AN INVESTIGATION INTO THE RELATIONSHIP BETWEEN CREATIVITY AND ACADEMIC PERFORMANCE IN SCHOOL CHILDREN

by

SYBIL NOBLE

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INTRODUCTION

The subject of creativity is of interest not only to the research worker and educationist but also, with its related mental health aspect, to the clinical psychologist. As the writer's interest is in clinical psychology the opportunity, which occurred in 1968, to undertake research on creativity, was welcomed. This opportunity arose out of a larger piece of research into the relationships between personality variables and mathematical ability in school children. This involved the administration of personality tests and tests of arithmetic and mathematical ability to all the English speaking school children in Grahamstown from Standard 2 to Standard 10. The writer assisted in this testing program and did the greater part of the marking, scoring and entering on computer sheets. Thus personality test scores for over 2,000 children from the age of 8 or 9 to 17 or 18, both boys and girls were available. It was found possible to extend the computer program to calculate a score for creativity based on a combination of Cattell's personality factors and it was decided to compare these creativity scores with actual school performance, as measured by internal school examinations, which with the cooperation and agreement of the Cape Education Department and local schools, the writer was able to obtain.

Creativity in education can be broadly divided into two aspects. Firstly, the identification and training of especially talented pupils, and secondly the development of "creativity" in every individual and it is this aspect which interests the clinician, from the point of view of the prevention of mental ills. Both aspects are important, though with regard to the former, the number of writers who mention the "space race" as a reason for the upsurge of interest in creativity is somewhat sinister! The writer shares the viewpoint of Wallach and Kogan (1965) when they say in this context,

> "The irony of the matter is that this kind of concern over creativity may well be the strategy par excellence for killing it."

The second aspect seems to have been neglected. In an increasingly crowded, competitive, and mechanized civilization the needs and

development of the individual are often forgotten, to the detriment of his creative capacities. In the words of Schaefer-Simmern (1948),

> "Because the harmonious development of his sensuous, emotional, intellectual and physical powers is neglected, his creative capacities cannot unfold."

Much of present day research on creativity is concerned with the identification, description and education of especially creative people. Naturally it is important to recognize, encourage and develop the talents of those especially gifted individuals, whose abilities in whatever sphere will be of benefit to society. But the individual, too, is important, not only because his happiness, mental health and fulfilment affect society, but for his own sake. John Dewey, in his foreword to Schaefer-Simmern's (1948) book "The Unfolding of Artistic Activity" refers to individuality as,

> "the creative factor in life's experiences... individuality...is seen as the factor that varies from the previously given order, and that in varying transforms in some measure that from which it departs, even in the very act of receiving and using it. This creativity is the meaning of artistic activity which is manifested not just in what are regarded as the fine arts, but in all forms of life that are not tied down to what is established by custom and convention. In recreating them in its own way it brings refreshment, growth and satisfying joy to one who participates."

Schaefer-Simmern describes the remarkable transformations in the lives of, amongst others, mental defectives, when this unfolding of artistic activity takes place.

With regard to mental health Torrance (1964) describes its connection with creativity as follows,

> "Although we lack scientifically developed information concerning the relationships between creativity and mental health, scattered evidence from a variety of sources leaves little question but that the stifling of creative desires and abilities cuts at the very roots of satisfaction in living and ultimately creates overwhelming tension and breakdown. There is also little doubt that one's creativity is an invaluable resource in coping with life's daily stresses, thus making breakdown less likely."

Maslow (1959) distinguishes "special talent" creativeness from "self-actualizing" creativeness. (By "self-actualization" he means actualizing one's potential, becoming everything one is capable of becoming.) He believes the former is independent of mental health but the latter shows itself as an "effect of positive mental health and appears as creative flexibility and free energy to accomplish the ordinary affairs of life in a creative way" (Demos and Gowan, 1967). He sees creativity in every person, if only as suppressed potential.

Cattell and Butcher (1968) say,

> "The cultivation of creativity may turn out to be the development of personality - nothing more."

More poetically Goethe says,

> +"The highest bliss on earth shall be
> The joys of personality."

The implication seems to be, not only a search for exceptionally talented individuals, but also a chance for each individual to develop in his own way - in Jung's word to "individuate" for his own sake, and this too will indirectly benefit society.

+Westöstlicher Diwan Suleikabuch

In South Africa there has been very little research on creativity, especially at the school level. Only three articles on creativity are found in "Psychologica Africana" in the last six years. The present study aims to investigate some of the background questions in the English speaking schools of Grahamstown, South Africa. If there is a particular personality pattern which distinguishes creative individuals, are those who possess it successful at school? Are they more successful in the early school years or near the end of their school careers? How do boys and girls compare? The answers to these and similar questions might provide the first step towards making school a place where children's creative capacities can unfold and develop to the satisfaction of the individual and the advantage of society.

