),
and Torrance (1962a), have written in a similar vein.
Mooney (1957a) and Rhodes (1961), went even further,
claiming that there are four significantly different
aspects of creativity, namely (1) the product created,
(2) the process of creating, (3) the person of the crea-
tor, and (4) the environment in which creation comes about.
Each of these aspects affords a different approach to the
identification of creative talent; each, therefore, has
a different ultimate criterion and a different definition.

It will be noted that in the preceding analyses
of definitions of creativity, the distinction between
process and product is made consistently. On the basis
of this distinction it was decided to examine the definitions employed by various investigators whose works were studied in preparing this thesis. Out of a sample of some fifty-two definitions of creativity, the following facts emerged: twenty-five — approximately one-half — focussed on the process alone, seventeen on the product, and ten combined both perspectives. It is also interesting to note that less than one-third of the researchers gave an explicit description of what they meant by creativity.

It seems apparent, then, that no single definition will be able to encompass all the meanings that have been attached to the term "creativity." It is quite possible, therefore, that as Yamezco (1964a, p. 403) suggested, "various investigators could be studying quite different aspects of human behaviour according to the specific definition of the term employed."

The following sections will consider in some detail attempts that have been made to define the concepts from each of the three perspectives outlined in the preceding paragraph.
Definitions Emphasizing the Creative Product

So often misquoted as denying the concept of creativity, Burt (1964, p.15) has provided one of the most coherent and comprehensive product-oriented definitions of the concept. In his foreword to Koestler's (1964) book, Burt considered that the notion of creativity should embrace four criteria:

First, there must be the basic idea or conception; secondly, the idea must be embodied in concrete and articulate form...; thirdly, the outcome as thus embodied must be new; and finally...it must have value; the novelty must be a useful novelty.

The majority of definitions of the creative product have, like Burt's, emphasized the quality of newness. Flanagan (1963, p.92), for example, talked of "evoking something new into being," whilst Chiselin (1963, p.36) described a creative product as being "new in the sense of being unique, without specific precedent." Drewdahl (1956, p.22) adopted a similar emphasis when he defined creativity as involving the production of "compositions, products, or ideas of any sort which are new or novel." Other writers have employed such synonymous phrases as "the production of novelty" (Bruner, 1962, p.1), "uncommonness" (Barron, 1955, p.478), "new intellectual and aesthetic products" (Parkyn, 1964, p.20), freshness, novelty (Whitehead in Burnett 1957)
and Dunkel (1961)), and "novel work" (Stein, 1958).

"Newness," however, is a relative concept and requires further qualification before it becomes invested with practical meaning.

The problem of determining the newness of a product was taken up by Wilson et al (1953) who pointed out that, at one extreme, newness has the connotation of never having been thought of by anyone. In practice, they said, this would be impossible to verify. At the other extreme, newness may be interpreted as including all human behavior that is not repetitive. Bredahl (1956, p.22), for example, talked of products "previously unknown to the producer." Such a conception, however, also fails to be meaningful since it does not allow for differences between more creative and less creative individuals. In a widely-accepted attempt to solve this problem of determining the newness of a product, Wilson et al (1953) defined originality operationally as being the ability to produce ideas that are statistically infrequent for the population of which the individual is a member. Such a definition has, of course, much more relevance to children's creativity.

*An example of this approach would be Chambers' (1964, p.2) discussion of products "which are new or novel to civilization."
However, considerably more variables enter into the determination of creative products than originality alone. Because originality is basically a quantitative rather than a qualitative concept, most investigators have recognized that a value judgement must be made before "original" products can properly be called "creative" products.

In describing this judgemental factor, Barron (1955, p.479) asserted that a response must be to some extent "adaptive to reality." Stein (1958) is another to have taken cognizance of this factor by defining the creative product as that novel work "that is accepted by a group of significant others as useful, tenable, or satisfying at some point in time." Similar conditions were laid down by Mednick (1962, p.221) when he talked of creative products which "meet specified requirements or are in some way useful," and by Mackinnon (1962, p.485) who considered that if a response is to be considered creative it must "to some extent be adaptive to, or of, reality." In a similar vein, Maltzman (1960, p.299) talked of the importance of relevancy and of the reactions of other members of society to the product, while Ginsburg (1964, p.3725) referred to the ability to resolve recognized disparities "in unusual but appropriate fashion."
Bruner (1962a, p. 4) talked simply of "interest" (i.e., "relation to some enterprise in a person's life.") and of "effective surprise" (1962a, p. 3). MacKinnon (1962, p. 483) refined the concept of the creative product even further when he distinguished between "artistic" and "scientific" creativity. In artistic creativity, the creator externalizes something of himself into the public field, whereas, in scientific creativity, the product is unrelated to the creator as a person. Artistic creativity, therefore, results in products that are clearly expressions of the creator's inner state, his needs, perceptions, motivations, and the like. Such is the stuff of creative writing. In scientific creativity, on the other hand, the creator acts as a mediator between externally defined goals, operating on some aspect of his environment to produce "a novel and appropriate product" which contains little of his personal style. MacKinnon also recognized a third type of creativity in which the practitioner must be both artist and scientist. In this third form of creativity, the product is both an expression of the creator and at the same time a meeting of the demands of some external problems. Architects, mathematicians, and musical performers fall into this category.

"Discussed in more detail on p. 35 of this thesis."
Above all else, then, product-oriented definitions of creativity — whether in the fields of "artistic" or "scientific" endeavour — emphasize the dual qualities of neatness and appropriateness. In view of this distinction, one must guard against an existing tendency to generalize some of the findings that apply strictly to originality as if they also applied to creativity.

Definitions Emphasizing the Creative Process

In the next chapter of this thesis the nature of the creative process in general is discussed in some detail. This section will review definitions that reflect attempts to take cognizance of what is known and speculated about the creative process, as distinct from the creative product.

Despite the number of definitions that either explicitly or implicitly incorporate references to the creative process, those that emerge as being of the most practical value are based on the creative product. This emphasis, to a large degree, reflects a fairly widespread tacit agreement with Rogers' (1954, p. 256) claim that "we cannot expect an accurate description of the creative act, for by its very nature it is indescribable." Thus, the emphasis in the past has been on the product rather than the process and, as Torrance (1962, p. 17) says "only rare
attempts have been made to assess the process." This emphasis is reflected, too, in the authoritative statement of the 1959 Committee report on the Criteria of Creativity at the Utah Conference (Taylor, 1959) which recommended that the products of creative behaviour should be the first object of study and that when such products are judged to be "creative," the behaviour which produced them can be called "creative."

Because of their essentially speculative nature, it is very difficult to establish points of agreement and even points of disagreement among various definitions emphasizing the creative process. The remainder of this section will consider three topics:

1. The quality of newness.
2. Koechler's bisociative theory.
3. Stages in creative thought.

The quality of newness. Like the definitions of the creative product, definitions of the creative process also emphasize the quality of newness. Bartlett, (1958, p.190), for example, talked of "adventurous thinking" which he described as "getting away from the main track, breaking out of the mould." MacLeod (1962, p.188) stressed a similar quality by considering that when we think creatively, "we shake ourselves loose from our old
assumptions, we see the problem as imposing new requirements, we see old instruments as capable of new functions."
Simpson (1922), in defining creative ability, talked of the initiative which one manifests by one's power to break away from the usual sequence of thought into an altogether different thought. Similarly, Mednick (1962, p.221) provided a concise definition of the creative thinking process which included reference not only to the quality of newness, but also to more qualitative requirements, when he defined it as "the forming of associative elements into new combinations which either meet specified requirements or are in some way useful."
Bruner (1962a, p.65) has given a detailed account of what he considered to be the "specified requirements" referred to by Mednick.

The creative process was defined by Bruner as the production of novelty in an act that produces "effective surprise." The element of surprise he defined in terms of "unexpectedness" (i.e., not a feature of the model by which we predict the environment), and "interest" (i.e., relation to some enterprise in a person's life). Bruner recognized three kinds of "effectiveness." Firstly he talked of "predictive effectiveness" such as a formula for falling bodies. This may come as a result of either
intuitive insight or a slow accretion of ideas. Secondly, he referred to "formal effectiveness" in which consistency or harmony or depth of relationship is the result. In this process one sees relationships which were not evident before, groupings that were not present, and ways of putting things together not before within reach. Thirdly, Bruner talked of "metaphysical effectiveness" which results from connecting domains of experience that were before quite apart. To Bruner, then, invention involves a high degree of discernment and choice.

Koestler's bisociative theory. No section on process-oriented definition of creativity would be complete without some reference to Koestler's major contribution to this area. In his classic work "The Act of Creation," Koestler (1964) described what he called "bisociation," a term he coined in order to make a distinction between the routine skills of single-plane thinking and the creative act, which "connects (or bisociates) previously unconnected frames of reference operating on more than one plane."

In formulating the basic elements of his bisociative theory of creativity, Koestler admits to owing much to Poincaré's famous lecture at the Société de Psychologie in Paris in 1908. In this lecture,
Poincaré made the point that mathematical discovery consists in a "combination of ideas" and that

Among chosen combinations the more fertile will often be those formed of elements drawn from domains which are far apart... Yet combinations so formed would be entirely sterile, but certain among them, very rare, are the most fruitful of all.

In his description of this process, Poincaré stressed the characteristic features of what Koestler later termed the "disjunctive act" of creation—a concept which embodies the conscious and unconscious processes underlying creativity in all spheres.

According to this theory (Koestler, 1964, p.120), the creative act is not an act of creation in the sense of the Old Testament. It does not create something out of nothing; rather "it uncovers, selects, re-shuffles, combines, synthesizes already existing facts, ideas, faculties, skills." This leads to the paradox that the more original a discovery the more obvious it seems afterwards.*

Koestler illustrated these concepts in some detail in an analysis of humour which, because it is related to

*Similarly, Bruner (1962a, p.65) viewed the principal creative activity as being the combining of different existing coding systems into "new and more general systems." Because of this—as Whitehead had earlier noted—progress appears to occur on the margins between fields where "combinatorial creativity" takes place.
more exalted forms of creativity and because it produces a sharply-defined response, he considered to hold out promise of throwing light on the analysis of creativity in general. According to Koestler, the pattern underlying all varieties of humour is bisociative in that it involves perceiving a situation or event in two habitually incompatible associative contexts. The pun, for example, is the bisociation of a single phonetic form with two meanings — "two strings of thought tied together by an acoustic knot" (Koestler, 1964, p.65).

Stages in creative thought. A quality that appears in several definitions of the creative process is one that takes cognizance of the concept of stages in creative thought. Torrance (1962a, p.16), for example, defined creative thinking as:

the process of sensing gaps or disturbing, missing elements; forming ideas or hypotheses concerning them; testing these hypotheses; and communicating the results, possibly modifying and retesting the hypotheses.

Olsen (1954) had an almost identical viewpoint, while Stein and his associates (unpublished paper, no date) similarly defined creativity by regarding it as a process of hypothesis formation, hypothesis testing, and the communication of results.
The principal features of definitions incorporating references to the process of creativity, then, would include seeing it as (1) involving adventurous, divergent thinking possessing the qualities of newness and usefulness or appropriateness; (2) being the aptitude for achieving (or "biascissing") new meanings and functions for old instruments and concepts, i.e., the capacity to avoid the usual, routine, conventional ways of thinking and doing things; (3) typically proceeding through the stages of sensing a problem, forming hypotheses, testing these, and communicating the results.

Definitions Emphasizing Both Process and Products

In his outline of the different aspects of creativity, McLean (1957) stressed the need for an approach that takes hold of all perspectives at once. By taking cognizance of both product and process, several investigators have succeeded in providing comprehensive definitions of creativity.

A good example of such an approach is that of Piers et al. (1960, p. 347) who emphasized the process of creativity when they defined it as "the capacity to avoid the usual routine...the forming of new patterns and combinations of information...[and] the transplanting of old
relationships..." Also, by referring to "ideas and/or products which are original, novel, or uncommon and which are workable," Piers et al recognized the importance of considering the product of creativity.

Getzels and Jackson (1963, p.172) similarly took cognizance of both product and process when they talked of the essence of creativity as lying in "the ability to produce new forms, to conjoin elements that are customarily thought of as independent or dissimilar." They went on in the same definition to stress the fact that creativity is not "merely the propensity for seeing the bizarre," but rather it is the aptitude for "achieving new meanings having social values."

Other definitions with similar emphases on both product and process are those of Newell, et al (1962), Rogers (1954), Wilson (1958), Rhodes (1951), Mackintosh (1962), and Lebrun (1963).

**Summary and Conclusions**

After outlining in general terms some attempts that have been made to describe different kinds and levels of creativity, this chapter went on to discuss the wide range of definitions to be found in the literature. The bulk of the chapter reviewed attempts to define creativity from the perspectives of product and process, a third
section considering definitions combining both approaches. The consistent emphases of most researchers are noted as being on the qualities of newness (usually defined in relation to the individual's group) and appropriateness or usefulness.

In the absence of any widely-accepted definitions of creativity and because of the fact that creativity would seem to be used as a generic term to cover several aspects of human behaviour, it is felt that an emphasis is placed upon any investigator in this area to select from the many definitions those features which are relevant to his particular study. Therefore, bearing in mind the facts that this is a study of creativity in a group of children and that many of the definitions are more applicable to older age-groups, the investigator considered that creativity was best defined as a product and that, as such, it possesses the following features: (1) it is new; (2) its newness is defined in relation to the standard of the individual's particular group; (3) it is accepted as being useful, tenable, appropriate, or satisfying, i.e., it has merit.

Rather than attempting to add yet another definition to an already long list, the investigator decided that it would be prudent to accept one that was already
in existence. Because the definition advanced by Piera et al (1960, p.347) best seemed to incorporate the principal features of the above summary statements, it was accepted for the purpose of this study. They defined creativity as being:

...the capacity of the individual to avoid the usual, routine, conventional ways of thinking and doing things to produce a quantity of ideas and/or products which are original, novel, or uncommon and which are workable. It must be purposeful or goal-directed. It may involve the forming of new patterns and combinations of information derived from past experiences, and the transplanting of old relationships to new situations, or the generation of new relationships.

Finally, lest it be thought that the lack of a widely-accepted definition of creativity is indicative of an undesirable degree of confusion, it is pertinent to note Bruner's (1962b, p.59) advice when talking of a similar problem in the field of "intuitive thinking."

He made the point that a pure and unambiguous definition along with precise identifying techniques are often the goals of research, not their starting points. It may therefore suffice at this stage to ask whether we are able to identify certain behaviour as being more creative than others, in the anticipation that, as Taylor (1964b, p.7) said, "the issues in any problem of definition become clarified as research progress is made."
CHAPTER III

THE PROCESS OF CREATIVITY

In the matter of creativity, the product is often confused with the process. We are interested in the process but we examine the product.

(Carpenter, 1962, p. 392)

This quotation from Carpenter serves admirably to point out a basic dichotomy in the study of creativity, namely the distinction between product and process. Although this contrast was discussed in the previous chapter on definitions, it is appropriate at this stage to give a more detailed outline of some attempts that have been made to describe the process of creativity.

The remainder of this section will discuss the following topics:

1. Stages in the creative process.
2. Criticism of the concept of stages.

Stages in the Creative Process

Many of the attempts that have been made to analyse the phases comprising the creative process have been based on Wallas' (1926) classic analysis that distinguished the four stages of preparation, incubation, illumination (and its accompaniments), and verification.
This section will consider some of the literature bearing on these four stages.

Preparation. Nobody is able to say with certainty just how the process of creativity is initiated or stimulated but there appears to be fairly general agreement that the creative process is set in motion by a problem of some kind. Initially it may not be very clearly defined and it may not even be considered by the individual to be a problem. Patrick (1941, p.128), for example, speculated that in this stage ideas occur without such relation to each other "for they are shifting rapidly." This rather nebulous situation was aptly summed up by Ghiselin (1952, p.4) when he said:

Creation begins typically with a vague, even a confused excitement, some sort of a yearning, hunch or other preverbal intimation...Stephen Spender's expression is exact: 'a dim cloud of an ides which I feel must be condensed into a shower of words.'

Despite this uncertainty as to how the creative process is initiated, most writers who subscribe to the concept of stages in the process emphasize the need for an individual to be completely familiar with the area in which he is working. Peterson and Robinson (1959), for example, in describing this preparation phase, stressed the need for the person to "saturate" himself with the specific media of his specialty so
that he has a broad and thorough understanding of it. Others to have similarly stressed the importance of preparation include Murphy (1956, p. 11) who talked of the need for "long immersion of the sensitive mind in some specific medium," and Mayer (1954, p. 196) who stated that "there is no substitute for hard work and perspiration."

**Incubation.** In the second stage the individual may temporarily abandon the problem and allow for a period of incubation. Ghiselin (1952, p. 5), for example, considered this stage to be one of complete indecision, in which "nothing tends towards determination," while Peterson and Robinson (1959) expressed the feeling that during this time the conscious interacts with the sub-conscious, with a subsequent reorganization of experience. Murphy (1956, p. 12) also took up this issue and considered that this stage involved the consolidation of relevant experiences "into higher or structured patterns or ordered experiences." In a similar vein, Patrick (1941) talked of an idea recurring from time to time in different mental sets, being modified as it recurs.

According to Kestler (1964, p. 209), the search for a clue at this stage proceeds on several planes and involves unconscious processes at various levels of depth.
This simultaneous activity, in itself, creates what Koestler described as "a state of receptivity, a readiness of the 'prepared mind' to pounce on favourable chance-constellations, and to profit from any casual hint."

In discoveries of this type, the chief function of the unconscious seems to be that of keeping the problem constantly on the agenda, even while conscious attention is occupied elsewhere. But in other types of discovery, according to Koestler, the unconscious plays a more specific guiding role by "bringing forms of ideation into play which otherwise manifest themselves only in dreaming and related states."

A viewpoint remarkably similar to certain aspects of Koestler's work was expressed by Golovin (1963). In describing the lack of orderly, logical reasoning during the incubation period, Golovin (1963) considered this to be consistent with the view of thinking as a process of random scanning and manipulation of stored data patterns. This takes place in the search for structures having physical properties suggested by the initial problem, as coded and stored by the central nervous system.

*For more detailed discussions of the relative importance to creativity of unconscious functions, the reader is referred to Galton (1883), Poincare (1908), Eis切尔 (1937), Rubie (1958), Gestels and Jackson (1962), Givens (1963) Koestler (1964), Garwood (1964), Barron (1955).*
The actual period of incubation may last for a short or long time. Eindhoven and Vinacke (1952), for example, considered that if the creator is given as many sessions at a task as he wishes, it is apparently typical for creation to extend over more than one period with considerable variability in this respect among individuals. Yamamoto (1964a, p.407), in quoting Anderson (1960), is another to have drawn attention to this time element by indicating that it is "often absent from our short period test... which measures the level of ability, not whether the person will be deeply concerned." This factor must be borne in mind when considering the validity of current tests of creativity described in the next chapter.

Illumination. The third phase, which has variously been called the stage of "illumination," "intuition," "insight," or "inspiration," is generally considered to be the crux of the creative process. This is the stage when a complete or partial solution to the problem occurs. This may be, as Ghiselin (1952, p.5) expressed it, in the form of "a mere glimpse serving as a clue or like a germ to be developed,...sometimes essentially complete, though needing expansion, verification or the like..." Patrick (1941) wrote of the idea becoming definite for the first time at this stage — although it is but a
general idea, the whole preceding the parts and the
details being added in the final stages of revision.

Some of the most persuasive explanations of this
stage are those of the psychoanalytic and neo-psycho-
analytic theorists. Peterson and Robinson (1959), for
example, hypothesized that illumination occurs when the
subconscious reorganization of experiences at the incu-
bation stage "reaches the point where its potential
usefulness as a solution is forced into the conscious
level of thought." Thus, for Kohler's chimpanzees, Nueva,
"the moment of truth occurred when her glance fell on the
stick while her attention was set on the banana. At that
moment the two previously separate matrices fused into
one, and the 'stick to play with' became a 'stick to
reach with'..." (Koestler, 1964, p.402). A similar view
was expressed by Iris (1951) who considered this stage
to be characterized by the facility with which id
impulses or their closer derivatives are received.

Like Poincaré (1913), other writers see the
appearance of sudden illumination to be a manifest sign
of long unconscious prior work. As Rapaport (1951) has
written, in this stage there occurs a temporary suspen-
sion of the ego's control of the id which permits the
latter's contents to enter consciousness. Or, expressed
more simply: creativity results from "regression in the service of the ego." (Kris, 1951) *

Some attempts have made to explain this illumination stage in a non-Freudian manner by utilizing neurological concepts. Golovin (1963, p.14), for example, saw this "insight" stage as occurring when a neuron pattern, having a desired structural relationship to the initial problem, has been located or produced — often by a process of unconscious random scanning. The germinal idea, according to Golovin, seems to open the door to a whole flood of new associations, connections and suggestions. In a similar analysis, Mednick (1962, p.222) described what he termed an "associative theory of the creative process." In this theory, Mednick described three ways of attaining creative solutions, each of which represented a different method of bringing the requisite associative elements together.

The interpretations of Golovin and Mednick are in many ways similar to the explanation of the illumination stage of creative thinking that appears to emerge from Hebb's (1965) neurological theory. Although Hebb himself

*For more detailed discussions of this process of ego regression (or countercathexis), the reader is referred to Rapaport (1951, p.372), Pine (1959), Hartman (1951, p.378), Bellak (1960), Barron (1963), Torrance (1962a, p.143) and Koestler (1964, p.178, 190).
has very little to say specifically about creativity, it would be fair to extrapolate his theory as seeing this insight stage as involving chance combinations of "facilitations" from different "phase sequences" made more probable by intensive concentration on the relevant features of the problem.

This virtually unanimous emphasis on spontaneous intuitions, unconscious guidance, and sudden leaps of imagination lends support to Koestler's (1964, p.268) suggestion that the role of strictly rational thought processes in discovery "has been vastly over-estimated..." 

**Verification.** The final stage of the creative process occurs when the creator verifies, elaborates, and evaluates his production. Murphy (1956, p.44) aptly described this phase as the "hammering out, the sifting and testing, the critical evaluating and perfecting of the work done."

Selovin (1963, p.18) considered that this stage may often require "relatively prodigious efforts to make the insight more pertinent, to justify it, to draw all fruitful and necessary conclusions from it, and to relate it properly to the broader context..." Darwin's "The Origin of Species," twenty-three years in writing, is one of the prime examples of cases where the process
of elaboration, verification, and confirmation — the long donkey-work following the brief flash of insight — is more decisive than the discovery itself.

Verification was considered by Kris (1951, p.489) to be a form of reality testing in which alternations between this and the preceding stage may be "rapid, oscillating, or distributed over long stretches of time."

Similarly, Rapaport (1951, p.720) saw this stage of creative thinking as being characterized by the establishment of relationships to other contents of consciousness as the "idiosyncratic inventive product" of the individual is turned into the social communication of art or science.

Criticism of the Concept of Stages

The whole concept of analysing the process of creativity into stages has been challenged by those who conceive of it in more holistic terms. Viennese (1952, p.248), for example, considered creative thinking to be a total pattern of behaviour in which "various processes overlap and interweave between the occurrence of the original stimulus and the formation of the final product..."

Wallas himself pointed out that the pattern of creative thinking is seldom a clear-cut series of four steps and that the whole process is best considered in dynamic
molar terms. Bruner (1962b, p. 53) advanced a similar view when, in comparing "intuitive" and "analytic" thinking, he considered that the former characteristically does not advance in well-defined steps but, instead, "tends to involve maneuvers based seemingly on an implicit perception of the total problem."

Even the firmest adherents of the concept of stages would probably agree with Vinacke's (1952, p. 249) conception of creative thinking as consisting of "dynamic interplaying activities rather than as more or less discrete stages..." Peterson and Robinson (1959), for example, pointed out that creativity does not follow a lock-step pattern of steps but that any may be omitted and there is interaction among all of them.

Summary and Conclusions

This chapter described in some detail the four stages of creative thinking, first advanced by Wallas some forty years ago. A critique of the whole concept of stages in the creative process was then presented.

To sum up this chapter, it would seem that the creative process is neither haphazard nor rigid. It is

*Intuitive thinking may be roughly equated with creativity in Bruner's dichotomy.
probably best regarded as being an "on-going, dynamic and multi-hued" (Carpenter, 1962, p. 392) process in which stages overlap and inter-relate. The whole question of the existence and nature of stages — yet to be supported or refuted by research — is one which deserves thorough investigation, for it is significant for both the evaluation and teaching of creativity.

Until such time that research evidence suggests otherwise, it would seem that one can proceed cautiously in assessing creativity in short-period tests as long as there is sufficient evidence to suggest that they correlate satisfactorily with creative performances in everyday situations in which stages in the creative process can operate freely.
CHAPTER IV

MEASUREMENT AND IDENTIFICATION OF CREATIVITY

Beyond vehement assertions that creativity is different and distinct from the type of abstract intelligence that is measured by established intelligence tests, there is little agreement among investigators as to the nature of creativity either as a conceptual entity or as a psychological measure. Unlike convergent thinking which conforms to a logical model and is therefore more easily accessible to evaluation, creative thinking, with all its elusive elements, poses considerable problems of assessment. It was a difficult enough task to translate the properties of intelligent behaviour into measures of intelligence; to do the same for creative thinking is proving even more onerous.

This chapter will describe some of the more significant issues of assessment and will evaluate various attempts to identify or measure creativity. To facilitate the discussion, the following structure has been adopted:

1. Creativity and conventional intelligence tests.
2. Teacher/supervisor and peer ratings of creativity.
3. Validity of creative thinking tests.
4. The Minnesota Tests of Creative Thinking.
5. Two other approaches to the measurement of creativity.
6. Assessment of creative writing.
7. Some criticisms of creativity testing.

Creativity and Conventional Intelligence Tests

As the most widely-employed means of evaluating cognitive functioning, intelligence tests have been the target of much direct and implied criticism from many researchers into creativity.

According to writers such as Guilford (1958), one of the main objections to these tests has been their alleged failure to take proper cognizance of creative processes by omitting some of the primary abilities important for that area. Taba (1963), for example, noted that intelligence tests are composed on the pattern of convergent thinking, do not accommodate divergence in cognitive functioning or cultural experience, and penalize the tendency to detect relationships other than commonplace ones or to follow an unconventional association pattern. These omissions are usually deliberate, emerging, as they do, from current conceptualizations of intelligence in Western culture.

Most current definitions of intelligence, according to English and English (1958, p.268), make reference
to the "individual's total repertory of those problem-solving and cognitive discrimination responses that are usual and expected in a given age level and in the large population unit to which he belongs." Several writers (Eastwood, 1964; Anderson, 1960; Springbett et al, 1957; Taylor, 1959b; Thurstone, 1952; Torrance, 1962a), have taken issue with this tendency for intelligence tests to evaluate the usual and expected, i.e., "those cognitive processes that have been called convergent, retentive, conservative more than those processes which have been called divergent, innovative, or constructive" (Getzels and Jackson, 1962, p.14). In making this distinction between the two processes of cognitive functioning, Getzels and Jackson gave further expression to Guilford's (1950) classic dichotomy between convergent and divergent thinking.

Convergent thinking, as defined by Guilford (1957), pertains to well-structured problems for which one right answer or a restricted number of very similar answers is called for. Divergent thinking, a major component of creativity according to Guilford, pertains to less structured situations in which the individual's thinking is free to take different directions.
Even Burt (1952a, 1964), who has found much to criticize in American research in this area, agreed with Getzels and Jackson's inference that the common type of intelligence test fails to sample all, or at least a sufficiently broad range, of known cognitive abilities. However, as Burt has pointed out, this conclusion is by no means a new one and, by itself, is not sufficient justification for discerning two distinct cognitive or intellectual modes of convergent and divergent thinking. "Indeed," said Burt (1962a, p. 295), "the new tests for 'creativity' would form very satisfactory additions to any ordinary battery for testing the general factor of intelligence."

It would seem, then, that there is fairly widespread agreement that conventional tests of intelligence place far more emphasis on convergent than on divergent thinking abilities. Some psychologists (particularly the British "school") would argue, however, that both types of thinking are contained under the rubric of general intelligence and that they are not sharply dichotomized modes of mental operation. 

* See Chapter VI for a detailed discussion of the relationship between creativity and intelligence.
Teacher/Supervisor and Peer Ratings of Creativity

Apart from a few contrary claims by researchers such as Barron (1955) and Taylor (1957), there is a fairly general agreement that ratings of creativity by supervisors/teachers or peers have not proved to be a consistent criterion for evaluating tests of creativity. According to Strang (1962, p.64), this occurs because teachers' ideas of creativity are apt to be vague, "their observation of individual pupils is inadequate, and there is only a restricted range of creativity in the usual classroom." A similar viewpoint was expressed by Piers et al (1960) who found that in spite of efforts to define the criteria, teachers do not agree very well in rating students on creativity. In suggesting that only gross discriminations of this ability can be expected from teachers, Piers et al considered that this is not too surprising when it is remembered that teacher ratings of intelligence, originally used as criteria for validating the Binet tests, have long been considered to be less accurate than intelligence tests themselves.

Barron (1955) reported a correlation of 0.55 between a test of originality and observers' ratings; Taylor (1957) found that ratings of creativity correlated with ratings of productivity by supervisors to the extent of 0.69.
Other writers to have reported low correlations between ratings by supervisors/teachers or peers and creativity test scores include Hollard (1959), Klaussaeier et al. (1962), and Ellinger (1965). The last-named found that teachers were able to identify the highly creative children (according to the Minnesota Tests) in their classrooms in only slightly more than one-third of the cases.

Too little research has been conducted on the relative effectiveness of supervisor/teacher versus peer ratings to permit any firm conclusions being drawn in this area at this stage. Two contrary views have been expressed. On the one hand, researchers such as Sprecher (1959) have found no significant differences between peer and supervisor when asked to rank the individuals in a group on creativity. McDermaid (1965, p.16), on the other hand, reported a correlation of only 0.30 between peer and supervisor ratings, indicating that the two groups "agree only minimally in their estimates of creativity."

Thus, while correlations between ratings of creativity and creativity test scores are not high, they are not necessarily as damaging to the concept of creativity as some critics have claimed. Although it could be argued that because correlations between tested
and rated creativity are low, then the concept of creativity has little validity, a more likely explanation of the low correlations is to be found in the low reliabilities of each measure. Even if pooled ratings from several assessors are used and improved definitions and criteria of creativity are developed, it is probable that even more sophisticated tests will lead to the perpetuation of relatively low correlations between rated and tested creativity.

Validity of Creative Thinking Tests

Perhaps one of the major reasons why research related to the measurement and development of creative thinking did not catch the imagination of educators in past years lies in the failure of researchers to deal adequately with difficult problems of criteria and validity...

Torrance (1962a, p. 141)

At present there are two general approaches to the measurement of creativity. The first involves the identification of persons who are commonly agreed to be creative (cf., Mackinnon, 1962; Roe, 1959). One of the problems with this approach is that judges must agree on whom they consider to be creative — even when they do not know precisely what creativity is. The second approach involves analyzing the nature of creativity, devising separate tests to measure each component, and
determining the relationships of the components (cf., Guilford, Setzala and Jackson, Torrance).

In both of these approaches — especially when they are applied to children — the "problems of criteria and validity" as referred to by Torrance, loom large. Both involve consideration of the predictive validity of the identification procedure, the second one requiring, in addition, evidence of concurrent validity. These two types of validity — concurrent and predictive — will be considered in the remainder of this section.

**Concurrent validity.** Any assessment procedure that depends solely on test results inevitably raises the question of what external or "natural" behavioural criterion was employed to validate the instrument. In the field of creativity, this question has often been answered poorly, if at all. Thus, critics such as Klausmaler et al (1962, p.75) have criticized the whole field of creativity testing on the grounds that if researchers are unable to prove that their tests can effectively differentiate creativity in terms of the performances of students in non-test situations, "it is possible that the differences are merely artifacts of the specific tests being used."

For similar reasons MacKinon (1962, p.485) rejected as indicators or criteria of creativity "the
performance of individuals on so-called tests of creativity on the grounds that such tests fail to reveal "the extent to which the subject faced with real life problems is likely to come up with solutions that are novel and adaptive and which they will be motivated to apply in all their ramifications." MacKinnon's method of meeting (or avoiding) this problem of establishing validating criteria was to study only those persons who have been recognized by others as being successfully creative in their own field. Although such an approach is less applicable to children because of absence of clearly-defined criteria of creativity at that level, it is a promising one, nevertheless.*

Workers such as Barron (1955), Drevdahl (1956) and Torrance (1962a, etc.) have provided some limited external confirmation of the validity of tests of creativity. A comprehensive review of the literature on the few validation studies which have been conducted in this area, was presented in a sobering article published by Yamaoto as recently as 1965. For a detailed description of this material, the reader is referred to the original source, it being sufficient in the present context to

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*This general approach was adopted in the experimental section of the present study.
present Yamamto's three conclusions. These were that (1) investigators have not yet come to an agreement as to the most meaningful and practical immediate criteria of creative thinking; (2) every one of the easily obtained measures including school grades, supervisor and teacher ratings, peer nominations, etc., has shortcomings as a suitable criteria; and (3) more validation studies are urgently needed to establish both empirical and conceptual validities of the current instruments. In an earlier article, Yamamoto (1964a) described yet another difficulty—that of finding a criterion which is not contaminated by other features of human traits and behaviour, especially by intelligence.

It would seem, then, that much work remains to be done in this crucial area of establishing appropriate criteria of creativity and the concurrent validity of test instruments.

*Predictive validity.* Many writers have expressed their doubts as to the long-term reliability or predictive validity of existing tests of creative thinking. Most would agree with Yamamoto (1965) when he expressed the need for undertaking longitudinal studies to examine the adequacy of various intermediate criteria against ultimate criteria of one kind or another. Writers to
have adopted similar viewpoints include Fiers et al (1960), Vernor (1961), Guilford (1962), Mackinnon (1962), and Torrance (1962a).

Further research is therefore required if both concurrent and predictive validities of test instruments are to be established. The former can only be accomplished by continued hard work in attempts to decide on suitable definitions and criteria of creativity. The establishment of the predictive validity of tests, on the other hand, must await results from well-controlled longitudinal studies in which performances during childhood are correlated with actual productivity in adult life.

The Minnesota Tests of Creative Thinking

Since 1958, the Bureau of Educational Research of the University of Minnesota, under the direction of E. Paul Torrance, has been developing a set of tasks known as the Minnesota Tests of Creative Thinking. Because much of the research into creativity, until recently, was conducted with the identification of this attribute in older children and adults, Torrance and his associates attempted, right from the beginning, to devise a set of tasks "which could be used from kindergarten through graduate school," (Torrance, 1962a, p.44).
Their first work was in adapting Guilford's tests for use with children, but almost simultaneously work was commenced with tasks constructed on the basis of analyses of reported experiences of eminent scientific discoverers, inventors, and creative writers. A detailed description of the tasks which formed an earlier version of the Minnesota Tests of Creative Thinking was presented in a chapter and an appendix of Torrance's (1962a) book, "Guiding Creative Talent." A subsequent revision of this battery* (Torrance et al., 1962; Torrance et al., 1963) had not been reported fully in the literature at the time of writing this thesis. However, preliminary editions of the manuals for these revised tests were made available to the writer by Torrance. Information contained therein, together with other relevant material (some of which is unpublished), will be reported in some detail in the remainder of this section and in Appendix A, under the following headings:

1. Rationale of the battery.
2. Reliability.
3. Validity.
4. Description of the tests (Appendix A).

*Employed in the experimental facet of the current investigation.
5. Administration of the tests (Appendix A).
6. Rationale of the tasks (Appendix A).
7. Scoring (Appendix A)

**Rationale of battery.** In the developmental work leading up to the verbal and non-verbal batteries of the Minnesota Tests, Torrance and his associates were guided in their selection of tasks by their definition of creative thinking. By defining it as "the sensing of problems or gaps in information, forming ideas or hypotheses, testing and modifying these hypotheses, and communicating the results," Torrance et al. (1963, p.1) adopted a process-oriented conceptualization of the dimension. This represented a departure from the approach of Guilford and his associates at the University of Southern California who have long insisted that predictor measures should represent single factors. Instead, Torrance (1962a, p.45) considered that tasks should be "models of the creative process, each requiring several types of thinking."

Although Guilford's "pure factor" approach was rejected, an attempt is made in the Minnesota Tests to assess the products which result from the administration of the tasks, in terms of Guilford's divergent thinking factors (fluency, flexibility, originality, and
elaboration). Special care was also experienced in making the tasks interesting and challenging for individuals at all educational levels. They have been aimed, also, at permitting the subject to "regress in the service of the ego." It has been argued, too, that the less-structured complex task allows greater freedom for the subject to respond spontaneously according to flashes of insight and "spur of the moment" ideas (Eastwood, 1964).

'Reliability. The manuals for Verbal Form A (Torrance et al., 1963) and Non-verbal Form A (Torrance et al., 1962), present no information as to the reliability of the Minnesota Tests. Torrance stating in explanatory notes to both manuals that this will be presented in subsequent revisions. Meanwhile, he said, "it seems reasonable to expect that reliability and validity information will be satisfactory, since these tasks resemble so closely earlier tasks similarly constructed."
Subsequent publications have provided some rather sketchy information on the reliability of the tests using test-retest, split-half, and interrater-agreement techniques.

Presumably, Torrance's above reference to "... earlier tasks similarly constructed" is aimed at drawing the reader's attention to material such as that published in his 1962 book (Torrance, 1962a). In this book,
several product moment coefficients of correlation were reported for the various tasks constituting an earlier version of the Minnesota Tests. However, it must be noted that the figures presented therein referred solely to interscorer reliability; no reference to other indices of reliability, particularly the stability of the measures or their intra-task equivalence, being made. Although the coefficients that were reported were generally high (mostly in the high 0.80s and 0.90s), it could be argued that this is sketchy evidence on which to base subsequent work. However, as emphasized earlier in this section, work with the Minnesota Tests is highly exploratory and on-going, so that "sophisticated" criticism of the statistical matters may be premature at this stage of research into this area.

Some moderately encouraging test-retest data on the battery have been published in recent articles. Torrance himself, in a mimeo (Torrance, undated: probably 1963, p.19), has provided some information as to the test-re-test reliability of battery totals. He considered that these have generally been quite satisfactory. In the intermediate grades and with college students, coefficients have been around 0.88, even with alternate forms of the stimulus materials. In the primary grades,
for battery totals, they have ranged from the upper 0.40's to the 0.70's. Test-retest reliabilities for single tasks were, of course, somewhat lower, in a few cases dropping into the 0.30's. In attempting to account for the low reliability of the tests in the primary grades, Torrance expressed the rather intriguing — and somewhat evasive — thought that he was not so concerned about that as he was about "some of the conditions and things which happen to children to cause this low reliability in scores."

According to Guilford (1950), a possible explanation of such low reliabilities may lie in the tendency for creative people to differ considerably in performance from time to time. This may mean, therefore, that tests may show considerable error variance due to "function fluctuation."

Coefficients of temporal stability,* published in a research memorandum by Torrance and Dowen (cited by Goldman, 1964), are presented in Table I. In discussing these figures, the authors suggested that there are special problems which contribute to low temporal reliability of some of the tests. Among these are: the shortness

* Temporal stability: the requirement of any test that the results will not vary unduly from one test session to another. This is the same as Cronbach's "coefficient of stability."
<table>
<thead>
<tr>
<th>Tests</th>
<th>Fluency</th>
<th>Flexibility</th>
<th>Originality</th>
<th>Elaboration</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Verbal Battery</td>
<td>.76</td>
<td>.72</td>
<td>.81</td>
<td>.89</td>
<td>.75</td>
</tr>
<tr>
<td>Ask and Guess</td>
<td>.89</td>
<td>.79</td>
<td></td>
<td></td>
<td>.85</td>
</tr>
<tr>
<td>Product Improvement</td>
<td>.85</td>
<td>.76</td>
<td>.68</td>
<td></td>
<td>.73</td>
</tr>
<tr>
<td>Unusual Uses</td>
<td>.75</td>
<td>.74</td>
<td>.71</td>
<td>.47</td>
<td>.68</td>
</tr>
<tr>
<td>Four Verbal Tests</td>
<td>.85</td>
<td>.78</td>
<td>.83</td>
<td>.85</td>
<td>.87</td>
</tr>
</tbody>
</table>

from Torrence and Gowan (cited by Goldman, 1964)
of some of the subtests in a battery (e.g., the Figure Completion test is only ten items long); the difficulties of testing children of tender ages; and the novelty of the tests (a block may be caused the first time round when asked for unusual uses of an object, though later a child may give numerous answers).

Wodtke (1964) has reported the results of test-retest with the Minnesota battery after a period of six months. With an N of 100 to 150, consisting of children in Grades 2 to 5 for the Non-verbal Form and Grades 4 and 5 for the Verbal Form, Wodtke reported the following test-retest alternate forms reliability coefficients:

Non-verbal totals ranged from .23 to .64 with a median of .46

Verbal " " " .24 to .74 with a median of .41

Battery " " " .35 to .79 with a median of .60

Wodtke also reported the test-retest reliability of factor scores for the Fifth Grade population (see Table II). In Table II, it can be seen that apart from some very low reliability coefficients in the non-verbal battery, particularly the Picture Construction and Figure Completion tasks, and some modest coefficients in some of the Verbal tasks, there is reason for optimism regarding future developments in test stability.
## TABLE II

### MINNESOTA TESTS:

**TEST-TEST RELIABILITY IN 5th GRADE-SAMPLE**

<table>
<thead>
<tr>
<th>Task</th>
<th>r</th>
<th>Task</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask and Guess</td>
<td>.66</td>
<td>Picture Construction</td>
<td>.05</td>
</tr>
<tr>
<td>Product Improvement</td>
<td>.50</td>
<td>Figure Completion</td>
<td>.35</td>
</tr>
<tr>
<td>Unusual Uses</td>
<td>.43</td>
<td>Circles *</td>
<td>.59</td>
</tr>
<tr>
<td>Consequences</td>
<td>.58</td>
<td>Non-verbal Fluency</td>
<td>.63</td>
</tr>
<tr>
<td>Verbal Fluency</td>
<td>.79</td>
<td>Flexibility</td>
<td>.40</td>
</tr>
<tr>
<td>Flexibility</td>
<td>.61</td>
<td>Originality</td>
<td>.59</td>
</tr>
<tr>
<td>Originality</td>
<td>.58</td>
<td>Elaboration</td>
<td>.45</td>
</tr>
<tr>
<td>Elaboration</td>
<td>.61</td>
<td>Total</td>
<td>.64</td>
</tr>
<tr>
<td>Total</td>
<td>.73</td>
<td>Total Creativity battery</td>
<td>.75</td>
</tr>
</tbody>
</table>

*Replaced by lines test in revised battery. (from Wodtke, 1964)*
As noted above, reported levels of inter-scorer agreement have consistently been high. In addition to Torrance's (1962a) work, cited above, Vodike (1964) has noted that the coefficients of inter-scorer agreement for a sample of sixty-five pupils ranged from 0.91 to 0.99 with a median of 0.98 for battery total scores and from 0.82 to 1.00 for subtest scores. Similarly high levels were reported by Yamamoto (1962) on the basis of sixty-four test records scored.