CHAPTER 1

GENERAL BACKGROUND TO CREATIVITY THEORY

1.1 History of the Concept

Although the word "creativity" is a comparatively new one - it is not found in dictionaries more than a decade old - the study of the subject cannot be dated from the coinage of the word. The word "creativity" may be said to be linked with the development of this interest in the process of original thinking into a scientific study. Hudson (1967) says,

> "The present burgeoning is not a new phenomenon, but a return to a subject which has titillated the psychological fancy for a hundred years or more."

In fact it is just a hundred years since F. Galton published "Hereditary genius : An inquiry into its laws and consequences" in which as Guilford (1967a) points out, he did not seriously attempt to understand the mental operations of geniuses, but rather the hereditary determination of creative performance. Other books about the genealogy and estimated intelligence of men and women of genius were written by Cox in 1926 and Havelock Ellis in 1946, but no specific scientific study of the subject was made till the 1950s.

Guilford points out that although the study of creativity should have been the concern of scientific psychologists, they were having difficulty understanding such mental events as sensation, perception and memory, and the study of creativity was pushed aside. However psychometrists could not altogether avoid the problem and thus a certain aspect of creativity research is not only connected with, but may be said to be a direct descendant of, research on intelligence. Before 1900 testing of presumably separate mental faculties enjoyed a brief vogue and in 1904 Spearman came to the conclusion that all measures of ability tend to be positively correlated and that these positive correlations could be largely accounted for by a single general factor which he called "g". For twenty to thirty years it was generally

accepted that "g" accounted for all the multifarious manifestations of human ability and by 1920 the intelligence test was being used for military selection and decisions involving children. In the 1920s and 1930s psychologists became increasingly aware that Spearman's theory was inadequate to explain the facts. In 1925 Terman published his work on genius in which children with high IQs were found not to be the physical and social cripples as commonly thought. Following this was a spate of research on intelligence and giftedness, but by 1954 there was a slackening of progress. It began to be realised that giftedness was not synonymous with a high IQ and the limitations of the intelligence were becoming apparent. Getzels and Jackson (1962) list these limitations as,

(1) To begin with the typical intelligence test did not sample a sufficiently broad range of intellectual tasks. It relied on tasks which require, in Guilford's term "convergent" thinking, which means that to do well a subject had to be able to recall, to recognize and to solve, but he need not necessarily be able to invent or innovate.

(2) Secondly, the IQ rarely accounts for more than one quarter of the variance in school achievement. It was noticed that children very high in intelligence, as measured by intelligence tests, are not necessarily high in other intellectual functions such as creativity.

(3) Thirdly, the intelligence test has not developed in accordance with advances in understanding of such fields as cognition, learning and problem solving. Too often the soundness of a new intelligence test was its degree of correlation with an old one.

The assumption that intelligence and creativity were closely related came to be questioned. Getzels and Jackson (1962) point out that as early as 1898, before the intelligence test had even been developed, Dearborn had questioned this. In discussing the imaginative responses of Harvard students to a series of inkblots he commented that two of the poorest records were made by students of decidedly intellectual type. Other studies by Colvin in 1902, Colvin and Meyer in 1906 and Chassel in 1916 came to similar conclusions. Thus through the period of the greatest use and

veneration of the intelligence test ran a note of criticism which increased in the 1950s.

With the decline in esteem of the intelligence test, studies of creativity gradually gained ground. Hudson (1967) and others give as another reason the launching of Sputnik and the consequent "space race". The recent wave of enthusiasm for the subject can be dated from the inaugural address to the American Psychological Association in 1950 in which J.P. Guilford drew attention to education's appalling neglect of the study of creativity. Of some 121,000 titles indexed in Psychological Abstracts up to 1950 only 186 dealt with the topic. Since then research has increased enormously. Getzels and Madaus (1969) illustrate the increase in the Encyclopedia of Educational Research by pointing out that in the 1941 edition no mention was made of Creativity; in 1950 "creative" was added to the catalogue of higher mental processes; in 1960 "creative thinking" appeared as a brief subsection, in 1969 it gained the status of an independent article.

Today the concept of creativity is "important, indeed almost a cult, in educational and psychological thinking". (Freeman et al, 1968). This sudden upsurge inevitably means

> "that this concept as commonly employed is amorphous and indefinite; its relationship with longer established concepts in education is vague and loose and its use by both educators and psychologists highly individualistic.... There is as yet no unified psychological theory of creativity available to the research worker or the educational practitioner." (Freeman et al, 1968)

Despite the difficulties, which are mainly due to immaturity, the concept is valuable and useful and attempts to define it of importance because creativity research is related to many other fields in psychology. As Hudson (1967) says it has encouraged speculation and has broken down some of the barriers between one discipline and another.

1.2 Defining creativity

In defining creativity Demos and Gowan (1967) point out that creation must be distinguished from invention and discovery. They also say that definitions in terms of traits have given way to definitions in terms of process. An example is

Stein's (1963) definition, "Creativity is that process which results in a novel work that is accepted as tenable or useful or satisfying by a group at some point in time."

Though there is no universally agreed upon definition of creativity, attempts at definition are usefully classified by Getzels and Madaus (1969) into three categories according to the emphasis given the product, the process, and the experience. Thus, some definitions are in terms of the manifest product; it is novel and useful. McKinnon, for example, says that creativeness must be novel or at least statistically infrequent, adaptive to, or of, reality and sustained or developed to the full. Other definitions are in terms of the underlying process: it is divergent yet fruitful. Ghiselin, for example, says that creativity is a process of change and development in the psychic life of an individual leading to invention. Finally, definitions may be in terms of a subjective experience: it is inspired and immanent. Maslow emphasises the importance of the flash of insight, the transcendant sensation itself, without reference to whether it will ever result in anything tangible.

Getzels, along different lines gives primacy to the nature of the problem rather than to the solution, making a distinction between presented and discovered problem situations.

Newell and others have presented an omnibus definition, which states that thinking can be called creative if (1) the product has novelty and value either for the thinker or the culture, (2) the thinking is unconventional, (3) it is highly motivated and persistent or of great intensity, and (4) the problem was initially vague and undefined so that part of the task was to formulate the problem itself. (Getzels and Madaus, 1969)

What are present creativity studies searching for? The bewildering mass of research and theory on a topic as broad as creativity can be roughly organized into three sections, namely, how the creative process works, or nature; educational implications, or nurture, and criteria and measurement.

1.3 How the Creative Process Works : The Nature of Creativity

There is the greatest disagreement among theorists in accounting for creative thinking. Getzels and Madaus (1969) point out the widely diverse sources from which such theories derive and name six; logic or philosophy, learning theory, Gestalt principles, factor analysis, experimental psychology, and psychoanalysis.

The first three of these are concerned more with problem solving than with creativity. They do not "take sufficient account of situations where the problem is not presented but is discovered, where the individual is motivated to seek out problems for solution through curiosity rather than necessity." (Getzels and Madaus, 1969)

Three modes of inquiry are being applied more specifically to creativity. Factor analysis is dealing with the intellective elements in creativity, experimental psychology with motivational aspects like curiosity and psychoanalysis with the subliminal or unconscious processes of creativity.

Though some progress is being made in these fields, Hudson (1967) warns against any complacency or over-simplification of the problems involved. He describes four great men to illustrate the wide differences in how the creative process works.

Firstly, Turner, the great English painter who left behind an enormous body of work. Yet he made his reputation by extremely conventional means, first as a brilliant draughtsman and then as an imitator of acknowledged masters. At twenty, although he worked with intelligence, docility, alertness, indomitable industry, patience and great dexterity of eye, he showed no signs of originality. Yet in his maturity he revolutionized the painting of light.

Secondly, Rilke, the poet. Of him Hudson says,

> "Indeed, his behaviour is almost a caricature of the inspirational genius at work: the long years of inactivity; the sudden insight, in which the whole poetic fabric of his poems seems revealed in a phrase; the extraordinary sense that in writing

> he was taking some divine variety of dictation; the astonishing speed and lack of doubt with which he worked; the totally unexpected eruption of the Sonnets when he had set out to complete the Elegies. In all these respects, Rilke seems to have enjoyed an unusual and exalted experience."

Thirdly, Kepler, the scientist who had a sudden insight, an absolute conviction, which he kept for years. Though his insight proved to be a "dud", it carried him eventually, through an enormous amount of work, to the discovery of "Kepler's Laws".

Finally, Charles Darwin. Darwin was "barely competent" at school and was taken away early and sent to Edinburgh to study medicine. He idled away his time in Edinburgh and after two years, when he learnt that he was to inherit money, stopped work altogether. His father, not liking him becoming an idle sportsman, decided that he should become a clergyman and sent him to Trinity College, Cambridge, where he obtained his degree after three years. His main interest while at Cambridge was in shooting wildfowl. It was the merest chance that the opportunity to voyage on the "Beagle" came about, thus transforming his life. As Hudson says, nothing in his early life indicated his dormant gifts.

These histories demonstrate the complex nature of the creative process and warn in Hudson's words that "psychology remains a discipline with practical influence - through the beliefs of parents, teachers and administrators - over the shaping of children's lives. It follows that over-simplification may be translated into practical blunders".