Torrance and Gowan (1963) reported several split-half reliability coefficients. For the circles task they found a split-half reliability of 0.96 for fluency. Similarly high levels were reported for the figure completion task and for the non-verbal battery fluency scores. The authors admitted that there were many much lower reliability coefficients for both the split-half and temporal stability indices, but in putting forward the highest ones, they maintained that with further research and experimentation the reliability of the Minnesota Tests could be improved to these levels.

It would seem, then, that although inter-scorer agreement and split-half reliabilities are very satisfactory, the Minnesota Tests have a long way to go before attaining dignity as a stable measure of a person's
purported creativity.

**Validity.** Most people would probably agree that the Minnesota Tests appear to "make good sense" and that they have "promise," but what of their statistical validity?

A variety of scattered evidence of the concurrent validity of the Minnesota Tests was summarized by Torrance (1962a, p.64). He reported research in which the tests discriminated between industrial art students rated as highly creative and those rated as least creative, between saleswomen who sell most and those who sell least, and between saleswomen who work in creative departments and those who work in routine departments. With elementary schoolchildren, the tests showed promising validity in terms of observed behaviour in small group situations, on the basis of peer and teacher nominations, and on the basis of traditional achievement.

In a later article, using the approach of identifying criterion groups regarded as highly creative or non-creative, Torrance (undated: probably 1963, p.22) reported the accumulation of what he described as "several encouraging bits of validity evidence."

To quote him in full:
Children nominated by their teachers on various criteria of creative thinking, curiosity, and the like, achieved higher scores on the test of creative thinking than did their peers who are not so nominated or are nominated as being low on the criterion in question. Above the third grade, pupils receiving a large number of peer nominations on various criteria of creative thinking achieved higher scores on the tests of creative thinking than did those who received no nominations. At the high school level, our best validity evidence comes from peer nominations especially if we use the same criteria in asking for nominations that we use in scoring the tests...

Not surprisingly, several critics have entered the lists against the extremely vulnerable field of the predictive validity of tests such as the Minnesota battery. Newland (1963, p. 395) is one to have given voice to such criticism when he pointed out that longitudinal research is needed to ascertain whether those who give purely statistically infrequent responses in childhood tend to be those who give socially applicable new responses as adults, and the extent to which the psychological processes underlying the divergent thinking at the two age levels may not be similar.

In answering this and similar criticisms, Torrance (undated: probably 1963, p. 1-3), pointed out that they are based on the assumption that measures of creative behaviour in children should predict or are intended solely to predict creative behaviour in adulthood. This view, Torrance considered, "ignores the rather obvious
fact that social and cultural stress make it impossible for many children to continue their creative development. Torrance then went on to ask if we want to identify only that potentiality which will flourish in spite of all efforts to thwart it? Or, do we also want to identify that potentiality which will be realised under intelligent guidance, more favourable conditions and the like?

Longitudinal studies are currently in progress to test the predictive validity of the Minnesota Tests when used with young people. These, of course, will be some years in coming to fruition. The more pressing problem is that of establishing satisfactory immediate criteria, i.e., showing tests actually differentiating between adults or children known on other grounds to be creative or non-creative. Research has focussed on this problem and must continue to do so if critics such as Vernon (1964) are to be convinced that tests like the Minnesota battery are able to measure what we recognize as creativity in daily life and do this better than g or other tests.

At their present stage of research into the assessment of creativity, then, Torrance and his associates are particularly vulnerable to criticism. Although it is very easy to indulge in destructive condemnation of the Minnesota Tests on many quite legitimate grounds, most critics have
used a commendable amount of restraint and have generally adopted a positive approach. Although problems of reliability and validity loom large in the tests (so that they rate higher in promise than in performance at this stage), these difficulties are by no means insurmountable. Indeed, Torrance deserves credit for having the courage to publish progress reports of his research before he has "ironed out all the bugs." In doing so he has generated a good deal of research and criticism which in the long run must make for progress in this important area of evaluation.

Two Other Approaches to the Measurement of Creativity

As Torrance (1962a, p.22-42) has presented a brief but comprehensive review of methods which have been employed to assess creativity at various age levels, it will be sufficient in the present context to confine the discussion to the approaches employed by two of the most-quoted researchers — Guilford and Getzels and Jackson.

Guilford's theory of abilities. In a provocative and controversial theory, Guilford and his associates have suggested that thought and intelligence are not one

* Further, and more critical, comments on Guilford's theory of the structure of the intellect are presented in Chapter VI.
unitary thing, but are composed of multiple abilities which can be grouped into mental operations. They consider that approximately 120 meaningful dimensions of the intellect will eventually be found.

Thus far, they claim to have identified over fifty of these components of their theoretical model of the "Structure of the Intellect" (Guilford and Merrifield, 1960).

In this model, five kinds of mental operations are applied to four kinds of content and six kinds of products. A look at the five mental operations is necessary in order to grasp something of Guilford's concept of the nature of creative thinking abilities and the difference between these abilities and those sampled by traditional measures of intelligence. Firstly, there are the cognitive operations involved in recognizing, comprehending, becoming aware of, and the like. Secondly, there is memory, which comes into play in retaining what has been cognized. Next, we have two kinds of productive thinking used in producing something new from what has been cognized and memorized. Divergent thinking is involved when possible solutions are many, whereas convergent thinking proceeds towards a restricted answer or solution. Finally, evaluative abilities are involved
when we assess what has been cognized, memorized, and produced, to determine its correctness, suitability, or adequacy.

Guilford hypothesized originally that the thinking abilities most pertinent to creative thinking were those he had defined as "divergent productions and transformations," in one of his later modifications of his conceptualization of creative thinking abilities, however, he included redefinition abilities which are in the convergent production category and sensitivity to problems which falls within the evaluation category (Guilford and Merrifield, 1960).

Space does not permit a detailed description of all the factors that Guilford has asserted to fall under the rubric of creativity. As this information is readily available in sources such as Guilford and Merrifield (1960), Guilford (1959), Wilson (1958), and Torrance (1962a), a brief description of five of the more important specific factors will suffice in the present context.

(1) Sensitivity to problems is usually defined as the ability to see defects, needs and deficiencies, to see the odd and the unusual, and to see what needs to be done. This is manifested in creative people who always have "thorns in their flesh," who are always
bothered by some problem, and always aware of some defect, some need, some deficiency. Tests used to measure this ability require the individual to suggest improvements for common appliances or for social institutions.

(2) Ideational Fluency is defined as the ability to produce a variety of ideas or hypotheses concerning possible solutions to problems. Other things being equal, the more ideas a person has in a given period of time the more chance there is for him to come up with a good one. A frequently-used test of this ability is the Brick Uses test in which the individual is asked to list all the uses he can think of for an ordinary brick. Among the creative thinking abilities identified by Guilford, fluency abilities are clearly the most accessible to objective measurement.

(3) Flexibility involves the ability to adapt to changing instructions, to be free from inertia of thought, and to use a variety of approaches. The creative individual needs to be able to adopt alternative lines of attack in the solution of problems. Adaptive flexibility reflects the ability to change the direction of one's thinking to meet new requirements imposed by changing problems. A test of this ability presents problems in which the principle for arriving at a solution changes radically
from item to item. Spontaneous flexibility is the ability to be fluid in one's thoughts and to be ready to strike out in different directions.

(4) Originality is perhaps the central element of creativity and is certainly its most striking aspect. Briefly, it involves the ability to produce associations or responses which are uncommon, remote, unusual, clever or unconventional among members of a certain population with a relatively homogeneous culture. Guilford used three different approaches to measure this important ability. One approach was in terms of uncommonness of ideas. Responses to a fifty word free-association test were tabulated and weighted according to their infrequency of occurrence. A second approach to measuring originality was in terms of the ability to produce clever responses. Suggested titles for simple story plots were rated for cleverness by judges. The third approach was in terms of the ability to produce remote associations. Individuals were asked to state all the consequences they could think of for sudden and striking hypothetical changes and were scored for their ability to see remote and far-reaching effects.

(5) Redefinition involves the ability to redefine, to reorganise what we see in new ways, to shift the
function of a familiar object, to see something well-known in a new context.

Getzels and Jackson's creativity measures. The creativity tests employed by Getzels and Jackson (1962)* were taken or adapted from Guilford and Cattell or were constructed especially for the experiment. Five tests were used to assess creativity:

(1) Word Associations involved giving as many definitions as possible to common stimulus words. Responses were scored according to the absolute number of definitions and according to the number of different categories into which they could be put.

(2) Uses for Things required — the subject to give as many uses as he could for objects that customarily have a stereotyped function attached to them. Responses were again scored not only on the number of uses mentioned for objects such as a brick and a paper clip, but also on the number of different categories into which the uses mentioned could be put.

(3) Hidden Shapes — in this non-verbal task, the subject is asked to find a given geometric form that is hidden in more complex forms or patterns.

* See p. 16 of this thesis for a detailed critique of this study.
(4) Fables. The subject is given the beginnings of four fables, and he is required to compose three different endings to each — one "moralistic," one "humorous," and one "sad." The score depended on the number, appropriateness, and originality of the endings.

(5) Make-up Problems. In this task, the subject was given four complex paragraphs, each of which contained a number of numerical statements. The task involved making up mathematical problems which might be solved with the information provided. The score depended on the number, appropriateness, and originality of the problems.

Little direct or objective evidence of the reliability and validity of these tests was presented by Getzels and Jackson.

These descriptions of two approaches to the reassessment of creativity — along with the evaluation of the Minnesota battery — are sufficient to illustrate both the complexity and the range of newly-devised measures of creative potential.

Assessment of Creative Writing

Despite pessimistic statements regarding the validity and reliability of essay-type examinations,
several writers have attempted to compile scales for evaluating creative writing. Indeed, one of the basic assumptions of the present study is that it is legitimate to study creativity via creative writing. In order to put the assessment of creative writing in broad and critical perspective, the remainder of this section will consider the following three topics:

1. Definitions and limitations of essay-type examinations.

2. Scales for evaluating creative writing.

3. Torrance's Scale for Evaluating Creative Writings.

The rationale for studying creativity via creative-writing is presented in Chapter x.

**Definitions and limitations of essay-type examination.** Stalnaker (1959, p.495) defined an essay-type question as being:

one which requires a response composed by the examinee, usually in the form of one or more sentences, of a nature that no single response or pattern of responses can be listed as correct, and the accuracy and quality of which can be judged subjectively only by one skilled or informed in the subject.

Sims (1948, p.17) advanced more of an explanatory definition of the essay examination when he described it as being:
a relatively free and extended written response to a problematic situation...which...reveals information regarding the structure, dynamics, and functioning of the student's mental life as it has been modified by a particular set of learning experiences.

As seen by these writers, then, the essay-type examination method involves a subjective judgment of subjectively-determined responses. It is therefore not surprising to note that it has been criticized on the grounds of being an unreliable assessment device, a criticism that is particularly cogent when the method is applied to an ability or a skill which is, in itself, an unstable trait. Stelmaker (1959, p.504), Penfold (1956), and several other writers have cited creativity as being a possible example of such an unreliable ability, the former cautioning against describing a person as uncreative if he was unable to be creative at a certain time, under the terms laid down in an examination. To overcome this, he said, "it may well be that the sampling in the essay questions should be extensive in the sense of spreading over a considerable period of time and a considerable variety of situations..." Penfold similarly talked of the uncertainty as to whether originality or creative ability are stable and not subject to day to day
fluctuations.*

However, when considering such criticisms of the reliability of essay-type examinations, it is important to realise that many of them have their origin in England where the composition has been employed widely as a prediction for future success in English modern languages, or school in general (Peel and Armstrong, 1956; Resendino, 1959). As such, the essays are often rated on elements such as grammatical form, content, sentence construction, as well as elements like creativity. Because these canibus qualities are usually well-known to the examinee in advance, they inevitably lead to some confusion of objective or emphasis which, in turn, must contribute to the measure's lack of stability. To the writer's knowledge, there has been very little research conducted into the use of an essay-type test to assess creative ability alone. Nevertheless, one cannot, and should not, gloss over the very real problems of reliably assessing essay-type responses for creativity and it is with these cautions in mind that we turn our attention to various scales for evaluating creative writing.

* In an attempt to guard against such fluctuations, the present writer tested the parent population on two separate occasions on two different forms of Torrance's creative writing measure.
Scales for evaluating creative writing. Like Getzels and Jackson (1962, p. 38), several writers have taken the position that "fantasy or imaginative production as observed in story-telling...is legitimate data for analysis."

Apart from Torrance and his associates' criteria (described below), the most comprehensive and thoroughly-researched creative writing scale is that devised by Carlson (1961). She listed seventeen possible qualities of original writing that have emerged from a survey she made of several professional publications between 1929 and 1959. These were (1) novelty or freshness, (2) individuality, (3) a personal quality revealing the self, (4) emotion or feeling, (5) becomingness related to identification, (6) imagination, (7) recombination or restructuring quality, (8) subtractive element consisting of finding the essence, (9) immediacy, (10) dynamic vitality, (11) curiosity, (12) reservoir of experiential data, (13) perceptive sensitivity, (14) flexibility or versatility, (15) symbolism, (16) coherent unity, and (17) an expressive-communicative element. Reference to Torrance's Scale for Evaluating Creative Writings (Appendix B) will show that there are many similarities between his and Carlson's lists.
A further example of an analytic scale for assessing creative writing, is that provided by Baker (1964), who made his evaluations in the following areas: (1) titles, (2) beginning sentences, (3) character names, (4) locations, (5) types of characters, (6) types of inanimate objects, (7) themes, (8) form, and (9) endings.

Other writers to have devised scales include Kough and De Haan (1955), Pinc (1959), Wollen and Stevenson (1960), Getzels and Jackson (1962), Taylor (1962), and Flescher (1963).

Torrance's Scale for Evaluating Creative Writings. The criterion measure employed in this investigation was a detailed scale for evaluating creative writing which was devised by Torrance et al (1963). This scale is the extension of an earlier one drawn up by the senior author in 1959.

In selecting the stimulus titles for the stories, Torrance and his associates were "anxious to think of titles that would spark the imagination of the children, be new to them, permit them to regress, and bring out their concepts about divergent characteristics and behaviour" (Torrance, 1965b, p. 26). Thus, titles such as "The lion that doesn't roar" and "The woman who swears like a sailor," were chosen (see Appendices B and C).
Stories are marked on an evaluation scale (see Appendix D) consisting of some twenty-three criteria adapted from sources such as Hinton (1940), Haw and Haw (1961), and Carlson (1961).

On this scale, the rater is required to consider each of the characteristics separately. If the writing is considered to manifest none of the quality under consideration, it is assigned a value of "0." If it definitely and clearly manifests the quality being judged, a value of "2" is assigned. If the quality under consideration comes through very weakly, is of poor quality, or is contaminated by the obvious and banal, a value of "1" is assigned (see Appendix E for a copy of the score card).

According to Torrance et al (1963, p.1), preliminary use of this instrument yielded inter-scorer reliabilities of around 0.70, "but it is believed that some of the specifications added to the description of the scales in the present form will increase this level of reliability." This figure of 0.70 is comparable to other inter-scorer correlations reported by Wiseman (1949) and Taylor (1962), but is lower than that reported by Wallen and Stevenson (1960) who found that intercorrelations between pairs of judges ranged from 0.70 to 0.93 with a median of 0.81.
No data on the correlation between Forms A and B of this test were available at the time of writing this thesis. Wallen and Stevenson's (1960) correlations in the 0.80's between different sets in their measures, are suggestive only of the degree of stability that can be achieved.

It is recognized and emphasized, then, that this study is based upon the use of a criterion measure that is vulnerable to criticism, both general to essay-type examinations and specific to the instrument itself.

Some Criticisms of Creativity Testing

Previous sections of this chapter outlined some of the technical weaknesses of current tests. Specific reference was made to the lack of full data on the reliability and validity of tests — particularly the Minnesota battery. This section will consider three other criticisms that have been levelled against attempts to assess creativity via tests.

Firstly, there is the time element. The question of whether creativity is a stable variable or a selective, only sporadically present, personality syndrome, is a crucial one in assessment. If the latter is the case it may be impossible to identify creativity in ordinary test situations. Anderson (1960, p.49), for example, has
discussed the absence of a time element from the usual short-period test. The actual creative process, he considered, tends to involve a time perspective, "for it is only through deep concern with a problem over a period of time" that creativity functions in the individual. Similarly, Brown (1963, p.5) considered that there is a difference between the psychic energy required to take a paper and pencil test and that needed to actually produce something original "which is the result of time, effort, and personal commitment."

However, many workers in this area would agree with Barron (1955, p.478) who considered that there is good reason for believing that "originality is almost habitual with persons who produce a really singular insight." The validity of this assumption — implicit in most current tests of creativity — awaits further research.

Secondly, there is the question of low inter-correlations among creativity subtests. In a critical reference to a tendency among some writers to gloss over this issue, Thorndike (1963, p.424) cautioned against pooling subtests with low intercorrelations into a common total with a common name. "We should," he said, "be most circumspect in using such a global and value-laden term as 'creative'."
Thirdly, Bellak (1960) has pointed to a further difficulty in assessing creativity via paper and pencil tests. He considered that a mental set, and possibly cues, are often necessary for creation. Furthermore, this mental set is often "stimulus-bound" to such specific situations as a work room, a drawing board, etc. If this is indeed true, it is quite possible that no test could be expected to represent a natural creative situation. Those who have adopted more direct "work-sample," procedures for appraising creativity (e.g., MacKinnon, 1962) have felt this to be the case.

These three issues — the time element, low inter-task correlations, and mental set — together with the lack of full data on the more technical qualities of tests, further demonstrate the need for continued research in this area and for caution when using tests of creative thinking.

Summary and Conclusions

This chapter commenced with an examination of the alleged failure of intelligence tests to take proper cognizance of creative processes. It then went on to describe studies which have found low correlations between ratings of creativity and creativity test scores.
The lack of convincing findings on the concurrent and predictive validities of existing tests of creativity was then described, this being followed by a detailed description and critique of the Minnesota Tests of Creativity. Particular emphasis was laid on the available information on the reliability of these tests. This section was followed by one which considered the measurement procedures employed by Guilford and his associates and by Getzels and Jackson. A section on the methods and problems of assessing creative writing was then presented. Finally, brief mention was made of some criticisms which have been levelled against attempts to assess creativity via tests.

Most critics of current tests of creativity would probably agree that although such tests are extremely interesting from the experimental standpoint, until evidence of predictive validity is available, they should be considered as being still in the experimental phase of their development and their use should be confined to research situations. Premature identification of individuals as being more or less creative and doubtful inferences being adopted as settled facts should therefore be avoided.
PART TWO

CREATIVITY AND RELATED VARIABLES

...it is becoming apparent that cognitive and emotional factors interact with cultural influences to promote or inhibit creativity.

Stanley (1956, p. 79)

Among the writers who have described conditions which interact to produce the creative act, there is widespread implicit agreement with Stanley’s threefold classification of cognitive, emotional, and cultural influences (Thurstone, 1951; Guilford, 1958; Rivlin, 1959; Strang, 1959; Anderson, 1960; Yamamoto, 1964a; Stein, no date). It is in the flux of the complex interaction of these three variables that the organism behaves creatively (or non-creatively) in a given situation.

In delineating factors found or hypothesized to be related to creativity, this part of the thesis will consider the literature under the following five convenient headings:

1. Creativity and environmental variables.
2. Creativity and intelligence.
3. Creativity and achievement.
4. Creativity and personality variables.
5. Creativity and miscellaneous variables.
It is recognized that this classification is an arbitrary one and that the categories overlap to a considerable degree.

This part of the thesis aims at presenting a comprehensive review of the full spectrum of research on creativity and its related variables. Although not all areas reviewed were chosen for experimental investigation, those that were selected were considered to have a bearing on specific findings of this thesis, as well as being in keeping with its holistic aim. For the most part, the hypotheses to be tested spring from the expectations of the literature. When research is equivocal (or non-existent), however, exploratory hypotheses will be set up. For the sake of clarity, all hypotheses to be tested in the present investigation will be stated immediately after each topic has been reviewed and summarized. They will be numbered consecutively and collated at the beginning of Part Three.
CHAPTER V

CREATIVITY AND ENVIRONMENTAL VARIABLES

In describing the relationships between creativity and environmental factors, this chapter will review literature in three main sections:

I. Creativity and Society

II. Creativity and Educational Factors

III. Creativity and Family Background

I. CREATIVITY AND SOCIETY

We are perhaps more in the dark about the environmental conditions which facilitate creativity than we are about any other aspect of the problem.

(Taylor and Barron, 1963, p.373)

Although good quality research on the general environmental conditions — cultural, professional, and institutional — conducive to creative thinking is lacking, a spate of articles of varying degrees of scientific viability has emerged in recent years. Indeed, such has been the output of research and speculation in this area that Burt (1964, p.16) was moved to comment that the pastime of "debunking the 'cult of the great men'... and crediting the spirit of the age and contemporary
trends of society” with outstanding achievements has once again become fashionable. Whilst not all studies have succeeded in, or even aimed at, such a debunking, many have made worthwhile contributions in drawing attention to the significance for creativity of cultural/societal factors.

This section will discuss these factors under the following headings:

1. General impact of society.
2. Specific impact of society.

General Impact of Society

In attempting to account for notable creative achievements, Pressley (1955) considered that in the past too much emphasis had been placed on presumed constitutional genius and too little on the concomitance of favourable environmental factors. Similar sentiments were expressed by Kroeber (cited by Stein, undated) who pointed out that inasmuch as historically recognized geniuses do not appear in an even flow, but in clusters, it appears that cultural factors must at times allow and at others inhibit the realisation of creativity. Indeed, according to Stein, creative acts are like "mutations" in that they must secure a congenial
environment if they are to survive. If, however, the pressures are against creativity, the individual may become socially conforming and well-adjusted, but he runs the risk of becoming delinquent or mentally ill (Torrance, undated, probably 1963). To Patrick (1955), the stifling of creativity cuts at the very roots of satisfaction, ultimately creating overwhelming tension and breakdown.

A more balanced viewpoint, embracing both individual and cultural concomitants of creativity, was advanced by Koestler (1964, p.120). Whilst recognizing the importance of "the 'ripeness' of a culture for a new synthesis," he made the point that it still needs the "intuitive power of an exceptional mind" and sometimes a "favourable chance event" to bring a discovery from potential to actual existence.

Koestler (1964, p 120) also described some creative acts as representing "striking tours de force" by individuals in advance of their times. In fact, according to Ghiselin (1952, p.2 ), the efforts of creative minds have rarely been sustained by society and have sometimes even been hindered. In a similar vein, Rogers (1954) claimed that no contemporary mental can satisfactorily evaluate a creative product at the time it is formed.
Whatever the relative emphasis placed upon environmental and individual factors, there can be little doubt that cognitive and emotional factors interact with cultural influences to promote or inhibit creativity. Or, as Whitehead (cited by Burnett, 1957) asserted, creativity does not function in isolation: it functions within an actual or envisaged situation — physical, emotional, and ideational. Other writers to have written in a similar vein include Strang (1959), Anderson (1959), MacLeod (1962), Torrance (undated, probably 1963), and Lebois (1963).

**Specific Impact of Society**

Several writers have attempted to delineate the main features of what they consider to be the most favourable kind of atmosphere for the encouragement of creative thinking. Although little in the way of empirical research has been conducted in this area, some writers — particularly Mooney and Stein — have made significant contributions at a speculative level.

The most common approach to this problem has been from the negative angle, writers outlining what they consider to be the cultural blocks to creativity and then suggesting or implying ways in which these could best be overcome or minimized. Mooney (1956, p. 273–274)
provides perhaps the most outstanding example of this approach. He talked of blocks to "openness," "centredness," "ordering in time," and "selecting for fit." Blocks to "openness" he defined as those cultural factors which prevent the development of an open, imaginative, and freely-composing mind. These indicate the necessity to use energy that could be used for creativity in adjusting to one another in inter-dependent relationships. Blocks to "centredness" include those factors which prevent self-realization, self differentiation, self acceptance, etc. "There is no honour," said Hooney (1956, p.274), "for the man whose temperament leads him into the inward journey." Blocks to "ordering in time" he described as being one who doesn't cause other people trouble. The creative man, however, needs more than a social norm to guide him into lines of productive development. Finally, Hooney's blocks to "selecting for fit" are those which impinge on the development of "aesthetic modes of thought" and thinking as an "open-field operation."

A similar slant to the problem was provided by Whyte (1956), who also focused on some of the more negative features of our modern society. "For better or worse," he wrote, "we live in an organization society" in which most of our talented youth will make their major
contributions through the vehicle of the huge collective enterprises which are, paradoxically, "basically hostile to creativity." Meier and Hoffman (1961) also expressed concern at the inhibiting effect of formal authority relations in organizations, particularly in business, which they saw as attracting people who can work comfortably but not creatively.

An even broader view of cultural blocks to creativity was expressed by Barron (1958, p. 155) when he talked of society as demanding of its members a surrendering of their individuality. Creative people, however, reject this pressure because they want to own themselves totally and because they perceive a short-sightedness in the claim of society that all members should adapt themselves to a norm for a given time and place. Barron saw these pressures to conform as tending to elicit kinds of motivation in the individual that are incompatible with the creative process. Conformity, involving loss of self reliance, according to Crutchfield (1962), undermines the person's creativity by weakening the essential validity of his own processes of thought and imagination, thus making his cognitive process less flexible and his insights less sensitive. Anderson (1959b), in his evaluation of the "open system versus the closed system," is another to have protested
against the conformity inherent in the latter system. Creativity, to him, needs freedom for the person to respond with his whole person as he sees and understands the truth.

Another important contribution in this area has been made by Stein (1958), who oriented his studies of creativity around his conception of it as being a function of the "transactional relationships between the individual and his environment." In this paper, he presented several social and cultural factors that have been hypothesized or regarded as sources for creativity or as factors which have served to encourage, inhibit, or impede it. These he divided into two major (but overlapping) categories: (a) factors affecting the sources and development of creativity: the physical environment, the philosophical orientation of the culture, the development level of the culture, educational opportunities and experiences, child-rearing practices, political factors, etc., and (b) factors affecting the survival of creative accomplishments: the intermediaries (the psyche group, the patron, the entrepreneur, the critics, etc.) and some characteristics of the audience.

What, then, are the positive features of society that are considered to foster creativity? Writers would
consider these to include conditions such as the
tolerance of non-conformity (Anderson, 1959b;
Crutchfield, 1962); the encouragement of diversity and
freedom of thought (Stein, undated); the reduction of
cautions needed in contact with the external world
(Freshill, 1961); opportunities to observe, explore,
and participate; the recognition and approval of
creative efforts (Strang, 1959); a decrease of authori-
tarian controls (Vestch, 1953); a minimum of suppression
and tolerance of some measure of disintegration (Barron,
1955); and frequent success experiences (Pressey, 1955).

Cross-cultural Studies

Not surprisingly, in view of the recency of research
into this area, few attempts have been made to trace the
impact of different cultures on creativity. In fact, most
research has been conducted in the U.S.A. and with upper
middle class, urban, whites; only a few researchers such
as Torrance (1963b, 1964) and his former associate,
Eastwood (1964), have attempted to discover the impact
of cultures outside the U.S.A..

Eastwood (1964) was very cautious in drawing con-
cclusions from different means obtained on non-verbal tests
administered in the United States, Australia, and Seoul.
However, he did note as being significant and valid the
the fact that in both the American and Australian samples, a "drop" occurred at about the grade four level but did not occur at all in the less Westernized culture of Samos. This, he interpreted as suggesting that decrements in creativity resulted more from factors (not specified) operating in sophisticated societies than from biological factors.

Torrence (1963b, p.40,41,55) found imaginative stories by children about both animals and persons with divergent characteristics* to be a promising technique for studying cultural pressures against creative thinking. Of cultures outside the United States, he noted that the stories of French children reflected perhaps the highest tolerance of divergency and those of Greek children the greatest interest in trying to understand and explain such behaviour. Canadian stories showed concern about understanding the external social causation, whereas little such concern was found in American stories in which "divergency is divergency and cause matters not."

Torrence further reported that in most of the American children's stories, the source of pressure tended to be peers.

* Employed as the criterion measure in the present study.
Among cultures within the United States, Torrance (1963b) found that the most severe pressures against creativity occurred in heterogeneous classes in urban areas, stories written by children in small towns reflecting far more tolerance of divergence. The stories of children in schools controlled by religious bodies reflected the greatest intolerance, whilst those of Negro children in a segregated school in Georgia reflected the greatest parental support of divergence.

Cross-cultural studies, limited as they are in scope and validity at this stage of research into creativity, hold out hope for broadening our understanding of the nature of this ability and the environmental conditions that are most likely to foster it.

**Summary and Conclusions**

This section reviewed the literature on cultural/social factors which have been found or hypothesized to be related to creativity. After a brief discussion of

* A similar finding was reported by Klausmeier and Wiersma (1964) who found differences between the means of seven of ten divergent thinking tests of a small city of 90,000 and a big city of 800,000. All differences were significant at or above the 0.05 level and all were in favour of the smaller city.
the general impact of society on creativity, a detailed analysis of specific factors of society which have been considered to foster or inhibit creativity was presented. A final section reviewed the sparse literature on cross-cultural studies.

The consensus of the studies reviewed in this section would be a view of creativity as being a product of the interactions of cognitive, emotional, and social/cultural factors. Contrary to Burt's evaluation, the influence of Goethe's "zeitgeist," or spirit of the age, has not been glorified; nor has it been deprecated.

Although no testable hypotheses emerge from the sections on the impact of society on creativity, it was considered that these were important areas to review because they draw attention to the broad formative influences that operate on creativity.

One of the most frequent emphases of this thesis is the necessity to view all research findings not only within the context of the specific sample, but also within the broader contexts of society and culture. Where relevant, therefore, the findings presented in Part Three will be discussed with an eye to such
influences, particularly when such findings are at variance with those obtained overseas.

II. CREATIVITY AND EDUCATIONAL FACTORS

The plain fact is that we know very little about the characteristics of children who are apt to become creative adults and very little about the educational or other experiences that tend to produce such characteristics. [emphasis not present in original article]

(Wilson (1958, p.111)

Although the last eight years or so have seen a tremendous upsurge of interest in the impact of education on creativity, and vice versa, Wilson's statement continues to hold an element of truth. As with so many other facets of research into creativity, the literature on the relationship between these two variables is characterized by equivocal and often controversial findings, is all-too-often marred by advocacy and conjecture at the expense of scientific principles, and is nourished by a hope of better things to come and a feeling that such research is going to be of ultimate benefit to mankind.

This section will consider the literature bearing on the following six topics:
1. Creativity and education in general.
2. Influence of teacher personality.
3. Training.
4. Emphasis on quantity versus quality.
5. Competition.

Creativity and Education in General

In recent years it has increasingly been assumed that all individuals to some degree possess the abilities involved in being creative, that these abilities can be improved through education, and that it is one of the school's legitimate functions to provide such training (Wilson, 1958; Torrance, 1962d). As MacKinnon (1962) maintained, the educator's task is not enough to recognize creative talent after it has come to expression, but to discover talent when it is still potential and to provide the kind of educational climate and environment that will facilitate its development and expression. This emphasis on the role of education has been echoed by several writers, some arguing on the basis of sound research evidence, but all too many confusing fantasy and fact, according to Wallen (1964), possibly in their attempt to have highly creative children emerge as "the good guys" (Jonicich, 1964, p.135). Just what constitutes
appropriate education for facilitating the development and expression of creativity is by no means clear, despite the considerable amount of recent interest in this field.

The remainder of this section will bring together some of the principles and concrete suggestions that have been advanced as means of encouraging creativity via education.* To facilitate the discussion, the points will be discussed under four headings:

1. Educational goals.
2. Classroom climate.
3. Classroom methodology.
4. Guidance and therapy.

Educational goals. Many writers have criticised schools on the grounds that they tend to favour the intelligent conforming pupil rather than the intelligent creative one. These criticisms have usually been accompanied by assertions that education should explicitly recognise creativity as being one of its chief goals.

Torrance (1960b, 1962a, 1962c, 1963a, 1963b, 1964, etc.), for example, has written at length in his

* It will be noted that many of the principles advanced by the various writers extend far beyond the domain of formal education and that many of them are very similar to those made to foster intelligence.
various publications of the need for schools to value creativity, while Carpenter (1962) has talked of the need to make the development of this ability a definite and enumerated goal. In a similar vein, MacKinnon (1962, p. 493) considered that education should pay more attention to the nurturing of traits which "have been shown to be intimately associated with creative talents." Education, too, should consciously orient individuals to the acceptance of themselves and others as creative beings according to McCney (1954). Similarly, Golovin (1963, p. 19-20) considered that because of the difficulties in predicting creative ability, the largest number of creative workers in any field can only be obtained by extending appropriate education to all those who demonstrate the capacity to acquire the "necessary volume and depth of structured interrelated experiences."

To a large extent, these sentiments echo those expressed by Whitehead who saw the formal process of education as being a means by which the creative advance into novelty is rendered more efficient and fruitful. The role of formal education, according to Whitehead, should be that of making the individual aware of the wider possibilities of value of which he is capable; he doesn't discover in order to know, he knows in order to discover.
**Classroom climate.** According to Rogers (1954), the conditions of "psychological safety" and "psychological freedom" are imperative to the development and expression of creativity. Rogers' statement — one of the first to have emerged in this field — was subsequently followed by other articles, many of which similarly emphasized such qualities as permissiveness, encouragement, and approval (Meares, 1958; Sumption and Luecking, 1960; Shertzer, 1960; Carpenter, 1962; Givens, 1962). A recent and concise statement along these lines is that of Flescher (1963, p.266) who asserted that the educational climate should "permit the expression of idiosyncratic needs, maintain a tolerance for innovation, be receptive to divergent-thinking activity, and encourage creative leadership."

Although Torrance (1964) reported finding that homogeneous grouping for tasks requiring creative problem solving enables less creative members to become more productive, no other research appears to have considered the influence of different group compositions.

**Classroom methodology.** Several writers have attempted to translate research findings on creativity into principles of classroom methodology. A direct
result of this has been the enormous increase over the past few years in the number of courses designed to improve creativity. According to Guilford (1958), in the late 50's, there were about two thousand such courses being offered in the universities, in industries, and in governmental agencies. Symptomatic of education's growing interest in creativity is the work being done by Osborne's Creative Education Foundation which has recently sponsored a research periodical, the Journal of Creative Behaviour.

Two good examples of the type of advice offered to teachers aiming at developing creativity through school experiences are the principles outlined by Torrance (1962d) and by Mackinnon (1962). The former listed some twenty suggestions to teachers. These included making children more sensitive to environmental stimuli, encouraging the manipulation of objects and ideas, giving information about the creative process, creating "thorns in the flesh," and encouraging the habit of working out the full implication of ideas. Mackinnon (1962, p. 494) was even more specific when he wrote that there should be an emphasis on transfer of training from one subject to another, the searching for common principles in terms of which facts from quite different domains of knowledge can be related, the stressing of analogies, and similes, and metaphors, a seeking for symbolic equivalents of experience in the widest possible
number of sensory and imaginal modalities, exercises in imaginative play, training in retreating from facts in order to see them in larger perspective...*

*Guidance and therapy. One or two writers have stressed the need to recognize the importance of creative relationships in teaching and counselling highly creative individuals. Torrance (1962a), for example, cited experiments as showing that many things can be learned creatively more economically than they can by authority, and that some people strongly prefer to learn creatively. Elsewhere, Torrance (1962a, p.8) had recommended that school guidance workers should adopt such roles as providing a creative individual with a "refuge," being his "sponsor" or "patron," seeing that his creative talent is recognized, and helping parents and others understand him. In a similar vein, Garwood (1964, p.48) considered that insight-oriented psychotherapies, "which tend both to loosen repressions and facilitate integration of the previously repressed mankind," often will, if successful, augment creativity.

* There are many similarities between these views of Mackinnon and those expressed by Bruner (1962b) in his description of intuitive thinking. The applicability of Bruner's ideas to creative education was noted by Torrance (1964) who considered them as being useful in charting the course of educational developments that will encourage creative growth.
Other writers to have discussed the relationships between creativity and education include Vestach (1953), Pressey (1955), Stein (undated), Wilson (1958), Wall (1960), Holland (1961), Rhodes (1961), Getzels and Jackson (1962), and Parkyn (1964).

Many of the writers cited in this section represent those who have responded with a sense of urgency to the apparent need to translate research findings (and speculation) into implications for educational practice. While some have quite justifiably been accused of "bandwagonism," of premature advocacy, and of confusing fantasy and fact, most have undoubtedly been persuaded into taking a pragmatic view.

**Influence of Teacher Personality**

There is some evidence that teacher personality influences the level and the amount of creative behaviour in pupils.

At least three studies have reported findings indicating a close relationship between the two factors. Torrance (1963b, p.32), for example, described the results of a study in which teachers participating in an experiment aimed at discovering their influence on children's creative writing, were administered a test
which yielded a score defined as "Creative Attitudes."
These teachers were divided at the median into a "high
creative" and a "low creative" group. It was found that
the pupils of the teachers in the former group showed
"significant growth" in creative writing, whereas the
pupils of those teachers in the lower half actually
showed a "slight decrement" between the pre- and post-
tests of creative writing. Similar results were reported
by Wodtke (1964, p.4092) whose test-retest results
suggested that Grade 4 pupils of "low controlling" teachers
achieved higher gains in verbal creativity than the pupils
of "highly controlling" teachers (p < .05). These findings,
with slight boy-girl differences, were supported in
research reported by James (1965, p.4594). In this study,
James found that boys in the classes of high creative
teachers differed significantly (p < .01) from those in
classes of low creative teachers on elaboration, origin-
ality, fluency, non-verbal, and total creativity scores.
Girls in the former group of classes were found to differ
significantly (p < .01) from girls in the lower group on
curiosity and verbal tasks, and, at the .05 level of
significance, on fluency, elaboration, and non-verbal
tasks.
All is not lost, however, for those children who have a teacher with a low creative attitude, according to Torrance and Punsalan (1960). In a report which is difficult to reconcile with the foregoing findings, they suggested the existence of a compensating mechanism by which children who are exposed to a limited number of creative activities in school tend to undertake a larger number of creative and exploratory activities on their own. Unfortunately, little supporting evidence for this contention was reported by the authors.

Three studies of limited scope do not provide sufficient evidence to warrant drawing firm conclusions as to the influence of teacher personality on children's creativity. Therefore, as Wodtke and Wallen (1965, p. 63) so recently cautioned, until further research has been completed, judgements as to the comparative effectiveness of permissive versus directive teaching for creativity "must be regarded in most cases as pure conjecture, and at best as judgements based on tentative findings."

Nevertheless, the consensus of reports at both the experimental and the speculative levels would suggest that when this important area has been more comprehensively investigated, the direction of the findings reported in this section will be maintained. Teacher-pupil interaction,
and its resultant effects upon children's cognitive functioning, is an area of research that could well be linked with the study of creativity in future investigations.

Training

Although Stein and Heinz's (1960) comprehensive bibliography of over three hundred articles and books on creativity included only three empirical studies on the stimulation of creativity, this area has been investigated more thoroughly in recent years. Several writers have presented evidence which supports Parnes' (1962, p.191) contention that the gap between an individual's "innate creative talent" and his lesser "actual creative output" can be narrowed by deliberate education in creative thinking. Such a belief is in accord with the growing conviction that creativity is to a large degree a behavioral set or habit pattern based on the rewards accrued by the individual during past learning experiences (Torrance and Harmon, 1960; Haven, 1964). In other words, it is assumed that if creativity is learned, it can be taught.

One of the first researchers to have investigated the possibility of training subjects to produce creative responses was Maltzman (1960). He saw the basic problem
in the training of originality as being the devising of a means of increasing the frequency of uncommon behaviour, i.e., responses "low in the response hierarchy." To achieve this, he evolved a procedure in which the repeated presentation of a list of stimulus words in a modified free association situation was accompanied by instructions to give a different response to each stimulus. Maltzman reported that after training of this sort, subjects produced significantly more original associations to other words, and performed better on a test of originality.

Meadow and Barnes (1959) reported similar findings. They found that an experimental group which had received a thirty hour training course in creative problem solving, attained a greater increase on measures of "idea quality" than a control group. Osborn (1963, p.24-25) made even stronger claims when he reported that those who took courses emphasizing his principle of "brainstorming" and other allied methods, were "able to average 94 per cent better in production of good ideas than those without benefit of such a course." These increments apparently remained evident in a group of students tested a year or so after taking the course.

In an experiment conducted by Myers (1960, cited by Torrance, 1963b, p.29), a random half of children in
a class were given intensive training in creative thinking over a period of four months but no training in creative writing. The control group was given training in convergent problem solving. As measured by pre- and post tests of creative writing, the experimental group showed greater growth than the controls. A similar pattern was found by Torrance (1964, p. 105) with groups of sixth grade children. When rewarded for originality, the children produced about twice as many original ideas as when they were rewarded for quantity regardless of quality. When rewarded for the interest and originality of their stories, other groups of children wrote more interesting and original stories but made more errors in usage, spelling, and mechanics than did children rewarded for correctness.

Results similar to the foregoing were reported by Carlson (1959) who found that a variety of stimuli resulted in greater fluency and originality in creative writing than did the use of story titles alone. Similar results were reported by True (1964) who found that the teaching of general semantics significantly increased ideational fluency and spontaneous flexibility, by Torrance (1963b), and by Vestch (1953).

In a review of the literature on the influence of training on creative writing, however, Marksheffel (1964)
reported limited and inconsistent findings ranging from Carlson's (1963) report of gains in favour of an experimental group to Heys' (1962) report of inconclusive results.