Another important point is the role of "unconscious" or "subliminal" forces which many artists and scientists have credited in trying to account for their achievements. To take Poincaré as an example "The role of this unconscious work in mathematical invention appears to me incontrovertible." (Quoted by Getzels and Madaus, 1969)

1.4 Creativity and education

> "Creative education...aims at a self-starting, resourceful, and confident person, ready to face personal, interpersonal and other kinds of problems. Because he is confident, he is also tolerant where there should be tolerance. A world of tolerant people would be peaceful and co-operative people. Thus creativity is the key to education in its fullest sense and to the solution of mankind's most serious problems."
>
> (Guilford, 1967a)

That the idealistic aim implicit in these words of Guilford's, is far from being realized in education today, could hardly be disputed. In reading the literature on creativity the impression is gained that there is a split between the needs of the individual and the needs of society. It is implicit in much of the writing and research on creativity. The stress on the testing and early discovery of talented individuals implies that if they were left to the mercy of the ordinary school system, their talents would never reach fruition, to the detriment of society. That the needs of society and the individual need not be antagonistic is illustrated by the above quotation from Guilford.

Maslow (1959) believes that there should be no segregation of the creative from the non-creative. He distinguishes "special talent creativeness" from "self-actualizing" creativeness and believes that the practical consequences of his thinking are that,

> "It definitely discourages the either-or, all-or-none approach to creativity which is now so wide-spread and which amounts to a dichotomous separation of sheep from goats, creative from non-creative, those who <u>are</u>, from those who <u>are not</u>. Instead it tends to see more or less creativity in every person, if only as supressed potential, and asks the questions 'Why was it lost? How much is left? How much can be recovered?' "

The implications of this sort of approach for education are obvious. An educational system in which the need for the full development of the individual was recognized, and made possible of fulfilment, would not need to worry about a waste of creative talent. Fromm (1959) referring to the creative attitude says,

> "...creativity in this sense does not refer to a quality which particularly gifted persons or artists could achieve, but to an attitude which every human being should and can achieve. Education for creativity is nothing short of education for living."

In any event, if it were possible to detect, with accuracy, the creative at an early age could they be trained? Vernon (1967) says,

> "Programmes designed in America to train creative thinking may contain educationally valuable ideas but, in the writer's view, are irrelevant to the development of outstanding creative talent."

Some investigators, for example MacKinnon (1967b) and Hudson, (1967) suggest that the exceptionally creative may emerge, despite poor education - in fact it might even act as a challenge. Torrance (1967a) takes a somewhat different view quoting Plato that "what is honoured in a country will be cultivated there," and points out that at different times and places certain types of creative talent have flourished - for example music in Europe 100 to 200 years ago.

Various attempts have been made to increase creativity in the classroom. Most of the ideas come from America and vary from "brainstorming", which involves producing a large volume of ideas under conditions which suspend criticism, to providing a permissive attitude and shunning drill. "But the question remains whether any of the proposals do in fact increase creativity." (Getzels and Madaus, 1969)

Barnes (1967) believes that creative problem solving can be taught. He predicts that in the education of the future there will be less emphasis on memory and more on creative thinking. Today people cannot foresee what knowledge they will

need in five or ten years time. Therefore there is need to develop flexibility so that future problems can be met creatively and inventively.

Torrance (1967b) has done a large amount of work on the encouragement of creativity in the classroom and believes that "creative teaching makes a difference". However some of the methods he advocates as "creative teaching" as opposed to "non-creative" teaching could be seen as "good" as opposed to "bad" teaching. The following are included in "A Checklist for Creative Teaching" by one of his students,

> "Don't be afraid to wander off your teaching schedule - stay flexible. Different kinds of children learn in different ways. Criticism is killing - use it carefully and in small doses. Don't be afraid to try something different."

But consider the following statement in the preface to "Creativity: its Educational Implications" (Gowan et al, 1967).

> "Recent research also hints that effective teaching behaviours fostering creativity include energy, wisdom, patience and originality."

Surely research is not needed to establish that these qualities are important in all good teaching. When creativity is "taught" as if it were something new on the curriculum it becomes narrow and self-defeating. Hudson (1967) is sceptical of much of the "fashion" for creativity teaching but says, somewhat lightheartedly,

> "The conscious nurture of children's creative potentialities may still be a worthwhile operation, but not because it produces more and better brainworkers. It may be worthwhile because, quite simply it makes school a more enjoyable place to be. And this, in its turn, may lead children a little nearer the 'rich emotional life' which is every progressive psychologist's dream."

However research on creativity has come up with some valuable warnings for educationists. Convincing evidence has been found that creative children are actually discouraged in schools. Getzels and Jackson (1962) in their study of highly intelligent and highly creative school children found that the highly intelligent group was more favoured by teachers, than the highly creative group despite the fact that the latter group with a lower mean IQ reached the same level of attainment.

MacKinnon (1967a) says that,

> "Creative students will not always be to our liking...in striving to achieve creative solutions to the difficult problems which they have set themselves they will often show psychic turbulence which is so characteristic of the creative person."

And R.B. Cattell (1963) points out that,

> "whereas the schools for at least two generations have cherished the ideal of the extrovert, almost as if it were synonymous with mental health, the evidence is overwhelming that the creative person is an introvert."

Thus creativity research has provided the impetus for some valuable re-thinking of educational methods. The following "warning" note from Cattell (1963) might be used to sum up this section,

> "In any case, creativity is not to be cheaply achieved by tinkering with curricula, for all the evidence indicates that it lies in personality and values, not in cognitive skills."