Thus, despite the difficulties of controlling the manipulation of the environment in order to measure hypothesized change, there is an increasing amount of such "action" research being conducted into the effects of training on creativity. In few other areas of research into this subject has there been such a high degree of accord, most writers agreeing that creativity can be developed by appropriate training techniques. If these findings continue to draw empirical support the implications for education could be considerable.

**Emphasis on Quantity Versus Quality**

The question of relative emphasis on quantity versus quality has produced mixed experimental evidence. On the one hand, according to Guilford (1962), it is believed that an evaluative attitude inhibits the flow of ideas while, on the other hand, it is believed that concurrent evaluation has a selective effect by letting only high quality responses come through.
Osborn (1963) has long considered that creativity is encouraged by temporal segregation of hypothesis formation and the judicial evaluation of the adequacy of the hypothesis. This principle of deferred judgement, or "brainstorming" as Osborn preferred to call it, has been subjected to only limited experimental investigation — much of it, unfortunately, conducted by "advocates" rather than by fully impartial researchers. Osborn (1963, p. 21) himself, in developing the thesis that "quantity breeds quality," in an inadequately-described study, reported finding that the second half of creative thinking sessions provided "78 per cent more good ideas than did the first half." Osborn's colleagues, Meadow et al. (1959), similarly found that significantly more good solutions were produced under brainstorming instructions than under non-brainstorming instructions.

The foregoing findings were supported, too, in research conducted with groups. Parnes and Meadow (1963, p. 319-320), for example, reported finding that groups producing ideas on a creative thinking problem were more productive of good quality ideas when following the deferred judgement principle than when following more conventional discussion methods. They found, too, that groups utilizing the deferred judgement principle were
more productive of good-quality ideas than the same number of individuals working independently with conventional methods.

There is some question, however, as to whether Osborn and his associates' findings are applicable to all age groups. Torrance (1963b, p.27-28), for example, found that the principle of motivation for quantity without regard for quality appeared to be inappropriate in the first three grades. Although Torrance admitted that his findings were of marginal statistical significance, they are sufficient to call for the exercise of caution when considering both the validity and the universality of the principle of brainstorming.

All in all, it would seem that Hyman (cited by Guilford, 1962) was probably correct when he concluded that quantity may breed quality for some types of problems but not for others. To this should be added the possibility that the principle of deferred judgement may not be appropriate at all age levels.

Competition

There would be wide agreement with Tumin's (1954) statement to the effect that nothing is quite so hostile to the maximisation of creativity as the competitive
grading system which prevails in our schools. Such
competition, however, refers to the drive towards attain-
ment in convergent areas of thinking and is simply another
way of drawing attention to the assumed incompatibility
of creativity and stress on conventional academic attain-
ment.

In fact, according to Torrance (1963b, p.28),
competition per se is in no way inimical to creativity —
provided the stress is on such thinking. He found that
competition in grades one to six actually increased
fluency, flexibility and originality to a statistically
significant degree. Practice and "warm-up" did not
entirely eliminate the advantages achieved by such
competition.

Evaluation

Very little research has been conducted on the
question of the effects of evaluation on creativity.
Darnell (1963, p.3683) found that the methods of product
evaluation (accepting, critical, stoical) did not signifi-
cantly influence the quality of creative expression in
children from a total of nine classes in grades 4, 5,
and 6. He reported that the method of product evaluation
affected only seven of the seventeen quality measures at
"specific grade levels and at specific periods." In a slightly different vein, Torrance (1963b, p.29) reported on the effects of peer evaluation. Results of his research indicated that children in the kindergarten and primary grades are not bothered by the opinions of their peers but that negative criticism in the 4th, 5th, and 6th grades "puts a damper on creativity."

**Summary and Conclusions**

This section commenced with a review of some principles and suggestions that have been advanced as means of encouraging creativity via education. Particular attention was paid to claims for having creativity recognized as a specific educational goal, to the factors of classroom climate and methodology held to be conducive to creativity, and to relevant principles of guidance and therapy. Second and third sections, respectively, outlined research on the effects on creativity of teacher personality and of training. The differential impact of emphasis on quantity as opposed to emphasis on quality was then discussed, particular mention being made of Osborn's principle of "brainstorming." Finally, there was a brief discussion of the effects on creativity of competition and evaluation.
Most writers have adopted an essentially pragmatic approach to the relationship between creativity and education, many relying on conjecture and "common sense" extrapolation from a small body of equivocal and controversial research. Nevertheless, there is considerable agreement — explicit and implicit — among writers with the belief that education must not only recognize the importance of creativity, but must also provide an atmosphere and a training conducive to its development. There is an air of confidence that if these and other prerequisites could be met, the future holds great promise for increasing both the number of creative people and the quality of their productions. Most certainly, there is no lack of hypotheses for well-controlled "action" research to investigate.

Hypothesis

While many of the factors reviewed in this section were not selected for experimental investigation and are included because of their relevance to findings in other areas, the following exploratory hypotheses will be tested:

1. That there will be significant differences between schools on the mean scores on the creative writing measures.
III. CREATIVITY AND FAMILY BACKGROUND

The family backgrounds of creative individuals have been the subject of recent study. While some aspects of this area of research have been investigated with empirical thoroughness and a pleasing degree of unanimity, others have received only cursory attention. This section will consider three topics:

1. Family dynamics and parental attitudes.
2. Parents' socioeconomic and educational status.
3. Sibling order.

Family Dynamics and Parental Attitudes

Several studies of varying degrees of empiricism have reported on the child-rearing antecedents of creativity. Of those studied in the course of this investigation, there was almost complete agreement that family dynamics in general and parental attitudes in particular, exercise a considerable influence on creativity.*

*One exception was a finding reported by Dever (1964) in a study of 100 Negro 4th graders. He found only a moderate relationship between children's creative thinking ability and parental attitudes, there being no statistically significant difference among the Parent Attitude Questionnaire means of high, middle, and low creative children.
The two outstanding researches in this area — those of Nichols (1964) and Ellinger (1965) — have made a big contribution to the understanding of the degree and nature of this relationship and will therefore be described in some detail in this section.

Nichols (1964) studied the child-rearing attitudes of the mothers of 1,246 high-ability high school seniors to test the hypothesis that restrictive controlling attitudes are negatively related to creativity. Using the Parental Attitude Research Instrument, the mothers were scored for three factors: Authoritarian Control, Hostility-Rejection, and Democratic Attitudes. Nichols (1964, p.1047) considered that the data of the study suggested "with certain qualifications...the hypothesis of a negative correlation between mothers' authoritarian child-rearing attitudes and the originality and creativity of their children..." In other words, creative children tend to have less-authoritarian mothers than do less-creative children. However, all of the observed relationships were quite small, reaching significance only by virtue of the large sample. In discussing these results, Nichols (1964, p.1048) suggested three possible ways in which a correlation between the two variables would arise:
(a) the mother's expressed attitude reflects her treatment of the child during his early life,...(b) the behaviour of the child affects the attitudes of the mother toward child-rearing; (c) both the mother's attitude and the child's behaviour are affected by some third variable (e.g., socioeconomic status, genetic factors, etc.).

On the basis of the evidence at hand, however, Nichols concluded that it was not possible to decide with certainty between these three possible explanations.

In a study of 458 4th grade pupils, Ellinger (1965) found a correlation of 0.592 (p < .005) between creative thinking ability and a composite of variables representing home environment. A partial correlation was computed in an attempt to account for the effects of intelligence. Although the correlation dropped markedly when this measure was used, it remained at a level which was significant at the p < .01. Ellinger reported, too, that parents of high creative children involved their children in family activities to a greater extent, read to them more often, kept their homes more plentifully supplied with magazines, books, and reference materials, and went to libraries more consistently than did parents of low creative children. There was also evidence to suggest

* (1) family activity, (2) school emphasis, (3) intellectual stimulation, (4) emotional climate, (5) parental expectation level, (6) models sought.
that "the kind and frequency of coercive discipline, especially of a physical nature, is negatively correlated with creative thinking ability." (Ellinger 1965, p.6308). Girls seemed to be more directly influenced by their home environment than were boys.

Other features of the family dynamics and parental attitudes noted by various writers as being related to creativity include:

(1) Parents' encouragement of a relaxed and independent approach to life (Weisberg and Springer, 1961; Holland, 1961; Hawkins, 1964, p.174; Sherman, 1965). Thus, Hawkins found that when asked to rank a given list of values in the order in which they would like their sons to possess them, parents of divergent students ranked "a sense of humour" and "the ability to look at things in a new way and to discover new ideas" several ranks higher than did the parents of convergent students. Similarly, Weisberg and Springer found that there was little stress on conformity to parental values and that there was open and not always calm expression of strong feelings. Parents were also noted as being able to accept the child's regressive behaviour without great discomfort.
(2) Acceptance of individual divergence and risks (Getzels and Jackson, 1962) with a lack of demand for submissiveness (Stein, 1958).

(3) "Extraordinary respect for the child and confidence in his ability to do what was appropriate" (Mackinnon, 1962, p.491). This, according to Mackinnon, contributed to the autonomy of future creative individuals.

(4) Emerging from (3) above, a lack of intense closeness or identification with one or both of the parents — usually the father, according to Mackinnon (1962) and Stein (1958, 1963) but sometimes the mother (Weisberg and Springer, 1961; Garwood, 1964).

(5) Discipline almost always consistent and predictable (Mackinnon, 1962; Stein, 1958).

(6) Parents having a goal in life (Stein, 1958).

(7) Family unit not an overly close one; there is little clinging to one another (Weisberg and Springer, 1961). Stein (1958), however, noted that 35 per cent of the creative men in his study said their parents' marriage was very happy as against only 12 per cent of the less creative.

It would seem, then, that with small variations, research is almost unanimous in pointing to the significance of family dynamics and parental attitudes for
creativity. Notwithstanding this general agreement, there are still variations among studies as to the relative importance of such specific factors as the stability of the marriage and the differential impact of the father and the mother.

Parents' Socioeconomic and Educational Status

The socioeconomic status and educational levels of parents and their relationship to creativity is another area characterized by few and equivocal findings. These range from Markey's (1935) statement that children with higher socioeconomic backgrounds display most imaginative behaviour to Stein's (no date,b) finding that the more creative of his group of chemists came from lower socioeconomic levels and had parents of lower educational status.

Findings similar to those of Stein were reported by Saker (1964) who found indices of socioeconomic status to be the least reliable of several variables in predicting certain facets of creativity and by Rivlin (1959), Nambo (1964), Skager et al (1965),¹ all of whom found

¹Skager et al, however, pointed out that, in their study at least, the use of college subjects rather than a more heterogeneous population may have removed any variation in creativity which may have been accounted for by socioeconomic status.
that the parental occupation levels of creative students did not differ significantly from those of non-creative students. On the other hand, in support of Markey's statement, Walsberg and Springer (1961) reported finding that the fathers of more creative children have greater occupational autonomy or independence than the fathers of their less creative peers. No explanations of any of these findings were preferred by the writers.

In contrast to Stein's above comment regarding the lower educational levels of parents of creative scientists, two other studies have reported findings in the opposite direction. Stein (1958) himself, in another study, found that whereas 9 per cent of the fathers of the more creative had no education or had not graduated from elementary school, the relevant figure for the fathers of the less creative was 41 per cent. Similar results were reported by Green (1957) and by Rivlin (1959), both of whom found that creative students' parents reached a significantly higher level of education.

Although too little research has been conducted to support anything but a tentative conclusion at this stage, it seems likely that there is a fairly close relationship between creativity and the socioeconomic and educational status of parents.
Sibling Order

The relationship between creativity and sibling order has not been the subject of extensive research. Only three writers studied in the course of this investigation made reference to this factor; predictably, they arrived at different conclusions. Thus, whilst Stein (1958) and Rambo (1964) reported that sibling order was not found to be related to creativity, Weisberg and Springer (1961) found that the creative child is often an older sibling.

Summary and Conclusions

This section reviewed the literature on family background factors which have been found to be related to creativity. Particular attention was paid to the influence of certain aspects of family dynamics and parental attitudes which several writers have agreed upon as being conducive to creative thinking. The equivocal research on parents' socioeconomic and educational status was then reviewed, this being followed by a summary of the small amount of equally equivocal research on the influence of sibling order on creativity.
Appearing to emerge from the literature in this area is a composite picture of the creative individual's family background as being a home of above-average socioeconomic and educational status which manifests or encourages a syndrome of qualities such as democracy, tolerance, non-authoritarianism, intellectual stimulation, involvement in family activity, acceptance of divergence, consistent discipline, and emotional and intellectual independence.

Hypotheses

Although the differential effects on creativity of family dynamics and parental attitudes are not tested in the present investigation, the literature in this area was reviewed in some detail because of its relevance to findings in other areas and because of this study's aim of providing a comprehensive coverage of factors related to creativity.

In addition to the evidence linking creativity with family dynamics, another definite hypothesis to have emerged from this section may be stated as follows:

2. That highly creative children come from homes of higher socioeconomic status than their less creative peers.
In addition, two exploratory hypotheses will be tested:

3. That there will be differences between highly creative and less creative children with respect to sibling order.

4. That highly creative children will have a different number of siblings than their less creative peers.
CHAPTER VI

CREATIVITY AND INTELLIGENCE

In the past, it was widely assumed that there was a direct, one-to-one relationship between creativity and intelligence, with the former being largely a function of the latter. Many researchers, particularly in the United States, have recently challenged this assumption, with the result that the relationship between the two factors has been the subject of a great deal of research — much of it controversial.

The remainder of this chapter is divided into two major sections:

I. Research Findings

II. A Critical Evaluation of the Research.

I. RESEARCH FINDINGS

Reported correlations between measures of creativity and intelligence range from coefficients of zero or even negative values to some as high as 0.60. Tables III and IV summarize some of the available research findings on the relationship between the two
variables in studies focussing on adults and children respectively.

This section will concentrate on the following two topics

1. Discussion of Tables III and IV.
2. Studies not reported in Tables III and IV.

Discussion of Tables III and IV

Four facts are apparent from a quick inspection of Tables III and IV: (1) Most of the studies are American; (2) they have been conducted mainly since 1956, and with increasing tempo since 1962; (3) correlations range from coefficients of zero or even negative values to some as high as 0.60; and (4) the median coefficient falls within the 0.30 to 0.40 range.

Because much of the research conducted in this area is vulnerable to criticism and because many of the studies are not directly comparable, there is a need for considerable caution in drawing conclusions from the available evidence. The studies reported in Table III and IV vary in terms of:

1. The criterion of creativity.
2. The intelligence test employed.
3. The group studied.
<table>
<thead>
<tr>
<th>Study</th>
<th>Sample</th>
<th>N</th>
<th>Intelligence Test</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meer &amp; Stein (1955)</td>
<td>Res. Chemists</td>
<td>63</td>
<td>W-B Full Scale</td>
<td>.46</td>
</tr>
<tr>
<td>Meer &amp; Stein (1955)</td>
<td>Non. Ph.D. Chemists</td>
<td>39</td>
<td>W-B Full Scale</td>
<td>.40</td>
</tr>
<tr>
<td>Taylor (1957)</td>
<td>Eng. &amp; Scientists</td>
<td>103</td>
<td>Terman Concept Mast.</td>
<td>.38</td>
</tr>
<tr>
<td>Barron (1957)</td>
<td>USAF Captains</td>
<td>100</td>
<td>Terman Concept Mast.</td>
<td>.33</td>
</tr>
<tr>
<td>Meer &amp; Stein (1955)</td>
<td>Ph.D. Chemists</td>
<td>24</td>
<td>W-B Full Scale</td>
<td>.32</td>
</tr>
<tr>
<td>Welch (1946)</td>
<td>College students</td>
<td>48</td>
<td>Wonderlic</td>
<td>.27</td>
</tr>
<tr>
<td>Fisichelli &amp; Welch (1947)</td>
<td>College students</td>
<td>103</td>
<td>Wonderlic</td>
<td>.27</td>
</tr>
<tr>
<td>Torrance (1962a)</td>
<td>Graduate class</td>
<td>75</td>
<td>Miller Analogies</td>
<td>.11</td>
</tr>
<tr>
<td>Torrance (1962a)</td>
<td>Counsellors</td>
<td>-</td>
<td>Miller Analogies</td>
<td>.10</td>
</tr>
<tr>
<td>Mackinnon (1959)</td>
<td>Architects</td>
<td>40</td>
<td>Terman Concept Mast.</td>
<td>- .08</td>
</tr>
<tr>
<td>Torrance (1962a)</td>
<td>Graduate class</td>
<td>70</td>
<td>Ohio State Psych.</td>
<td>- .02</td>
</tr>
<tr>
<td>Harris &amp; Simberg ( - )</td>
<td>Engineers</td>
<td>-</td>
<td>Wonderlic</td>
<td>.50 to .30</td>
</tr>
<tr>
<td>Buel &amp; Bechner (1961)</td>
<td>Ind. researchers</td>
<td>54</td>
<td>Adaptability Test</td>
<td>.34 to .13</td>
</tr>
<tr>
<td>Chorness (1963)</td>
<td>USAF instructors</td>
<td>50</td>
<td>Airman Class Batt.</td>
<td>.34 to .23</td>
</tr>
<tr>
<td>Author(s) and Date</td>
<td>Group Studied</td>
<td>N</td>
<td>Intelligence Test</td>
<td>r</td>
</tr>
<tr>
<td>-----------------------------</td>
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</tr>
<tr>
<td>Wallen &amp; Stevenson (1960)</td>
<td>Gr. 5 Mixed</td>
<td>63</td>
<td>Cal. Ment. Mat.</td>
<td>.57</td>
</tr>
<tr>
<td>Wodtke (1964)</td>
<td>Gr. 4</td>
<td>100+</td>
<td>Lorge Thorndike</td>
<td>.57</td>
</tr>
<tr>
<td>Yamamoto (1964)</td>
<td>Gr. 10 Mn IQ 118</td>
<td>70</td>
<td>Lorge Thorndike</td>
<td>.56</td>
</tr>
<tr>
<td>Seitz (1964)</td>
<td>Gr. 8 Mn IQ 105</td>
<td>308</td>
<td>Kuhlmann-Anderson</td>
<td>.56</td>
</tr>
<tr>
<td>De Boer (1965)</td>
<td>Gr. 6 Mn IQ 115</td>
<td>295</td>
<td>Cal. Ment. Mat.</td>
<td>.55</td>
</tr>
<tr>
<td>Yamamoto (1962)*</td>
<td>Gr. 3-6 High Iq</td>
<td>79</td>
<td>Stanford-Binet</td>
<td>.43</td>
</tr>
<tr>
<td>Wodtke (1964)</td>
<td>Gr. 5</td>
<td>130+</td>
<td>Lorge Thorndike</td>
<td>.37</td>
</tr>
<tr>
<td>McGuire et al (1960)</td>
<td>Gr. 7</td>
<td>1417</td>
<td>Cal. Ment. Mat.</td>
<td>.36</td>
</tr>
<tr>
<td>Torrance (1962a)</td>
<td>Gr. 1-6</td>
<td>354</td>
<td>Otis</td>
<td>.32</td>
</tr>
<tr>
<td>Iscoe &amp; Pierce-Jones (1964)</td>
<td>White Children</td>
<td>135</td>
<td>WISC Full Scale</td>
<td>.32</td>
</tr>
<tr>
<td>Yamamoto (1964c)</td>
<td>Gr. 9-12</td>
<td>272</td>
<td>Lorge Thorndike</td>
<td>.30</td>
</tr>
<tr>
<td>Torrance (1962a)</td>
<td>Gr. 5-6</td>
<td>238</td>
<td>Kuhlmann-Anderson</td>
<td>.27</td>
</tr>
<tr>
<td>Torrance (1962e)</td>
<td>Gr. 7-12</td>
<td>272</td>
<td>Lorge Thorndike</td>
<td>.27</td>
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<tr>
<td>Bower (1960)</td>
<td>El. school High Iq</td>
<td>150</td>
<td>Stanford-Binet</td>
<td>.26</td>
</tr>
<tr>
<td>Torrance (1962a)</td>
<td>Gr. 5-6</td>
<td>110</td>
<td>Cal. Ment. Mat.</td>
<td>.24</td>
</tr>
<tr>
<td>Iscoe &amp; Pierce-Jones (1964)</td>
<td>Negro children</td>
<td>132</td>
<td>WISC Full Scale</td>
<td>.21</td>
</tr>
</tbody>
</table>

*Non-verbal creativity

(continued)
<table>
<thead>
<tr>
<th>Author(s) and Date</th>
<th>Group Studied</th>
<th>N</th>
<th>Intelligence Test</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yamamoto (1964c)</td>
<td>Gr. 11-12 Mn IQ 118</td>
<td>140+</td>
<td>Large Thorndike</td>
<td>.18</td>
</tr>
<tr>
<td>Yamamoto (1963)</td>
<td>Gr. 5 Mn IQ 116</td>
<td>461</td>
<td>Large Thorndike</td>
<td>.14</td>
</tr>
<tr>
<td>Fleming &amp; Weintraub (1962)</td>
<td>Gr. 3-6 High IQ</td>
<td>68</td>
<td>Pintner</td>
<td>.04</td>
</tr>
<tr>
<td>Fleischer (1963)</td>
<td>Gr. 6 High IQ</td>
<td>110</td>
<td>Cal. Ment. Mat.</td>
<td>.04</td>
</tr>
<tr>
<td>Torrance (1962a)</td>
<td>Gr. 6 High IQ</td>
<td>30</td>
<td>Stanford-Binet</td>
<td>.03</td>
</tr>
<tr>
<td>Kelly (1965)</td>
<td>Gr. 4, 6, 8</td>
<td>492</td>
<td>Cal. Ment. Mat.</td>
<td>.54 to .33</td>
</tr>
<tr>
<td>Neufeld (1964)</td>
<td>Gr. 8</td>
<td>300</td>
<td>Kuhlmann-Anderson</td>
<td>.54 to .17</td>
</tr>
<tr>
<td>Kelly (1965)</td>
<td>Gr. 6-8</td>
<td>200+</td>
<td>Cal. Ment. Mat.</td>
<td>.28 to .27</td>
</tr>
<tr>
<td>Getzels &amp; Jackson (1962)</td>
<td>Gr. 6 – H.S. High IQ</td>
<td>53.3</td>
<td>Various</td>
<td>.39 to .12</td>
</tr>
<tr>
<td>Piers et al (1960)</td>
<td>Gr. 7-8 High IQ</td>
<td>114</td>
<td>Otis</td>
<td>.34 to .06</td>
</tr>
<tr>
<td>Ripple &amp; May (1962)</td>
<td>Gr. 7</td>
<td>(a) IQ 72-90</td>
<td>30</td>
<td>Otis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(b) IQ 96-110</td>
<td>30</td>
<td>Otis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(c) IQ 116-133</td>
<td>30</td>
<td>Otis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(d) IQ 72-133</td>
<td>30</td>
<td>Otis</td>
</tr>
</tbody>
</table>

* Non-verbal creativity
These three factors will be considered in turn in the remainder of this section.

**The criteria of creativity.** Creativity scores in the studies reported in Tables III and IV were obtained in two principal ways. The first, and most commonly employed, method involved the use of such creativity tests as the Guilford or Torrance batteries (e.g., Barron 1957, Torrance 1962, Fleming and Weintraub 1962, and Yasumoto 1962, 1963, 1964c). A second method was the use of rating scales of various kinds, the subjects being rated by their teachers, supervisors, or peers. An example of this approach was Taylor's (1957) use of a checklist rating scale which was employed by supervisors to rate a group of engineers and scientists in an electronics laboratory. Another example of this — again in a study of adults — was Bueh and Bachner's (1961) evaluation of a group of research personnel according to such criteria as the proportional contribution to patents issued.

Because of this current lack of generally-accepted criteria of creativity, it is inevitable that, as Skager et al (1965, p.31) said, "different researchers working in what is nominally the same domain may not be investigating the same phenomena." This lack of agreement highlights the necessity for having a consensus on the
criteria of creativity before one can say with any certainty what its relationship is to intelligence or to any other variable.

The intelligence test employed. As well as having to be able to measure creativity more accurately, one must also be certain that intelligence tests are, in fact, valid and reliable instruments. While considerable advances have been made in this field, few would claim that the traditional type of intelligence test samples all, or even a comprehensive range, of known cognitive abilities or that it measures with a high degree of accuracy those that it purports to measure.

In the studies reported in Tables III and IV, considerable variation between researchers as to their choice of intelligence test is apparent. Most have favoured the use of such group tests as the Otis Quick Scoring Test, the Wonderlic Personnel Test, and the California Mental Maturity Test, only a few employing an individual test such as the Stanford-Binet Intelligence Scale.

A further factor that tends to jeopardize the comparability of results is the differential ceiling effects of the various intelligence tests. This factor is of particular significance in view of the fact that
most studies have been conducted with "high-grade"
populations where the ceiling effect of a test is more
likely to have a distorting influence on the apparent
range of intelligence and, therefore, on the results of
any correlations involving intelligence.

The group studied. A subsequent section of this
chapter outlines the effects of the intellectual homo-
genesis of the group studied on correlations between
creativity and intelligence. It is sufficient to point
out, in the present context, the fact that the majority
of the studies reported in Tables II and III have been
carried out with groups of at least high-average ability.

A further source of variance among studies lies in
the field(s) of creativity represented in the groups
studied. Writers have variously focussed on creativity
as it is manifested in one or more of the areas of
science, art, and literature. This procedure of grouping
fields together, or generalizing results from one field
to the others, has met with some criticism. Spieth (1964),
for example, considered that some of the erratic results
obtained in attempts to correlate intelligence and
creativity may be explained by the failure to specify
the creative field comprising the investigators' samples.
Although many studies have recently been conducted in this area, their lack of comparability, together with their all-too-frequent methodological and interpretational weaknesses, have made the drawing of firm conclusions as to the relationship between intelligence and creativity difficult and premature.

Studies Not Reported in Tables III and IV

In addition to the studies summarized in Tables III and IV, several writers have reported on the relationships between measures of creativity and intelligence in more general terms. Gardner (1963, p.822), for example, reported finding "highly significant correlations," noting that general intelligence appears to be a major influence on creativity, "except perhaps in the case of children with very superior IQ." Similarly, Kheiralla (1963, p.2361), in a study of 211 children from Grades 4, 6, 8, 10, and 12, noted that the creative child is in most cases, "a person of superior or gifted mental capacity...," while Gaier and White (1965, p.66-67) found that distinguished writers were "unusually high in conceptual and verbal intelligence." Altenhaus (1964) reported finding a "significant linear relationship" between the two variables in a study conducted with 266 sixth grade pupils. Like Ripple and May (1962) and others,
he noted that the use of a broad unselected sample yielded significantly higher correlations than when a restricted sample was used. Miller (1962) reported finding a positive relationship between intelligence and creativity in writing.

Several writers have advanced persuasive arguments as to why there should be a substantial relationship between creativity and intelligence. Anderson, (1960), for example, argued that because both variables require the possession of extraordinary patterns of association and fluidity of ideas, it is within the group of brighter people that creative people will be found. Similarly, Russell (1956) considered that high intelligence undoubtedly increases the chances for the reorganization of experiences, for the production of new insights. Barron (1957, p.735), too, considered it reasonable that the two variables should "covary positively" because their very definitions demand that they do so. If one defines originality, he said, as "the ability to respond to stimulus situations in a manner which is both adaptive and unusual," and if one defines intelligence simply as "the ability to solve problems," then the "very difficult problem which is rarely solved requires by definition a solution that is original." Reasoning similar to that
of Barron was reflected in a statement by the participants and editors of a Conference on Scientific Creativity (Taylor and Barron, 1963, p. 387). In pointing out that in the field of science, knowledge was an essential prerequisite to creativity, they stressed that the more highly developed a body of knowledge becomes, the more intelligence is required for its mastery. The creative scientist, they said, "...must therefore be of a high order of intellectual ability..." Thus, as Yamamoto (1964a, p. 406) pointed out when talking of the difficulties in selecting criteria of creativity, "...it is almost impossible to find a criterion which is not contaminated by other features...especially by intelligence."

In contrast with the foregoing research and speculation suggesting a substantial relationship between creativity and intelligence, some writers have pointed to low relationships between the two variables. Owens (1965, p. 5122), for example, found that in a sample of fourth, fifth, and sixth grade pupils of mixed ability, "the correlation between total intelligence and creativity was low positive and statistically non-significant."

Metcalf (1965, p. 5744), too, found little evidence that "variability in the creative thinking abilities is a function of scholastic aptitude level."
Summary

In surveying the literature on research findings and speculation regarding the relationships between intelligence and creativity, this section summarized over fifty separate studies of varying degrees of scientific validity and comparability. Variations from study to study according to the criterion of creativity, the intelligence test employed, and the group studied, were noted as making for difficulties in drawing firm conclusions. These difficulties are highlighted even more in the following section which presents a critical evaluation of the research conducted in this area.

II. A CRITICAL EVALUATION OF THE RESEARCH

Because of the multiplicity of theoretical and methodological approaches that have been employed in studying the relationship between creativity and intelligence, it is not surprising to find a wide variety of findings and speculations in the research. This section will highlight the controversial nature of many of the studies conducted in this area by focusing on three main topics:

1. Differing conceptions of the structure of the intellect.
2. The effects of studying intellectually homogeneous populations.


Differing Conceptions of the Structure of the Intellect

Until recently, there has been a distinct cleavage of opinion between British and American psychologists as to the relative importance of intelligence for creative thinking. This difference appears to have emerged from the much deeper and long-standing disagreement between American and British researchers as to the structure of the intellect.

This section will examine the following three aspects of the problem:

1. The hierarchical theory of intelligence.
3. The need for reconciling the two conceptions.

The hierarchical theory of intelligence. Vernon (1961, p.11) considered that the crucial difference between the American and British schools of thought centred on the question of the existence and relative importance of a general factor, "g." British psychologists, according to Vernon, generally hold to a
"hierarchical" theory of intelligence, a concept which emphasizes the importance of \( g \) and which postulates the existence of "certain main types of ability over and above \( g \) (in particular the educational and practical types)...", which can in turn be subdivided into numerous minor group factors.

According to Vernon (1961, p.134), however, \( g \) is so much larger than all factors put together in unselected populations of adults or children, that it is "psychologically foolish as well as mathematically difficult to belittle it." This concept of \( g \), although subjected to a good deal of battering by its critics over the years, has been evaluated by Thorndike (1963, p.423) as having "survived as a concept having a degree of both theoretical plausibility and practical utility because the different cognitive sub-abilities...are linked together substantially by appreciable correlations." Most adherents of this approach to the structure of the intellect do not recognize creativity as being a distinct sub-ability. On the contrary, creativity is usually viewed as being subsumed under general intelligence, which is usually defined in such a way as to encompass a broad range of behaviour. Thus, definitions such as Vernon's (1960, p.184) "fluid collection of infinitely varied thinking
abilities," by their very comprehensiveness, lead one to expect a close relationship between creativity and intelligence. Burt's (1955, p.166) general description of the cognitive aspect of intelligence as being "the capacity for adapting, guiding, or directing mental activities by means of discriminative and integrative processes," is similarly broad enough to encompass most current definitions of creativity.

But, however all-embracing such definitions may be, and however statistically satisfying a hierarchical theory may be, "this should not obscure the fact that there is not yet a satisfactory psychological classification of the significant types of cognitive processes involved in the general factor" (Lawrence, 1957, p.3). Multiple factor analysis, Lawrence suggested, could help in the identification of what comprises Vernon's fluid collection of overlapping skills. It is to this approach that we now turn.

Multi-factorial views of intelligence. American factorists, such as Thurstone and Guilford, have long opposed the notion of a hierarchy dominated by g. Many of them posit, instead, a theory of the intellect as being composed of a number of independent types of abilities — or multiple factors. This multi-dimensional
approach to the intellect has been widely-adopted by many American psychologists, often on the grounds that it "holds more promise for education than a undimensional approach" (De Mille, 1963, p.204). In this section, Guilford's unique multi-factorial analysis of intelligence has been selected for closer study because of its relevance to creativity.

Guilford concerned himself with the variety and structure of higher intellectual abilities, claiming that these are far too diverse and complex to be represented by a single intelligence or g. Instead, he and his associates suggested a three-dimensional model of the intellect which organizes what they consider to be the known, unique, or primary intellectual abilities, into a single system (Guilford and Merrifield, 1960). These three bases for the classification of the components of intelligence, together with descriptions of some of the specific factors making up creativity, were described in Chapter IV of this thesis. However, with regard to creativity, it is appropriate in the present context to recall that Guilford distinguished between convergent and divergent thinking and that he conceived of creativity, not as a unitary ability, but as the product of different factors (mainly in the divergent thinking category) working together.
Guilford's theory of the intellect (and hence creativity), however, has come in for considerable criticism. Vernon (1961, p.444), for example, wrote that "there is no good proof of the independence of anything like such a large number of factors" isolated by Guilford, and that "there is a serious dearth of external validatory evidence to show that the new factors give additional information about thinking in everyday life." Mann (1963, p.159) similarly stressed that the results of research on the validity of Guilford's conceptual scheme has "tended to lend it partial, but by no means complete, support." Vernon (1964, p.166) considered, too, that there is considerable overlapping among Guilford's factors and that "a good deal of what was common to them would probably more simply be attributed to g or to other such well-established group factors as verbal and spatial abilities, ideational fluency, and inductive reasoning."

It must be noted, too, that, according to Wallen (1964, p.440), abilities not included in currently-used intelligence tests are in practically all instances, "abilities that derive only from the interpretation of test data, and in virtually no instances have these other abilities been shown to be important in meaningful non-test human endeavours." Furthermore, according to Wallen, Guilford's
claims fly in the face of evidence that current tests are those that have been shown over a period of years to have predictive value for a great many meaningful human activities. This cannot yet be said of Guilford's tests.

Such criticisms cast some doubt as to whether or not there is such a concept as creativity — at least as conceived of by Guilford and other multi-factorists. At the very least they make one suspect that creativity could well be more closely associated with intelligence than much American research could lead one to believe. Most definitely, they call for the exercise of caution when evaluating Guilford's contribution to the theoretical conceptualization of creativity and its measurement.

The need for reconciling the two views. Although there is an increasing amount of rapprochement between those who subscribe to an hierarchical theory of intelligence and those who see the intellect as having a multi-dimensional character, these differences remain sufficient to make for distinct cleavages of opinion as to the relative importance of intelligence for creative functioning.

Vernon (1961, p.171-172) proposed an interesting means of reconciling the American and British approaches
by factor analysis, which, he claimed, "should greatly simplify the present chaotic picture of innumerable partly overlapping, partly inconsistent, factors."

He recommended that every factorial investigation should include in its battery, sufficient tests to give all-round measures of V, N, S, and I, very much as defined by Thurstone, or alternatively of British g + vried + k.s. Only then should residual correlations be studied for indications of further common or group factors (such as creativity). Vernon was of the opinion that once such a procedure had been followed, there would be very little significant overlapping left in many correlation matrices, but what was left "would have a much better chance of yielding factors that would be psychologically meaningful and stable from one research to another."

Until such time as divergent conceptions of the structure of the intellect are reconciled along such lines as those suggested by Vernon, however, it is likely that creativity and its relationship with intelligence will remain in dispute.

Effects of Studying Intellectually Homogeneous Populations

As can be seen in Tables III and IV, most studies of the relationship between creativity and intelligence
have been confined to selected groups of individuals, usually of high general ability. Gelsers and Jackson (1962), for example, based their research on samples drawn from a private school population with a mean IQ of 132, while Guilford (1957) studied highly-selected air cadets and Roe (1959) focused on small groups of eminent scientists.

This selective factor, by holding general intelligence fairly constant, has the advantage of facilitating the study of the special ability under consideration in that it permits differences in this ability to manifest themselves without being too contaminated by differences in intelligence. According to Skager et al. (1965), researchers have used restricted samples because they were concerned about the problems of defining criteria appropriate to creativity. By adopting this procedure, however, many researchers have contributed to the dissemination of inappropriate conclusions about the magnitude of the relationship between the two variables.

The remainder of this section will discuss the following four topics:

1. Effects of restriction of range.

2. Research with unrestricted samples.
3. Recognition of effects of restriction of range.
4. The threshold concept.

Effects of restriction of range. In describing the effects of selecting samples restricted with respect to the distribution of one or more of the variables under study, several writers have challenged the generality of many of the research findings in this area.

Ripple and May (1962, p.229), for example, considered that such a procedure could lead to "mistaken inferences concerning the relationship between intelligence and creative-thinking abilities in groups where intelligence is distributed in a manner more representative of that found in a school classroom." Wallen (1964, p.440) was equally critical of extrapolating research findings emerging from a study of the top 10 per cent of people. He pointed out that it is true that "if one selects extreme groups with respect to intelligence...the relationship between intelligence and certain indices of creativity...will be very low." Such results are to be expected, since one has already selected very high scorers on the particular test in question. These results, however, are completely irrelevant to the question as to whether the measures would predict creativity across the entire range of
ability, "a question," according to Wallen, "that in general has been answered in the affirmative." Or, as Woldtke (1964b, p.399) has expressed it, "it is unreasonable to expect further prediction from an intelligence test within a group of highly exceptional individuals."

Recognition of the fact that restriction of range affects correlations is not new, however, for Karl Pearson suggested a statistical means of correcting for it many years ago. In discussing Pearson's procedure, Guilford (1956, p.318) pointed out that a correlation coefficient is always relative to the kind of population sampled and that "the size of r is very much dependent upon the range of ability or, in more general terms, the variability of measured values, in the correlated sample." In other words, the lower this variability, the lower will be the correlation, everything else being equal. Thus, in the extreme, if the restriction were to a range of zero (all IQ's being equal), there would be no correlation whatever."

Holland (1961), Nichols (1964) and Holland and Nichols (1964) are others to have cautioned against over-generalizing correlations obtained from restricted samples.

*Thorndike (1949) has provided three different formulas for inferring statistical parameters in a population when a sample has been selected or curtailed in some way with respect to the range of one or more variables.
Research with unrestricted samples. What happens, then, when no sampling restrictions are imposed upon the group being studied? Findings from the limited amount of research that has been conducted with groups in which there is a broad range of scores on both measures suggest that they are "substantially related but by no means identical." (Skager et al. 1965, p.32).

Ripple and May (1962) have provided valuable — albeit limited — evidence which bears out many of the foregoing comments regarding the effects of restriction of range. In order to demonstrate the caution necessary in expressing the relationship between IQ and creativity, they studied four groups that were selected at random from approximately one thousand seventh grade students in a large Mid-Western U.S.A. city. Three of these groups were homogeneous (low, average, and high IQ respectively) with thirty children in each. The fourth group consisted of thirty students selected from each of the three homogeneous groups to make up a heterogeneous group. These children were then given the Otis Quick Scoring Mental Ability Test, along with nine tests of creative thinking. The results of the correlations between intelligence and the various creative thinking tests are summarized in Table V. It will be noted that the
### TABLE V

**CORRELATIONS BETWEEN INTELLIGENCE AND CREATIVITY IN HOMOGENEOUS AND HETEROGENEOUS GROUPS**

Ripple and May (1962)

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Av.</th>
<th>Low</th>
<th>Het.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of r's</td>
<td>.45 to -.04</td>
<td>.44 to .00</td>
<td>.29 to -.01</td>
<td>.73 to .14</td>
</tr>
<tr>
<td>Median r</td>
<td>.17</td>
<td>.16</td>
<td>.14</td>
<td>.60</td>
</tr>
</tbody>
</table>

A summary of Ripple and May's (1962) findings.
uniformly low correlations between the two variables in all three homogeneous groups are in marked contrast to the high positive correlations obtained within the heterogeneous group. From these results, Ripple and May concluded that while IQ's are not effective predictors of creative thinking abilities among student populations which are fairly homogeneous with respect to intelligence, "they do seem to be somewhat effective in predicting creative thinking performances in more representative populations."

A similar tendency was reported by Marsh (1964) in his re-working of Getzels and Jackson's (1962) data. He found that by making appropriate corrections for "the effects of the explicit selection of the IQ variable" and adjusting for the degree of unreliability of the creativity tests, corrected correlations between creativity and intelligence were considerably higher than those reported in Getzels and Jackson's original study. Marsh (1964, p.93) went on to conclude that "rather than being almost independent of the general factor of intelligence, this factor is the most constant and conspicuous ingredient of creativity."

Findings similar to those reported by Ripple and May and by Marsh have been published by Richards et al (1964), Altenhaus (1964), and Wodtke (1964).
Recognition of effects of restriction of range.

Only a few researchers have taken into account the effects intellectually homogeneous populations can have on correlations between intelligence and creativity. Fleming and Weintraub (1962, p. 83), for example, in a study of a group of children with a mean IQ of 136, recognized that it was because of "the relative homogeneity of the group with respect to intelligence, [that] no relationship was found between either verbal or non-verbal creativity and IQ." Similarly, Holland (1961, p. 143), when reporting that in a group of exceptionally bright students, intelligence had little or no relationship to creative performance, went on to point out that these results may in part be a function of the regression of creativity on aptitude; students are selected initially for their high aptitude, and then the relationships between aptitude and creativity are studied within this narrow range of aptitude.

Bredahl (1956) and Yamamoto (1954c) are others to have taken cognizance of the effects of restriction of range, while MacKinnon (1962) has admitted that over the whole range of intelligence and creativity there is "a positive relationship between the two variables."

The threshold concept. The hypothesis that intelligence above a certain critical, or "threshold" level,
has relatively little significance for creativity has recently come into vogue among American investigators. This hypothesis was first advanced by Meer and Stein (1955) who suggested that creative thinking abilities show their differentiated effects only beyond a certain minimum level of intelligence. Other writers to have subscribed to this belief include Drevdahl and Cattell (1958), Anderson (1960),* MacKinnon (1962), Torrance (1962, 1963), Yamamoto (1962), Ginsburg (1964), Marsh (1964), and Edwards and Tyler (1965). Indirect support for the concept of a threshold has been published by Barron (1957), Rhodes (1961), De Mille (1960), and Solovin (1963).

The minimal level of intelligence necessary to carry on a creative task has been estimated by several writers as being an IQ of about 120 (Meer and Stein, 1955; Yamamoto, 1961; Torrance, 1962). MacKinnon (1962, p.488), however, considered that it varies from field to field and "in some instances may be surprisingly low..."