1.5 Criteria and measurement

1. Tests

Although Hudson (1967) refers to a period of "false academic calm" research into intelligence never really ceased. Despite Spearman's two factor theory an awareness of the complexity of intelligence was implicit in the diversity of tasks in the

intelligence scales. Research led eventially to Guilford's structure of intellect theory in which he,

> "organizes the various primary mental abilities...into a three dimensional grid or box. One dimension of the grid classifies abilities into five major groups according to the kind of process or operation performed (cognition, memory, divergent thinking, convergent thinking, and evaluation); the second dimension of the grid classifies abilities into four categories according to the kind of content involved (figural, symbolic, semantic, and behavioural); and the third dimension classifies abilities into six categories according to the kind of product entailed by the application of a certain operation to a certain type of content (units, classes, relations, systems, transformations, and implications). These three dimensions of categorization generate 120 cells, each of which theoretically represents a separate ability identified by a particular kind of operation, content and product. Only about fifty of these hypothesized factors are now known, but the properties of the empty cells are specified, so that the model also serves as a guide for future investigations of intellectual differences. Guilford's classification system thus provides an important bonus - it offers a prescription for test construction in as yet unexplored areas of intellectual functioning. Another noteworthy feature of this model is that it highlights a relatively new distinction in cognitive functioning - one that has been systematically investigated in Guilford's own laboratory - namely the properties of fluency, flexibility, and originality that characterize what Guilford has called "divergent thinking". These properties take us beyond the confines of accuracy and correctness, the sine qua non of intelligence, into the realm of creativity."
>
> (Jackson & Messick, 1967)

Guilford's work inspired a great variety of "creativity" tests. Examples among the many are; Mednick's Remote Associates Test, built on associative theory, Flanagan's Ingenious Solutions to Problems Test which attempts to assess creative thinking through multiple-choice items and the AC Test of Creative Ability, directed especially at problems of engineering. There are many others but possibly the most extensive set for use at all educational levels is the Minnesota Tests of Creative Thinking.

It is by no means certain that these tests actually test creativity. Hudson says "there is scarcely a shred of factual support for this". But Gowan (1967) believes that though tests of creativity are limited they do seem to pick out creative children.

2. Another method of establishing a criterion of creativity is actual achievement. For example, the Nobel prize could be taken as an undisputed indication of creative talent.

3. Ratings have also been used as a criterion - this involves evaluation by peers, supervisors, teachers etc. This method was used by MacKinnon (1964) in his study of architects, and by Anne Roe (1953) in her study of scientists.

4. Personality. The closeness of fit to an empirically derived profile of the creative personality is used as a criterion. As this is the method used in this study it is described in more detail later. Chapter 2 deals with the personality characteristics of creative individuals and Chapter 4.3 and 5.1 describe the method of calculating a creativity score. As the subjects in this study are children, and the creativity score is derived from personality factors of a standardised personality test and based on the creativity of adults, the question needs to be answered as to whether the same personality dimensions appear in children and adults. In answer to this question Cattell and Butcher (1968) say,

> "Theorists have, in general, favoured the view that personality structure might be expected to be simpler with younger children, and the probability that fewer personality factors would be evident. This hardly seems to be true, for some fourteen to fifteen factors have been found at the high-school level and almost the same number in the younger age groups."

Which is the best criterion of creativity? Hudson (1967) quotes Cox as saying many years ago,

> "...high but not the highest intelligence, combined with the greatest degree of persistence, will achieve greater eminence than the highest degree of intelligence with somewhat less persistence."

And MacKinnon (1962) says,

> "Our data suggest, rather, that if a person has the minimum of intelligence required for the mastery of a field of knowledge, whether he performs creatively or banally in that field will be crucially determined by non-intellective factors."

Hudson then points out thaa if they are right the search for better tests of high-grade intelligence is a mistaken one. Instead we need better tests of personality. However he points out that because a test which predicts creative reasoning has not yet been devised, it does not mean to say that it is not possible to devise such a test. Present mental tests are crude affairs compared with the skills needed by, for example, a research scientist.

It seems that creativity is the product of a subtle and complex blend of factors including innate ability, environmental conditioning, personality, accumulation of knowledge - plus a dash of chance - and therefore it is not surprising that attempts to measure it have not yet met with complete success. However, the measurement of personality factors conducive to creativity is one of the most fruitful avenues. As Hudson says,

> "The whole point of testing, in other words, lies in measuring those qualities which predispose a man to follow a particular bent. Some of these may be a matter of intellectual ability; but, in all probability, the majority do lie - as Cox, Roe and MacKinnon suggest - within the sphere of personality."