Beyond this hypothesized threshold, factors such as achievement (Edwards and Tyler, 1965), personality and social factors (Meer and Stein, 1955, Marsh, 1964), "unique intellectual factors" (Drevdahl and Cattell, 1958,

*The threshold concept is often erroneously attributed to Anderson (see Torrance, 1962; Yamamoto, 1964c).
"technical ability, training, opportunity" (Rivlin, 1959) have been suggested as being of greater significance than any increase in intelligence.

Not surprisingly, in view of the cogent criticisms of much of the research carried out into the relationships between intelligence and creativity, the concept of a threshold has also been the target of criticism. As McClelland (1958, p. 13) has emphasized, the conclusion that intelligence is a "threshold variable" with respect to creative performance cannot be established by research on a group at one extreme of the distribution of intelligence or creativity. Wallen (1964) adopted a similarly critical view of the tendency to generalize results of research conducted on the top 10 per cent of people. It would appear, then, that when a threshold does appear, it may be nothing more than an artefact of studying high ability groups.*

Thus, until more research has been conducted with samples representative of the range of intelligence in the general population and until writers cease stating

* One wonders, too, whether an IQ could be a threshold for anything, since it is a ratio, which depends on chronological age. It seems more credible that, if there is a threshold, it would be found at a mental age or raw score level.
or implying that findings emerge from samples with a restricted range of intelligence are true of the whole range, this area will continue to abound with conflicting claims and controversy.

Getzels and Jackson's Study

One of the most widely publicised investigations of the relationship between creativity and intelligence is that published by Getzels and Jackson in 1962. This study compared two groups selected from 449 students in a Mid-Western U.S.A. private secondary school. A high intelligence group consisted of twenty-eight students in the top 20 per cent in IQ but not in the top 20 per cent in creativity. A high creativity group consisted of twenty-six students in the top 20 per cent in creativity but not in the top 20 per cent in IQ. Five tests were used to assess the level of creativity. The two groups were compared with each other and with the rest of the population of the school on various cognitive and personality variables. Most of the results of this study will be discussed in the appropriate section of this thesis, this section being concerned only with those on the relationship between creativity and intelligence. These are summarized in Table VI which shows that only low correlations were obtained between several measures of creativity
### TABLE VI

**CORRELATIONS BETWEEN INTELLIGENCE AND CREATIVITY MEASURES ACCORDING TO SEX**

*Getzels and Jackson (1962)*

<table>
<thead>
<tr>
<th>Creativity Test</th>
<th>IQ Boys</th>
<th>IQ Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Association</td>
<td>.378</td>
<td>.371</td>
</tr>
<tr>
<td>Uses</td>
<td>.186</td>
<td>.147</td>
</tr>
<tr>
<td>Hidden Shapes</td>
<td>.366</td>
<td>.303</td>
</tr>
<tr>
<td>Fables</td>
<td>.131</td>
<td>.115</td>
</tr>
<tr>
<td>Make-up Problems</td>
<td>.246</td>
<td>.393</td>
</tr>
</tbody>
</table>

(from Getzels and Jackson, 1962, p.20)
and intelligence, and that there were no significant differences between these correlations for boys and girls.

This investigation has been criticised on theoretical, methodological, statistical, and interpretational grounds, all of which raise serious doubts as to the validity of the results. In order to draw attention to the alleged weaknesses of a crucial study, while at the same time highlighting some of the controversial issues which tend to contaminate many of the research findings in this area, the main criticism of Getzels and Jackson's study are outlined below.

**Selection of comparison groups.** Getzels and Jackson's procedure of selecting two groups for study, one representing the top 20 per cent on a battery of creativity tests, but not of high intelligence, and the other representing the top 20 per cent in intelligence but not outstanding on tests of creativity, has been questioned by Burt (1962) and criticized severely by De Mille and Merrifield (1962).

Burt, in challenging Getzels and Jackson's notion that there are two basic cognitive or intellective modes (the "creative" and the "intelligent"), considered that there can be little justification in selecting two such
groups. De Mille and Herrifield (1962, p. 804) were even more critical, calling this procedure "a tortured exercise in the study of types." By discarding a large number of students who scored high on both measures, they considered that Getzels and Jackson established an "arbitrary and essentially meaningless" dichotomy, thus manufacturing two fictitious types of people. In fact, they said, the procedure was rather like studying parents and married people, while leaving out the group composed of married parents!

**Methodology.** In selecting their two contrast groups, Getzels and Jackson relied on the score from a single intelligence test applied, as Burt (1962) pointed out, not at the time of the inquiry but when the pupils first entered the school. Furthermore, the intelligence test was not the same for all pupils. In the light of these and other factors, Burt (1962a, p. 294) concluded that "the assessments so obtained must have a rather low reliability." Vernon (1964) expressed a similar viewpoint.

A further criticism of the methodology was made by Marsh (1964, p. 92) who pointed out that while the IQ scores were corrected for age, the creativity test results were not; the result of ignoring this age
factor was the production of a "coefficient that is only a partial index of the relationships involved."

Yet another criticism of the study is that the populations have been considered to be too small and far too atypical of the normal range of ability to reveal anything worthwhile about the relationship between the two variables. This point has been elaborated in an earlier section of this chapter (see pp. 154-161).

Creativity tests of doubtful validity and reliability. According to Vernon (1964) the most serious flaw of Getzels and Jackson's study—and of others in this area—was the failure on the part of its authors to provide real evidence for the assumptions that the tests of creativity were valid or reliable instruments.

Several writers have criticized the tests on the grounds that they are heavily loaded with verbal meaning, the chief component of most measures of intelligence. Furthermore, as Surt (1962) pointed out, the inter-correlations of the creativity tests are themselves not much higher than the correlations between the tests of intelligence and creativity, a finding which some observers considered to cast serious doubt as to whether there is a factor of creativity distinct from g and v. Indeed,
Vernon felt that had a well-balanced set of intelligence tests like the Stanford-Binet been used, "it might well have covered all that is measured by the creativity tests."

Concern that the low correlations among Getzels and Jackson's "creativity" tests has received so little attention from those who have worked with them, was expressed by Thorndike (1963, p.424): "Though Getzels and Jackson are emphatic in pointing out the low correlations of their tests with IQ, they say nothing at all about the equally low correlations among the "creativity" tests themselves..." Because of this, Thorndike considered that Getzels and Jackson were ill-advised to pool such tests into a common total with such a value-laden name as "creative."

De Mille and Merrifield (1962, p.804) have also criticized the creativity measures on the grounds that they considered them to be scores derived from "a somewhat redundant and not entirely appropriate collection of five tests representing a very limited array of factors of creative thinking."

By correcting for attenuation, Marsh (1964) found that correlations between IQ and the five variables listed
above (see p. 165) increased as follows: Word Association from 0.37 to 0.51, Uses from 0.17 to 0.30, Hidden Shapes from 0.33 to 0.46, Fables from 0.12 to 0.28, and Make-up Problems from 0.31 to 0.44. Even these corrected figures were probably rather conservative for the corrections assumed high reliabilities (0.80 to 0.90) for the five variables.

**General evaluation.** It would seem, then, that it is unwise to generalise from Getzels and Jackson's findings since they "do not apply to all kinds of students, all kinds of schools, and all kinds of intelligence and creativity tests" (Edwards and Tyler, 1965, p. 99). Indeed, there is much support for De Mille and Merrifield's (1962, p. 807) statement that, "throughout the book the reader encounters questionable clinical interpretations, incongruous theoretical statements, and gratuitous research conclusions."

The rather uncritical acceptance of this study is particularly surprising in view of the many apparently well-founded criticisms that have been levelled against it. It would appear that the critical reviews of Burt (1962), De Mille and Merrifield (1962), Vernon (1964), and Marsh (1964) have either passed unnoticed or have been dismissed by many American researchers in this area.
Certainly, no rebuttals of the criticisms of their study have been published by Getzels and Jackson, and only a few articles of the many studied in the preparation of this thesis have even mentioned the critical reviews.

However, even if one cannot accept the findings as they stand, it is likely that many of them are at least indicative of the directions of relationships that will emerge in future studies of superior design. Torrance (1962a, p.58-59), for example, found that six out of eight replications with slightly less restricted groups, confirmed Getzels and Jackson's results. In most of the groups studied, Torrance reported that "about 70 per cent of the most creatives would have been eliminated if a 'gifted' group was being selected on the basis of the intelligence test..."

Despite its many weaknesses, then, an out-of-hand rejection of Getzels and Jackson's study would be equally as unwise as an unquestioning acceptance of it. Most certainly it has made some major contributions to the field of creativity, if only by stimulating more and better research.
Summary

After reviewing speculation and research of ranging degrees of comparability and scientific validity, this chapter went on to present a critical evaluation of the research conducted into the relationships between creativity and intelligence. The latter section presented a brief outline of the differing conceptions of the structure of the intellect, focusing on the differences between the hierarchical view of intelligence as opposed to the views of Guilford and others who have proposed multi-dimensional theories. A detailed discussion of the implications of studying intellectually homogeneous populations was followed by a critique of Getzels and Jackson's crucial study.

Conclusions

Until there is more harmony between the hierarchical and multi-factorial conceptualizations of the structure of the intellect, until there is research less vulnerable to criticism than much of the work to date, and until both "intelligence" and "creativity" can be measured more accurately than at present, it seems likely that equivocal results will continue to be obtained in attempts to
determine the relationships between the two variables.

Until these pre-requisites have been met, we will have to be content with the findings of current research which suggest that in homogeneous populations the correlations between creativity and intelligence are clustered around low positive (but significant) coefficients and that when no sampling restrictions are imposed upon the group being studied, the two variables are substantially related but by no means identical.

Hypotheses

5. That in a group of academically able children, there will be a low positive correlation between creativity and intelligence.

6. That there is a threshold level of intelligence necessary for high performances in creativity.

In addition to the preceding hypotheses springing from the literature reviewed in this chapter, the following exploratory hypothesis will be tested:

7. That there will be qualitative differences between highly creative and less creative children on sub-tests of the WISC, with the Verbal Scale being the most discriminative.
CHAPTER VII

CREATIVITY AND SCHOLASTIC ACHIEVEMENT

As in the research conducted on the relationship between creativity and intelligence, studies of the relationship between creativity and scholastic achievement have been equivocal in their findings. Here, too, Getzels and Jackson's (1962) claims that creativity is an important determinant of academic achievement have sparked off a spate of research. Whilst some of it has supported the substance of these claims, much of it has either refuted them or cast doubt on their generality.

This chapter will review the literature on the following aspects of the research on the relationship between creativity and achievement:

I. Studies Reporting High Correlations
II. Studies Reporting Low or Negative Correlations

I. STUDIES REPORTING HIGH CORRELATIONS

Several writers have described finding high correlations between creativity and achievement in general or between creativity and particular subjects.

Perhaps the best-known of such studies is that of Getzels and Jackson (1962). They found that despite a
twenty-three point difference in mean IQ between a high creative group (mean IQ 127) and a high IQ group (mean IQ 150), their achievement scores were equally superior to those of the school population as a whole (mean IQ 132).

The findings from eight partial replications of the Getzels and Jackson study were reported by Torrance (1962a). Five of these were conducted at the elementary school level, one at the secondary level, and two at the college graduate level. In six of the eight studies, Getzels and Jackson's findings were supported. In two elementary schools, however, the highly intelligent pupils achieved higher than the highly creative ones. These two disparate results were considered by Torrance to be indicative of either a more normal distribution of talent in the two schools concerned, with a threshold of IQ 120 operating, or that in some learning situations, students have more opportunity to learn creatively than in others. Despite Torrance's explanations along these lines, the reasons for the failure to reproduce the results in these two samples are by no means clear.

The criticisms that were levelled against Getzels and Jackson's study in another context (see p. 164) are, of course, no less germane in the present context. Because of research weaknesses, Getzels and Jackson's
and Torrance's findings regarding the relationships of creativity scores to academic achievement are best regarded as being of limited generality. Or, as Edwards and Tyler (1965, p.99) expressed it, "they apparently do not apply to all kinds of students, all kinds of schools, and all kinds of intelligence and creativity tests..."

It has also been suggested that one reason for the high creativity-achievement relationship was the component of general intelligence selectively operating in the battery of creativity tests (Flescher, 1963). Furthermore, Flescher (1963,p.251) raised the question as to whether "differential achievement expectations were realistic in that [Geltzels and Jackson's] situation, particularly since standardized achievement tests are deficient in measuring gifted vertical and horizontal development..."

Flescher's criticism, however, may have only limited applicability, for, as Neufield (1964) found in a group of 150 male eighth grade children, the relationship between creative thinking and achievement variables remained significant even when the effect of intelligence was partialled out. In this group, the correlations ranged from 0.05 to 0.60, with the majority falling in the 0.20's, 0.30's, and 0.40's. With the 150 eighth grade
females, however, about half of the correlations became non-significant when intelligence was partialled out. With this group, the correlations ranged from 0.12 to 0.39 with the median and coefficient being in the high 0.20's. A similar sex difference in the relationship between creativity and achievement was reported by Feldhusen et al., (1965). Positive and significant correlations between the two variables were obtained with a group of boys, but none were obtained with a group of girls in whom coefficients ranged from 0.22 to 0.31. Unfortunately, to the writer's knowledge, no other studies have attempted to partial out the effects of intelligence on correlations between the two variables or have concerned themselves with the possibility of sex differences in such correlations.

Other investigators to have found a close relationship between creativity and achievement include De Boer (1965), who reported a correlation of 0.71 in a group of 295 sixth grade children of high intelligence (mean IQ 115), and Wallen and Stevenson (1960), who reported correlations ranging from 0.66 to 0.72 for various measures of achievement with a group of 63 fifth grade children of average calibre. Although Yamamoto (1962) reported high correlations, his results, derived from
a group of 79 Grades 3 to 6 children of superior intelligence and achievement, were uniformly lower than those obtained by Wallen and Stevenson. Yamamoto reported that achievement, as measured on the four subtests of the Iowa battery, showed much higher correlations with creative writing scores than did IQ. Reading and language skills gave higher coefficients (0.43 to 0.75) than did work-study skills and Arithmetic (0.47 to 0.68) over the four grades.* Similar findings were reported by Baker (1964, p.4578) who noted that in a group of 401 sixth grade children, "the ability to read is related to the ability to write creatively." Other writers to have suggested, in general terms, a close connection between creativity and achievement, include Buhl (1958), Rivlin (1959), Kheiralla (1963), Holland and Nichols (1964), and Gunasen (1964).

*Commenting on this, Torrance (1962c, p.60) considered that "the ability to 'get the right answer' through recognition, memory, or convergent thinking apparently becomes more important in the work-study skills and arithmetic skills."

Yamamoto (1964c, p.403) later reported diametrically opposite results when he stated that in an elementary group, "...it was observed that the highly creative pupils achieve better on work-study and arithmetic skills than on reading skills."
Yamamoto (1962, p.12) considered that these and other similar results supported the general position that "creative performance needs as its background a certain level and amount of intellectual and academic knowledge." This statement by Yamamoto would suggest that, for high performances on creative writing at least, a threshold of academic skills is necessary.

II. STUDIES REPORTING LOW OR NEGATIVE CORRELATIONS

Several studies have reported results which fail to support those of Getzels and Jackson, Torrance, and others reported in the previous section.

Both Metcalf (1965) and Edwards and Tyler (1965), for example, found that individuals who were high on scholastic aptitude (but not high on creativity) demonstrated significant superiority, in both tested achievement and grade point average, over those who were high on creative thinking, but not high on scholastic aptitude.

Edwards and Tyler (1965, p.98) wrote that for subjects below average [not explained further, but presumably relative to the average of the sample] in general scholastic aptitude (as many of our high creativity subjects were), abilities measured by creativity tests cannot compensate for the lack of abilities measured by intelligence tests.
Here, too, as suggested elsewhere in this chapter, the threshold concept may be involved.

Flescher (1963) conducted an investigation similar to that of Getzels and Jackson but selected two other groups in addition to two high IQ - low creativity/low IQ - high creativity groups. These additional groups consisted of students who scored high on both the intelligence and the creativity tests and those who scored high on neither. Flescher found no evidence to support a conclusion that creativity is as closely related to achievement ($r = 0.09$) as is IQ ($r = 0.79$). He attributed these results to (a) the high correlation between IQ and achievement tests (0.56 to 0.76), (b) the extremely low correlation between his creativity index and IQ (0.04), and (c) the questionable validity of the creativity tests.

Using a large ($N = 266$) cross-section sample of sixth grade children who were heterogeneous as to IQ, Altenhaus (1964) found that IQ tended to be a somewhat better predictor of school achievement than did the creativity measures used. He found, too, that students who scored high on both measures of creativity and intelligence tended to score significantly higher on tests of achievement than did those who were gifted in only one of these areas.
Other writers to have reported results relevant to this area include Owens (1965) who found that in a total population of fourth, fifth, and sixth grades, pupils' achievement correlated lowly, but significantly, with total creativity. For students of superior scholastic aptitude, on the other hand, Holland (1961) found that scholastic achievement, like scholastic aptitude, was generally unrelated to creative performances. Holland also hypothesized that outstanding academic achievement would be associated with low scores on measures of creativity, this hypothesis subsequently being confirmed to Taylor and Holland's (1962) satisfaction. Similarly, Mackinnon (1959, p.25) reported that many of his creative subjects were by no means honour students at college, few of the research scientists earning more than C+ or B− averages. Mackinnon ascribed this largely to the fact that "many had a disposition to follow their own interests and to explore independently problems of their own setting."

In an interesting study of a group of junior high school pupils (N not stated), Rambo (1964) held intelligence constant by comparing those of high and those of low creativity at three levels of intelligence — retarded, normal and superior. He reported that within the three intelligence levels, pupils high in creativity were
similar to pupils low on creativity in grade-point average and academic attainment.

III. SUMMARY, CONCLUSIONS, AND HYPOTHESES

Summary

This chapter reviewed the literature on the relationships between creativity and scholastic achievement. Studies (such as those conducted by Getzels and Jackson) which reported high correlations between the variables were described. It was pointed out that many of the findings are vulnerable to criticism, particularly on the grounds of high relationships possibly being an artefact of the component of general intelligence selectively operating in the creativity tests. A study which noted the effects of partialling out the effects of intelligence, however, found that high correlations were obtained, although these were confined to a group of boys. Another group of studies reporting low or negative correlations between the two variables was also described. In a particularly well-controlled investigation, Flescher reported negative results, attributing them to such factors as the use of "intelligence-free" creativity tests.
Conclusions

The equivocal results obtained so far in this area seem to reflect differences in methods of identifying comparison groups, differences in the specific areas of creativity and attainment measured, and differences in the ability level, variability, and sex of the samples studied. In general, it would seem that for high-level performances, in creative writing at least, a threshold of academic skills is necessary. Unfortunately, there have been insufficient studies in specific attainment areas to permit firm conclusions being drawn on the relationships between creativity and various school subjects.

To sum up, then, the problems of whether, how, and at what levels creativity influences scholastic learning (or vice versa) bears further investigation.

Hypotheses

Despite the equivocal nature of research findings in this area, there appears to be sufficient evidence for the following hypothesis:

8. That there will be a significant relationship between creativity and scholastic achievement.

A subsidiary hypothesis will also be tested:
9. That some school subjects will be more closely related to creativity than others.
CHAPTER VIII

CREATIVITY AND PERSONALITY VARIABLES

The delicate complexity of the creative process seems vulnerable to the intrusion of personality dynamics. There is no serious dispute that nonintellective, personality factors are related to creative potential. However, the specific nature of this relationship is still relatively undefined.

(Flescher, 1963, p.263)

Most writers would agree with Flescher's contention that creativity is related to personality factors. Indeed, some have gone so far as to state that, cumulatively, personality "decidedly exceeds intellect in importance" (Dreweohl and Cattell, 1958, p.109). It is not surprising, therefore, to find that a great number of studies have contrasted individuals considered to be highly creative on with those considered to be less creative, on various personality dimensions.

As in so many other aspects of research into creativity, this area is characterized by a big variation among studies in terms of the methods of deriving personality parameters, the creativity measures employed, the type of creative endeavour studied, the age-range and ability-levels of the populations, and the degree of empiricism of the research. Despite these variations which make the studies of limited comparability, an attempt will be made in the
remainder of this chapter to abstract three groups of traits reported repeatedly as being closely related to creativity. This chapter will review the literature under the following three headings:

I. Creativity and Social Adjustment

II. Creativity and Interests and Experiential Background

III. Creativity and Motivational Factors

I. CREATIVITY AND SOCIAL ADJUSTMENT

One of the most frequently-made assumptions about creative individuals is that they are anti-social or, at best, unsocial. Beyond Torrance's and Getzels and Jackson's research and a certain amount of indirect support, however, there is a dearth of objective evidence to substantiate such a claim. On the contrary, there is growing support for the belief that the creative individual is little different from, or even superior to his less-creative peers in terms of adjustment factors. The remainder of this section will review the literature on the adjustment of creative individuals under the following three headings:

1. The creative individual as a socially disrated person.
2. Creativity and neuroticism.

3. The creative individual as a socially neutral or preferred person.

The Creative Individual as a Socially Disrated Person

According to Torrance (1962a, p. 106), teachers and peers feel threatened when highly creative children express their creativity. These feelings are, in the case of peers, often translated into such sanctions as open aggression and "hostility, criticism, rejection, and/or indifference" (Torrance, 1963b, p. 136). Such sanctions are particularly noticeable in the higher grades, according to Torrance (1963b, p. 29). Results of sociometric surveys he conducted in thirty-three classrooms revealed that whereas children in the kindergarten and primary grades are not bothered by peer opinions, negative criticism in the fourth, fifth, and sixth grades "puts a damper on creative thinking."

Torrance (1963b, p. 135) reported finding further evidence of what he interpreted as pressure against highly creative individuals. In a study of twenty-five groups (five groups from five grades), he found that although a majority (68 per cent) of the most creative pupils initiated more ideas than any other member of the group, few were credited by their peers with making the most
valuable contributions. Unfortunately, however, Torrance’s report of this study was not clear as to whether the ideas advanced by the highly creative group were, in fact, “valuable contributions.”

Some research has focussed on teachers’ attitudes towards creative individuals. Getzels and Jackson (1962), for example, reported finding that when teachers were asked to rate children on the degree to which they would like to have them in class, they exhibited a clear-cut preference for the high IQ child. The ratings given to such children were significantly higher than those gained by the total student body, whereas the ratings given to the highly creative children did not differ significantly from those of the total student body. Criticisms of these findings have been voiced by De Mille and Merrifield (1962), who pointed out that both of the teachers’ preferences were in the same direction and of nearly the same magnitude. Moreover, when the t-test employed was corrected for population variance, the significance was found to vanish.

Several writers have described socially disrated traits which have been found or hypothesized to accompany creativity. These include such characteristics as rebelliousness, disorderliness, and exhibitionism (Barron, 1955); difficulty in establishing warm and friendly
relationships with other people and a sense of need for retreat from the social world to the world of ideas and objects (Blooom, 1963); detachment from others from an early age (Stein, 1963); a tendency to resist group work and to follow individual interests and goals (Mackinnon, 1959); an independence of mind and a nonconformity to group pressures (Mooney, 1953; Drevdahl, 1956; Guilford, 1957; Gatzels and Jackson, 1962; Torrance, 1962a); a more self-contained attitude (Drevdahl and Cattell, 1958; McClelland, 1962; Crutchfield, 1962); and a tendency to be disturbed by complex human emotions (McClelland, 1962). These personality traits have occasionally been extrapolated to the point where they are assumed to be evidence, in themselves, of social maladjustment. Or, as Torrance (1962a, p. 404) noted, "it is inevitable that highly creative individuals experience unusual problems of adjustment." Inevitability is not proof, however, for there is very little direct research support for the assumption that creative people are poorly adjusted. Apart from Roe (1952), who found that many of the highly creative scientists she studied were experiencing rather severe emotional problems, and Mead (1959), who found a correlation between schizophrenic-like behaviour and highly creative artistic productivity, few other writers
have empirically linked creativity with maladjustment. Indeed, as will be seen in the next two parts of this section, it is by no means certain that the creative individual is as socially disrated as writers such as Torrance and Getzels and Jackson would suggest.

**Creativity and Neuroticism**

Just as the belief of genius being but one step from insanity has a large following, the concept of creativity being a form of neuroticism is given considerable but equally unjustified credence. Although many of those who subscribe to such a concept quote psychoanalytic "evidence" in support of their claim, among psychoanalytic writers of any standing, there are few who consider creativity to be linked with neuroses. On the contrary, there are many who have taken pains to categorically refute such a claim and at least one writer (Breton) has implied that if one is not creative then one is neurotic!

The most widely-cited psychoanalytic support for the relationship between creativity and neuroses has been the conception of creativity as being regression in the service of the ego. While the essential features of ego regression do, in fact, function in both creativity and mental disturbance, there are considerable differences
in the manner in which such a "mechanism" performs.

As Ballak (1960) has observed, both the creative and the disturbed person share the quality of ease of ego-regression, of adaptive functions of the ego, of less rigidly defined conceptual and perceptual boundaries, and less strong counter-cathexes. However, as Getzela and Jackson (1962, p. 92) have pointed out, although the unconscious forces motivating the creative solution, "parallel the unconscious forces motivating the neurotic solution,...", the creative person differs from the disturbed individual in his ability for synthesis and his ability to "increase again the adaptive capacity."

A further distinction was pointed out by Grotjahn (1957) who considered that whereas the neurotic utilises his energy to repress, the creative person frees his energy to create.

A possible implication of this psychoanalytic position has been suggested by Wonderly and Fleming (1965, p. 405). In a recent article, they considered that both creative and non-creative individuals are threatened by the same type of situation but that they differ in their adjustment techniques. Whereas non-creatives adopt neurotic behaviour patterns, creatives express themselves in some art form. Barron (1963) had earlier expressed
viewpoint similar to that of Wonderly and Fleming. He believed that the creative type of individual very likely has a genetic predisposition toward a schizoid type of reaction but that in the course of his early history he is forced to face many difficult, sometimes fairly traumatic, hurdles. But, at the time of facing such obstacles he is capable of overcoming them. If he were not, he would likely turn out to be simply schizophrenic and not creative.

It would seem then, that rather than believing that creativity is a form of neuroticism or that it is facilitated by neurotic behavior, psychoanalytic writers have generally adopted the attitude that creativity is enhanced by the removal of neurotic encumbrances. Other writers to have advanced views in support of such a specific conclusion include Hart (1950), Fanchel (1945) and Greenscree (1962).

The Creative Individual as a Socially Neutral or Preferred Person

In support of the tenor of the psychoanalytic conceptions of creativity as being unrelated to neuroticism, there is an increasing body of research suggesting that highly creative individuals exhibit no more objectionable behavior than their less creative peers.
Guilford (1962), for example, found that creative young men showed no particular dislike for conventional or socially approved behavior, while Yamamoto (1964b, p. 257), in a study of 428 high school students, found "no effect of creativity on one's choice of best friends." Similar findings were reported by Wodtke and Wollen (1965).

In addition to this research, several investigators have found that creative students actually tend to score higher than non-creative students on sociability or sociometric measures. Rivlin (1959), for example, found that creative high school students were significantly (p<.05) more popular than their non-creative peers. Similarly, in a study of 308 eighth grade students, Seitz (1964) found that the personality characteristics of total adjustment, personal adjustment, and social skills were all significantly related to creativity.

Further support for the rejection of the stereotype of the withdrawn, anti-social, and maladjusted creative individual can be found in the literature. In the area of social adjustment, for example, writers have described creativity as being positively related to such factors as ego strength (Rapaport, 1951; Barron, 1957b; Crutchfield, 1962), emotional maturity (Dreulahl and Cattell, 1958), integration (Stein, 1958; Luker, 1964), stability
(Taylor, 1960), empathy (Greenacre, 1962), and adjustment (Green, 1957; Wallen and Stevenson, 1960; Gerber, 1965; Smith, 1965). In the allied area of personal adjustment, creative individuals have been described as rating highly on such factors as self-acceptance (MacKinnon, 1959; Taylor, 1960; Garwood, 1964; Sherman, 1965), sense of personal worth (Weisberg and Springer, 1961; Seitz, 1964), self-discipline (MacKinnon, 1962; Carpenter, 1962), self-confidence (Holland, 1961; Guilford, 1962; Kheiralla, 1963; Seitz, 1964), and sense of personal freedom (Hawkins, 1964).

There is evidence, then, that the creative individual is at least as well-adjusted as his less-creative peers.

Summary and Conclusions

This section reviewed research — both empirical and speculative — bearing on the relationships between creativity and adjustment factors. Studies by Torrance and Getzels and Jackson, in which creativity was found to be a major determinant of low sociometric status, were noted as having methodological weaknesses. Although several writers have described what appear to be socially disrated traits accompanying creativity, the weight of
research evidence suggests that in terms of sociometric status, the creative individual is at least as well adjusted as, and probably superior to, his non-creative peers.

Hypothesis

10. That highly creative children will be superior to their less creative peers on measures of social adjustment.

II. CREATIVITY AND INTERESTS AND EXPERIENTIAL BACKGROUND

Research Findings

It is not surprising to note that many writers have found creative individuals to have wide-ranging interests, for these undoubtedly lead to the development of a repertoire of experiences which facilitate the production of new ideas. Taylor and Holland (1964), for example, described the creative person as tending to accumulate an over-abundance of raw materials, while Hednick (1962) similarly described him as having the requisite elements to form associations. It will be remembered, too, that the chapter on the process of creativity (Chapter III) drew attention to the need for what Murphy (1956, p.41) termed "the long immersion of the sensitive mind in some specific medium."
Other writers to have found a close relationship between creativity and breadth or depth of interests include Mooney (1953), Barron (1957a, 1957b), MacKinnon (1959), Holland (1961), Getzels and Jackson (1962), Maizell (1962), Golovin (1963), and Hawkins (1964). Indeed, of all the research studied in the course of preparing this thesis, only Stein (1958) reported no significance in the differences between the interests of creative and non-creative groups.

Hypothesis

11. That highly-creative children will have a greater range of interests than their less-creative peers.

III. CREATIVITY AND MOTIVATIONAL FACTORS

Research Findings

Many writers have described the creative individual as being significantly more energetic or industrious than his less-creative peers (Chiselin, 1952; Bloom, 1963; Maizell, 1957; MacKinnon, 1959; Torrance, 1962a; Taylor and Holland, 1964). Other writers have employed such synonymous adjectives as active (Buel and Bachner, 1961), hard-working (Mayer, 1954; McClelland, 1962), engrossed in work (Barron, 1957a; Hanle, 1964; Chambers, 1964), diligent (Carpenter, 1963), enthusiastic (Anderson,
1959b), committed (Bruner, 1962a), and persistent (Mooney, 1954); Taylor and Holland, 1964).

This quality of industriousness is often reflected in the breadth and depth of interests so often found to characterise the creative individual (see preceding section). Both qualities are reflections, in turn, of another characteristic which is widely found in highly-creative individuals — high activation. Without motivation, according to Golovin (1963, p.19), the necessary persistence in acquiring interrelating experiences will be absent. This is particularly important in areas of endeavour where thinking may take place over a considerable time span or at high intensity. Other writers to have asserted that motivational factors play important roles in actualizing potential creativity include Schaeotel (1949), Guilford (1950), Suhl (1958), Stein (1958), Anderson (1959b), Torrance and Punssalan (1960), Bloom (1963), Taylor and Holland (1964), Hawkins (1964), Chambers (1964), and Yamamoto (1964a).

Hypothesis

12. That highly creative children will be more highly motivated than their less creative peers.
CHAPTER IX

CREATIVITY AND MISCELLANEOUS VARIABLES

In this brief chapter on the relationships between creativity and miscellaneous variables not readily classifiable under environmental, cognitive, and personality factors, the following three areas will be discussed:

I. Creativity and Age

II. Creativity and Sex Differences

III. Creativity and Race

I. CREATIVITY AND AGE

Research Findings

Studies vary in their descriptions of the development of creativity. This variation has resulted partly from a lack of systematic evidence, partly from a tendency to over-extrapolate findings from cross-sectional studies with limited populations, and partly from an almost complete lack of longitudinal research.

Some workers have been quite emphatic in stating that chronological age is related to creativity level (Olshin 1963; Gardner, 1963; Kelly, 1965), whilst others have reported that age does not appear to be closely related (Fleming and Weintraub, 1962 and Sheirala, 1963). The latter view was also expressed by Isaac and Pierce-Jones.
(1964, p. 794 - 795) who reported that their research "revealed no main effect of chronological age on divergent thinking in terms of ideational fluency." (C.A.: $F = 1.43$ with 4 df). Much, of course, depends on the kinds of performances admitted as evidence of creativity and on the age-range of the samples.

Torrance (1962a) has reported a much more complicated picture of the development of creative thinking. According to him, developmental curves for most creative abilities follow a pattern which is quite unique. Pre-1962 research with grades 1 to 12 and with graduate-level students was reported by Torrance (1962a, p. 93) as follows:

There is a steady increase from first through third grade. With one exception, there is a sharp decrease between the third and fourth grades followed by some recovery during the fifth and sixth grades. Another drop occurs between the sixth and seventh grades, after which there is growth until near the end of the high school years.

Torrance thought it was significant that the decrements in creative thinking ability at about ages five, nine, and twelve coincided with transitional periods in educational careers in the American society.

The apparent discrepancies among the above workers with regard to the relationship between age and creativity suggests the need for more definitive longitudinal studies of the development of creativity in the
school years. However, it would appear that the more homogeneous a population with respect to age, the lower will be the relationship between it and creativity (or any other variable for that matter). This fact, together with the equivocal findings cited above, can lead to only one hypothesis.

**Hypothesis**

13. That there will be no significant difference between highly creative and less creative children on the variable of chronological age.

**II. CREATIVITY AND SEX DIFFERENCES**

**Research Findings**

Although the rarity of women in most areas of creative endeavour is well known (Roe, 1959; Torrance 1962a, 1963b; McClelland, 1962.), the small body of reported research on sex differences in creativity at the primary school level is equivocal.

As in so much of the research at this age level, it has been Torrance (1963, p. 103 - 109) who has brought a systematic approach to this question. In a study of 259 first, second, and third grade children from two elementary schools, he explored the problem of providing sex-appropriate materials for eliciting creative productivity.
Each subject was given a test requiring that he invent ideas for improving toys assumed to be typically feminine (a nurse's kit), typically masculine (a fire truck), and appropriate for both sexes (a toy dog). The tasks were scored for fluency and flexibility. When the mean profiles of boys and girls on all three tasks were compared for the first grade, differences in favor of boys were found to be significant at about the .07 level. In the second grade, differences were significant at better than the .05 level, and better than the .01 level in the third grade — both in favor of the boys. In discussing these results, Torrance (1963b, p.108) commented that "...whatever factors explain the rarity of women among inventors and creative scientists may begin operating as early as the second or third grades."

Results somewhat contrary to those reported by Torrance emerged from a study conducted by Klausmeier and Wierama (1964). They found that girls had significantly higher mean scores on such tasks as Object Uses and Object Improvement. They reported, also, that on three of four convergent thinking tests, boys had significantly higher mean scores. Neufeld (1964), too, found differences in favor of females (eighth grade) on tests of word fluency, ideational fluency, expressional fluency, and
average creativity. Kheiralla (1963), in a study conducted over the Grades 4-12 range, found girls to be superior to boys in most creative abilities.

Writers to have stated that sex is not related to creativity level include Piers et al (1960), Fleming and Weintraub (1962), Olshin (1963), and Baker (1964). Some writers, too, have reported sex differences that vary according to the type of task. Price (1963), for example, found that while there were no significant differences in performances on three of Guilford's divergent thinking tests by sex groupings, girls scored higher than boys on two tests of fluency. Boys scored higher than girls on the test, Figure Production.

Other writers to have noted sex differences in performances on creativity tests include Green (1957), Klausmeier et al (1962), Guenesson (1963), and Raabo (1964). Unfortunately, however, none of these studies stated explicitly the direction of the differences.

Finally, a brief word about an interesting hypothesis being investigated by Torrance and his associates. "By its very nature," according to Torrance (1962a), "creativity requires both sensitivity and independence." (p.111). Because sensitivity is a feminine virtue in our culture and independence is a masculine value, it is to be
expected, according to Torrance, that the highly creative boy will be more effeminate than his peers and the highly creative girl will be more masculine than hers. Roe (1959), Barron (1957b), and Torrance (1959) have all produced evidence in support of these hypotheses, Torrance citing examples of children who sacrifice their creativity in order to maintain their "masculinity" or their "femininity" as the case may be. The inhibiting effects of sex-role conditioning, with boys and girls being rewarded differentially for their creative thinking, can be a very powerful force.

As in so many other areas of research into creativity, then, there is insufficient evidence to either support or refute the relationship between creativity and sex. The following exploratory hypothesis will therefore be tested:

Hypothesis

H1. That there will be sex differences in performances on the creative writing measure.

III. CREATIVITY AND RACE

Research Findings

Few investigators have looked at the relationship between race and creativity. In a study of 132 Negro and
135 white children, Iscoe and Pierce-Jones (1964) found that the former group attained significantly higher mean divergent thinking scores in terms of ideational fluency. There were no racial differences, however, on flexibility scores. They reported, too, that whereas a significant correlation of 0.36 ($p < .01$) was obtained between whites' scores on verbal intelligence and total creativity, the comparable correlation for Negroes dropped to 0.21 ($p < .05$). Although these differences were perhaps indicative of an actual trend, they were of marginal significance. It must be noted, too, that the chief emphasis of Iscoe and Pierce-Jones' study was not so much aimed at discriminating the relationships between creativity and race as at the racial differences in the relationships between creativity and age and intelligence. To the writer's knowledge, no research on Maori - Pakeha creativity differences has yet been conducted in New Zealand.

**Conclusion**

Until more cross-cultural studies have been made, then, the relationship between race and creativity will remain less than clear.

In the absence of any significant numbers of non-Europeans in the present population, no hypothesis will be set up in this area.
PART THREE

REPORT OF THE STUDY

The six chapters of this section of the thesis will describe and discuss the methodology and findings of the study under the following chapter headings:

1. Aims and procedures.
2. The criterion measure.
3. Creativity and environmental variables.
4. Creativity and intelligence.
5. Creativity and scholastic achievement.
6. Creativity and personality variables.
7. Creativity and miscellaneous variables.

It will be noted that the last five chapters parallel those in Part Two, out of which emerged the hypotheses which will be tested and reported in this section. Each of these five chapters will have sections setting out the hypotheses, method, results, and discussion of results in the light of evidence presented in Part Two.
CHAPTER X

AIMS AND PROCEDURES

This chapter on the aims and experimental procedures of the study is divided into the following five sections:

I. Specific Aims and Hypotheses

II. The Sample

III. Definition of Terms

IV. Measuring Instruments and Testing Programmes

V. Methods of Statistical Analysis

I. SPECIFIC AIMS AND HYPOTHESES

The specific purposes of this study were to investigate: (1) significant differences between high and low creative writing groups (henceforth referred to as HC and LC respectively) on selected measures of cognition and personality and on certain environmental variables; (2) some predicted relationships between creativity in top-stream Form I children and selected measures.

To these ends the following hypotheses were formulated in the various areas:
Educational Factors

1. That there will be significant differences between schools on the mean scores on the creative writing measures.

Family Background

2. That highly creative children will come from homes of higher socioeconomic status than their less creative peers.

3. That there will be differences between highly creative and less creative children with respect to sibling order.

4. That highly creative children will have a different number of siblings than their less creative peers.

Intelligence

5. That in a group of academically able children, there will be a low positive correlation between creativity and intelligence.

6. That there is a threshold level of intelligence necessary for high performances in creativity.

7. That there will be qualitative differences between highly creative and less creative children on sub-tests of the WISC, with the Verbal Scale being the most discriminative.
Scholastic Achievement

8. That there will be a significant relationship between creativity and scholastic achievement.

9. That some school subjects will be more closely related to creativity than others.

Personality Variables

10. That highly creative children will be superior to their less creative peers on measures of social adjustment.

11. That highly creative children will have a greater range of interests than their less creative peers.

12. That highly creative children will be more highly motivated than their less creative peers.

Miscellaneous Variables

13. That there will be no significant differences between highly creative and less creative children on the variable of chronological age.

14. That there will be no sex differences on performances on the creative writing measure.

In addition to these fourteen hypotheses, five others centering on the criterion measure will be tested:

A. That teachers' ratings will agree significantly with the selection of children for the HC and LC groups on the basis of test scores.
B. That there will be a significant relationship between scores on the creative writing measure and scores on the Minnesota Tests of Creative Thinking, and that there will be a higher correlation between creative writing and the Verbal Form of the battery than with the Non-verbal Form.

C. That scores on the creative writing measure will not be unduly influenced by (a) the number of words in the story, (b) the story topics chosen, and (c) ability to finish the story in the time allowed.

D. That the inter-scorer reliability of the creative writing measure will be in excess of 0.70.

E. That the creative writing measure has a satisfactory test-retest alternate forms reliability.

II. THE SAMPLE

Based on scores achieved on the criterion measures (two tests of creative writing), 32 HC and 32 LC subjects were selected from 189 top-stream Form I children from six Auckland Intermediate Schools.

The sample was homogeneous with respect to age, there being no significant difference between boys and girls, and the total sample on this variable. With a mean age of 11.4½ years at 15.6.94, this sample appears
to be slightly younger than the total intake of Form 1 children (11.66 years at June 1st, according to Monroe (1962) in a survey of twelve Auckland Intermediate Schools). This is probably due to the fact that top-stream children, in general, tend to be promoted after two years or less in the infant classes and that some of them have been accelerated one or more years. Nevertheless, there was an age range of over two years (10 years 3 months to 12 years 6 months) in the total sample.

The HC and LC groups, who form the major part of this investigation, were well differentiated on the creativity criterion measure ($t = 34.58$, $p < .01$). In addition to the intensive study of these two contrast groups, limited data were obtained for the 189 pupils of the six classes who were present for both creative writing tests. This larger sample is referred to as the "total sample" or the "parent population" in the remainder of this thesis.

Several considerations determined the selection of this particular sample. These, along with the limitations inherent in the selection of such a specific group, will be discussed in this section under the following headings:
1. Ability range.
2. Class level.
3. Geographic and socioeconomic factors.

Ability Range

When it was decided to study high-ability children, it was necessary to ascertain that the selected schools adopted similar procedures for classifying their pupils. As expected, it was found that all six schools classified their children in such a way that the top 10-15 per cent in terms of a combination of intelligence and achievement were placed in the top-stream classes of their respective schools. Although testing and weighting methods varied slightly from school to school, there was a high degree of similarity in the overall classification procedures employed, all schools except one having administered an Otis test, and most having the results from standardized tests of attainment to guide them in their selection.

Several reasons for studying top-stream (i.e., high-ability) children presented themselves.

One of the main factors behind the selection for study of such children was that much of the research on creativity has been carried out with similar populations. Whilst it was not intended that this study should replicate, or be bound by, any existing study, it was
considered to be unwise to diverge too far from the small body of existing research at the primary school level. Therefore, by selecting a population similar to those studied in overseas' investigations and by employing similar tests, it was thought that the relevance of some of the published findings to New Zealand conditions could be tested.

The second reason for studying such a group was the investigator's personal interest in, and recent teaching experience with, this level of ability. It was considered that personal knowledge of top-stream children would assist in the administration of the tests and in the drawing of conclusions.

Thirdly, the investigator had been impressed by three informal observations of creative writing at this level: (1) the wide range of competence attained by different children of apparently similar intellectual endowment; (2) the apparently low relationship between creative writing ability and such factors as IQ obtained on a group test of intelligence and sociometric status; (3) the apparent inapplicability to New Zealand children of some overseas' findings on creativity, especially in the fields of personality factors.
Finally, it was thought that by selecting a population that was reasonably homogeneous with respect to intelligence, specific factors (i.e., creativity) would therefore stand out and lend themselves to closer investigation.

Emerging out of the last point, however, is one of the major limitations of the present study. Any investigation that selects an intellectually-homogeneous group for study, almost automatically limits the extent to which the findings can be generalized. A section in Chapter VIII examined the Anglo-American disagreements as to the effects of studying homogeneous groups (see p. 154-164). It is appropriate at this stage, however, to restate that workers such as Vernon (1961) consider that the more homogeneous the group with respect to intelligence, the greater is the tendency to inflate the importance of specific factors at the expense of the g-factor. Despite the fact that the total sample of this study was presumed to represent the top 10-15 percent of the Form I population in six schools, it was found to be only moderately homogeneous with respect to intelligence, inasmuch as there was a range of over forty IQ points on the Otis and a range of over sixty points on the WISC. (The latter test being administered
only to the contrast groups). Nevertheless, it is important at this stage to emphasize the fact that the findings of this study should only cautiously be extended to more representative populations or to samples of lower academic aptitude.

Class Level

Once committed to the study of top-stream children, the choice of age or class level was determined largely by practical considerations. Form I Intermediate School children were selected mainly because of the widespread existence of "streaming" systems. This meant that top-stream Form I children were already placed in separate classes, thus facilitating the administration of tests. It also meant that comparatively recent classification data were available. Another important consideration was that by selecting Intermediate Schools, the total sample would be drawn from much wider, and therefore more representative, socioeconomic areas than if a primary school class level had been selected. Finally, as a good number of American studies have focussed on the Grade six level, this seemed an appropriate age-group to study if cross-cultural comparisons were to be made.

Post-primary and Form II children were not studied because of the lack of norms at this age level for some
of the tests that were to be used in the investigation.

**Geographic and Socioeconomic Factors**

Practical considerations alone dictated the selection of Auckland as the locale for this study. Because of the testing time involved over several visits to each school, it was not possible to extend the study to achieve a large city — small city — town — rural sampling. The applicability of the results of this investigation to children from smaller urban or rural areas is therefore unknown.

There does not appear to be any sound reason, however, to suppose that the results obtained in this study would vary from one type of urban community to another within the egalitarian society of New Zealand, with its common syllabus of instruction and uniform methods of teaching. There may be good reason, however, to question the generality of results to rural communities and to non-European groups, the former being unrepresented, and the latter being represented by only a handful in the total sample.

Within Auckland itself, the six intermediate schools were chosen primarily with a view to covering a representative range of socioeconomic areas. Subjective advice from
educators intimate with Auckland’s geography was the initial basis of selection. Objective data (see Table VII) later came to hand, however, and indicated that while the contributing areas of the six schools covered a wide range of economic backgrounds, there were a disproportionate number of areas (six out of sixteen) within the highest (Category I) median income bracket and too few in the lower bracket (one out of sixteen in Category V). As mentioned below, however, some changes in the income structure of at least two of the schools’ contributing areas have probably occurred since 1959-60 (the period for which income data was available) with the construction of state-housing.

With reference to Table VII, the following is a brief description of the six schools used in the sample:

School A is located in the midst of a well-established area of high socioeconomic status. All of its contributing schools are found within areas enjoying the top 20 per cent of incomes.

School B, located in an area of rapid population growth, is within the middle-class socioeconomic status range, with no extremes.

School C is located in a very mixed area with families ranging from the very highest to the very lowest
# TABLE VII

**DISTRIBUTION OF THE SIX SCHOOLS ACCORDING TO THE MEDIAN INCOMES OF THEIR CONTRIBUTING AREAS**

<table>
<thead>
<tr>
<th>School</th>
<th>Median Income Category</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td>A</td>
<td>3</td>
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<tr>
<td>B</td>
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<tr>
<td>C</td>
<td>1</td>
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<td>D</td>
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<tr>
<td>E</td>
<td>-</td>
</tr>
<tr>
<td>F</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
</tr>
</tbody>
</table>

*Median income zones, based on incomes from "Report on the Incomes and Income Statistics of New Zealand, 1959-60," were ranked and divided into the five categories employed in the above table.*
income brackets. Along with Schools F, and possibly D and E, this school has the most heterogeneous population.

School D, although within Category II in Table VII, is located in a mixed area which includes a number of multiple-unit state houses built since 1959-60, as well as a well-established "executive-class" residential area.

School F is similar to School D.

School F is located in an area which ranges across the whole spectrum of economic status, excluding the very bottom groups.

It can be seen, then, that the sample is not drawn from areas which are fully representative, either in terms of geographic considerations or in terms of socioeconomic factors as reflected in the median incomes of the areas. Results should be interpreted accordingly.

III. DEFINITIONS OF TERMS

This section will consider the following three topics:

1. Definitions of creativity.

2. Definitions of creative-writing.

3. Rationale for studying creativity via creative writing.
Definition of Creativity

As mentioned in Chapter II, the writer accepted the definition advanced by Piers et al. (1960, p. 347) as being one of the most comprehensive and succinct descriptions of creativity. They saw it as being:

...the capacity of the individual to avoid the usual, routine, conventional ways of thinking and doing things to produce a quantity of ideas and/or products which are original, novel, or uncommon and which are workable. It must be purposeful or goal-directed. It may involve the forming of new patterns and combinations of information derived from past experiences, and the transplanting of old relationships to new situations, or the generation of new relationships.

Definitions of Creative Writing

In the present study, Wollen and Stevenson’s (1960, p. 273) broad definition of creative writing was accepted as a working description. They defined it as:

the expression of information, ideas, and feelings coloured by original thoughts and inspired by the inner urge of an individual to express himself.

Similar definitions were advanced by Kough and De Haan (1955), Good (1959), Wolfe (1952), Van Allen (1948), Carlson (1961), and Strang (1961).

By and large, however, operational definitions of the various concepts (including creative writing) were employed and these will be discussed in the appropriate sections of subsequent chapters.
Rationales for Studying Creativity via Creative Writing

One of the basic assumptions of this investigation is that it is legitimate to study creativity via creative writing. The reasons for selecting the two contrast groups on the basis of creative writing ability as opposed to creative ability per se (as measured by an existing or a specially-constructed test), were fourfold.

Firstly, as its name implies, creative writing is widely viewed in the literature and by the layman as being a means of communicating creativity of many kinds, or as Strang (1961) put it, an artistic vehicle for creative expression. Getzels and Jackson (1962, p.38), too, considered that it involved "a creative process."

Secondly, as Vernon has pointed out, workers such as Getzels and Jackson and Guilford provide no real evidence for the assumption that their tests are valid measures of creativity. In a critical review of some current research, Vernon (1964, p.167) commented as follows:

Just because a set of tests looks as though it involves creativity and gives lowish correlations with $g$, $v$, or $k$ tests does not mean that it measures what we recognize as creativity in daily life, unless we can show that they actually differentiate between adults or children known on other grounds to be creative or non-creative...
Rather than rely on tests which are still in the experimental stage and which are, as yet, unvalidated, it was decided to focus on creative writing as being an adequate manifestation of what Vernon referred to as "creativity in daily life" in the above quotation. This approach is in accord, too, with that of Mackinnon (1959) who asserted that creativity is best studied in individuals who have proved they are creative rather than in those in whom it is predicted. Furthermore, it was thought that creative writing is a specific school-like and life-like task and, as such, may provide meaningful results at this stage of research into creativity.

The third reason emerged from the second. Because of the controversial nature of the validity and reliability of creativity tests in general and of Guilford's factorial analysis of creativity in particular, it was considered prudent to reject Guilford's "pure factor" approach which insists that measures of creativity should represent single factors (e.g., word fluency) with separate tasks for measuring each factor. Instead, it was decided to adopt Torrance's general approach to the indentification of creative ability through complex tasks presumed to involve the creative process (Torrance 1962a, p.45). It was decided, however, not to employ his Minnesota Tests
as the criterion measure for selecting the two contrast
groups. As it stands, it is a complex and time-consuming
test to administer and score. Furthermore, an absence
of New Zealand normative data for these tests would have
meant relying on United States' scoring norms or attempt-
ing to establish New Zealand ones. These alternatives
were rejected in favour of using creative writing measures.
This does not mean, however, that it is considered that
the latter tests are in any way superior to the Minnesota
or any other tests of creativity. Nevertheless, it is
considered that for the group studied, it is at least
as valid as any other existing approaches.

Although the writer considers it to be theoretically
legitimate and practically desirable to study creativity
via creative writing, this does not imply that a child's
status on tests of creative writing can be equated with
his "general" creative ability. (Indeed, two studies
have shown that there is only a low to moderate relation-
ship between creative writing and creativity, Yamamoto
(1962) reporting a correlation of 0.51 between the two
variables in a sixth grade population and Woldtke (1964)
reporting correlations in the high 0.30's in a fifth grade
sample). Rather, it is emphasized that this study is
focussed on but one aspect of creativity, namely creativity
as it is manifested in children's writing.
IV. MEASURING INSTRUMENTS AND TESTING PROGRAMME

The instruments employed in this study included tests of acknowledged validity and reliability and some still in the early stages of development. Rating scales, some of which were modified from existing scales, others of which were constructed for particular purposes, were also used.

This section will outline the measuring instruments employed and the testing programme followed in the study. More detailed descriptions of the assessment procedures will be given in the relevant sections of the remaining chapters.

Measuring Instruments

Creativity
1. Torrance's Creative Writing tests.
2. The Minnesota Tests of Creative Thinking.
3. Teachers' ratings of creative writing.

Intelligence
1. Otis Intermediate Self-Administering Test of Mental Ability.
2. Wechsler Intelligence Scale for Children.
Scholastic Achievement

1. A.C.E.R. Silent Reading battery.
2. Teachers' ratings.

Social Adjustment

1. Teachers' ratings.
2. Children's preferences.
3. Ratings of interview behaviour.

Socioeconomic Status

1. Median incomes of fathers.
2. Status-rankings of fathers' jobs.

Motivational Factors

1. Ratings of interview behaviour.
2. Teachers' ratings.

Home Background, Interests, and Activities

1. Individual interview.

Summary of Testing Programme

The following is a brief summary of the testing programme for the total sample and for the two contrast groups:

November, 1963: most contributing schools were administered the Otis and the A.C.E.R. reading battery.

April, 1964: a pilot study was conducted with a group of twenty Form I children. This was primarily aimed
at studying the creative writing measures and the
Minnesots battery with a view to determining the clarity
of directions, the appropriateness of items, and the
problems of marking. As a result of this study, some
minor changes were made to the tests.

_June, 1964:_ Forms A and B of the creative writing
measure were administered a week apart, the sociometric
instruments — teachers' and children's' — also being
completed at this time. Teachers were asked to rank
their pupils on creative writing ability and about this
time they made the five-point ratings for Spelling,
Written Language, and Arithmetic. Classes which had
not been given the Otis or the A.C.E.R. Reading battery
in 1963 were tested on these instruments.

_July, 1964:_ The Verbal and Non-verbal forms of
the Minnesota Tests of Creative Thinking were administered
to small groups in the six schools.

_August to October, 1964:_ Each child in the contrast
groups was tested individually on the WISC, and was
interviewed as to background and interests. Ratings
of interview behaviour were made at that time.
V. METHODS OF ANALYSIS

The statistical design of this investigation was aimed at maximizing the amount of information that could be obtained from a given amount of computation and at providing, whenever feasible, an independent check of observations.

In order to determine whether or not there were significant differences between the two contrast groups on the variables tested, t-ratios and chi-square tests of significance were applied when appropriate. The t-test was applied to data in which there was good reason to believe that the distribution of the parent population on the variable under study was a normal one and that there was homogeneity of variance within the groups - (Guilford, 1956a, p.219-221). When evidence suggested that it was reasonable to predict a difference in a particular direction, one-tailed tests were employed to examine the significance of differences on these variables. In all other comparisons, the less powerful two-tailed tests were used (Guilford, 1956a, p.207-209).

When t-tests were calculated to assess the significance of the difference between the means of the LC and SC groups, it was assumed that these means were uncorrelated. The number of df to use with t in this case was
therefore taken to be \((N_1 - 1) + (N_2 - 1)\). This means that there were 62 df, which indicates that t's of 1.67 and 2.39 for one-tailed tests and 2.00 and 2.66 for two-tailed tests are significantly at the .05 and .01 levels respectively.

Chi-square, the less-sensitive non-parametric statistic, was employed as a test of significance when no assumptions concerning the form of population distribution were made. With some of the variables, the median test for two samples had to be applied before the chi-square could be calculated (Guilford, 1956a, p.249-250). Yates' correction for continuity was applied when any expected cell frequency was less than 10 and there was 1 df, (Guilford 1956a, p.234).

In addition to assessing for significant mean differences, Pearson product-moment correlation coefficients were computed. These were used for data available from the total population when the conditions of rectilinearity and homoscedasticity were met (Guilford, 1956a, p.149-150). Some data from the two contrast groups were also translated into product-moment correlations by calculating regression lines of best fit from the extremes of distribution on one variable, namely creative writing ability (see Appendix 0). Where appropriate,
corrections for attenuation (Guilford, 1956a, p. 476) will be made to indicate the highest value to which correlations between particular measures could be pushed by improving the reliability of measurement. A correction for restriction of range will be applied to the correlation between Otis intelligence test scores and creative writing (see Thorndike, 1949, p. 173 and Guilford, 1956a, p. 318).

The .05 level of confidence was chosen as the cut-off point for acceptance of the significance of findings. This level, although less sensitive than the more usually accepted .01 level, was chosen because the study of creativity is still in the exploratory stage where findings will need to be substantiated by further research.

VI. SUMMARY

This chapter outlined the aims and procedures of the study. After a brief description of the specific purposes, the hypotheses that emerged from Part Two were collated. This section was followed by a detailed description of the nature and limitations of the sample. Definitions acceptable to the writer, together with the
rations for studying creativity via creative writing, were then presented. The fourth section summarized the measuring instruments employed and the testing programme followed in the study, the final section outlining the methods of statistical analysis used in the treatment of data.
CHAPTER XI

THE CRITERION MEASURE

In the first week of June, 1964, Form A of Torrance et al's (1963) Creative Writing Test (see Appendix B) was administered to all children in all six top-stream classes. A week later, Form B of the same test (see Appendix C) was administered. Protocols were then marked by the writer according to Torrance et al's (1963) "Scale for Evaluating Creative Writings" (see Appendix D for a slightly modified form of these criteria). To prevent the possibility of a "halo-effect" operating when the second form was marked, all essays were given a code number which was folded over and the essays shuffled. The marker thus had no means of identifying the stories with either the authors or the schools.

Population parameters for Form A of the creative writing measure were as follows: Mean = 13.00; SD = 7.83; Range = 0-33.* A coefficient of skewness (Connolly and Sluckin, 1958, p.47-49) was calculated as being + 0.076, thus revealing an insignificant amount of positive skewness which does not represent any real divergence from the symmetrical form. The assumption

* Form B had almost identical parameters.
that creative writing is normally distributed in this population was therefore held to be proven, this justifying the transformation of the raw data into the statistically convenient T-scores. This was done by graphic procedures and the combined T-scores for the two tests were calculated for all 189 pupils who were present for both tests. From this wider population, the top 32 (approximately one-sixth of the total sample) and the bottom 32 pupils were selected for more intensive study.

The literature on the measurement and identification of creativity is reviewed in some detail in Chapter IV and in the relevant Appendices of this thesis. The remainder of this chapter will describe and discuss findings relevant to the criterion measure that have emerged from the present investigation. The following three areas will receive attention:

1. Teacher ratings of creative writing ability.
2. Relationships between creative writing and creativity.
3. Reliability of the criterion measure.

Each of these areas will have sections setting out hypotheses, method, results, and discussion of results. The hypotheses to be tested emerge partly from the direction of research findings and partly from the
expectation that the criterion measure employed in this investigation has a satisfactory degree of validity and reliability, while some are purely exploratory. To avoid confusion with hypotheses already formulated in Part Two, the ones in this section will be given letters instead of numbers.

**Teacher Ratings of Creative Writing Ability**

**Hypothesis A.** That teachers' ratings will agree significantly with the selection of children for the HC and LC groups on the basis of test scores.

**Method.** To test this hypothesis, teachers of the six classes were asked to rank their pupils into three groups according to creative writing ability, as defined by criteria adapted from Wallen and Stevenson (1960) and from Torrance et al (1963). This rating (see Appendix H for a copy of the scale) was made in June, 1964, at a time when the teachers had no knowledge of their pupils' scores on the criterion measure. The resultant data for the HC and LC groups were arranged into a 2x3 contingency table and a chi-square was computed to test whether the obtained frequencies for the two groups constituted a meaningful departure from a random distribution.
**TABLE VIII**

CHI-SQUARE ANALYSIS OF TEACHER-RATED CREATIVE WRITING ABILITY: BY HIGH AND LOW CREATIVE GROUPS

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=32)</th>
<th>LC (N=32)</th>
<th>Total (N=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High creative</td>
<td>13</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Medium creative</td>
<td>9</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td>Low creative</td>
<td>10</td>
<td>16</td>
<td>26</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32</strong></td>
<td><strong>32</strong></td>
<td><strong>64</strong></td>
</tr>
</tbody>
</table>

\[ x^2 = 8.36 \]

\[ df = 2 \]

\[ p < .02 \]
Results. From Table VIII, it will be observed that the contrast groups differed significantly \( p < .02 \) on teacher-rated creative writing ability, the BC group predictably being rated higher than the LC group. It is interesting to note, however, that there was a marked tendency towards a higher degree of agreement between scores on the criterion measure and teachers' ratings in the LC group than in the BC group. In a closer analysis of this trend, the obtained frequencies for the two groups were compared with the expected frequencies of the total sample. When this procedure was followed, it was found that while the BC group did not differ significantly from the parent population, the LC group differed at the .02 level of confidence, in the direction of being rated lower.

Discussion of results. The results provide clear, albeit qualified, support for the hypothesis that teachers' ratings agree significantly with the selection of children for the BC and LC groups on the basis of test scores. It seems, however, that teachers tend to be more accurate in their judgements of low, than of high, creative writing ability, when these judgements are compared with an independent assessment of this ability. This latter statement could, of course, be reversed to read that the
test instrument is more effective in selecting out those of low creativity than it is in selecting in those of high creativity. Nevertheless, whatever way this finding is interpreted, there can be little doubt that this investigation is, in fact, studying two groups of widely dissimilar levels of creative writing ability.

The fact that teachers could identify only 40.7 per cent of the HC children (i.e., 13 of the 32 in Table VIII), is in accord with an almost identical figure found by Ellinger (1965) and with findings published by writers such as Piers et al (1960), Strang (1962), and Klausmeier et al (1962). It is unlikely, therefore, that this study would provide support for findings such as those reported by Barron (1955) and Taylor (1957), both of whom reported fairly high correlations between tested and rated creativity.

**Relationships Between Creative Writing and Creativity**

Hypothesis B. That there will be a significant relationship between scores on the creative writing measure and scores on the Minnesota Tests of Creative Thinking, and that there will be a higher correlation between creative writing and the Verbal Form of the battery than with the Non-verbal Form.
Method. The Minnesota Tests of Creative Thinking (used with Torrance's permission) were administered to the contrast groups in July, 1964. Both Verbal Form A and Non-verbal Form A were given in two group-test situations, although three children who were absent at the time of group-testing were tested individually as soon as possible thereafter. The writer administered and marked the tests, using slight modifications of the existing American procedures and scoring standards. Test protocols were allocated code numbers. For further information regarding these tests, the reader is referred to p.64-77 and Appendix A of this thesis and to Appendices F and G for copies of the test forms.

Means and SD's were calculated for the two contrast groups on the factors of fluency, flexibility, originality, elaboration and total scores for both forms. The significance of differences between the two groups was determined by the application of t-tests (one-tailed for the Verbal Form and two-tailed for the Non-verbal Form). Product-moment correlations between creative writing, verbal creativity, and non-verbal creativity were calculated by estimating regression lines of best fit from the extremes of the distribution on the variable of creative writing.
Results. Tables IX and X set out the differences between the HC and LC groups on the components of verbal creativity and non-verbal creativity, respectively.

From Table IX it can be seen that significant differences at well beyond the .01 level were obtained on all sub-scores, as well as the total score, of the verbal battery, all being in favour of the HC group. Significant differences between the contrast groups were obtained on only two of the five sub-scores on the non-verbal battery, however. The only one of these differences to have reached the .01 level of significance was the factor of originality as revealed by titles to pictures — a factor which, because of its obviously high verbal loading, seems out of place in a non-verbal battery anyway. It seems likely, too, that differences on the total score achieved significance ($p < .05$) mainly by virtue of the large contribution the score on elaboration made to its variance. To overcome this, it would probably have been better to have transformed the raw scores of the components into scaled scores before summing them.

As can be seen in Table XI, the three creativity measures correlated with each other in approximately the same order of magnitude, all correlations being significant at well beyond the .01 level of confidence.
**TABLE IX**

**MEAN DIFFERENCES ON VERBAL FORM OF MINNESOTA TESTS OF CREATIVE THINKING FOR HIGH AND LOW CREATIVE GROUPS**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th></th>
<th></th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HG (N=32)</td>
<td>LC (N=32)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Fluency</td>
<td>71.53</td>
<td>18.31</td>
<td>49.81</td>
<td>18.50</td>
</tr>
<tr>
<td>Flexibility</td>
<td>33.34</td>
<td>6.62</td>
<td>24.03</td>
<td>6.12</td>
</tr>
<tr>
<td>Originality</td>
<td>34.09</td>
<td>6.85</td>
<td>19.00</td>
<td>6.83</td>
</tr>
<tr>
<td>Elaboration</td>
<td>12.59</td>
<td>2.78</td>
<td>7.50</td>
<td>1.38</td>
</tr>
<tr>
<td>Total</td>
<td>151.56</td>
<td>32.98</td>
<td>100.66</td>
<td>33.11</td>
</tr>
</tbody>
</table>

**p. <.01**
## Table X

Mean Differences on Non-Verbal Form of Minnesota Tests of Creative Thinking for High and Low Creative Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HG (N=32)</td>
<td>Mean</td>
<td>SD</td>
<td>LG (N=32)</td>
<td>Mean</td>
<td>SD</td>
<td>t</td>
</tr>
<tr>
<td>Fluency</td>
<td>19.13</td>
<td>6.09</td>
<td></td>
<td>18.34</td>
<td>6.80</td>
<td></td>
<td>0.48</td>
</tr>
<tr>
<td>Flexibility</td>
<td>16.44</td>
<td>4.60</td>
<td></td>
<td>15.16</td>
<td>5.09</td>
<td></td>
<td>1.03</td>
</tr>
<tr>
<td>Orig. (Figures)</td>
<td>26.84</td>
<td>4.37</td>
<td></td>
<td>23.41</td>
<td>9.78</td>
<td></td>
<td>1.80</td>
</tr>
<tr>
<td>Orig. (Titles)</td>
<td>9.16</td>
<td>1.84</td>
<td></td>
<td>6.66</td>
<td>2.64</td>
<td></td>
<td>4.40 **</td>
</tr>
<tr>
<td>Elaboration</td>
<td>62.19</td>
<td>18.64</td>
<td></td>
<td>50.94</td>
<td>17.51</td>
<td></td>
<td>2.49 *</td>
</tr>
<tr>
<td>Total</td>
<td>134.94</td>
<td>34.78</td>
<td></td>
<td>114.81</td>
<td>32.50</td>
<td></td>
<td>2.45 *</td>
</tr>
</tbody>
</table>

* p < .05

** p < .01
### TABLE XI

**INTER-CORRELATIONS**<sup>1</sup> **BETWEEN CREATIVITY MEASURES**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Verbal Creativity</th>
<th>Non-verbal Creativity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative Writing</td>
<td>.66**</td>
<td>.42**</td>
</tr>
<tr>
<td>Verbal Creativity</td>
<td></td>
<td>.53**</td>
</tr>
</tbody>
</table>

<sup>** p < .01</sup>

<sup>1 Product-moment correlations calculated by estimating regression lines of best fit from extremes of distribution on creative writing variable.</sup>
As hypothesized, there was a higher correlation between creative writing and verbal creativity \((r = 0.66)\) than between the former and non-verbal creativity \((r = 0.42)\).*

**Discussion of results.** The intercorrelations between creativity measures obtained in this investigation are generally higher than those reported by writers such as Barron (1955), Piers et al (1960), and Getzels and Jackson (1962). In part, this may be due to the fact that these writers have all reported on the intercorrelations of specific tasks, rather than of battery totals as in this study.

The high correlation \((r = 0.66)\) obtained between creative writing and verbal creativity and the significant \((p < .01)\) differences obtained between the HC and LC groups on all factor scores in the latter measure, are what one would predict from a "common-sense" appraisal of the two measures. They are in keeping, too, with a similar finding reported by Yamaoto (1962) who found a correlation of 0.51 between writing scored for originality and a composite verbal creativity score in a sixth grade sample.

* These correlations became 0.93 and 0.59 respectively when corrected for attenuation (assuming reliabilities of 0.68, 0.73, and 0.75 for the respective measures of creative writing, verbal creativity, and non-verbal creativity).
The correlation of 0.53 obtained between verbal creativity and non-verbal creativity is identical to one reported by Fleming and Weintraub (1962). Although these coefficients are reasonably high, thus suggesting the existence of commonalities between the two measures, they are sufficiently low to suggest that the tests are measuring different aspects of the creativity attribute. The same may be said of the correlation of 0.42 obtained between creative writing and non-verbal creativity. This moderately high coefficient provides limited support for findings reported by Flescher (1963, p. 261-262) who, in a factor-analytic study, found that both Divergent Drawings and Imaginative Compositions loaded heavily (0.35 and 0.56, respectively) on a factor he identified as "fantasy expression." We considered that this somewhat paradoxical similarity occurred because both tasks are representative of clinical projective techniques and have as their distinguishing feature "reecourse to inner fantasy activity through the media of imagery or ideas." As mentioned earlier, however, too much should not be read into the moderately high correlation between creative writing and non-verbal creativity obtained in the present study because of the undue weighting given to verbal

* 0.72 when corrected for attenuation.
originality (titles) and elaboration in the latter.

Thorndike's (1963) well-made point that one should not pool subtests with low intercorrelations into a common total (see p. 91 of this thesis), should not lead one to expect such correlations ever to become very high, for, as Barron (1955) has pointed out, it is reasonable that the dimension of creativity should have its variance apportioned to several media of expression. That being the case, the intercorrelations obtained between measures of creativity in the present study appear to be as high as one could reasonably expect.

Reliability of the Criterion Measure

**Hypothesis C.** That scores on the creative writing measure will not be unduly influenced by (a) the number of words in the story, (b) the story topics chosen, and (c) ability to finish the story in the time allowed.

**Hypothesis D.** That the inter-scorer reliability of the creative writing measure will be in excess of 0.70.

**Hypothesis E.** That the creative writing measure has a satisfactory test-retest alternate forms reliability.

**Method and results.** To test the first part of Hypothesis C, a product-moment correlation coefficient was calculated between scores on Form A of the criterion
measure and the number of words written in Form A. For both boys and girls and for the total sample, coefficients approaching zero (0.05) were obtained, thus indicating that the two variables were virtually independent of each other. This finding supports research reported by Baker (1964) and by Shouksmith (1958) but is at variance with a statement by Torrance (1964, p.87) that "the more creative children wrote longer stories..."

The second and third parts of Hypothesis C were tested by means of chi-square analyses of the differences between the HC and LC groups on the two criteria. There were no significant differences between the two groups on either the story topics chosen or the ability to finish the story in the time allowed, thus confirming the hypothesis.

Hypothesis D was tested by choosing a random sample of fifty stories from the parent population and having the writer and an independent examiner with Intermediate School teaching experience rank these on the basis of Torrance's criteria. The rank order correlation obtained was in the order of 0.76, thus confirming the hypothesis.

Hypothesis E was tested by correlating the scores achieved by the total sample (N=193) on the two forms of the criterion measure. This yielded a coefficient of 0.52
which became 0.68 when the Spearman-Brown formula for estimating the reliability of a test twice as long as was applied. Whilst this is by no means a high test-retest alternate forms reliability coefficient, it is considered to be a satisfactory one at this stage of research into creativity.

Discussion of results. From the results outlined above, it would seem that the creative writing measure employed in this investigation is not unduly influenced by extraneous factors such as story topic chosen and capacity to complete in the time allowed. The scoring criteria employed lend themselves to a satisfactory degree of inter-scorer agreement and, provided both forms are administered, the measure has a reasonable degree of stability. In other words, at this stage, its use as a criterion measure in a research setting appears to be justified, provided one does not attempt to disguise its imperfections.

Summary of Findings

Summing up, then, the following facts may be stated about the criterion measure:

(1) raw scores on this measure did not differ from a normal distribution, there being an insignificant amount of positive skewness.
(2) The contrast groups differed significantly \( p < 0.02 \) on teacher-rated creative writing ability. Teachers were able to identify only approximately 40 per cent of the HC children as assessed by the criterion measure and were generally more accurate in their judgements of low than of high creative writing ability.

(3) HC children differed significantly from their LC peers on all subscores of the Verbal Form of the Minnesota Tests of Creative Thinking, but on only two of the five sub-scores on the Non-verbal Form of that battery.

(4) Creative writing correlated with verbal creativity to the extent of 0.66, and with non-verbal creativity to the extent of 0.42. A correlation of 0.53 was obtained between verbal and non-verbal creativity.

(5) There were no significant relationships between scores on the criterion measure and (a) number of words written, (b) story topic chosen, and (c) ability to complete story in the time allowed.

(6) Inter-rater agreement in the order of a coefficient of 0.76 was achieved.

(7) A test-retest alternate forms reliability coefficient of 0.68 was obtained.
CHAPTER XII

CREATIVITY AND ENVIRONMENTAL VARIABLES

This chapter will present the findings in the following two areas:

I. Creativity and Educational Factors
II. Creativity and Family Background

I. CREATIVITY AND EDUCATIONAL FACTORS

Review of the Literature

The literature on the relationships between creativity and educational factors is reviewed in pages 107-125.

Hypothesis

2. That there will be significant differences between schools on the mean scores on the creative writing measures.

Method and Results

Means and SD’s for the combined T-scores on the creative writing measures were calculated for each of the six classes. The significance of the differences between all possible pairings of these classes were assessed by means of t-tests, these being set out in Table XII.
<table>
<thead>
<tr>
<th>School</th>
<th>M</th>
<th>SD</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (N=35)</td>
<td>111.09</td>
<td>15.05</td>
<td>2.92**</td>
<td>2.67**</td>
<td>5.52**</td>
<td>4.59**</td>
<td>2.77**</td>
<td></td>
</tr>
<tr>
<td>B (N=26)</td>
<td>97.58</td>
<td>19.72</td>
<td>2.92**</td>
<td>0.99</td>
<td>1.56</td>
<td>0.83</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td>C (N=41)</td>
<td>102.02</td>
<td>14.45</td>
<td>2.67**</td>
<td>0.99</td>
<td>3.30**</td>
<td>2.29*</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>D (N=34)</td>
<td>90.12</td>
<td>16.46</td>
<td>5.52**</td>
<td>1.56</td>
<td>3.30**</td>
<td>0.85</td>
<td>3.19**</td>
<td></td>
</tr>
<tr>
<td>E (N=24)</td>
<td>93.58</td>
<td>15.68</td>
<td>4.51**</td>
<td>0.83</td>
<td>2.29*</td>
<td>0.85</td>
<td>2.19*</td>
<td></td>
</tr>
<tr>
<td>F (N=29)</td>
<td>101.66</td>
<td>12.18</td>
<td>2.77**</td>
<td>0.92</td>
<td>0.11</td>
<td>3.19**</td>
<td>2.19*</td>
<td></td>
</tr>
</tbody>
</table>

** p < .01
* p < .05
From Table XIII, which summarizes these inter-school comparisons, it will be noted that School A was significantly superior to the other five schools and that School D and E were significantly inferior to three of the other five schools. Schools C, F, and B ranged between these two extremes. Of the fifteen possible inter-school comparisons, there were nine significant differences.

In view of the inter-school differences expressed in the above two tables, the distribution of cases in the BC and LC groups as set out in Table XIV is not surprising. School A provided almost half of the BC group, while 13 of the 32 LC children were from School D.

Discussion of Results

The above results provide partial support for the exploratory hypothesis "that there will be significant differences between schools on the mean scores on the creative writing measures." In the main, these differences reflect the marked superiority of School A and the marked inferiority of School D on scores on the criterion measure. It is necessary, then, to look at possible reasons for the discrepant performances of these two schools relative to the other four; these will be outlined in the remainder of this section.
<table>
<thead>
<tr>
<th>School</th>
<th>Superior to</th>
<th>No Diff.</th>
<th>Inferior to</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>DE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>DE</td>
<td>EF</td>
<td>A</td>
</tr>
<tr>
<td>D</td>
<td>DE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>CEFP</td>
<td>A</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td>ED</td>
<td>ACF</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>EB</td>
<td>ACF</td>
</tr>
</tbody>
</table>
### TABLE XIV

**DISTRIBUTION OF HC AND LC GROUPS**

**AS PER INTERMEDIATE SCHOOL**

<table>
<thead>
<tr>
<th>School</th>
<th>HC (N=32)</th>
<th>LC (N=32)</th>
<th>Total (N=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>15</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>E</td>
<td>2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>F</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
(1) There is a possibility that the differences between schools reflect different levels of intelligence. While the whole question of the relationship between creativity and intelligence will be given close attention in the next chapter, it is relevant, in the present context, to make brief reference to inter-school differences on this variable. From Table XV, it will be noted that nine of the fifteen possible inter-school comparisons on intelligence (as measured by the Otis raw score) attained statistical significance. Closer inspection of this table, however, reveals that School A, with its marked superiority over the other schools on the criterion measure, was superior to only one school (D) on the variable of intelligence.* On the other hand, the differences between School D and all other schools in the sample were statistically significant at the .01 level of confidence. This suggests, then, that low intelligence was more important in selecting out LC children than high intelligence was in selecting in HC children. Such a phenomenon could well be explained by the operation of a threshold of intelligence — a concept which will be discussed in more detail in the next chapter.

* The fact that School A was the only school in which the Otis was administered by the writer could give rise to speculation as to how this pattern could have occurred.
TABLE XV

MEAN DIFFERENCES ON CTAB INTERMEDIATE RAW SCORES

FOR THE SIX SCHOOLS IN TOTAL SAMPLE

<table>
<thead>
<tr>
<th>School</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>t</th>
<th>t</th>
<th>t</th>
<th>t</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (N=35)</td>
<td>60.97</td>
<td>7.56</td>
<td>1.00</td>
<td>1.90</td>
<td>4.37**</td>
<td>0.92</td>
<td>1.22</td>
<td></td>
</tr>
<tr>
<td>B (N=26)</td>
<td>62.54</td>
<td>4.63</td>
<td>1.00</td>
<td>0.92</td>
<td>6.15**</td>
<td>2.00*</td>
<td>2.50*</td>
<td></td>
</tr>
<tr>
<td>C (N=41)</td>
<td>63.85</td>
<td>5.21</td>
<td>1.90</td>
<td>0.92</td>
<td>7.26**</td>
<td>2.90**</td>
<td>3.51**</td>
<td></td>
</tr>
<tr>
<td>D (N=34)</td>
<td>53.32</td>
<td>6.98</td>
<td>4.37**</td>
<td>6.15*</td>
<td>7.26**</td>
<td></td>
<td>3.27**</td>
<td>3.32**</td>
</tr>
<tr>
<td>E (N=24)</td>
<td>59.25</td>
<td>6.67</td>
<td>0.92</td>
<td>2.00*</td>
<td>2.90**</td>
<td>3.27**</td>
<td></td>
<td>0.22</td>
</tr>
<tr>
<td>F (N=29)</td>
<td>58.86</td>
<td>6.24</td>
<td>1.22</td>
<td>2.50*</td>
<td>3.51**</td>
<td>3.32**</td>
<td></td>
<td>0.22</td>
</tr>
</tbody>
</table>

* p < .05
** p < .01
(2) To check on the possibility of fluency differences between schools (as indicated by the number of words written in Form A of the criterion measure), further series of t-tests were calculated. Table XVI sets these out and reveals that only one of the fifteen possible inter-school differences was statistically significant.

This pattern of no significant relationship between creative writing and a fluency factor was confirmed when the two were calculated as being correlated only to the extent of 0.05 (see Chapter XI).

(3) Although it will be remembered that School A was described as being located in an area of high economic status (see Chapter I, Section II), the next section of this chapter will point out that socioeconomic factors did not significantly differentiate between the HC and LC groups. This was borne out in a closer analysis of the socioeconomic status of the fifteen children from School A in the HC group. It was found that this
sub-group did not differ significantly from either the remainder of the HC group or with the LC group on this criterion. On the other hand, the LC sub-group from School D was significantly inferior to both the total LC group and the HC group.

In other words, then, socioeconomic factors seem to account, in part for the preponderance of School D children in the LC group, but not for the high incidence of School A children in the HC group. Further reasons must therefore be sought for the latter.

(4) It was thought that the large number of School A children in the upper-group may have been reflecting, in turn, differences in the contributing schools. It was found, however, that these fifteen children came from five different primary schools and that the numbers of HC children from each school were not significantly different. A similar tendency was found for the LC group from School D which came from four different contributing schools.

(5) In the absence, so far, of any convincing reasons for School A having such a large representation in the HC group, it can only be assumed that these factors lie outside the areas tested in the present investigation. It is highly probable, then, that closer
<table>
<thead>
<tr>
<th>School</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>t</th>
<th>t</th>
<th>t</th>
<th>t</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (N=38)</td>
<td>234.47</td>
<td>54.23</td>
<td>0.30</td>
<td>1.72</td>
<td>0.98</td>
<td>0.98</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>B (N=33)</td>
<td>241.21</td>
<td>91.78</td>
<td>0.30</td>
<td>1.49</td>
<td>1.05</td>
<td>1.08</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>C (N=42)</td>
<td>215.24</td>
<td>44.41</td>
<td>1.72</td>
<td>1.49</td>
<td>0.47</td>
<td>0.25</td>
<td>2.26*</td>
<td></td>
</tr>
<tr>
<td>D (N=36)</td>
<td>221.11</td>
<td>63.19</td>
<td>0.98</td>
<td>1.05</td>
<td>0.47</td>
<td>0.13</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td>E (N=28)</td>
<td>218.93</td>
<td>69.34</td>
<td>0.98</td>
<td>1.08</td>
<td>0.25</td>
<td>0.13</td>
<td>1.25</td>
<td></td>
</tr>
<tr>
<td>F (N=35)</td>
<td>237.43</td>
<td>40.94</td>
<td>0.26</td>
<td>0.22</td>
<td>2.26*</td>
<td>1.30</td>
<td>1.25</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05
analysis of the influences of both teacher and home would provide more clear-cut findings. Such an explanation would be in keeping with the weight of evidence presented in the relevant sections of Chapter V.

While this study did not aim at making a thorough investigation of the impact of teacher personality or methodology on creative writing, some cautious observations can be made in this area. The teacher in School A, for example, was noted as encouraging cognitive discourse in a democratic atmosphere of shared direction and a moderate degree of permissiveness. All other classes were noted as being either teacher or child dominated, with corresponding degrees of "control" versus "permissiveness." The class in School D was considered to be the most teacher-dominated of the six. Although these comments regarding teacher personality are in keeping with the literature reviewed in Chapter V, it is emphasized that they did not arise from any systematic observations or from the results of responses to any validated measuring instrument. They should therefore be interpreted as nothing more than hypotheses requiring more scientific evaluation.

In an attempt to determine the possible impact of methodological differences in the teaching of creative
writing, a questionnaire was devised (see Appendix P). This asked teachers to record their approaches towards areas such as choice of topics, marking procedures, and methods of stimulation. Although it is recognized that an N of six is too few to obtain significant results generalizable to the teaching population as a whole, at least three tendencies emerged as being of possible significance. Firstly, the teachers of the bottom two classes recorded that they "mostly" chose topics in keeping with the direct experiences of the child, the other four doing so only "sometimes." This is in conflict with the current emphases of many Education Department advisers. Secondly, the teachers of the top three classes "always" or "mostly" marked stories according to the effectiveness of the communication of ideas, as well as the quality of ideas, whereas the bottom three did so only "sometimes." Thirdly, it was found that the teachers of the bottom two classes "never" shared their work with other classes, the bottom class only "sometimes" making children's work available for the class to read; the other teachers obviously place greater store on the communication of creativity.

A more refined questionnaire along the lines of the one employed in this study would provide an interesting and fruitful area of further research.
II. CREATIVITY AND FAMILY BACKGROUND

This section will describe and discuss findings in the following three areas pertaining to family background:

1. Parents' socioeconomic status.
2. Sibling order.
3. Size of family.

Parents' Socioeconomic Status

Review of the literature. The literature on the relationship between creativity and socioeconomic factors is reviewed on p.131-132.

Hypothesis 3. That highly creative children come from homes of higher socioeconomic status than their less creative peers.