CHAPTER 2

THE PERSONALITY OF CREATIVE INDIVIDUALS

As stated in the previous chapter, one criterion of creativity is based on a measure of personality, and this is the one used in this study. But what is the personality of the creative individual? Do all creative individuals have the same personality pattern, or does it differ according to the field of interest? An attempt will be made in this chapter to answer these questions.

2.1 Biographical studies

The first studies of the personality of particularly creative individuals were biographical, notably Kretschmer's "Psychology of Men of Genius" (1931). Kretschmer gave some support to the old idea that,

> "Great wits are sure to madness near allied,
> And thin partitions do their bounds divide."+

holding that a streak of pathological instability, or unbalanced tension is essential to creativity. Cattell and Butcher (1968) point out that this idea was largely refuted by Terman's "Genetic Studies of Genius" written in 1925, in which he studied the top one per cent, in intelligence of a group of school children. He found that they were significantly more physically fit and free of mental disorder, than the general population. Cattell and Butcher say further,

> "More statistically objective studies than Kretschmer's show that psychosis (or at least schizophrenia, which constitutes more than half of all psychoses) is actually less frequent among persons of high creativity, as are a variety of other mental disabilities. If we exclude anxiety neuroses, there is also no indication that geniuses are more neurotic. But there <u>are</u> indications that high creativity may be associated with unusual degrees of introversion and with certain kinds of high anxiety, as well

+(John Dryden - Absolom and Achitophel - Part I)

> as with flexibilities of imagination that are quite disabling in regard to high efficiency and freedom from oscillation in routine performances."

The study of the personality of creative people became more exact and scientific with the development of personality testing. In particular the application of the technique of factor analysis to personality study meant that definite factors could be isolated. Cattell (1965) says,

> "Factor analysis, on the other hand, believes that there are natural, unitary structures in personality and that it is these traits, rather than the endless labels in the dictionary, on which we should concentrate."

In 1963 Cattell published a study in which he surveyed the lives of eminent research scientists, and it is important to note that his findings were arrived at before the empirical studies of Drevdahl and others, though published later. Though he studied the scientists biographically he described them in terms of personality test factors. To begin with, in terms of the broad, second order factors, he found that the typical research scientist appeared to be introverted and stable. Referring to this study Cattell and Butcher (1968) say,

> "On the whole...one would expect that the ability, characteristic of introverts, to withdraw, to exclude the outside world in long periods of concentrated thought and speculation, would outweigh in creative scientists (and even more in creative artists) the superior ability of the extrovert to communicate socially. This is indeed what was generally found.
>
> On the other hand, to say that creative scientists appear from the biographical evidence to be introverted rather than extraverted is too simple a statement and needs some qualification. The very broad

> second-order concepts of introversion and extraversion are useful for a first approximation, but can conceal as much as they illuminate, and a description in terms of primary factors may be needed to make the picture clearer and more consistent. Certainly, this seems to be so for eminent scientists. The general tendency to introversion does not apply to all the components, but seems to be largely concentrated in the A Factor." (Affectothymia, A+, versus Sizothymia A-)

The A- scientist can be described as "sceptical, withdrawn, unsociable, critical, precise". However on another component of introversion, the H Factor, (Parmia versus Threctia) they are on the positive end of the scale and display resourcefulness, adaptibility and adventurousness. On Factor F, (Surgency - Desurgency) they have been found low, showing characteristic introspection, restraint, brooding and solemnity of manner.

> "These observations suggest a certain paradoxical structure within the general introversion second-stratum factor, in that traits that generally tend to correlate positively in the general population may very well correlate negatively among creative scientists; and this may be the basis of Kretschmer's notion of "warring heredity", in that such people appear to have a constitutionally low susceptibility to inhibition, as would be shown by a low score on Factor H, while yet being highly inhibited, as would be shown by a low score on Factor F."

With regard to the second order factor of stability it seems to be generally agreed that creative geniuses have a higher average level of ego strength and emotional stability than the general population.

Other characteristics that Cattell found from biography were that creative scientists appeared to have the socially rather uncongenial and undemocratic attitudes associated with dominance (Factor E) and with the L Factor (Suspecting versus Accepting). The dominance of the E Factor seems to be associated with a rugged independence of mind, and a readiness to face endless difficulties and social discouragement. Lastly, they have an exceptional degree of intellectual self-sufficiency and are able to depart freely from the customary judgments of the world without being upset by their isolation. They appear to barely notice their own eccentricity and they expect the freedom to be odd.

To summarise Cattell's findings in terms of the primary personality factors, the personality profile of the creative scientist is one of schizothyme hardness, high intelligence, stability, dominance, desurgent taciturnity and high self-sufficiency.

2.2 Empirical studies

The first empirical study using primary personality factors was carried out by Drevdahl (1956) with graduate students. His criterion was the creativity shown by these students in essays, research and class discussion, as evaluated by professors familiar with them. He found statistically significant differences between students of high and low creativity on the 16 Personality Factor test (described in Appendix A) in that the former were more schizothyme (A-) self-sufficient (Q_2) desurgent (F-) and radical (Q_1).