Method and results. Each child in the two contrast groups was asked during the individual interview to describe his or her father's occupation, this being allocated a status ranking according to Congalton and Havighurst's (1954) classification. Lovegrove's (1964) modification of this instrument was also used — mainly to provide a cross-check on the original scale, but also because of its unique properties. In his scale, Lovegrove rearranged the occupations listed in the original scale into random
order and presented it to a group of fifty teachers. They were asked to classify each occupation on the basis of the extent to which the average individual engaged in them would be "more likely than not to provide a home environment which was congruent with that of the school" (Lovegrove, 1966, p.23). The resulting data were then used to provide a T-score for each occupation. Reliability correlations varying from 0.82 to 0.90 were obtained. This scale is presented in Appendix K.

The data from Havighurst and Congalton's scale were analyzed by means of the median test for two samples, Lovegrove's scale lending itself to the application of the t-test. Tables XVII and XVIII respectively set out the differences between the two groups on these two sets of criteria. It will be observed that while both tables indicate differences in favour of the HC groups, in neither case did those differences quite attain statistical significance.

When the value of 5.26 was taken as the median ranking of the 116 occupations listed in Havighurst's scale, however, it was found that 23 of the HC children's fathers were in occupations above that value, this finding being significant at the .02 level of confidence. On the
### TABLE XVII

**Mean Differences on Lovegrove's Modification of Havighurst's Occupational Status Scale for High and Low Creative Groups**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HC (N=32)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean  SD</td>
<td></td>
</tr>
<tr>
<td>Occ. Status</td>
<td>55.5  7.14</td>
<td>1.25</td>
</tr>
</tbody>
</table>

### TABLE XVIII

**Chi-Square Analysis of Status Rankings of Fathers' Occupations: By High and Low Creative Groups**

<table>
<thead>
<tr>
<th>Median Value</th>
<th>Group</th>
<th>HC + LC (N=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HC (N=32)</td>
<td>LC (N=32)</td>
</tr>
<tr>
<td>4.65+</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td>4.63-</td>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>

\[ x^2 = 2.248 \]

\[ df = 1 \]

\[ p < .20 \]
other hand, 19 of the LC children's fathers' occupations were in this upper bracket, this figure failing to achieve statistical significance (p < .30). In other words, although there was no significant difference between the HC and LC groups on the variable of fathers' occupational status, the former group was significantly superior to the general population on this criterion.

Discussion of results. These results suggest that socioeconomic status is a variable that has a considerable bearing on creativity when taken over the whole socioeconomic range, but that, in a restricted sample (such as in the present investigation), it is of less significance. It is possible, then, that there is a threshold of socioeconomic status, over and above which increased status has relatively little significance for creativity and below which creativity of a high order is unlikely to occur.

In the present population, this threshold appears to be just below the mean or median occupational ranking, only two of the HC group scoring below 46.9 on Lovegrove's T-scale and only three scoring below 6.07 on Havighurst's scale with its median of 5.26. Such an hypothesis appears to have some logical merit, for it is reasonable to expect
that homes of higher socioeconomic status will be more stimulating than those lower down the scale. It would account, too, for the fact that by the time a child reaches Intermediate School, other environmental factors have begun to exert their influences, thus diminishing the effects of home factors to the extent that fine differences between the socioeconomic status of homes are not accompanied by higher levels of creativity.*

A threshold concept accounts for these factors by postulating that, insofar as its relationship to creativity is concerned, socioeconomic status is better regarded as a dichotomy than as a series of fine gradations. It must be stressed, however, that this is an hypothesis and no more, that it is largely speculative, and that it could well be a mere artefact arising from the sample and/or the method of selecting the contrast groups.

Nevertheless, it finds support in the general field of giftedness, in which the preponderance of parents in the professional and managerial groups is well-known (Berbe, 1963). It certainly bears further study.

In the absence of clear-cut confirmation of the hypothesis as stated originally, it would seem that if

* A subsidiary hypothesis would be that socioeconomic factors are of greater significance for creativity in younger children.
home factors play a part in influencing creativity, they are more likely to be found in areas such as family dynamics and parental attitudes which can cut across socioeconomic classes. As well as closer attention to these areas, future research could well concern itself with an attempt to rank Havighurst's scale on the criterion of the extent to which the average individual engaged in each occupation provides a home that encourages divergent thinking. It is likely that there would be significant differences between such a scale and the one compiled by Lovegrove (1964).

Although the results of this study are somewhat equivocal in themselves, it does seem that socioeconomic factors do play a considerable role in creativity over the whole population. Qualified support is therefore provided for findings reported by writers such as Markey (1935), Roe (1953), and Weisberg and Springer (1961). On the other hand, if the findings are interpreted strictly within the context of a socioeconomically fairly homogeneous sample, they also provide qualified support for writers such as Stein (no date, b), Rivlin (1959), Baker (1964), and others. This somewhat paradoxical state of affairs simply emphasizes the need to interpret research within the context of the sample studied.
Sibling Order

Review of literature. The few studies conducted in this area are reviewed on p. 133.

Hypothesis 4. That there will be differences between highly creative and less creative children with respect to sibling order.

Method and results. To test this hypothesis, the two contrast groups were compared on the criterion of "first-born" versus "others." Although there was a slight tendency for there to be more first-born children in the HC group (16) than in the LC group (12), a chi-square analysis revealed that the differences did not approach statistical significance.

Discussion of results. This finding supports those of Stein (1958), Chambers (1964) and Ramsbo (1964) but not those of Visher (1948), Roe (1953), or Weisberg and Springer (1961).

Size of Family

Hypothesis 5. That highly creative children will have a different number of siblings than their less creative peers.

Method and results. From Table XIX it can be seen that although HC children tend to come from smaller
### TABLE XIX

**CHI-SQUARE ANALYSIS OF FAMILY SIZE:**
**BY HIGH AND LOW CREATIVE GROUPS**

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=32)</th>
<th>LC (N=32)</th>
<th>Total (N=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 children</td>
<td>24</td>
<td>17</td>
<td>41</td>
</tr>
<tr>
<td>4+ children</td>
<td>8</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32</strong></td>
<td><strong>32</strong></td>
<td><strong>64</strong></td>
</tr>
</tbody>
</table>

\[ \chi^2 = 3.33 \]

\[ df = 1 \]

\[ P < .10 \]
families, the difference between the contrast groups does not quite attain statistical significance.

Discussion of results. Although the tendency for HC children to have fewer siblings than their less creative peers is non-significant, it is interesting to speculate as to possible causes for such a trend should it be confirmed in a study of broader scope than the present one. Firstly, it could be that the tendency for HC children to come from homes of higher socioeconomic status (although statistically non-significant) reflects itself to some degree in size of family. A second, and more probable, explanation could be that a greater degree of intellectual stimulation is possible in smaller families, with each child having more of his parents' attention. It is possible to argue, too, that emotional contacts are more intense in smaller families, these making children more sensitive to feelings and thoughts which makes for higher quality creative writing.

Summary of Findings

Summing up this section on the relationship between creativity and family background factors, the
following findings emerged:

(1) Socioeconomic factors did not significantly differentiate between the HC and LC groups. The fact that the HC group differed significantly from the general population is taken as an indication of some form of a socioeconomic "threshold."

(2) There was no significant difference between the contrast group with regard to sibling order.

(3) HC children tend to have fewer siblings than their LC peers. The difference between the two groups, however, just failed to attain statistical significance.
CHAPTER XIII

CREATIVITY AND INTELLIGENCE

After describing the test instruments employed in this section of the study, this chapter will present the findings bearing on the relationship between creativity and intelligence.

Five of the six schools had administered the Otis Intermediate Self-Administering Test of Mental Ability in November-December of 1963 as part of their regular pre-entry testing in the contributing schools. As the sixth (School A) had given the A.C. T. R Intermediate D General Ability Test, the Otis was administered to that class in June, 1964 to make the data comparable. Because scores on the creative writing measures were not corrected for age, all Otis IQ's were therefore converted to a raw score corrected to November, 1963.

All sixty-four children in the two contrast groups were tested individually on the full battery of the Wechsler Intelligence Scale for Children, only the digit span sub-test being omitted. These results, too, were left as raw scores rather than being transformed into age-based IQ's or Scaled Scores. The problem of overcoming
the differential contributions various sub-tests would make to the composite raw scores for each of the three major scales of this test was solved by calculating IQ's for these scales and then translating them to mental ages (the equivalent of raw scores), using the formula

\[ WA = \frac{CA \times IQ}{100} \]  

The literature on the relationships between creativity and intelligence is reviewed in some detail in Chapter VI. The remainder of this chapter will discuss findings bearing on the following three topics:

1. Relationships between creativity and intelligence.
2. The threshold concept.
3. Creativity and sub-categories of intelligence.

**Relationships Between Creativity and Intelligence**

**Hypothesis 5.** That in this group of academically able children, there will be a low positive correlation between creativity and intelligence.

**Method and results.** A product-moment correlation coefficient was calculated between Otis raw scores and the Combined T-Scores on the creative writing measure for the total population for which both scores were
available (N=189). This was in the order of 0.32. Small, but not significant sex differences were recorded, correlations of 0.27 and 0.37 being obtained for boys and girls respectively. Inter-school differences were also noted, School A yielding the highest correlation (0.45) and School C the lowest (0.001).

Product-moment correlations were calculated between the three WISC scales and the Combined T-Scores on the creative writing measures, the composite Verbal Creativity scores, and the composite Non-verbal Creativity scores. Because data on these measures were restricted to the two contrast groups, these correlations were calculated by estimating regression lines of best fit.

* This correlation became 0.41 when corrected for attenuation (assuming reliability coefficients of 0.90 and 0.68 for the Otis and creative writing measure respectively).

When the original correlation of 0.32 was corrected for restriction of range it was increased to 0.50. This corrected correlation should not be unduly emphasized, however, for it implies an assumption that the correlations between the two variables of creativity and intelligence are the same at all levels of intelligence — something of which there is little information.
from the extremes of the distribution. From Table XX, it will be observed that both creative writing and verbal creativity correlated moderately highly with all three WISC scales, but that low and non-significant correlations were recorded between non-verbal creativity and the WISC battery.

As would be expected from the evidence of a moderately high relationship between creativity and intelligence, the EC group was significantly superior to the IC group on all three scales of the WISC, and on the Otis raw score ($p < .01$ in all cases). Measures of central tendency, variability, and tests of significance on these intelligence measures are given in Table XXI.

As a check on the accuracy of this method, the Otis raw scores and the Combined T-Scores on the creative writing measures for the two contrast groups were treated to yield a correlation by the "regression technique." The resultant correlation coefficient of $0.54$ was found to be not significantly different from the coefficient of $0.32$ obtained between the two measures in the total population. This was determined by reference to Walker and Lev's Chart XIV (Walker and Lev, 1953, p.476) in which the 95 per cent confidence interval for an $r$ of $0.32$ with an $N$ of 32 (i.e., the sample with the smallest size) is set out as being $-0.10$ to $0.59$. In other words, then, the disparity between the two estimates of the correlation coefficients does nothing to diminish one's confidence in the accuracy of the "regression technique."
### TABLE XX

**CORRELATIONS BETWEEN WISC SCALES AND CREATIVITY MEASURES**

<table>
<thead>
<tr>
<th>Intelligence Test</th>
<th>Cr. Writing</th>
<th>Verbal Cr.</th>
<th>Non-V. Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WISC, Full Scale</td>
<td>.60**</td>
<td>.53**</td>
<td>.16</td>
</tr>
<tr>
<td>WISC, Verbal Scale</td>
<td>.55**</td>
<td>.56**</td>
<td>.13</td>
</tr>
<tr>
<td>WISC, Performance Scale</td>
<td>.56**</td>
<td>.48**</td>
<td>.20</td>
</tr>
</tbody>
</table>

** p < .01
### TABLE XXI

**Mean Differences on Misc Scales and Otis Intermediate for High and Low Creative Groups**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>HC (N=32)</td>
<td></td>
<td>LC (N=32)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>t</td>
</tr>
<tr>
<td>Verbal Scale(^1)</td>
<td>14.68</td>
<td>1.35</td>
<td>13.00</td>
<td>1.28</td>
<td>5.11**</td>
</tr>
<tr>
<td>Performance Scale(^1)</td>
<td>14.46</td>
<td>1.04</td>
<td>12.76</td>
<td>1.17</td>
<td>4.64**</td>
</tr>
<tr>
<td>Full Scale(^1)</td>
<td>14.67</td>
<td>1.09</td>
<td>13.02</td>
<td>1.20</td>
<td>5.77**</td>
</tr>
<tr>
<td>Otis(^2)</td>
<td>64.97</td>
<td>5.82</td>
<td>57.13</td>
<td>7.58</td>
<td>4.65**</td>
</tr>
</tbody>
</table>

\(^1\) Expressed as mental ages

\(^2\) Expressed as raw scores

** p < .01
As a matter of interest, the HC group had a mean Otis IQ of 133.84 compared with 123.34 for the LC group, this ten-point difference being significant \((t=4.33, p \cdot 01)\). The comparable IQ's for the WISC were: Full Scale 125.72 versus 111.38; Verbal Scale 125.78 versus 111.97; Performance Scale 121.44 versus 109.41. As well as illustrating the fact that we are dealing with two intelligence tests of very different content and administration, these discrepancies between the Otis and WISC IQ's give rise to such questions as the extent to which the Otis tests are administered with fidelity to the instructions (especially timing) in the contributing schools.

**Discussion of results.** The correlation coefficient of 0.32 obtained between creative writing and Otis scores confirms the hypothesis and is in keeping with studies conducted with adults as reported by writers such as Dreydahl (1956), Barron (1957a), Neer and Stein (1955), and others summarized in Table III (p.138). It is similar, too, to correlations found in studies of children as reported by writers such as Weckte (1964), McGuire et al (1960), Torrance (1962a), Yamamoto (1964c), and others summarized in Table IV (p.139-140). Reference to these two tables shows that the present correlation falls within
the median range of the forty plus coefficients reported in the literature reviewed by the present writer.

The moderately high correlation between creative writing and the WISC battery, however, finds very few precedents in the literature. As can be seen in Tables III and IV, no studies of adults have reported correlations in excess of 0.50, while only a handful of studies focusing on children have reported correlations in excess of that figure. Nevertheless, several writers such as Kheiralla (1965), Gaier and White (1965), and others reviewed on p.144-146, have indicated substantial relationships between the two variables and have advanced sound reasons why this should be so.

The discrepancy between the correlation of 0.60 obtained between the WISC battery and creative writing and overseas studies which show low or non-significant correlations between creativity and intelligence, may be accounted for in several ways. It could be that creativity, as it is manifested in children's story writing, bears a higher relationship with intelligence than does creativity in other areas of endeavour. The discrepancy may also represent cross-cultural differences in the relationships between the two variables. Both of these explanations, however, tend to be ruled out by
the low correlation (0.32) obtained between the criterion measure and the Otis in the present study — another discrepancy that calls for explanation. It is highly probable that both these differences reflect the use of the WISC, a well-balanced individual test which — as will be seen later in this chapter — samples a broad range of cognitive abilities and appears to permit both divergent as well as convergent thinking to operate.

Such a view would be in accord with those of Hunt (1952a) and Vernon (1964, p.168), the latter having pressed for the use of "more up-to-date and reliable batteries of g and v tests" in this area of research.

Comment must be made, too, regarding the inter-correlations between the WISC scales and the creativity measures set out in Tables XI (p.240) and XX (p.273). Reference to these two tables shows that creative writing correlated to approximately the same extent with both Verbal Creativity (0.66) and the WISC Full Scale (0.60) and that the two latter tests were themselves correlated to only a slightly lower degree (0.53). This pattern suggests that there is a moderately high degree of communality among these three tests, a trend which points the need for further factor-analytic studies such as those
conducted by Fleacher (1963) and advocated by Vernon (1961). If such studies bear out the trend of this aspect of the present study, they would provide convincing support for those who argue that creativity is to a large degree subsumed under general intelligence (see p. 414-415).

It must be remembered, too, that the correlations between the two variables that emerged from this study were obtained with an unvalidated criterion measure of modest reliability and with a restricted population — both factors tending to limit the size of the correlation between creativity and intelligence. One can only speculate on the relationship that would have emerged had creative writing been correlated with the WISC in an unrestricted sample; undoubtedly, it would have been high.

In general, then, the results of this aspect of the investigation provide only qualified support for the hypothesis as stated in the beginning of this section. While the data confirms that in this high-ability population, there is a low positive correlation between creative writing and scores on a group test of intelligence (Otis), there is strong evidence to suggest that there is a moderately high relationship between the former and a
well balanced individual test of intelligence (WISC). If the latter is more indicative of the "true" relationship that exists between creativity and intelligence, then the present study tends to support the view of many British investigators who see general intelligence as being an essential, and indeed the most important, constituent of creativity. It does not, however, go so far as to support Spearman's (1930) claim (as cited by Burt, 1962a) that creativeness depends solely on the eduction of correlates and is, therefore, merely a manifestation of general intelligence. Nor does it provide support for those American researchers who claim or imply that the two variables are virtually independent of each other.

The Threshold Concept

Review of the literature. Research on threshold concepts is reviewed on p. 161-164.

Hypothesis 6. That there is a threshold level of intelligence necessary for high performances in creativity.

Method and results. In determining "high performances in creativity," one SD above the sample mean was selected as being a convenient and meaningful — albeit arbitrary — cut-off point. This procedure of defining giftedness in terms of SD's from the population mean has
its precedent in criteria advanced by Gallagher (1960).

Because the six classes making up the sample had already been selected as being above a certain intelligence/attainment threshold, any specific threshold level that emerges in the present study will have limited applicability to the general population. Provided it is remembered that the hypothesis is aimed at determining the existence of a threshold, and not its exact level, however, this limitation can be minimized.

With these qualifications in mind, an inspection of the data on the top twenty-five children (i.e., one SD above the sample mean) suggested the existence of a threshold level in the vicinity of an IQ of 120 on the Otis. To test the significance of this observation, the number of children with IQ's of 120 or more in the top group was compared with the proportionate distribution of such children in the parent population. From Table XXII, which sets out the appropriate chi-square analysis of the significance of the frequency differences, it can be seen that IQ 120 emerged as being a significant \( p < .05 \) threshold level for the present sample.
TABLE XXII

CHI-SQUARE ANALYSIS OF "THRESHOLD OF INTELLIGENCE": FOR TOP TWENTY-FIVE CHILDREN ON CREATIVE WRITING MEASURES

<table>
<thead>
<tr>
<th>Category</th>
<th>Top 25</th>
<th>Expected Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Otis IQ below 120</td>
<td>1</td>
<td>6.2</td>
</tr>
<tr>
<td>Otis IQ 120 or more</td>
<td>24</td>
<td>16.8</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>25.0</td>
</tr>
</tbody>
</table>

\[ x^2 = 4.73 \text{ (Yates' correction applied)} \]

\[ df = 1 \]

\[ p < .05 \]
Discussion of results. While these results appear conclusive, two limitations of the present study emphasize the need to exercise caution when interpreting them. Firstly, it must be noted that the threshold of intelligence that Table XXII appears to demonstrate was obtained from an analysis of Otis scores. As there were no data available on the distribution of WISC scores in the parent sample, it is difficult to ascertain whether or not a threshold operates with that test as well. If, however, it is assumed that this test would have thrown a distribution similar to that of the Otis (i.e., 6.2 of the top 25 children with IQ's below 120), then the threshold must be lowered to IQ 115 or 110 before the top group would differ significantly from the parent population.

Although such a procedure is based upon a doubtful assumption, the discrepancy is sufficient to warrant further study of the threshold concept when different intelligence tests are used.

Secondly, the caution expressed on p. 165 of this thesis, regarding the difficulty of establishing the existence of a threshold in selected groups, may mean

* This difference further illustrates the discrepancy between the correlations reported in the previous section of this chapter.
that the results reported in Table XXII are nothing more than an artefact of the sample studied or of the arbitrary criterion of "high performances" in creativity that was chosen.

Despite these limitations, however, there appears to be sufficient evidence to at least support the existence of a threshold of intelligence being necessary for high-level creative performances. The results of this section of the study, therefore, provide qualified support for writers such as Neer and Stein (1955), Yamasato (1961), and Torrance (1962) who have estimated a threshold of intelligence as being in the vicinity of an IQ of 120.

Creativity and Sub-categories of Intelligence

**Hypothesis 7.** That there will be qualitative differences between highly creative and less creative children on subtests of the WISC, with the Verbal Scale being the most discriminative.

**Method and results.** Means and SD’s were calculated for the two contrast groups on all subtests of the WISC. As can be seen in Table XXIII, statistically significant differences at the .01 level of confidence were obtained on the Comprehension, Similarities, Vocabulary, Block Design, and Coding tests. The two groups differed at the
.05 level for the Arithmetic subtest. In all cases, differences were in favour of the HC group. Although differences in favour of the HC group were recorded in the remaining four subtests of the battery, they did not attain statistical significance.

Discussion of results. The main factor governing the selection of the WISC was the profile of subtest scores which it provides. It was hoped that the pattern of scores achieved by HC children would lend itself to some form of analysis in the light of numerous factorial studies that have been conducted on these scales. A closer study of the relevant literature, however, revealed that while these scales "yield a reliable total-score IQ indicative of a strong general factor, they are factorially complex." (Vernon, 1961, p.166). Or, as Adcock et al (1951, p.26) stated in a New Zealand context, "The manifest impurity of all these tests makes them very unsatisfactory for any precise measuring of abilities."

Factor analytic studies — some of which are reviewed by Vernon (1961, p.132, 166) — include Balinsky's (1941) differentiation between verbal and performance tests and failure to identify any other consistent group factor. They include, too, Gault's (1954) and
<table>
<thead>
<tr>
<th>Variable</th>
<th>HC (N=32)</th>
<th></th>
<th>LC (N=32)</th>
<th></th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>20.88</td>
<td>5.86</td>
<td>18.34</td>
<td>3.34</td>
<td>1.73</td>
</tr>
<tr>
<td>Comprehension</td>
<td>17.00</td>
<td>2.33</td>
<td>14.09</td>
<td>2.45</td>
<td>4.86**</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>13.19</td>
<td>1.74</td>
<td>12.28</td>
<td>1.28</td>
<td>2.37*</td>
</tr>
<tr>
<td>Similarities</td>
<td>14.88</td>
<td>0.99</td>
<td>11.96</td>
<td>3.26</td>
<td>4.82**</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>50.63</td>
<td>7.03</td>
<td>43.00</td>
<td>5.56</td>
<td>5.13**</td>
</tr>
<tr>
<td>Picture Completion</td>
<td>14.16</td>
<td>1.81</td>
<td>13.56</td>
<td>2.11</td>
<td>1.21</td>
</tr>
<tr>
<td>Picture Arr.</td>
<td>35.53</td>
<td>5.48</td>
<td>34.13</td>
<td>5.64</td>
<td>1.01</td>
</tr>
<tr>
<td>Block Design</td>
<td>38.06</td>
<td>8.67</td>
<td>30.34</td>
<td>9.89</td>
<td>3.33**</td>
</tr>
<tr>
<td>Obj. Assembly</td>
<td>25.63</td>
<td>2.92</td>
<td>24.28</td>
<td>3.73</td>
<td>1.61</td>
</tr>
<tr>
<td>Coding</td>
<td>51.68</td>
<td>5.79</td>
<td>42.63</td>
<td>6.30</td>
<td>6.14**</td>
</tr>
</tbody>
</table>

`** p < .01
* p < .05`
Hammer's (1950) independent conclusions that the Wechsler tests yield a fairly consistent general aductive factor (accounting for 32 per cent of the variance at the 10½ year level, according to Guilford (1954, p. 87)), and three smaller group factors representing verbal comprehension (7 per cent), spatial perceptual (8 per cent), and memory (8 per cent) factors. Davis' (1956) interesting attempt to identify some ten separate factors* is one which was accepted by Iscoe and Pierce-Jones (1964) but criticized by Vernon (1961, p. 166) on the grounds that results were distorted by poorly-chosen performance tests and heterogeneous testees. A further factorial study to be looked at in this area was that of Adcock et al (1954) who cautiously identified factors of memory or attention, closure, time, and verbal.

In view of the differing and factorially controversial analyses of the Wechsler scales, then, it is difficult to talk with confidence about group factors in addition to a general factor, on the basis of WISC scores. With these very important cautions in mind, the remainder of this section will attempt to explain the results summarized in Table XXIII in the contexts of other studies.

* Verbal Comprehension, Visualization, Numerical Facility, Mechanical Knowledge, Similarities, General Reasoning, Fluency, Information, Perceptual Speed.
Only those subtests that significantly discriminated between the two contrast groups will be discussed.

The HC group's superiority on the Comprehension subtest is a difficult one to explain in factorial terms. According to Davis (1956, p.139), not only is this test extremely complex, "it is also a relatively poor measure of those factors in which variance appears." Davis reported small loadings on such factors as general reasoning, verbal comprehension, and fluency, while Adcock et al. (1954) and Gault (1954) similarly found loadings on verbal factors. All three analyses, then, recognized that in addition to its high g loading, a significant proportion of the Comprehension subtest's variance is due to some kind of verbal-comprehension factor.

The Vocabulary subtest has been interpreted as possessing a factorial content similar to that identified in Comprehension. According to Davis, it lives up to its reputation for being the best single measure of verbal comprehension, as well as being the purest factor test and one of the most reliable of the scale. Similarly, Gault found that as well as having the highest g loading of all the subtests, it loaded significantly on a verbal comprehension factor. Adcock et al. also reported it as being one of the best g tests and divided its specific
variance between verbal and memory factors. As with Comprehension, then, the Vocabulary subtest is noteworthy as having significant loadings on g and a verbal comprehension factor — both of which, it is becoming clear, play an important part in creative writing.

Further support for this view of the importance of g and a verbal group factor is provided by the HC group's superiority on Similarities. Wechsler himself considered that this subtest systematically shows the highest loading on the g factor and that it is primarily a measure of generalizing or abstract ability. Gault reported that this subtest has a moderately high g loading and a verbal comprehension loading similar to those of Vocabulary and Comprehension. In addition to these widely-recognized factors, Adcock et al pointed out that this is a test which cannot be tackled by any trial and error activity but, instead, requires something in the nature of concentration and inspiration. If this is indeed the case, it could well help explain the apparently high relationship between creativity and this subtest as indicated in this investigation and as reported by Spieth (1964).

Contrary to its name, the Arithmetic subtest is also recognized as being a good test of general reasoning
(Wechsler, 1952*; Gault, 1954; Adcock et al., 1954; Davis, 1956), as well as having loadings on verbal comprehension and memory factors (Gault, 1954). All these factors could well facilitate high performances in creative writing.

An unexpected finding was the significant difference obtained between the groups on the Coding subtest. This was at variance with Neer and Stein's (1955) finding that there was virtually no relationship ($r = 0.04$) between creativity and Coding in a group of research chemists. Although most writers would agree with Wechsler's description of this test as being factorially ambiguous, it is interesting to note that Davis (1956, p.133) identified a small loading on a fluency factor which he described as a "tendency to be responsive and uninhibited with consequent free flow of responses to stimulation." This may well be, according to Davis, what Wechsler calls non-intellective in character. Had this factor been of greater significance and had it been supported by other research, it would have provided a persuasive conative explanation of why HC children did so well on the Coding subtest. As it is, however, this finding must remain an enigma.

* At the 10½ year level, Arithmetic achieved the third highest correlation (0.69) with the Full Scale Score.
To sum up, then, it is perhaps significant that five of the six subtests which differentiated between the HC and LC groups had relatively high loadings (in excess of .57) on what Gault termed a general educative factor. Coding, the only exception, had a loading of .33 on that factor, while Information was the only subtest with a high loading on that factor (.69) not to differentiate between the two groups. Four of the six subtests had significant loadings (in excess of .31) on Gault's verbal comprehension factor. Confusion, rather than clarification, resulted from attempts to link creativity with any other factors which have been identified as having loadings on the WISC.

It is therefore considered that the evidence presented in this section confirms the hypothesis that "there will be qualitative differences between highly creative and less creative children on subtests of the WISC, with the Verbal Scale being the most discriminative." That this is so, probably reflects the close relationship that exists between creative writing and general intelligence plus a verbal group factor.

Summary of Findings

Summing up this chapter, the following are the
main findings to have emerged from the study of the relationships between creativity and intelligence:

(1) A product-moment correlation coefficient of 0.32 was obtained between Otis raw scores and creative writing scores. When corrections for restriction of range and attenuation were applied, this coefficient increased to 0.50 and 0.41 respectively.

(2) Both creative writing and verbal creativity correlated moderately highly (0.48 to 0.60) with all three WISC scales — those coefficients being calculated by estimating regression lines of best fit.

(3) Within the present sample, an IQ of 120 on the Otis emerged as being a significant threshold level of intelligence for high-level performances in creative writing. There were indications, however, that the comparable threshold may be five to ten IQ points lower on the WISC.

(4) HC children differed significantly from their LC peers on six of the ten subtests of the WISC, all differences being in favour of the former group. Most of the differences were recorded on tests with high g and verbal loadings.
CHAPTER XIV

CREATIVITY AND SCHOLASTIC ACHIEVEMENT

Review of the Literature

The equivocal research on the relationship between creativity and scholastic achievement is reviewed on p. 174-184.

Hypotheses

8. That there will be significant relationships between creativity and scholastic achievement.

9. That some school subjects will be more closely related to creativity than others.

Method

Two methods of assessing scholastic achievement were employed:

A.C.E.R. Silent Reading battery. Reading was tested by the New Zealand standardization of the A.C.E.R. battery of silent reading tests. In four of the schools, these tests were administered in the contributing schools in November, 1963; the writer gave the tests in the remaining two schools in June, 1964. All raw scores were corrected to November, 1963. The following brief descriptions of the tests have been abstracted from the manual.
of directions:

(1) The Word Knowledge Test (Form C) is a vocabulary test aimed at measuring the child's understanding of commonly-used words.

(2) The Reading for Meaning Test (Form C) is a comprehension test.

(3) The Speed of Reading Test (Form B) is aimed at estimating the child's rate of silent reading.

**Teachers' ratings.** Teachers' ratings of children on the five-point rating scale used in the schools were available for Spelling, Written Language, and Arithmetic. On this scale, teachers are expected to rate their pupils on the basis of how they compare with a representative group of children of the age concerned, rating 5 per cent as "Outstanding" (1), 20 per cent as "above average" (2), 50 per cent as "Average" (3), 20 per cent as "Below Average" (4), and 5 per cent as "Extremely Limited" (5).

While Arithmetic and Spelling need no definition, Written Language is defined as follows:

*Ability and disposition to write appropriate, clear, correct, and effective English. Gains satisfaction from writing English. Writes English which gives satisfaction to others.*

(Primary School Record Guide, E-19/23)

The relationships between data from the A.C.E.R.
reading battery and the combined T-scores on the creative writing measures were assessed by means of Pearson product-moment correlation coefficients. As an independent check, t-tests were calculated to test the significance of the mean differences of the two contrast groups. Chi-square analyses were computed to test the significance of the differences between the two contrast groups on teacher-rated achievement.

Results

Performances on all three silent reading tests were significantly correlated with creative writing, the following coefficients being obtained:

Word Knowledge..................0.72
Reading for Meaning.............0.62
Speed of Reading................0.59 *

The close relationship between creative writing and this battery of reading tests was further reflected in the mean differences between the two contrast groups on these tests, the HC group being significantly superior on all three measures. (see Table XXIV)

* These correlations became 0.90, 0.79, and 0.76 respectively when corrected for attenuation (assuming reliability coefficients of 0.93, 0.94, and 0.93 for the respective reading tests, and 0.68 for the creative writing measure).
TABLE XXIV

MEAN DIFFERENCES ON A.C.E.R. READING TESTS

FOR HIGH AND LOW CREATIVE GROUPS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Word Knowledge</td>
<td>HC</td>
<td>31</td>
<td>71.65</td>
<td>10.64</td>
<td>32</td>
<td>52.97</td>
<td>11.01</td>
</tr>
<tr>
<td></td>
<td>LC</td>
<td>32</td>
<td>52.97</td>
<td>11.01</td>
<td>32</td>
<td>41.63</td>
<td>10.61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Speed</td>
<td>HC</td>
<td>30</td>
<td>17.40</td>
<td>3.57</td>
<td>31</td>
<td>14.96</td>
<td>4.14</td>
</tr>
<tr>
<td></td>
<td>LC</td>
<td>31</td>
<td>14.96</td>
<td>4.14</td>
<td>31</td>
<td>11.94</td>
<td>4.14</td>
</tr>
<tr>
<td>Meaning</td>
<td>HC</td>
<td>31</td>
<td>53.94</td>
<td>4.19</td>
<td>32</td>
<td>41.63</td>
<td>10.61</td>
</tr>
<tr>
<td></td>
<td>LC</td>
<td>32</td>
<td>41.63</td>
<td>10.61</td>
<td>32</td>
<td>38.96</td>
<td>10.64</td>
</tr>
</tbody>
</table>

1 Raw Scores

** p < .01 (one-tail)
From Table XXV, it will be observed that significantly more of the HC children than their LC peers were rated by their teachers as being "outstanding" or above average on the criterion of Written Language ability. A similar pattern is apparent in Table XXVI which sets out group differences on the criterion of Spelling ability. Both groups were significantly superior to the general population of Form I children on the criteria of Spelling and Written Language.

In relation to the parent population (i.e., the six top-stream classes), however, the HC group was found to be superior and the LC group inferior on both criteria, differences being significant at the .05 level of confidence.

No significant differences between the two contrast groups resulted from a chi-square analysis of teacher-rated Arithmetic ability.

Discussion of Results

The high correlations obtained between creative writing and the three silent reading tests, together with the superiority of the HC group on teacher-rated Written Language and Spelling, provide confirmation of the hypothesis "that there will be a significant relationship between creativity and scholastic achievement." These results confirm findings reported by writers such as
### TABLE XXV

**CHI-SQUARE ANALYSIS OF TEACHER-RATED WRITTEN LANGUAGE:**
**BY HIGH AND LOW CREATIVE GROUPS**

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=32)</th>
<th>LC (N=32)</th>
<th>Total (N=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outstanding</td>
<td>12</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>Above Average</td>
<td>17</td>
<td>11</td>
<td>28</td>
</tr>
<tr>
<td>Av. and Below</td>
<td>3</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>32</td>
<td>32</td>
<td>64</td>
</tr>
</tbody>
</table>

\[ x^2 = 13.06; \quad df = 2; \quad p < .01 \]

### TABLE XXVI

**CHI-SQUARE ANALYSIS OF TEACHER-RATED SPELLING:**
**BY HIGH AND LOW CREATIVE GROUPS**

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=32)</th>
<th>LC (N=32)</th>
<th>Total (N=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outstanding - Above Av.</td>
<td>29</td>
<td>17</td>
<td>46</td>
</tr>
<tr>
<td>Av. and Below</td>
<td>3</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>32</td>
<td>32</td>
<td>64</td>
</tr>
</tbody>
</table>

\[ x^2 = 9.35 \text{ (Yates' correction applied)} \]

\[ df = 1; \quad p < .01 \]
De Boer (1965), Wallen and Stevenson (1960), Baker (1964), Yamamoto (1962), and others reviewed on p. 174-179. They assume special significance when one considers Flescher's (1963) point that it may be unrealistic to expect differential achievement in high-ability groups. In other words, it could well be that in a more representative sample, the connection between creative writing and achievement established in this investigation could be even greater.

Three possible interpretations could be placed upon these results: (a) high level performances in creative writing could be reflecting high achievement, i.e., the creative writing tests were measuring scholastic conformity, rather than creativity; (b) high creativity may be contributing in some way to high achievement; (c) both high creativity and high achievement could be the result of some third variable or variables, such as intelligence and social adjustment. When these results are considered within the contexts of moderately high correlations between creative writing and WISC scores as reported in the previous chapter and the well established connection between intelligence and achievement, the third of the preceding possibilities emerges as being the most likely explanation. If this is indeed the case,
These results provide further support for the conclusion that creative writing is considerably influenced by general intelligence and, in all probability, by a verbal group factor.

The fact that there was no significant difference between the two contrast groups on the variable of teacher-rated arithmetic provides limited support for the hypothesis "that some school subjects are more closely related to creativity than others."
CHAPTER XV

CREATIVITY AND PERSONALITY VARIABLES

This chapter will present findings in the following three areas:

I. Creativity and Social Adjustment
II. Creativity and Interests and Experiential Background
III. Creativity and Motivational Factors

I. CREATIVITY AND SOCIAL ADJUSTMENT

Review of the Literature

The relevant literature on the relationship between creativity and social adjustment is reviewed on p. 186 to 194.

Hypothesis

10. That highly creative children will be superior to their less creative peers on measures of social adjustment.

Method

To test the above hypothesis, three different
measures of social adjustment* were employed:

1. Teacher ratings.
2. Children's preferences.
3. Rating of interview behaviour.

**Teacher ratings.** In assessing teachers' perceptions of children in their respective classes, teachers were asked to complete three rating scales. The first of these, a slightly modified form of an instrument designed by Getzels and Jackson (1962, p.273), was administered to the total sample, early in June, 1964. In this scale, the teachers ranked their pupils into three equal groups according to their preference for them as class-members (see Appendix I for a copy of the rating scale).

The data from this scale were arranged into a 2x3 contingency table and a chi-square was computed.

The second and third scales relevant to the assessment of children's social adjustment were the ratings on stability and co-operation that all teachers carry out on their classes twice yearly (see Appendix II for the criteria). To guard against the possibility of bias, the teachers were not informed of the children's standing.

*Because some schools were reluctant to have personality tests administered to their pupils, the writer had to be content with rating scales to assess this variable and the one involving motivational factors.
on any of the tests until all such ratings had been completed by the beginning of July, 1964.

The data on stability and co-operation were arranged into 2x2 and 2x3 contingency tables respectively, a chi-square being computed in each case.

Children's preferences. Peer nominations on two criteria were obtained from the total sample, early in June, 1964. Each child was asked to nominate, in order, five classmates with regard to whom he would choose to sit near and whom he would choose to work with (see Appendix J for a copy of this instrument). These criteria were adapted from similar ones employed by Gronlund (1959, p.50).

The total number of choices received by any one individual was used as a measure of his sociometric status in the class group. Although various methods of weighting have been proposed, according to Gronlund (1959, p.64), this is a dubious practice for "studies have shown that the stability of sociometric results is not improved by the weighting of sociometric choices." Thus, each choice was given a value of one regardless of its level. It must be noted, too, that because rejections were not asked for on this sociometric device, it is not possible
to distinguish between those who are actively disliked and those about whom feeling is neutral.

As the pattern of choices in a sociometric test usually forms J-curve, rather than being distributed normally, according to Evans (1963), this limits the choice of statistical techniques usually to a non-parametric test. Chi-square analyses of the 2x3 contingency tables were therefore calculated. To test the possible effects of sex differences on the sociometric status of the two contrast groups, a chi-square analysis of the rankings of the top four boys and top four girls in each of the six classes was conducted.

**Rating of interview behaviour.** The third source of data on social adjustment was a five-point scale for rating each child in the contrast groups on the degree of social confidence displayed in the individual interview situation (see Appendix L). Although most children were rated "blind," i.e., without knowledge of their status on the creative writing measure, in those cases where the writer had a fairly good idea of this, conscious attempts were made to guard against making biased judgements.

For statistical analysis, this five-point rating was translated into two categories — "marked confidence"
versus "moderate confidence/shy" — the chi-square statistic being applied to the resultant 2x2 table.

Results

Statistically significant differences between the HC and LC groups were obtained on four of the five criteria of social adjustment. The results will be described under the same headings employed in the preceding section on method.

Teacher ratings. Table XXVII shows the degree of preference expressed by teachers for the children in the HC and LC groups. It will be noted that N=17 for the HC group and N=31 for the LC group, this discrepancy resulting from the teacher in School A feeling that he could not rank his class on this criterion. With such a small N for the HC group, it would be prudent to interpret the findings on this variable with some caution, although other findings in this area are in the same direction.

From Table XXVII, it will be observed that the contrast groups differed significantly \((p < .05)\) in the degree of preference shown by their teachers, the HC group being the more preferred. It is interesting to note that more than one-half of the LC group were ranked
### TABLE XXVII

**CHI-SQUARE ANALYSIS OF TEACHER PREFERENCE FOR PUPILS:**

**BY HIGH AND LOW CREATIVE GROUPS**

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=17)</th>
<th>LC (N=31)</th>
<th>Total (N=48)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly preferred</td>
<td>6</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Moderately preferred</td>
<td>8</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Lowly preferred</td>
<td>3</td>
<td>17</td>
<td>20</td>
</tr>
</tbody>
</table>

| Total               | 17        | 31        | 48           |

\[ x^2 = 6.24 \]

\[ df = 2 \]

\[ p < .05 \]
in the lower third of their classes on this criterion, compared with less than one-sixth of the HC group so ranked. When the obtained frequencies for the HC and LC groups respectively were compared with the expected frequencies of the total sample, it was found that while the former group did not differ significantly from the parent population, the latter group differed at the .05 level of confidence. Thus, it appears that the difference reported in Table XXVII was not so much the result of HC children being preferred by their teachers as it was that the LC children were not preferred.

As can be seen in Table XXVIII, HC children were rated as being more stable than their LC peers, the differences being significant at the .01 level. There were no significant differences (p.4.70), however, between the two groups on degree of co-operation as rated by teachers. The discrepancy between these two ratings possibly means that teachers see HC children as having a greater degree of personal adjustment (cf., stability) than social adjustment (cf., co-operation). This is an hypothesis which bears further investigation.

Children's preferences. Statistically significant differences between the two groups on peer nominations for both the "seating" and "working" criteria were obtained.
TABLE XXVIII

CHI-SQUARE ANALYSIS OF TEACHER-RATED STABILITY:
BY HIGH AND LOW CREATIVE GROUPS

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=32)</th>
<th>LC (N=32)</th>
<th>Total (N=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A and B</td>
<td>26</td>
<td>15</td>
<td>41</td>
</tr>
<tr>
<td>C and D</td>
<td>6</td>
<td>17</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>32</td>
<td>64</td>
</tr>
</tbody>
</table>

\[ x^2 = 8.21 \]

\[ df = 1 \]

\[ p < .01 \]
As can be seen in Table XXIX and XXX, the HC group was consistently more preferred, the differences between the two groups being significant at the .01 level. When it is considered that the children were cautioned against making similar selections on the two criteria unless these were felt to be justified, the similarity of the results would indicate that top-stream Form I children make very little distinction between sociometric choices made on the bases of different criteria. This tendency is in accord with research which suggests that there is some general factor of social acceptability so that children who are acceptable in one situation will remain so in other situations (Evans, 1963).