A more extensive study by Cattell and Drevdahl (1955) was concerned specifically with creativity in the scientific field. A careful search was made for 46 leading research physicists, 46 distinguished research biologists and 52 productive researchers in psychology. They found that the personality profile of the creative scientists was very different from that of the average man being decidedly more schizothyme, more intelligent, more dominant and more inhibited. They were also significantly more emotionally sensitive (I+), more radical (Q_{1+}) and somewhat more given to controlling their behaviour by an exacting self concept.

In comparison with the general population, physicists, biologists and psychologists are thus close together, but there are some interesting minor differences. For example, it was found that the physicists are even more sizothyme than other researches, and the psychologists more dominant and less desurgent.

It was also established that successful researchers have much in common with eminent teachers and administrators when compared with the general population. However researchers are more sizothyme, less emotionally stable, more self-sufficient, more bohemian and more radical than are successful administrators and teachers.

In considering second-order personality factors, the researcher is lower on all primary personality factors involved in the second order extraversion factor than the general population. On the other hand, Cashdan and Welsh (1966) in a study of talented adolescents found that the high creative adolescent was one whose "interpersonal relationships are open and active". This suggests extraversion rather than introversion.

Anne Roe (1953) studied the personality traits of scientists (physicists, biologists and psychologists) and her results are in essential agreement with Cattell's. She studied 64 foremost American scientists (selected by ratings) through interviews, and by Rorschach, Thematic Apperception and Intelligence Tests and found personality differences to be more crucial than differences in intelligence. These scientists showed marked independence of mind and self-sufficiency and, although not overtly dominant or bossy, they showed considerable stubbornness and autonomy of judgment.

Barron (1955) found that more original or creative people tended to prefer complexity in their appreciation of works of art, to be more independent in their judgment, to be more self-assertive and dominant, and to reject suppression as a mechanism for the control of impulse.

MacKinnon (1962) is convinced that cognitive tests of divergent thinking are not adequate to distinguish creative and non-creative people in terms of real life achievement. His best known study is of 124 American architects, which he divided into three groups representing different levels of creative talent. He tested them with a variety of tests and among other characteristics revealed were dominance, rather low sociability, freedom from conventional restraints and inhibitions, readiness to admit views that were unusual and unconventional, relatively high femininity of interests and a general level of score slightly higher than the population average on those scales of the Minnesota Multiphasic Personality Inventory that measures tendencies to major neurotic or psychotic tendencies such as depression, schizophrenia, hysteria and so forth.

In attempting to answer the question, as to what extent creative persons in one field are like those in another, for example those in science like those in arts, Cattell and Butcher (1968) say,

> "At present we have to deal only with 'indications' of differences, but the common pattern is strongly evident."

They cite Lowell Kelly's results with medical men that it is a pattern which tends to be subjected to group antipathy and derogation.

Cattell and Drevdahl (1958) also give an answer to this question. They made a study of 153 writers of imaginative literature who showed a profile on the 16PF test that, by any pattern similarity coefficient (an index designed to express overall similarity between two profiles), would definitely be placed in the same family as the profiles for creative scientists; and the same is true of artists, taken from persons listed in Who's Who in American Art. This similarity also holds, as Drevdahl (1956) has shown, for those who are graduate students in the field of liberal arts and who are selected as highly creative. Cross, Cattell and Butcher (1967), in a study of sixty-three visual artists, found that the largest differences from scientists were on the anxiety factors, all in the direction of the artists being more anxious but they felt this may have been due to the youth of the subjects.

Thus differences are minor and studies of personality and creativity have shown a remarkable degree of similarity and consistency of the personality picture across all areas. In the words of Cattell and Butcher (1968),

> "It would almost seem as if the differences between science, art, and literature are differences of particular skills and interests only, and that the fundamental characteristic of the creative, original person is a type of personality."

Thus, fundamental agreement by many researchers is found in describing the personality pattern of the creative person. Differences are minor, though they will no doubt become more precise as research continues.

The question arises as to how far this knowledge can be used to predict creativity. Khan (1969) found that in predicting academic achievement, affective criteria, when added to the aptitude tests increased correlations. Taylor and Holland (1964) consider personality as measured by tests such as the 16PF a poor predictor but point out that there is considerable variation among studies.

However members of the Institute for Personality and Ability Testing have confidence in the ability of their tests to discover creative talent. They point out (Information Bulletin 10, 1963) that there are two main directions which research in this field has taken. Firstly, investigating more creative types of response in examination situations, and secondly, finding the personality characteristics of geniuses and outstandingly productive people in everyday life. They believe that the second approach is probably sounder, because there is no guarantee that the person who is clever in a standard test situation will necessarily have the motivation and temperament which make for originality and productivity in real life situations. They quote the research of Cattell and Drevdahl, and others, which has been described above in support of this.