Further analysis of the available data revealed that the HC group differed significantly (at the .05 level of confidence) from the parent population on these criteria. Differences between the LC group and the larger sample, however, did not approach statistical significance ($p < .20$ and $p < .30$ for "seating" and "working" respectively). It seems, therefore, that the HC group has a higher sociometric status than both the LC group and the parent population.

It appears to be unlikely that sex differences had any effect on the high sociometric status of the HC group,
### TABLE XXIX

**CHI-SQUARE ANALYSIS OF PEER NOMINATIONS ON**
"SEATING" **CRITERION: BY HIGH AND LOW CREATIVE GROUPS**

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=31)</th>
<th>LC (N=32)</th>
<th>Total (N=63)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly preferred</td>
<td>13</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Moderately preferred</td>
<td>15</td>
<td>12</td>
<td>27</td>
</tr>
<tr>
<td>Lowly preferred</td>
<td>3</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
<td><strong>32</strong></td>
<td><strong>63</strong></td>
</tr>
</tbody>
</table>

\[ \chi^2 = 40.00; \quad df = 2; \quad p < .01 \]

### TABLE XXX

**CHI-SQUARE ANALYSIS OF PEER NOMINATIONS ON**
"WORKING" **CRITERION: BY HIGH AND LOW CREATIVE GROUPS**

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=31)</th>
<th>LC (N=32)</th>
<th>Total (N=63)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly preferred</td>
<td>15</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>Moderately preferred</td>
<td>13</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>Lowly preferred</td>
<td>3</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
<td><strong>32</strong></td>
<td><strong>63</strong></td>
</tr>
</tbody>
</table>

\[ \chi^2 = 40.12; \quad df = 2; \quad p < .01 \]
there being no significant differences between the sociometric status of the four most creative boys and the four most creative girls in each of the six classes.

Rating of interview behaviour. Differences were obtained between the HC and LC groups on the criterion of social confidence as rated by the writer during the course of the individual interviews. On this criterion, 75 per cent of the HC group versus only 25 per cent of the LC group were rated as having "marked confidence," the difference between the groups being significant at the .01 level (see Table XXXI).

Discussion of Results

The results of this aspect of the study indicate quite clearly that HC children in top-stream Form I classes are superior to their LC peers and are at least equivalent to their parent population on social adjustment as rated by peers, teachers, and an observer. This finding supports those of Wallen and Stevenson (1960), Rivlin (1959), Seitz (1964), Wodike and Wallen (1965), and others, such as Guilford (1962), who have described creativity as being significantly related to factors indicative of social adjustment. It does not support research findings reported by Torrance (1962a), Getsels
### Table XXXI

**Chi-Square Analysis of Social Confidence**

*As Rated in Interview: By High and Low Creative Groups*

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=31)</th>
<th>LC (N=32)</th>
<th>Total (N=63)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marked confidence</td>
<td>23</td>
<td>8</td>
<td>31</td>
</tr>
<tr>
<td>Mod. confidence/shy</td>
<td>8</td>
<td>24</td>
<td>32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
<td><strong>32</strong></td>
<td><strong>63</strong></td>
</tr>
</tbody>
</table>

\[\chi^2 = 15.26\]

\[df = 1\]

\[p < .01\]
and Jackson (1962), and others who have stated or implied that the creative individual is a socially disrated person.

Apart from the sampling restrictions and the criticisms that could be levelled against the criterion measure, at least two other factors should be considered in assessing the validity of the research design of this aspect of the investigation. Firstly, it must be noted that rating scales suffer from all the defects of using human judgement as a measuring instrument. These defects are well-known and include such things as leniency error, halo effects, logical error, and proximity error. It is recognized, then, that the scales used in this study could well contain a high error variance with consequent diminished reliability and validity. It is probable, however, that although many of these defects can distort judgements in individual cases, they are reduced or balanced-out when the rating scales are used over a large number of cases. Secondly, it could be argued that slightly more than one term at an Intermediate School is insufficient time for teachers and children to base judgements of social adjustment.
If it is assumed that Torrance's (1963b) reports of peer sanctions against creativity in the fourth, fifth, and sixth grades are valid, how can they be reconciled with the contradictory findings of this study (assuming that they, too, are valid)? In the remainder of this section, some six possible explanations — all of them speculative — will be advanced to account for this discrepancy.

(1) There is a possibility that children assessed as creative on the basis of creative writing are more socially acceptable than those identified solely on the basis of instruments such as the Minnesota battery. Creative writing is, after all, a very personal and "silent" facet of creativity. However, the high correlation between creative writing and the Verbal Form of the Minnesota tests that was found in this study ($r = 0.66$), does not support any hypothesis of an isolated creative writing skill.

(2) It could be argued that in New Zealand, the BC child has learned adaptation techniques superior to those of his American counterpart. In other words, there may be cross-cultural differences present, with the New Zealand child being more "socially successfully creative" than the American child. Whether or not this hypothesized
superior social adaptation has impeded or facilitated creativity is a moot point. Torrance (1962a, p.104), however, has stated that "the highly creative child must either repress his creativity or learn to cope with the tensions that arise..." Similarly, Buhl (1961) reported finding that a highly creative group of engineering students had a distinct desire to have warm and close personal relationships but were afraid that by excelling in creative endeavours they would alienate themselves from such relationships. This, then, is an hypothesis worthy of further cross-cultural studies to supplement the meagre number already conducted (see p. 103 - 105).

(3) Another possibility could be that social pressures against creativity come later in New Zealand than in the United States. Although this study did not investigate the presence or absence of many of the socially desired traits reported in the literature as being related to creativity, it would seem that even if they were present, they were in no way inimical to HC children's social adjustment. However, in view of the fact that such traits are most often reported in studies of college students or adults, it may be that creative individuals are viewed as being more obnoxious as they grow older.
(4) It could be that social pressures against creativity, at least in children, are non-existent in New Zealand. Although some may find this a compelling explanation, it assumes that this egalitarian society — so often criticized for its mediocrity and lack of encouragement of talent — is in some way more liberal in its attitudes towards children's creativity than those areas of the United States sampled by Torrance. As noted in the section on Creativity in Society in Chapter V, there can be little doubt that cultural/societal factors, by interacting with cognitive and personality factors, determine creativity. The importance for creativity of favourable environmental factors were noted as being stressed by writers such as Pressey (1955), Scoone (1956), Barron (1958), Stein (1958), Whitehead (cited by Burnett, 1957), Anderson (1959b) Kestler (1964), and many others. Is it possible, then, that here in New Zealand, non-conformity is more tolerated in our children (Anderson (1959b), that they have greater opportunities to observe, explore, and participate (Strang, 1959), and that there are fewer authoritarian controls placed on their behaviour (Vestch, 1953)? These and other such explanations are the bases of hypotheses requiring further cross-cultural research.
(5) Yet another explanation lies in the possibility that the streaming system employed in most New Zealand Intermediate Schools provides a favourable climate for the acceptance of HC children. It could be, too, that the six teachers in this study were not comparable to those in Torrance's sample (or even to teachers in general in New Zealand). They were, after all, selected by their principals as being suited to teaching top-stress children. These explanations are unlikely to find support, however, for it will be remembered that both Torrance and Getzels and Jackson focussed on high-ability groups that are comparable to the parent population of the present study.

Quite apart from the above attempts to explain the discrepancy between the results of this study and those reported by Torrance, it is necessary to advance possible explanations of the close relationship between creativity and social adjustment. As found in this study, high creativity occurs in conjunction with superior intelligence, high achievement, diversity of interests, and acceptance by teachers and children. Any one or a combination of these aspects of the "syndrome" may have played the major role in determining the high ratings on
social adjustment measures gained by the HC group. It must be remembered, however, that although creative ability was not the only dependent variable in this aspect of the study, it was the most conspicuous member of the syndrome. The point to be made, then, is that, contrary to the findings of Getzels and Jackson and Torrance, high creativity did not in any way adversely affect rated social adjust-
ment.

Summary of Findings

Summing up, then, statistically significant differences between the HC and LC groups were obtained on the following measures of social adjustment:

(1) The degree of preference expressed by teachers for having children in their classes. The LC group was the least preferred, relative to both the HC group and the parent population. The HC group, however, did not differ significantly from the parent population.

(2) Teachers' ratings of stability, the HC group being rated higher.

(3) Children's preferences on both the criteria of "seating" and "working" companions. The HC group achieved higher sociometric status ratings than both the LC group and the parent population, there being no sig-
nificant differences between the latter two groups.
Sex differences had no effect on the high sociometric status of the HC group.

(h) Rating of social confidence displayed in individual interview as assessed by the writer, the HC group being the more confident. There were no significant differences between the two contrast groups on degree of co-operation as rated by teachers.

These results confirmed the hypothesis "that highly creative children will be superior to their less creative peers on measures of social adjustment." They therefore support a growing body of research evidence that suggests that the highly creative individual is accepted, and even preferred, by teachers and peers alike. The lack of agreement with similar research conducted by Torrance draws attention to the need for more cross-cultural research to test various hypotheses suggested in attempts to reconcile these findings.

II. CREATIVITY AND INTERESTS AND EXPERIENTIAL BACKGROUND

Review of the Literature

The relevant literature on the relationships between creativity and interests and experiential background is reviewed on p. 195 to 196.
Hypothesis

11. That highly creative children will have a greater range of interests than their less creative peers.

Method

To test the above hypothesis, the children in the contrast groups were questioned on the following areas during the course of individual interviews:

1. After school employment.
2. Membership of clubs/organizations.
3. Participation in extra-curricular lessons.
4. Participation in sports.
5. Number of films attended per month.
6. Number of books read per week.
7. Number of hours spent viewing television per week.
8. Favourite television programmes.
10. Favourite films.
11. School subject preferences.

A copy of the individual record sheet used in this aspect of the investigation is included in Appendix M.
Chi-square was applied to the data obtained from all except (7), for which a t-test was calculated. Preliminary median tests for two samples had to be applied to (11) and (12) before chi-squares could be computed. The children's future occupational preferences (12) were allocated a status ranking according to Congalton and NAVIGHURST's (1954) scale.

Results

Statistically significant differences between the HC and LC groups were obtained on only two of the above criteria of range of interests. Table XXXII sets out the number of children who participated in such extra-curricular lessons as music, drama, dancing, and speech. It will be noted that nearly one-half of the HC group participated in such activities, compared with less than one-fifth of the LC group, the difference being significant at the .02 level of confidence. From Table XXXIII, it will be observed that the contrast groups differed significantly (at the .01 level) in the number of books read, more than one-half of the HC group reading three or more per week, compared with less than one-fifth of the LC group who read as many.

Although there was a slight tendency for more
TABLE XXXII

CHI-SQUARE ANALYSIS OF PARTICIPATION IN EXTRA-CURRICULAR LESSONS: BY HIGH AND LOW CREATIVE GROUPS

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=32)</th>
<th>LC (N=32)</th>
<th>Total (N=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>15</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>No</td>
<td>17</td>
<td>26</td>
<td>43</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>32</td>
<td>64</td>
</tr>
</tbody>
</table>

\[ x^2 = 5.74; \; df = 1; \; p < .02 \]

TABLE XXXIII

CHI-SQUARE ANALYSIS OF NUMBER OF BOOKS READ PER WEEK: BY HIGH AND LOW CREATIVE GROUPS

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=32)</th>
<th>LC (N=32)</th>
<th>Total (N=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 or more</td>
<td>18</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>2 and less</td>
<td>14</td>
<td>26</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>32</td>
<td>64</td>
</tr>
</tbody>
</table>

\[ x^2 = 9.60; \; df = 1; \; p < .01 \]
HC children to belong to clubs or organizations such as Guides, Scouts, Red Cross, and St John Ambulance Brigade, the difference between the two groups did not approach statistical significance. HC children, too, showed a slight tendency to express preferences for future occupations of a higher status ranking (on Congalton and Havighurst's 1954 scale) than did LC children. The difference, however, was not statistically significant. It was interesting to find that when the value of 5.26 was taken as the median ranking of the 116 occupations listed in this scale, 31 of the HC group and 25 of the LC group chose occupations above that value. Chi-square analyses of the resultant contingency table (in which expected frequencies of 16 in both the upper and lower halves were assumed) indicated that both groups differed from the population as a whole at well beyond the .01 level of confidence.

Slight, but non-significant differences in favour of the LC group were recorded in the categories of participation in sports, number of films attended per month, and number of hours spent viewing television per week.

There were no significant differences between the groups with regard to their preferences for different categories of television programmes, books, or films,
or with regard to their preferences for various school subjects (see Table XXXIV). Only three children from each group had after-school employment.

**Discussion of Results**

While significant results were not obtained on all or even most of the criteria of breadth of interests, those that were provide further, albeit qualified, support for the findings of writers such as Murphy (1956), Taylor and Holland (1964) and others whose work is reviewed in Chapter VIII.

The results of this aspect of the study indicate that the HC child is one who seeks out intellectual stimulation in areas involving active rather than passive participation. Thus, relative to his LC peer, he prefers books and extra-curricular lessons to television and the cinema. This is possibly because the "stereotyped images" and "concrete nature" of such mass media provide little opportunity for the exercise of imagination (Bogart, 1956, p.38). It will be noted, too, that the differences between the two groups' reading habits are quantitative rather than qualitative, the HC children reading more books but showing no differences in the type of story preferred. Similarly, there are no differences between
### TABLE XXXIV

**Median Rankings of Degrees of Preference for School Subjects for High and Low Creative Groups**

<table>
<thead>
<tr>
<th>School Subject</th>
<th>$HC$ ($N=32$)</th>
<th>$LC$ ($N=32$)</th>
<th>$HC$ &amp; $LC$ ($N=64$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Studies</td>
<td>4.50</td>
<td>2.83</td>
<td>3.68</td>
</tr>
<tr>
<td>Manual</td>
<td>4.30</td>
<td>4.25</td>
<td>4.28</td>
</tr>
<tr>
<td>Physical Education</td>
<td>4.67</td>
<td>4.00</td>
<td>4.33</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>5.50</td>
<td>4.50</td>
<td>5.00</td>
</tr>
<tr>
<td>Art/Craft</td>
<td>5.30</td>
<td>5.67</td>
<td>5.50</td>
</tr>
<tr>
<td>Reading</td>
<td>5.17</td>
<td>6.37</td>
<td>6.00</td>
</tr>
<tr>
<td>Science/Nature Study</td>
<td>7.83</td>
<td>6.83</td>
<td>7.30</td>
</tr>
<tr>
<td>Music</td>
<td>7.00</td>
<td>7.83</td>
<td>7.50</td>
</tr>
<tr>
<td>Spelling</td>
<td>7.25</td>
<td>7.25</td>
<td>7.50</td>
</tr>
<tr>
<td>Creative Writing</td>
<td>7.17</td>
<td>8.25</td>
<td>7.75</td>
</tr>
<tr>
<td>Poetry and Literature</td>
<td>8.33</td>
<td>9.21</td>
<td>8.90</td>
</tr>
</tbody>
</table>
the groups' preferences for various types of films or television programmes.

Preferences for school subjects presented some surprising results. Perhaps the most surprising of these was the fact that there was no significant difference between the two groups' rankings of creative writing, the LC group placing it seventh of twelve and the HC group placing it as low as eighth. It would seem, then, that success in creative writing has not been associated with attitudes toward any one subject, least of all creative writing itself. Another unexpected finding in this area that is worthy of comment, is the fact that both groups chose the triad of Social Studies, Manual, and Physical Education as their most preferred subjects—a grouping that one would not normally expect to occur in top-stream children chosen largely on the basis of academic aptitude. Perhaps it is because these subjects involve active participation that they are so highly preferred.

Summary of Findings

To sum up, then, this aspect of the study provided limited and qualified support for the hypothesis "that highly creative children will have a greater range of
interests than their less creative peers." Statistically significant differences between the two contrast groups were obtained in areas which involve active intellectual stimulation, namely:

(1) The number of books read per week.

(2) The degree of participation in extracurricular lessons.

There were no significant differences, however, between the groups on such factors as after-school employment, membership of clubs/organizations, cinema attendance, television viewing habits, school subject preferences, and future occupational preferences.

III. CREATIVITY AND MOTIVATIONAL FACTORS

Review of the Literature

The relevant literature on the relationship between creativity and motivational factors is reviewed on p. 196-197.

Hypothesis

12. That highly creative children will be more highly motivated than their less creative peers.
Method

To test this hypothesis, two different sources of information were utilized:

1. Teacher ratings.
2. Ratings of interview behaviour.

Teacher ratings. Teachers' ratings of their classes on the two criteria of independence and perseverance became available after mid-year assessments had been made (see Appendix H for a copy of the criteria). The data on these personality characteristics were arranged into 2 x 2 contingency tables, a chi-square being computed in each case.

Ratings of interview behaviour. Each child in the contrast groups was rated on the degree to which the following three characteristics were displayed in the individual interview situation: (1) absorption in tasks, (2) initiative, (3) response to difficult tasks. Here, too, chi-squares were calculated from 2 x 2 tables which had been translated from the five-point ratings.

Results

The two groups differed significantly on four of the five measures, although two of these differences were only at the .05 level of confidence.
As can be seen in Table XXXV, teachers tended to rank HC children higher than LC children on the quality of independence, the differences being significant at the .05 level. However, when the obtained frequencies for the HC and LC groups respectively were compared with the expected frequencies for the total sample, it was found that neither group differed significantly from the parent population, although differences were very close to being significant with the LC group. It would seem, then, that as was the case with teacher preference, the difference between the LC and HC groups was not so much the result of the HC group being rated very highly on independence, as it was that the LC group tended to be rated lowly on this quality.

Tables XXXVI, XXXVII, and XXXVIII set out the chi-square analyses of the data on the differences between the two groups on the criteria of absorption in tasks, initiative, and response to difficult tasks. In all three qualities, the differences were significant (at the .01, .05, and .02 levels, respectively).

A slight, but non-significant difference in favour of the HC group was recorded in the category of perseverance as rated by teachers \( (p < .30) \).
### TABLE XXXV

**Chi-Square Analysis of Teacher-Rated Independence: By High and Low Creative Groups**

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=32)</th>
<th>LC (N=32)</th>
<th>Total (N=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A and B</td>
<td>24</td>
<td>15</td>
<td>39</td>
</tr>
<tr>
<td>C and D</td>
<td>8</td>
<td>17</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32</strong></td>
<td><strong>32</strong></td>
<td><strong>64</strong></td>
</tr>
</tbody>
</table>

\[ \chi^2 = 5.32; \quad df = 1; \quad p < .05 \]

### TABLE XXXVI

**Chi-Square Analysis of Task-Absorption as Rated in Interview: By High and Low Creative Groups**

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=31)</th>
<th>LC (N=32)</th>
<th>Total (N=63)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>26</td>
<td>16</td>
<td>42</td>
</tr>
<tr>
<td>Moderate/low</td>
<td>5</td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
<td><strong>32</strong></td>
<td><strong>63</strong></td>
</tr>
</tbody>
</table>

\[ \chi^2 = 8.12; \quad df = 1; \quad p < .01 \]
### Table XXXVII

Chi-Square Analysis of Initiative as Rated in Interview: By High and Low Creative Groups

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=32)</th>
<th>LC (N=31)</th>
<th>Total (N=63)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>15</td>
<td>7</td>
<td>22</td>
</tr>
<tr>
<td>Moderate/low</td>
<td>16</td>
<td>25</td>
<td>41</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
<td><strong>32</strong></td>
<td><strong>63</strong></td>
</tr>
</tbody>
</table>

\[ x^2 = 4.88; \ df = 1; \ p < .05 \]

### Table XXXVIII

Chi-Square Analysis of Response to Difficult Tasks as Rated in Interview: By High and Low Creative Groups

<table>
<thead>
<tr>
<th>Category</th>
<th>HC (N=32)</th>
<th>LC (N=31)</th>
<th>Total (N=63)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>17</td>
<td>5</td>
<td>22</td>
</tr>
<tr>
<td>Moderate/low</td>
<td>14</td>
<td>27</td>
<td>41</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
<td><strong>32</strong></td>
<td><strong>63</strong></td>
</tr>
</tbody>
</table>

\[ x^2 = 10.64; \ df = 1; \ p < .01 \]
Discussion of Results

The superiority of the HC group over the LC group on rated independence, task-absorption, initiative, and response to difficult tasks provides limited but persuasive support for the hypothesis that "highly creative children will be more highly motivated than their less creative peers." Further, albeit inferential, support for this hypothesis is provided by other findings reported in the present study, namely, the significant relationships between creativity and high achievement (Chapter XIV), participation in extra-curricular lessons, and interest in reading (Chapter XV, Section II). In view of the criterion for Category A of the Independence scale ("Thinks and acts with marked independence and originality"), it is rather surprising that teachers did not significantly differentiate between the HC children and the parent population on this variable. Two possible explanations of this may be advanced. Firstly, as stated in Chapter XI, teachers in this sample could identify only 40.7 per cent of the HC group on criteria similar to those employed in the actual creative writing measures; it is hardly likely that that level would be exceeded on alternative criteria. Secondly, it is possible that the five point rating scale employed in the schools lacks sensitivity in differentiating
among children in relatively homogenous top-stream classes. On the criterion of independence, over 60 per cent of the children in the total population of the sample were rated as "A" or "B," category "E" not being used at all.

Within the context of present study's findings, one can only speculate as to the reasons for the high level of motivation displayed by children in the SC group. It could well be that such children possess a high degree of "function pleasure," i.e., the desire to exercise one's capacities and abilities and to enjoy doing so. This leaves unanswered the question of whether the creative individual is driven to creativity in his desire to reduce the tension of disturbed homeostasis (Rickman, 1940; Olsen, 1954; Stein, 1958; etc.) or whether he sees creativity as being an avenue of self-actualization (Rogers, 1954; Bartlett, 1958; Maslow, 1959; Chambers, 1964; Ollman, 1965). While it is beyond the scope of the present investigation to pass informed judgement on the relative merits of different theories of motivation, some comments can be made in this area. Clinical impressions of the children assessed in this study, together with a thorough study of appropriate research findings, have left the writer with the conviction that both of these interpretations have a degree of merit,
that they are not sharply dichotomized, and that factors that motivate creativity in children vary from situation to situation. The writer therefore finds himself in agreement with Crutchfield (1962, p.121) who considered "underlying motivations are many and complex, varying widely with the nature of the situation and the nature of the person."

Another question left unanswered by the present investigation is that of the relative significance of extrinsic ego-involved motivation versus intrinsic task-involved motivation. Here, too, no pertinent empirical evidence emerges from this study so that one must rely on speculation based upon clinical impressions linked with research and other speculation reported in the literature. Here, too, the writer finds himself supporting Crutchfield's (1962, p.122) contention that creative children are more likely to be motivated by intrinsic than by extrinsic forces, i.e., that they perceive problems as being inherently challenging and are caught by them. These factors were particularly noticeable during the administration of the WISC.

Apart from general agreement that motivational factors are important for creativity, this field is characterized by a paucity of research into specific
facets of the problem. As well as continued attempts to discriminate between high and low creatives on the basis of degree and type of motivation, future research should concern itself with such motivational determiners as (1) teaching methodology — particularly the type of cognitive discourse, (2) the stimulation of the home — particularly the attitudes towards creativity, and (3) peer evaluations of creative thinking (as distinct from creative thinkers).
CHAPTER XVI

CREATIVITY AND MISCELLANEOUS VARIABLES

This chapter will present findings in the following two areas:

I. Creativity and Age
II. Creativity and Sex Differences

I. CREATIVITY AND AGE

Review of the Literature

The small amount of existing research on the relationship between creativity and chronological age is reviewed on p. 198-200.

Hypothesis

13. That there will be no significant difference between the UC and LC groups on the variable of chronological age.

Method and Results

To test the above hypothesis, the mean ages of the two contrast groups were calculated. These were compared with each other and with the mean age of the parent population.
The results were clear-cut: there were no differences between the contrast groups or between them and the total sample, all three groups having a mean age of 11.44 years on 15 June, 1964.

Discussion and Conclusions

Despite an age range of over two years in the total sample, then, the hypothesis as set out above was confirmed. On the surface, these results tend to support similar findings reported by writers such as Fleming and Weintraub (1962), Kheiralla (1963), and Isaac and Pierce-Jones (1964).

However, in view of this sample's homogeneity with respect to age, caution must be exercised in using these results to confirm or refute any statements regarding the relationship between creativity and age in unrestricted samples. Common-sense, alone, dictates that a child of five years is very unlikely to be more creative than he would be as an adult.

If, however, findings similar to those of the present study are duplicated with populations of greater age range, it would be appropriate to advance yet another "threshold" hypothesis — in this case an "age threshold" or "thresholds," over and above which increased age will
have relatively little significance for creativity. Lehman's (1953) analysis of optimal ages for productivity in various fields of human endeavor, provides limited support for such an hypothesis at the adult level.

It would seem, then, that further longitudinal and more-extensive cross-sectional research, such as that being conducted by Torrance and his associates, is required before it will be possible to state the relationships between these two variables with any degree of confidence.

II. CREATIVITY AND SEX DIFFERENCES

Review of the Literature

The equivocal research on the relationship between creativity and sex differences is reviewed on p.200-203.

Hypothesis

14. That there will be no sex differences on performances on the criterion measure.

Method and Results

In testing the above hypothesis, it was possible
to utilize data available from the total sample. The significance of the difference between the means of boys and girls respectively on the creative writing measure were computed by means of a t-test.

From Table XXXIX, it can be seen that although girls tended to score slightly higher than boys, the difference was not statistically significant when a two-tailed test of significance was applied. Had a one-tailed test been used, however, the significance would have been in the order of .05.

Discussion of Results

The finding that there was no statistically significant difference between boys and girls on mean scores achieved on the criterion measures, provides limited support for similar findings reported by writers such as Piers et al (1960), Fleming and Weintrub (1962), Olabin (1963), and Baker (1964). It provides no support for claims advanced by Torrance (1963) to the effect that boys demonstrate superior creativity at the elementary school level.

However, while the present study's trend for girls to be superior to boys does not quite attain statistical significance, the fact remains that had this direction been predicted (thus justifying the use of a one-tailed test), a .05 level of significance would have resulted. It can also be said, then, that this finding provides limited and qualified support
TABLE XXXIX

MEAN DIFFERENCES ON COMBINED T-SCORES ON CREATIVE WRITING MEASURES FOR BOYS AND GIRLS IN TOTAL SAMPLE

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th></th>
<th></th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys (N=94)</td>
<td>Girls (N=95)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Combined T Scores</td>
<td>97.71</td>
<td>17.40</td>
<td>101.93</td>
<td>17.34</td>
</tr>
</tbody>
</table>
for studies reporting differences in favour of girls 
(Kheirallah, 1963; Neufeld, 1964; and Klausmeier and 

Before considering possible reasons for the tendency 
for girls to score higher on the creative writing measures, 
there are several factors which can be dismissed as being 
of no causal significance. Although Table XL shows that 
girls scored significantly higher than boys \(p < 0.05\) on 
the factor of fluency on Form A of the creative writing 
measure, it was found that for both boys and girls this 
factor correlated with the creative writing score only to 
the extent of 0.05. Intelligence, age, and social adjust-
ment were other factors found to be unrelated to the sex 
differences, there being no significant differences between 
boys and girls on these variables. It is considered, too, 
that the story topics in both forms of the creative writing 
measure favoured neither sex, nor was there any possibility 
of marker bias, as all stories were given code numbers. 
No sampling bias on the basis of sex was present as boys 
and girls were equally represented over the six classes. 

In the remainder of this section, several possible 
reasons will be advanced to explain how girls could achieve 
superiority over (or equality with) boys in this facet of 
creativity
TABLE XL

MEAN DIFFERENCES ON NUMBER OF WORDS WRITTEN IN FORM A OF CREATIVE WRITING MEASURES FOR BOYS AND GIRLS IN TOTAL SAMPLE

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys (N=108)</td>
<td>Girls (N=104)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>t</td>
</tr>
<tr>
<td>No. of words written</td>
<td>217.13</td>
<td>57.66</td>
<td>239.04</td>
<td>67.27</td>
<td>2.54*</td>
</tr>
</tbody>
</table>

* p < .05 (two-tailed test)
(1) There is a possibility that writing is more often chosen by girls than by boys as a medium of creative expression. It could be that girls find this "silent" and intensely personal facet of creativity a more congenial and socially-acceptable way of manifesting their originality. Such an explanation, however, is at least partially rebutted by the lack of evidence of an isolated creative writing skill, girls as well as boys in the SC group scoring highly on the more "general" Minnesota Tests of Creative Thinking. Despite its plausibility in individual cases, then, this hypothesis may not survive closer scrutiny.

(2) Several writers (e.g., Kingsley and Garry, 1957) have cited studies in which girls obtain superior scores in all kinds of language skills, word fluency, and reasoning, whereas boys score higher on mechanical aptitude, science, mathematics, and spatial tests. Perhaps this differentiation of abilities has already started to become apparent at this age, in spite of Vernon's claim that this usually begins at around thirteen years. Many reasons have been advanced to account for this phenomenon, the most likely explanation being a process of sex conditioning by a progressively self-
generating impact of social custom, experience, and interest. It is possible to speculate, too, that girls achieve their superiority in creative writing at least partly as a result of their closer contact with their mothers and, therefore, more opportunities for the use of language. Boys at the Intermediate School age are more reliant upon actions than words, girls being observed to engage in more sedentary activities (perhaps as a result of the onset of puberty) such as reading, "gossiping," and even voluntary writing. This, then, is an area worthy of further investigation.

(3) A further possible explanation of girls' superiority in creative writing is that cultural pressures against creativity in girls may come later in New Zealand than in some American communities. This is based on the assumption, of course, that a falling-off of creativity among girls does occur at some stage — the only feasible way of accounting for the preponderance of males in most fields of creative endeavour in adulthood. It could be, however, that creative writing remains immune from any cultural pressures (perhaps because it is more socially-acceptable). There are, after all, quite a number of women writers such as Katherine Mansfield, Sylvia Ashton-Werner, and Ngaio Marsh who have successfully managed to
remain creative despite their sex!

(4) Finally, there is a possibility that the girls in this sample were assessed during a spurt in the development of their creative thinking abilities, similar to that described by Torrance (1963c, p.181) at the fifth grade level. Further longitudinal studies of sex differences in creativity at different age levels are therefore needed.
PART FOUR

SUMMARY AND CONCLUSIONS

The main emphasis and findings of this study will be collated in this, the final part of the thesis.
CHAPTER XVII

SUMMARY AND CONCLUSIONS

This chapter is divided into five main sections:

I. Summary
II. Limitations of Investigation
III. Conclusions
IV. Implications of Findings
V. Future Research Needs

I. SUMMARY

The purposes of this study were two-fold:

(1) To summarize the current knowledge of creativity in order to place the experimental aspect into its broad psychological framework.

(2) To investigate the relationship between creativity (as manifested in creative writing) and various environmental, cognitive, and personality factors.

The main findings to have emerged in these areas will be summarized in the remainder of this section under the chapter or section headings employed in this thesis.
Status of Creativity Research

Although the past decade has witnessed a marked increase of interest in creativity, a growing awareness of its importance for society, and agreement that it is manifested in some way and to some extent in almost everybody, the field remains characterized by:

(1) A lack of well-controlled and integrated research.

(2) A wide range of methodological approaches to the problem, many of which parallel those employed in the study of intelligence.

(3) An emphasis on studying creativity in high ability groups of adults.

(4) An aura of controversy arising from such factors as:

(a) the large amount of speculation and advocacy at the expense of scientific appraisals,

(b) the problems of criteria and validation of tests,

(c) the methodological and interpretational weaknesses of some research.
Definitions of Creativity

No widely-accepted definition of creativity, either as a product or a process, has yet been advanced. The main factors of the definitions of the creative product studied appear to be three:

(1) It is new.

(2) Its newness is defined in relation to the standard of the individual's particular group.

(3) It is accepted as being useful, tenable, appropriate, or satisfying, i.e., it has merit.

The Creative Process

(1) Creativity operates as a dynamic process in which the stages of preparation, incubation, and verification overlap and inter-relate — often at an unconscious level.

(2) These stages should be taken into consideration in the evaluation of creativity.

Measurement and Identification of Creativity

(1) Because of their emphasis on the usual and expected, rather than the divergent or innovative, conventional intelligence tests have been criticized as failing to take cognizance of creativity.
(2) Ratings by supervisors/teachers or peers have not proved to be consistent means of evaluating creativity.

(3) Existing creativity tests have been criticized on the grounds of their apparent lack of concurrent or predictive validity. There is, as yet, no agreement as to the most meaningful and practical immediate criteria of creativity.

(4) The Minnesota Tests of Creative Thinking have acceptable inter-scorer agreement and split-half reliabilities, but coefficients of stability and indications of validity are less satisfactory. Other tests in the area are similarly vulnerable to criticism.

(5) The absence of a time element in most tests of creativity has been criticized, as has the low inter-correlations among subtests and the "unnatural" setting imposed when evaluating creativity.

Design of Investigation

(1) The specific purposes of this study were to investigate (a) significant differences between high and low creative groups (HC and LC, respectively) on selected measures of cognition and personality and on certain environmental variables, and (b) some predicted relationships
between creativity in top-stream Form I children and selected measures.

(2) Based on scores achieved on the criterion measure, Torrance's Creative Writing Test, 32 HC and 32 LC pupils were selected from 189 top-stream Form I children from six Auckland Intermediate Schools.

(3) The psychometric instruments employed to test some nineteen hypotheses included tests and rating scales in the following areas: (a) creativity, (b) intelligence, (c) scholastic achievement, (d) social adjustment, (e) socioeconomic factors, (f) motivational factors, and (g) home background, interests, and activities. While some information was obtained for the total sample of the six classes, most data were confined to the two contrast groups.

(4) Most results of the study were analyzed through utilization of t-tests and chi-square. Pearson product-moment correlations were computed when the conditions of rectilinearity and homoscedasticity were met, some data from the two contrast groups being translated into correlations via regression lines of best fit calculated from the extremes of distribution on the creative writing measure.
TheCriterionMeasure

(1) Raw scores on this measure did not differ from a normal distribution, there being an insignificant amount of positive skewness.

(2) The contrast groups differed significantly \( p < .02 \) on teacher-rated creative writing ability. Teachers were able to identify only approximately 40 per cent of the HC children as assessed by the criterion measure and were generally more accurate in their judgments of low than of high creative writing ability (Table VIII, p.233).

(3) HC children differed significantly from their LC peers on all subscores of the Verbal Form of the Minnesota Tests of Creative Thinking, but on only two of the five subscores on the Non-verbal Form of that battery (Tables IX and X, p.238-239).

(4) Creative writing correlated with verbal creativity to the extent of 0.66, and with non-verbal creativity to the extent of 0.42. A correlation of 0.53 was obtained between verbal and non-verbal creativity (Table XI, p.240).

(5) There were no significant relationships between scores on the criterion measure and (a) number
of words written, (b) story topic chosen, and (c) ability to complete story in the time allowed.

(6) Inter-scorer agreement in the order of a coefficient of 0.76 was achieved.

(7) A test-retest alternate forms reliability coefficient of 0.68 was obtained.

**Educational Factors**

(1) One school was significantly superior to the other five schools.

(2) Of the fifteen possible inter-school comparisons, there were nine significant differences (Tables XII and XIII, p.248 and p.250). These differences were reflected in the distribution of HC and LC groups as per Intermediate School (Table XIV, p.251).

(3) Inter-school differences were not related to intelligence (Table XV, p.253), fluency (Table XVI, p.256), socioeconomic factors, or differences in contributing school. Factors of teacher personality and methodology were suspected, but not proved, as being the main reasons for these differences.
Family Background

(1) Socioeconomic factors did not significantly differentiate between HC and LC groups (Tables XVII and XVIII, p.264). The fact that the HC group differed significantly from the general population is taken as an indication of some form of a socioeconomic "threshold."

(2) There was no significant difference between the contrast groups with regard to sibling order.

(3) Although HC children tend to have fewer siblings than their LC peers (Table XIX, p.266), the difference between the two groups just failed to attain statistical significance.

Intelligence

(1) A product-moment correlation coefficient of 0.32 was obtained between Otis raw scores and creative writing scores. When corrections for restriction of range and attenuation were applied, this coefficient increased to 0.50 and 0.41 respectively.

(2) Both creative writing and verbal creativity correlated moderately highly (0.48 to 0.60) with all three WISC scales — these coefficients being calculated by estimating regression lines of best fit (Table XX, p.273).

(3) Within the present sample, an IQ of 120 on the Otis emerged as being a significant threshold level
of intelligence for high-level performances in creative writing. There were indications, however, that the comparable threshold may be five to ten IQ points lower on the WISC. (Table XXII, p.281).

(4) NC children differed significantly from their LC peers on six of the ten subtests of the WISC., all differences being in favour of the former group. Most of the differences were recorded on tests with high g and verbal loadings (Table XXIII, p.285).

Scholastic Achievement

(4) All three A.C.E.R. Silent Reading tests correlated significantly with creative writing, coefficients ranging from 0.59 to 0.72 (p.294). Not surprisingly, the NC group was significantly superior on all three (Table XXIV, p.295).

(2) The NC group was significantly superior to the LC group on teacher-rated Written Language and Spelling (Table XXV, p.297) but not on Arithmetic.

(3) These results probably reflect the moderately high relationship between creativity and intelligence obtained in this investigation.
Social Adjustment

(1) HC children were significantly more preferred than LC children by teachers. This difference was not so much the result of HC children being preferred by their teachers as it was that the LC children were not preferred (Table XXVII, p.305).

(2) HC children were rated as being more stable than their LC peers by their teachers (Table XXVIII, p.307).

(3) HC children were generally more preferred by their peers as seating or working companions when compared with either the LC group or the total sample. Sex differences had no effect on the high sociometric status of the HC group (Tables XXIX and XXX, p.309).

(4) Social confidence displayed in individual interview as rated by the writer was superior in the HC group (Table XXXI, p.311).

(5) There were no significant differences between the two contrast groups on degree of co-operation as rated by teachers.

Interests and Experiential Background

(1) HC children read significantly more books per week than their LC peers (Table XXXIII, p.321).

(2) HC children participated in more extracurricular lessons such as music, ballet, and speech (Table XXXII, p.321).
(3) There were no significant differences between the groups on such factors as after-school employment, membership of clubs and organizations, cinema attendance, television viewing habits, school subject preferences, and future occupational preferences.

**Motivational Factors**

(1) BC children were rated by teachers as being more independent than their LC peers, there being no significant difference between the former group and the parent sample (Table XXXV, p.329).

(2) BC children's behaviour in individual interviews led to them being rated higher than LC children on the criteria of task absorption, initiative, and response to difficult tasks (Tables XXXVI to XXXVIII, p.329-330).

**Age**

There was no significant difference between the BC and LC groups on the variable of chronological age.

**Sex Differences**

Although girls tended to score slightly higher than boys on the combined T-scores of the two forms of the creative writing measures, the difference failed to attain statistical significance (Table XXXIX, p.339).
II. LIMITATIONS OF INVESTIGATION

The findings of the experimental section of this investigation should be considered within the context of the following general limitations:

(1) The creativity criterion was restricted to performances on creative writing tests of unknown predictive validity and of limited reliability (test-retest alternate forms coefficient of 0.68).

(2) The population from which samples were drawn was restricted with respect to:

   (a) geographic factors (large city),
   (b) racial composition (mainly European),
   (c) economic factors (a slightly disproportionate concentration of high income areas),
   (d) ability level (top-stream children).

(3) In the absence of personality measures, it was necessary to place reliance upon teacher and/or observer ratings when assessing relative standing in personality dimensions such as motivation.

(4) Although the writer has been very critical of the amount of speculation in this area of research, recourse was inevitably made to such thinking when there was a conspicuous lack of data either from this investigation or in the literature.
III. CONCLUSIONS

The relationship between creativity and other variables as reported in this investigation suggest three major conclusions:

(1) Rather than existing in a vacuum, creativity forms part of a "syndrome" of cognitive abilities and personality attributes. Although it is difficult to determine which are the dominant components of such a syndrome or in what direction they interact, this investigation provides support for the view that general intelligence plays perhaps the most important role.

Despite the spate of research on the relationship between creativity and intelligence, this area remains the biggest single research need. The future could well see further factor analytic studies conducted along the lines suggested by Vernon (see p. 154), who recommended that such studies include measures of commonly-accepted factors so that any residual factors would be more likely to be both psychologically meaningful and stable from one research to another.

In order to ascertain the relationship between non-intellective factors and that part of the variance in creativity which is not associated with variance in
general intellectual ability, future research should focus on individuals with concomitant ability in both areas. Such a procedure, by holding intelligence constant, would avoid the danger of variables being confounded.

Even if the moderately high correlation obtained between creativity and intelligence (WISC) is indicative of the "true" relationship between the two variables, they are sufficiently independent to warrant continued efforts to identify determinants (or correlates, at least) in other fields.

(2) As a corollary of the above conclusion, this investigation indicates that creativity emerges not only from a favourable concomitance of the individual's own needs and potentialities, but also from the social milieu in which creation takes place. While this study was primarily concerned with the psychological correlates of creativity, sufficient evidence emerged to indicate the importance of sociological factors.

(3) When viewed within a wider philosophical framework, the results of this investigation are congruent with Whitehead's theory of a creative impulse towards growth. According to Whitehead (Burnett, 1957; Dunkel, 1964), creativity does not merely keep the existing
wheels turning at a comfortable level, but is a thrust towards novelty — towards what has not been conceived or actualized before. The syndrome of high creativity — high intelligence — high achievement — breadth of interest — superior motivation that emerges in the present study could be seen as being in accord with Whitehead's view of creativity as the motive power of a universe in which "Neither God nor the world reaches static completion."

IV. IMPLICATIONS OF FINDINGS

Some practical implications to have emerged from the present investigation include the following recommendations:

(1) That in view of the low relationship between creativity and a group test of intelligence such as the Otis, one or two creativity tests could well be included in any battery of classification tests used by schools. In order to more accurately identify the "doubly-gifted" group, a fuller battery of creativity tests could profitably be administered in top-stream classes.

(2) That on the assumption that girls must become culturally conditioned to be less creative as they become
older, steps be taken to see that creativity is continued to be fostered in both boys and girls as they proceed through their schooling.

(3) That in view of the low agreement between tested and teacher-rated creativity, teachers be made more aware of the ways of identifying creativity and its concomitants in their pupils.

(4) That the environmental circumstances found to facilitate creativity should be more widely disseminated among teachers and parents.

(5) That creative thinking receive recognition as a facet of education and that educators concern themselves with devising and evaluating specific programmes aimed at teaching its principles. This may mean replacing an emphasis on the assimilation of factual content with a concern for what Taba (1963, p.255) terms a "challenge for accommodation and stretching of the mind." It does not mean depending on permissiveness alone to bring creative potential to fruition.

V. FUTURE RESEARCH NEEDS

One of the chief emphases of the present study has been the paucity and equivocal nature of research into most facets of creativity — a feature which lends
support to MacLeod's (1962, p.180) suggestion that "experimental psychology is not yet ready to assimilate all the phenomena of creativity." While the present investigation succeeded in clarifying some areas, others were left even more confused or were not investigated. In addition to those areas already referred to in a previous section of this chapter, further research is required on the following aspects:

(1) Identification procedures. Until we have established a firm set of criteria of creativity, we cannot hope to specify the conditions under which it emerges. There is a need for test instruments which have convincing evidence of concurrent and/or predictive validity and of satisfactory levels of reliability. Much work remains to be done, too, in the area of standardizing and simplifying scoring procedures.

(2) Specific versus general factors. As well as a need for research aimed at determining the relationship between creativity and intelligence, attention should be directed towards the intercorrelations of batteries of creative thinking tests. While some studies have reported low inter-test correlations, others — such as the present one — have found sufficient overlap between
certain facets of creativity to suggest the existence of a "general" factor or, at least, broad group factors of creativity.

(3) Cross-cultural differences. There is a need for further studies in New Zealand and other cultures to determine the generality of findings emerging from an American-dominated literature. A study of racial differences in creativity in such an integrated community as New Zealand could well be undertaken.

(4) Teacher influence. One of the most fruitful topics for future research projects lies in the area of determining the influence on creativity of such teacher variables as methodology, cognitive discourse, and personality dynamics.

(5) Family dynamics. The motivational effects of the activities, interests, attitudes, and personality dynamics of the family are areas requiring further investigation.
APPENDIX A

THE MINNESOTA TESTS OF CREATIVE LEARNING

In this appendix the following topics will be discussed:

1. Description of tests.
2. Administration of the tests.
3. Rationales of tasks.
4. Scoring.

Description of tests. The complete battery of the Minnesota Tests of Creativity is divided into a verbal form and a non-verbal form. The battery of verbal tests consists of:

(1) Ask and Guess Test. This test comprises three tasks and requires the subject to (a) think of questions concerning the behaviour shown in a picture of a pixie looking at his reflection in water, (b) to list possible causes of the action shown, and (c) to list possible consequences (Time limit: five minutes for each task).

(2) Product Improvement. The subject is required to think of the cleverest, most interesting, and unusual ways for changing an illustrated toy elephant so that

*See Appendix B and C for copies of the test forms.*
children will have more fun playing with it (Time limit: ten minutes).

(3) Unusual Uses. The subject is asked to list as many interesting and unusual uses of cardboard boxes as he can (Time limit: five minutes).

(4) Unusual Questions. The subject is asked to think of questions about cardboard boxes; these should arouse interest and curiosity in others concerning boxes (Time limit: five minutes).

(5) Just Suppose. The subject is asked to list the consequences of clouds having strings attached to them (Time limit: five minutes).

The three non-verbal tasks comprise:

(1) Picture Construction. Subjects are required to think of a picture in which a curved shape would be an important part. Originality and elaboration are encouraged by the instructions (Time limit: ten minutes).

(2) Figure Completion. The subjects are asked to add lines to a series of ten figures to sketch some interesting objects or pictures (Time limit: ten minutes).

(3) Parallel Lines. This task consists of some thirty pairs of parallel lines which should form the main part of a series of drawings (Time limit: ten minutes).
Administration of the tests. The complete battery of the Minnesota Tests of Creative Thinking consists of ten tasks — seven verbal and three non-verbal. Verbal Form A may be administered as a group written test from "fourth grade through graduate school" or as an oral, individually administered test from six years upwards. The working time of the test is forty-five minutes.

Non-verbal Form A can be used as a group written test from kindergarten through to graduate school. It requires thirty minutes to complete the tasks. The need for interviewing briefly each child in the lower grades to obtain identifying labels for their drawings is stressed in the manual.

Rationale of tasks. According to the authors, each of the seven verbal tasks is believed to bring into play different mental operations, yet each requires the subject to think in divergent directions. The Ask-and-Guess Test was included to give subjects an opportunity to express their curiosity and to give an indication of their ability to develop hypotheses and think in terms of possibilities. Such a concept was considered to be in harmony with the definition of creative thinking as a process. The Product Improvement Task is an interesting
one with a high degree of face validity. It permits subjects to "regress in the service of the ego" and enables them to manipulate and recombine ideas. The Unusual Uses of cardboard boxes is a direct modification of Guilford's well-known Brick Uses Test and Torrance's own Tin Can Uses Test. Because of the ease of thinking of a multitude of uses centring on a cardboard box's function as a container, this task is in part a test of ability to free one's mind of a well-established set. The Unusual Questions Test was adapted from a technique devised by Burkhardt (1961) who developed it as a measure of "divergent power." His measures derived from this task correlated rather highly with his criteria for creativity in art, an abstract divergence score, and a total divergence score. Finally, the Just Suppose Test is an adaptation of the Consequences type of test in Guilford's (1959) battery. As in the Consequences Task, the subject is confronted with an improbable situation and asked to predict the possible outcomes from the introduction of a new or unknown variable. In order to respond productively to this task, the subject must "play with" the possibilities and imagine all of the things which would happen as a consequence.

The authors provided a somewhat briefer outline of the rationale of the three non-verbal tasks. In the
Picture Construction Task, the subjects are required to think of a picture in which the given shape is an integral part. The manual gives no discussion of the rationale underlying this task. The Incomplete Figures Test is an adaptation of the Drawing Completion Test developed by Franck. As is well-known from Gestalt psychology, an incomplete figure sets up in an individual tensions to complete it in the simplest and easiest way possible. Thus, to produce an original response, the subject usually has to control his tensions and delay gratification of this impulse to closure. In the Parallel Line's Test, a deliberate attempt is made, via the instructions, to stimulate all four types of divergent thinking and to set up a conflict among the response tendencies represented by them.

Scoring. All verbal tasks are scored for fluency and originality, most are scored for flexibility, and two of them for elaboration. On all tasks, fluency is defined as the total number of relevant responses, relevancy being defined in terms of the requirements of the task (see also Guilford, 1950; Thurstone, 1951; Taylor, 1958; Lowenfeld and Brittel, 1959; Sprecher, 1959; Strang, 1961; Crutchfield, 1962; etc.).
Flexibility is credited when the subject changes his category of response, the score thus becoming the number of different principles or approaches used in responding to the task (see also Guilford, 1950, 1962; Lowenfeld and Beittel, 1959; Sprecher, 1959; Guilford and Merrifield, 1960; Strang, 1961; Fleming and Weintraub, 1962; Newell et al., 1962; Crutchfield, 1962; Gailer and White, 1965; etc.). Originality is determined by the statistical infrequency of the occurrence of a given response, zero points being awarded for responses which occur in over 5 per cent of subjects, one point for those which occur in 2-5 per cent of responses, and two points for a 2 per cent or less response. All obvious responses are scored zero, regardless of infrequency (see also Guilford, 1950, 1951, 1962; Barron, 1957a; Taylor, 1958; Lowenfeld and Beittel, 1959; Vernon, 1961; Feshill, 1961; Givens, 1962; etc.). In scoring responses for elaboration, the problem is to determine the extent to which an idea is spelled out or elaborated by counting the details over and above what is necessary to communicate the basic idea.

Each of the three non-verbal tasks are scored for originality and elaboration, the Incomplete Figures and Parallel Lines tasks being used for fluency and flexibility
in addition. The basic principles for evaluating these categories are much the same as those outlined for the verbal tasks.

It is apparent that the contents of the Minnesota Tests are linked closely with the Guilford concepts of intellectual operations. Therefore, any criticism of their content inevitably involves a criticism of the limitations of factor analysis applied to testing of this kind (Goldman, 1964). This subject is too technical and too involved to be discussed in any detail in the present context; for a comprehensive outline of the issues involved the reader is referred to works such as those by Vernon (1961, 1964b). It is perhaps sufficient at this stage to refer to a recent article by Cicirelli (1965) which illustrated the importance of viewing the Minnesota Tests in the context of the limitations of factor analysis. Cicirelli subjected the eight subscores derived from the battery (verbal and non-verbal fluency, flexibility, originality, and elaboration) to factor analysis and claimed to have reduced them to the following four measures: (1) verbal fluency-flexibility-originality, (2) verbal elaboration, (3) non-verbal fluency-flexibility-originality and (4) non-verbal elaboration. Unfortunately.
however, he presented no supporting evidence or discussion of this breakdown of the battery. Nevertheless, research such as Cicirelli's and Owen's (1965) promises to be a fruitful line of investigation into the whole concept of creativity and its measurement.

No section on scoring the Minnesota Tests would be complete without reference to the current difficulties in scoring the battery. These difficulties are formidable indeed! Torrance's early work in evaluating creativity led him to experimentation with elaborate scoring procedures. However, these produced such overwhelming problems that he soon went in the direction of simplification and systematization. This procedure also proved unsatisfactory for it resulted in such high interscore coefficients of correlation that the subscores for fluency, flexibility, originality, and elaboration lost much of their meaning and the validity suffered. From thesis to antithesis and then to synthesis: Torrance and his associates now consider that they are using "a somewhat more detailed but reasonably objective and systematic system..." (Torrance, undated: probably 1963, p.19). Nevertheless, as Goldman (1964, p.10) pointed out in a recent article, "any tests encouraging a variety of
divergent responses are bound to involve complex and tedious methods of scoring." Since there is no one correct answer and all the responses to the verbal tests are write-in answers of the "open-end" type, little of the scoring can be reduced to a simple mechanical or clerical task.

As yet, little in the way of normative or comparison group data has been accumulated on the Minnesota Tests so that it must be emphasized that these tests are exploratory and for research purposes only.* At the time of writing this thesis the tests had not been published on a commercial basis.

Several as-yet-unresolved issues with respect to the effects of different techniques of administration on the various scoring categories were discussed by Torrance in a recent article (Torrance, undated: probably 1963, p.16-17). Whether or not to provide some kind of warm-up, to stimulate competition, or to invite subjects to regress constituted some of the perplexing issues which have been investigated. It has been found that while these features

*Goldman (1964) has made the point that norms for creative thinking tests must be developed with great caution because of important cultural variations. See also Torrance (1963b, p.72-88).
increase creative thinking, especially originality, when built into the test administration procedures, they introduce an unknown effect on validity. Relative emphasis on quantity as opposed to some quality like "clever, unusual, and original" in instructions was also described as an unresolved issue. Torrance cited one study in which instructions to give clever, unusual and original responses freed children below fourth grade to give a larger number of responses, thus increasing fluency. In another study reported by Torrance, when fluency and originality were differently rewarded, emphasis on the latter increased the originality of responses without significantly reducing the fluency. When time limits were doubled experimentally,* it was found that fluency was greater per unit of time during the usual time limit than during the extended time period. The reverse was true of originality. Finally, it has been found that the giving of examples reduces originality but increases fluency.

*Taylor (1959a) even suggested modifying some tests to become "take home" tests which would permit the examinee to add responses whenever he gets relevant ideas.
APPENDIX B

CREATIVE WRITING FORM A

INSTRUCTIONS: In the next thirty minutes, I would like you to write the most interesting and exciting story you can think of about one of the topics listed below. Try to write legibly but do not worry too much about your writing, spelling, and the like. Instead try to put into your story as many good ideas as you can. Choose any one of the following topics or make up a similar one of your own. Invent a new title of your own.

1. The dog that doesn't bark.
2. The man who cries.
3. The woman who can but won't talk.
4. The cat that doesn't scratch.
5. Miss Jones stopped teaching.
6. The doctor who became a carpenter.
7. The rooster that doesn't crow.
8. The horse that won't run.
9. The duck that doesn't quack.
10. The lion that doesn't roar.
APPENDIX C

CREATIVE WRITING FORM B

INSTRUCTIONS: In the next thirty minutes, I would like you to write the most interesting and exciting story you can think of about one of the topics listed below. Try to write legibly but do not worry too much about your writing, spelling, and the like. Instead, try to put into your story as many good ideas as you can. Choose any one of the following topics or make up a similar one of your own. Invent a new title of your own.

1. The teacher who doesn't talk.
2. The hen that crows.
3. The dog that won't fight.
4. The flying monkey.
5. The boy who wants to be a nurse.
6. The girl who wants to be an engineer.
7. The cat that likes to swim.
8. The woman that swears like a sailor.
10. The cow that brays like a donkey.
APPENDIX D

SCALE FOR EVALUATING CREATIVE WRITING

1. **Unusual title**
   (a) Breaks away from the purely descriptive.
   (b) Employ analogy or in some other way catches the essence of the content without direct description.
   (c) Catchy, has an unusual twist, or is surprising. (Must be still a reasonable synthesis of content).

2. **Picturesque language** - at least one of these to a high degree.
   (a) Suggests a picture - makes you see a picture.
   (b) Colourful.
   (c) Strikingly graphic - generates a definite image (visual).
   (d) Objectively descriptive.
   (e) Emphasizes word qualities - colourful word usage, picturesque terminology, especially apropos slang, very apt phrases.

3. **Vivid**
   (a) Told with liveliness and intensity.
   (b) Description has penetrating force and strength.
   (c) Description is so interesting, or even exciting, the reader may be stirred emotionally through the content of the story may be murky, dark, and shadowy. It must excite some part of the mind.
   (d) Description is bright and vigorous, alive, spirited, lively. e.g., dramatic staccato style.

4. **Flavour**
   (a) Characteristic element or flavour such as western, oriental, animal-world flavour (Kipling).
   (b) It evokes a feeling of being there.
(c) Is peculiarly appropriate to a particular area, period or era.
(d) Appeals to sense of taste or smell (olfactory and gustatory)

5. Personal element c.f. 13 (note personal)
   (a) Author involves himself in the account.
   (b) Expresses personal thoughts or feelings or projects these into his characters. e.g., surprise, love, dislike, sadness, unhappiness, anger, pleasure, disappointment, happiness, ridicule, sympathy, empathy, etc.

6. Original or surprising solution or ending.
   (a) Ending must be unexpected, unusual, surprising, or funny. (must be credible).
   (b) May or may not be a "punch-line."

7. Original setting or plot.
   (a) Unusual or original plot, theme, moral, design. (Do not confuse with topic).
   (b) Should not be based too much on known stories such as TV. comics, fairy stories, etc.

8. Humour
   (a) Comical, funny, amusing. (certain degree of deliberateness, not just mistakes).
   (b) Makes reader laugh or smile. (useful only to a small degree).
   (c) Brings together certain incongruities so as to illustrate some fundamental absurdity in human behaviour or character.

9. Invented words, names, etc.
   (a) Parts of two or more words are combined to express some concept.
   (b) Animals or persons or places given names appropriate to their character.
10. **Individuality of style**
   - not trite, commonplace, (i.e., style is sufficiently individual to be identifiable in a group of say 10).
   - must be pleasing.

11. **Resonance**
   (a) Writer has captured just the right words and expressions appropriate to the characters and situations.
   (b) Seems that the writer has identified perfectly with the characters, animals, or other elements of the situation, i.e., projection.

12. **Imagination**  
    Fantasy: skilled creation of a world that doesn't exist - fantastic characters - unique situations (not just based on title).

13. **Emotions or feelings**
   (a) Writing itself expresses emotion (c.f. 5).
   (b) Quality could be suggested in the writing.

14. **Finding the essence**. Skimming off the unessential words and ideas and selecting the most appropriate ones, i.e., "mental leaps" (Skepticity is not sole criteria – must not ramble).

15. **Immediacy of experience**. Direct relationship or closeness to life experiences such as home, school, neighborhood.

16. **Curiosity**
   (a) A searching, inquiring quality - often expressed through central character.
   (b) Positive reactions to new, strange, incongruous, or mysterious elements in environment and human relations.
   (c) Interest in exploring or manipulating new ideas or new elements in environment.
17. Reservoir of experiential data. Draws from personal experiences and uses experiential data, e.g., Dickens' "David Copperfield." (Direct rather than derived experience).

18. Perceptive sensitivity
   (a) Uses metaphors and analogies to nature, plant, animal life.
   (b) Insightful perceptions of people's thoughts, emotions, or deeds.

19. Flexibility or versatility
   (a) Absence of mundane, humdrum, cliches, worn-out similes.
   (b) Use of the new, the fresh, the vigorous.
   (c) Versatile style and word use.


21. Coherent unity. Synthesizes and brings into unity and harmony diverse elements, "hangs together," i.e., individual elements must be related.

22. Expressive communicative element. Mood or feeling (e.g., despair, cheerfulness, suspense, etc) communicated effectively, i.e., theme present and developed.

23. Unique punctuation. Punctuation used in such a way as to communicate an idea, feeling, unusual twist - meaningful unconventionalities, i.e., a departure from convention and rules in a productive way.
### Appendix E

**Score Card for Creative Writing Scale**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unusual Title</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Picturesque Speech</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Vivid</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Flavour</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Personal Element</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Original Solution or Ending, Surprising</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>Original Setting or Plot</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>Humour</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Invented Names, Words, etc.</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>Individuality of style</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>Becomingness</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Imagination</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>Emotions or Feelings</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>Abstractive Element, Finding the Essence</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>Immediacy of Experience</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>Curiosity</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>Reservoir of Experiential Data</td>
<td>0</td>
</tr>
<tr>
<td>18</td>
<td>Perceptive Sensitivity</td>
<td>0</td>
</tr>
<tr>
<td>19</td>
<td>Flexibility or Versatility</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>Symbolism</td>
<td>0</td>
</tr>
<tr>
<td>21</td>
<td>Coherent Unity</td>
<td>0</td>
</tr>
<tr>
<td>22</td>
<td>Expressive-Communicative Element</td>
<td>0</td>
</tr>
<tr>
<td>23</td>
<td>Unique Punctuation</td>
<td>0</td>
</tr>
</tbody>
</table>
The tasks in this booklet are a test of your ability to use your imagination in thinking up ideas and putting them into words. There are "right" or "wrong" answers in the usual sense. We want you to think as many ideas as you can. Try to think of unusual, interesting, and ever ideas -- something which no one else will think of.

You will be given seven tasks to do and you will be timed on each one, so make good use of your time. Work as rapidly as you can without shirking. If you run out of ideas before time is called, wait until instructions are given before going on to the next task.

Do not pay any attention to the rest of this page, but do not turn to the next page until told to do so.
TASKS 1 - 3: ASK-AND-GUESS TEST

The first three tasks will be based on the drawing below. These tasks will give you a chance to see how good you are at asking questions to find out things that you don't know and in making guesses about possible causes and consequences of events. Look at the picture. What is happening? What can you tell for sure? What do you need to know to understand what is happening, what caused it to happen and what will be the result?
Task 1: ASKING. On this page, write out all of the questions you can think of about the drawing on the page before this one. Ask all of the questions you would need to ask to know for sure what is happening. Do not ask questions which can be answered just by looking at the drawing. You can continue to look back at the drawing as much as you want to.

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Task 2. GUESSING CAUSES. In the spaces below, list as many possible causes as you can of the action shown in the picture. You may use things that might have happened just before the event in the picture, or something that happened a long time ago that made the event happen. Make as many guesses as you can. Don't be afraid to guess.

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TASK 3. GUESSING CONSEQUENCES. In the spaces below, list as many possibilities as you can of what might happen as a result of what is taking place in the picture. You may use things that might happen right afterwards or things that might happen as a result long afterwards in the future. Make as many guesses as you can. Don’t be afraid to guess.

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At the bottom of this page is a sketch of a stuffed toy elephant of the kind you can buy in most toy shops for five to ten shillings. It is about six inches tall and weighs about a pound. In the spaces on this page and the next one, list the cleverest, most interesting and unusual ways you can think of for changing this toy elephant so that children will have more fun playing with it. Do not worry about how much the change would cost. Think only about what would make it more fun to play with as a toy.
TASK 5: UNUSUAL USES (Cardboard Boxes)

Most people throw their empty cardboard boxes away, but they have thousands of interesting and unusual uses. In the spaces below and on the next page, list as many of these interesting and unusual uses as you can think of. Do not limit yourself to any one size of box. You may use as many boxes as you like. Do not limit yourself to the uses you have seen or heard about; think about as many possible new uses as you can.

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22.
In this task, you are to think of as many questions as you can about cardboard boxes. These questions should lead to a variety of different answers and which might arouse interest and curiosity in others concerning boxes. Try to think of questions about aspects of the object which people do not usually think about.

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24. 
You will now be given an improbable situation -- one that may never happen. You will have to just suppose that it has happened. This will give you a chance to use your imagination to think out all of the other exciting things that would happen IF this improbable situation were to come true.

In your imagination, just suppose that the situation described were to happen. THEN think of all of the other things that would happen because of it. In other words, what would be the consequences? Make as many guesses as you can.

The improbable situation -- JUST SUPPOSE clouds had strings attached to them which hang down to earth. What would happen? List your guesses on the next page.
APPENDIX G

NON-VERBAL FORM A

MINNESOTA TESTS OF CREATIVE THINKING

Name: ___________________________ Date: ___________________________
Age: ______ Sex: ______ Classification: ___________________________
School: ___________________________ City: ___________________________

In this booklet are three interesting things for you to do. All of them will give you a chance to use your imagination to think of ideas and to put them together in various ways. In each task, we want you to think of the most interesting and unusual ideas you can — ideas that no one else in this group will think of. After you think of an idea keep adding to it and build it up so that it will tell the most interesting and exciting story possible.

You will be given a time limit on each task, so make good use of your time. Work fast but don't rush. Try to keep thinking of ideas, but if you run out of ideas before time is called, sit quietly and wait until you are told to turn to the next page.

Do not pay any attention to the rest of this page. Turn to the next page when the signal is given.

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<th>Scoring Category</th>
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<th>Task 2</th>
<th>Task 3</th>
<th>Total</th>
<th>T-Score</th>
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<td>Flexibility</td>
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<tr>
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<tr>
<td>TOTAL</td>
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1962

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E. Paul Torrance
TASK 1: PICTURE CONSTRUCTION

At the bottom of this page is a piece of colored paper in the form of a curved shape. Think of a picture or an object in which this form would be an important part. Then lift up the piece of colored paper and stick it wherever you want it on the next page, just like you would a postage stamp. Then add lines with pencil or crayon to make your picture.

Try to think of a picture that no one else will think of. Keep adding new ideas to your first idea to make it tell as interesting and as exciting a story as you can.

When you have completed your picture, think up a name or title for it and write it at the bottom of the page in the space provided. Make your title as clever and unusual as possible. Use it to help tell your story. (Examiners and teachers will write down the titles for children who need such help.)

Lift up the piece of paper above by gently pulling on it and turn to the next page.
TASK 2: FIGURE COMPLETION

By adding lines to the figures on this and the next page, you sketch some interesting objects or pictures. Again, try to link of some picture or object that no one else will think of, to make it tell as complete and as interesting a story as I can by adding to and building up your first idea. Make up a title for each of your drawings and write at the bottom of each block next to the number of the figure.

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-  
/ \ 
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In ten minutes see how many objects or pictures you can make from the pairs of straight lines below and on the next two pages. The pairs of straight lines should be the main part of whatever you make. With pencil or crayon add lines to the pairs of lines to complete your picture. You can place marks between the lines, on the lines, and outside the lines -- wherever you want to in order to make your picture. Try to think of things that no one else will think of. Make as many different pictures or objects as you can and put as many ideas as you can in each one. Make them tell as complete and as interesting a story as you can. Add names or titles in the spaces provided.
7. ___________________  8. ___________________  9. ___________________

10. ___________________  11. ___________________  12. ___________________

13. ___________________  14. ___________________  15. ___________________

16. ___________________  17. ___________________  18. ___________________

Turn to next page.
APPENDIX H

TEACHER RATING OF CREATIVE WRITING

This is a pupil who consistently writes at a high level of creativity. Technical errors in spelling and grammar, neatness, vocabulary, and length should not be considered, nor should poetry be considered more creative than prose. This is a pupil who expresses information, ideas, and feelings coloured by original thoughts and who often seems to be inspired by an inner urge to express himself. His writing is marked by such characteristics as picturesque speech, vividness, flavour, humour, individuality of style, imagination, expression of emotions or feelings, curiosity, sensitivity, flexibility, symbolism, unity, and originality of plot, setting, and ending.

Instructions

Please rate the pupils in your class according to the following scheme:

1. Mark T next to the _____ pupils whom you would rate higher than the others in the class for the quality described in this item.

2. Mark B next to the _____ pupils whom you would rate lower than the others in the class for the quality described in this item.

3. Mark C for all the others - this is the middle group.
APPENDIX I

TEACHER PREFERENCE SCALE

The child's behaviour in the classroom setting cannot be understood without reference to observations and reactions by his teachers. The teacher is the best qualified person — indeed he is the only person in many ways — to provide this material. Accordingly I am asking teachers to make two observations: one dealing with teacher preferences and the other with the child's creative writing ability.

Item I

This is a pupil whom you especially enjoy having in the classroom. When asked what kind of person you prefer as a member of your class, this is the pupil who most readily comes to mind. He may or may not be the one who gets along best in the classroom situation, he may not be the brightest child in the class, and he may or may not be the one who gets the best marks. But he is liked by you and is the sort of person about whom you are most likely to say, "Of all the children in my class this is the one I most enjoy."

Instructions

Please rate the pupils in your class according to the following scheme:

1. Mark H next to the _____ pupils whom you would rate higher than the others in the class for the quality described on this item.

2. Mark L next to the _____ pupils whom you would rate lower than the others in the class for the quality described in this item.
APPENDIX J

SOCIOMETRIC RATING SCALE

NAME:  

SCHOOL:  

DATE:  

ROOM:  

Write down in order your five choices for children near whom you would most like to sit. Your first choice is the person near whom you would most like to sit and so on.

Remember

1. Your choices must be made from any of the children in this room, including those who are absent.
2. You should make all five choices for each question.
3. Your choices will not be seen by any other children.
4. Make your choices in order.

A. I would choose to sit near these children:

1. ____________________________ 4. ____________________________
2. ____________________________ 5. ____________________________
3. ____________________________

Now write down in order your five choices for children with whom you would most like to work. Your first choice is the person with whom you would most like to work and so on.

B. I would choose to work with these children:

1. ____________________________ 4. ____________________________
2. ____________________________ 5. ____________________________
3. ____________________________
## APPENDIX K

### OCCUPATIONAL STATUS SCHEDULE

*(Lovegrove, 1964)*

<table>
<thead>
<tr>
<th>Occupational Category</th>
<th>T-scaled Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountant to Business</td>
<td></td>
</tr>
<tr>
<td>University Lecturer</td>
<td></td>
</tr>
<tr>
<td>Training College Lecturer</td>
<td></td>
</tr>
<tr>
<td>Lawyer</td>
<td></td>
</tr>
<tr>
<td>Public Accountant</td>
<td>68.3</td>
</tr>
<tr>
<td>Primary Teacher</td>
<td></td>
</tr>
<tr>
<td>Secondary Teacher</td>
<td></td>
</tr>
<tr>
<td>Medical Practitioner</td>
<td></td>
</tr>
<tr>
<td>Headteacher</td>
<td></td>
</tr>
<tr>
<td>Bank Manager</td>
<td></td>
</tr>
<tr>
<td>Clergyman (with degree)</td>
<td></td>
</tr>
<tr>
<td>Dentist</td>
<td>63.4</td>
</tr>
<tr>
<td>Deputy Head (Govt)</td>
<td></td>
</tr>
<tr>
<td>Director (Large concern)</td>
<td></td>
</tr>
<tr>
<td>Architect</td>
<td></td>
</tr>
<tr>
<td>Engineer</td>
<td></td>
</tr>
<tr>
<td>Librarian</td>
<td></td>
</tr>
<tr>
<td>Newspaper Editor</td>
<td>60.4</td>
</tr>
<tr>
<td>Clergyman (Some Univ., no degree)</td>
<td></td>
</tr>
<tr>
<td>Office Manager or Supervisor</td>
<td></td>
</tr>
<tr>
<td>Social Worker</td>
<td></td>
</tr>
<tr>
<td>Journalist</td>
<td></td>
</tr>
<tr>
<td>Bank Clerk or Teller</td>
<td></td>
</tr>
<tr>
<td>Manager (Large concern)</td>
<td></td>
</tr>
<tr>
<td>Departmental Manager</td>
<td>58.1</td>
</tr>
<tr>
<td>Owner Business (£5,000-£10,000)</td>
<td>57.1</td>
</tr>
<tr>
<td>&quot;  &quot; (£10,000-£25,000)</td>
<td></td>
</tr>
<tr>
<td>Occupational Category</td>
<td>T-scaled Score</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Postmaster</td>
<td></td>
</tr>
<tr>
<td>Private Secretary (Male)</td>
<td></td>
</tr>
<tr>
<td>Owner large business ($5,000+)</td>
<td>56.4</td>
</tr>
<tr>
<td>Works Manager (Large concern)</td>
<td></td>
</tr>
<tr>
<td>Gentleman Farmer (Well established)</td>
<td>55.8</td>
</tr>
<tr>
<td>Gentleman Farmer (Reasonably well established)</td>
<td></td>
</tr>
<tr>
<td>Sales Manager (Large concern)</td>
<td>55.2</td>
</tr>
<tr>
<td>Insurance Agent</td>
<td></td>
</tr>
<tr>
<td>Clergyman (no degree)</td>
<td>54.7</td>
</tr>
<tr>
<td>Land Agent</td>
<td>54.1</td>
</tr>
<tr>
<td>Bookkeeper</td>
<td></td>
</tr>
<tr>
<td>Armed Service (Officer)</td>
<td>53.9</td>
</tr>
<tr>
<td>Owner Business ($1,000-$5,000)</td>
<td></td>
</tr>
<tr>
<td>Chemist (Wages)</td>
<td>53.3</td>
</tr>
<tr>
<td>Government Office Clerk</td>
<td>52.8</td>
</tr>
<tr>
<td>Dairy Farmer (well-established)</td>
<td>52.5</td>
</tr>
<tr>
<td>Farmer (crops; land with help)</td>
<td>52.3</td>
</tr>
<tr>
<td>Foreman (big responsibility)</td>
<td>52</td>
</tr>
<tr>
<td>Routine Office Clerk</td>
<td>51.8</td>
</tr>
<tr>
<td>Watchmaker</td>
<td>51.5</td>
</tr>
<tr>
<td>Post Office Clerk</td>
<td>51.3</td>
</tr>
<tr>
<td>Owner Business (Less than $1,000)</td>
<td></td>
</tr>
<tr>
<td>Policeman (W.C.O.)</td>
<td>50.8</td>
</tr>
<tr>
<td>Foreman (skilled)</td>
<td></td>
</tr>
<tr>
<td>Farm Manager</td>
<td>50</td>
</tr>
<tr>
<td>Manager (Small Department in Store)</td>
<td>50</td>
</tr>
<tr>
<td>Occupational Category</td>
<td>T-scaled Score</td>
</tr>
<tr>
<td>------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Policeman</td>
<td></td>
</tr>
<tr>
<td>Farmer (owns land operates with family)</td>
<td>49.8</td>
</tr>
<tr>
<td>Commercial Traveller</td>
<td>49.2</td>
</tr>
<tr>
<td>Motor Car Salesman</td>
<td></td>
</tr>
<tr>
<td>Printer (wages)</td>
<td>48.7</td>
</tr>
<tr>
<td>Armed Serviceman (N.C.O)</td>
<td></td>
</tr>
<tr>
<td>Foreman (small responsibility)</td>
<td>48.2</td>
</tr>
<tr>
<td>Salesman (shop assistant)</td>
<td>48.2</td>
</tr>
<tr>
<td>Welder (Wages)</td>
<td>46.9</td>
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<tr>
<td>Fitter</td>
<td></td>
</tr>
<tr>
<td>Mechanic</td>
<td></td>
</tr>
<tr>
<td>Plasterer (Wages)</td>
<td></td>
</tr>
<tr>
<td>Bricklayer</td>
<td></td>
</tr>
<tr>
<td>Electrician</td>
<td>46.9</td>
</tr>
<tr>
<td>Plumber</td>
<td></td>
</tr>
<tr>
<td>Painter</td>
<td></td>
</tr>
<tr>
<td>Carpenter</td>
<td></td>
</tr>
<tr>
<td>Building Construction Worker (semi skilled)</td>
<td>45.9</td>
</tr>
<tr>
<td>Fireman</td>
<td></td>
</tr>
<tr>
<td>Taxi driver (Wages)</td>
<td>45.3</td>
</tr>
<tr>
<td>Storeman</td>
<td></td>
</tr>
<tr>
<td>Sharemilker</td>
<td></td>
</tr>
<tr>
<td>Carrier (Wages)</td>
<td>44.5</td>
</tr>
<tr>
<td>Janitor</td>
<td></td>
</tr>
<tr>
<td>Butcher (Wages)</td>
<td>43.9</td>
</tr>
<tr>
<td>Engine Driver or Fireman</td>
<td></td>
</tr>
<tr>
<td>Occupational Category</td>
<td>T-scaled Score</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Forestry Worker</td>
<td></td>
</tr>
<tr>
<td>Milk Delivery (Wages)</td>
<td></td>
</tr>
<tr>
<td>Fisherman</td>
<td></td>
</tr>
<tr>
<td>Telephone Repairman</td>
<td></td>
</tr>
<tr>
<td>Shepherd</td>
<td>42.6</td>
</tr>
<tr>
<td>Barber (Wages)</td>
<td></td>
</tr>
<tr>
<td>Telephone operator</td>
<td></td>
</tr>
<tr>
<td>Factory worker (semi-skilled)</td>
<td></td>
</tr>
<tr>
<td>Miner</td>
<td></td>
</tr>
<tr>
<td>Bus Driver</td>
<td>40.8</td>
</tr>
<tr>
<td>Petrol Station Attendant</td>
<td></td>
</tr>
<tr>
<td>Railway Porter</td>
<td></td>
</tr>
<tr>
<td>Farmer Tenant</td>
<td></td>
</tr>
<tr>
<td>Hospital Orderly</td>
<td>39.2</td>
</tr>
<tr>
<td>Armed Services (ranks)</td>
<td></td>
</tr>
<tr>
<td>Waterside Worker</td>
<td>38.3</td>
</tr>
<tr>
<td>Truck Driver</td>
<td></td>
</tr>
<tr>
<td>Packer</td>
<td>36.6</td>
</tr>
<tr>
<td>Factory Worker (unskilled)</td>
<td></td>
</tr>
<tr>
<td>Farm Labourer</td>
<td>35.1</td>
</tr>
<tr>
<td>Roadworker</td>
<td></td>
</tr>
<tr>
<td>Nightwatchman</td>
<td></td>
</tr>
<tr>
<td>Cook</td>
<td></td>
</tr>
<tr>
<td>Freezing Worker</td>
<td>31.2</td>
</tr>
<tr>
<td>Gamer</td>
<td></td>
</tr>
<tr>
<td>Hotel Worker</td>
<td></td>
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## APPENDIX L

### INTERVIEW BEHAVIOUR RATING SCALE

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Absorbed by task</td>
<td></td>
<td></td>
<td></td>
<td>Easily distracted</td>
</tr>
<tr>
<td>2</td>
<td>Initiates activity</td>
<td></td>
<td></td>
<td></td>
<td>Waits to be told</td>
</tr>
<tr>
<td>3</td>
<td>Socially confident</td>
<td></td>
<td></td>
<td></td>
<td>Shy, reserved, reticent</td>
</tr>
<tr>
<td>4</td>
<td>Realistically self confident</td>
<td></td>
<td></td>
<td></td>
<td>Distrusts own ability or over-confident</td>
</tr>
<tr>
<td>5</td>
<td>Persistent when faced with difficult tasks</td>
<td></td>
<td></td>
<td></td>
<td>Gives up easily or can't give up</td>
</tr>
</tbody>
</table>
## APPENDIX II

### INDIVIDUAL RECORD SHEET

<table>
<thead>
<tr>
<th>Name:</th>
<th>School:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Father's Occupation</td>
<td></td>
</tr>
<tr>
<td>Mother's Occupation</td>
<td></td>
</tr>
<tr>
<td>Child's Work</td>
<td></td>
</tr>
<tr>
<td>Siblings</td>
<td></td>
</tr>
<tr>
<td>Place in Family</td>
<td></td>
</tr>
<tr>
<td>Television Viewing</td>
<td></td>
</tr>
<tr>
<td>Hours/week Viewing</td>
<td></td>
</tr>
<tr>
<td>Favourite Programmes</td>
<td></td>
</tr>
<tr>
<td>Books/week</td>
<td></td>
</tr>
<tr>
<td>Type of Books</td>
<td></td>
</tr>
<tr>
<td>Library Ticket</td>
<td></td>
</tr>
<tr>
<td>Parent's Use of Library</td>
<td></td>
</tr>
<tr>
<td>Films/month</td>
<td></td>
</tr>
<tr>
<td>Type of Films</td>
<td></td>
</tr>
<tr>
<td>Clubs &amp; Organizations</td>
<td></td>
</tr>
<tr>
<td>Lessons out of School</td>
<td></td>
</tr>
<tr>
<td>Sports - winter</td>
<td></td>
</tr>
<tr>
<td>Sports - summer</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX N

PERSONAL CHARACTERISTICS RATED BY TEACHERS

(from Primary School Record Guide E.19/23)

Stability

A. Exceptionally stable. Basic pattern of behaviour not likely to be disturbed even under the most unusual circumstances.


C. Generally calm and contented, but basic pattern of behaviour disturbed by unfamiliar circumstances.

D. Basic pattern of behaviour rather easily disturbed.

E. Highly unstable; Basic pattern of behaviour very easily disturbed.

Co-operation

A. Invariably co-operative. Works in thoroughly happily with adults or children. Seeks co-operative activities continuously.

B. Enjoys being a member of a team, ready to co-operate, often finds the opportunities.

C. Usually co-operative when the need arises.

D. Needs encouragement to co-operate with others. Tends to co-operate for own ends.

E. Continuously unco-operative in regard to others' wishes, ideas and activities.
Independence

A. Thinks and acts with marked independence and originality.
B. Usually thinks and acts independently; likely to take the initiative.
C. Often thinks and acts independently; able to take the initiative.
D. Easily swayed; rather imitative.
E. Very dependent on others; diffident.

Perseverence

A. Extremely persistent.
B. Not easily stopped.
C. Works quite steadily.
D. Somewhat changeable, restless.
E. Gives up easily.
APPENDIX 0

CORRELATIONS FROM REGRESSION LINES OF BEST FIT

This Appendix provides a brief explanation of the assumptions and method of calculating product-moment correlation coefficients by means of estimating regression lines of best fit from the tails of the distribution on one variable.

Assumptions

1. As for Pearson product-moment correlations.
2. That there is continuity from the tails to the middle of the distribution (see diagram).

Explanation of Method

Expressed diagrammatically, the following is an approximation of the scattergram that resulted when scores on creative writing (X axis) and the WISC (Y axis) were plotted for the HC\(^{(a)}\) and LC\(^{(b)}\) groups:

![Diagram showing scattergram with HC\(^{(a)}\) and LC\(^{(b)}\) groups plotted on X and Y axes.](image-url)
To find Pearson $r$ via the principle of least squares in evaluating $m$:

\begin{equation}
\begin{align*}
(1) \quad r &= \sqrt{\frac{m_x}{m_y}} \\
\text{i.e., } r &\text{ is the slope or the mean proportional of the two regression coefficients.}
\end{align*}
\end{equation}

(Lewis, 1960, p. 173-174)

To find $m_x$:

\begin{equation}
\begin{align*}
(2) \quad \Sigma Y &= \Sigma X m + Nk \\
\Sigma XY &= \Sigma X^2 m + \Sigma Xk \\
\end{align*}
\end{equation}

(Lewis, 1960, p. 17 and 169)

When the term $N$ in (2) is the number of pairs of $(X,Y)$ values entering into the computations and when the appropriate sums are placed in (2), we have:

\begin{align*}
386.2 &= 6538m + 64k \\
92,004.3 &= 713,796m + 6538k
\end{align*}

After the upper equation has been multiplied through by 102.16 to eliminate $k$, it is subtracted from the lower equation to give:

\begin{align*}
90,534.2 &= 667,922m \\
m &= 6.032
\end{align*}
To find $m_y$:

\[(3) \quad \Sigma X = \Sigma Y_m + nk \]
\[\Sigma XY = \Sigma X_m^2 + \Sigma Xk \]

Substituting:

\[6,538 = 386.2 m + 64k\]
\[92,004.3 = 12402.5 m + 886.2k\]

After the upper equation is multiplied by 13.85, it is subtracted from the lower equation to give:

\[1,453.0 = 128.6m\]
\[m = 11.30\]

Substituting in (4):

\[r_{xy} = \sqrt{0.032 \times 11.30}\]
\[= \sqrt{0.362}\]
\[= 0.602\]
### APPENDIX P

#### CREATIVE WRITING QUESTIONNAIRE

<table>
<thead>
<tr>
<th>1. Topics</th>
<th>2. Type of topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) free choice</td>
<td>(a) direct experience of child</td>
</tr>
<tr>
<td>(b) multiple choice (two or more topics)</td>
<td>(b) vicarious experiences of child, i.e., ideas from books, television, radio, schoolwork, etc</td>
</tr>
<tr>
<td>(c) single topic</td>
<td>(c) imaginative</td>
</tr>
</tbody>
</table>

**Comments:**

**Comments:**
3. Marking procedures

(a) according to the quality of the ideas...

(b) according to the effective communication of the ideas, i.e. writing, spelling, grammar, etc. .....................

Comments:

4. General

(a) writing preceded by discussion by teacher and class.....................

(b) writing preceded by comments by teacher with little class discussion.........

(c) writing preceded by miming activities...

(d) use of models (from books or composed by teacher)...........................

(e) unlimited time given for completion.....

(f) rough draft copies.........................

(g) work is give a mark or grading............

(h) work is available for class to read.....

(i) work is shared with other classes.......


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AUTHOR INDEX

When there are two or more authors

Only the first-named is indexed.
Owens, E. E., 146, 181, 372
Parkyn, G., 29, 114
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