2.3 The Creative Personality as measured by the IPAT tests

Thus research has led to the claim that certain personality tests can measure "creativity". The tests used in this study are the Children's Personality Questionnaire and the High School Personality Questionnaire, both developed by the Institute of Personality and Ability Testing and described in detail in Chapter 4.3. The 16 PF test, which is referred to in discussion is described in Appendix A. The CPQ and the HSPQ both have the majority of factors in common with the 16 PF. In describing personality in terms of these factors IPAT Information Bulletin 10 (1963) says,

> "In most general terms the creative person is a self-sufficient introvert, as shown by his significantly higher scores on the 16 PF Factors A- (reserve), F- (desurgency), and Q_2+ (self-sufficiency). There are other differences, but this is the most substantial one. This finding may itself explain why we have <u>needed</u> to get so concerned about creativity, for our high schools, particularly, have heretofore been geared to producing extraverts and "good mixers". Indeed, many educational psychologists have written as if extraversion and good adjustment were one and the same thing."

They say further,

> "Actually, the creative individual is not a simple introvert, and this is one reason why it is desirable to use all factors on the 16 PF or HSPQ rather than a single, second-order measure of extraversion-introversion. The H factor is high in the creative scientist in the opposite direction to that which would be expected from its setting in the second-order introversion factor. This probably means that the creative person is someone who might naturally have been an extravert,

> but who has experienced major inhibiting forces, which have, so to speak, kept the steam from escaping too easily. At any rate, the statistical formula which gives best prediction is one which weights Factors A, F, and Q_2 in the direction of introversion and H in the opposite direction."

At the high school level, the HSPQ also gives a measure for School Achievement and it can be seen that the personality attributes required for school achievement are different from those required for creativity. (The formula for School Achievement is .2A, .7B, -.1D, .3G, -.2H, -.4I, .2J, -.2O, $.3Q_2$, $.2Q_3$, $.2Q_4$, -1.1. The formula for Creativity is -.2A, +.4B, +.2C, +.2D, +.3E, -.4F, -.4G, +.2H, +.4I, +.1J, -.3O, $+.1Q_2$, $+.1Q_3$, +1.7.) The greatest difference is in the I factor; the creative person being tender-minded while the school achiever is tough-minded. The second greatest difference is in the G factor, the creative disregards rules (i.e. weaker superego strength). Other less marked differences are: the creative is reserved, sober, adventurous, excitable and assertive, while the achiever is warm-hearted, shy and undemonstrative. Both must score positively on intelligence but it is "weighted" .7 for the achiever and only .4 for the creative, (i.e. the sten score must be multiplied by .7 and .4 respectively).

Of the factors which are relevant in the creative profile, the I factor is of particular interest because -

1. It has the highest weighting in the Children's Personality Questionnaire (CPQ) (.69) and is one of the highest with 3 others in the HSPQ (.4).
2. There is the greatest difference between male and female on this factor. (Cattell 1965)
3. It is determined more by environment than heredity. (See quotations following.)
4. Its role in creativity does not seem to be clear. (See quotations following.)

Of the I factor Cattell (1965) says,

> "The nature-nurture evidence shows that this is largely a culturally determined pattern, not a temperament difference. Furthermore, there is evidence that its level is largely an expression of the degree of over protection or indulgence exercised by parents. The average score is quite significantly higher for girls than boys, which may largely reflect the greater degree of protection and indulgence which our culture exercises over girls."

Cattell and Butcher (1968) in their review of creativity say,

> "The high Premsia, I, seems to be characteristic of certain groups, e.g. it is marked in Meredith's students, and in Drevdahl's artists, but absent, as a true contributor to the criterion from Jones' chemists and engineers of mature years. (Possibly it is a necessary youthful 'process variable')".

Thus it would seem that its use as a predictor at the pre-adolescent level is open to doubt - longitudinal research is needed to clarify this issue.

Cattell and Butcher say further,

> "Evidence is accumulating that the I source trait dimension is related to early home background. It appears that 95 per cent of the variance arises from environment determination and only 5 per cent from hereditary determination. So far as preliminary evidence can show, the increase of Premsia, i.e. of protected emotional sensitivity, has to do with overprotection and indulgence in childhood. Because this factor was found by Cattell and his associates to be negatively related to various kinds of achievement, and by Cattell and Stice (1960)

to be related to 'hindering' and 'self-centredness' in small-group behaviour, it is hard to interpret the rather high I found in academic researchers (not, be it noted, with industrial researchers) as advantageous. More likely, we are dealing here with an incidental and non-useful characteristic of academic selection."

CHAPTER 3

CREATIVITY COMPARED WITH ACADEMIC ACHIEVEMENT

In this section research in which academic achievement and creativity are compared in some ways is described. In the present study the criterion of academic achievement is actual performance, i.e. success or otherwise in examinations and it is studied at the school level. Some similar studies have used standardised achievement tests, and some have been conducted with University students. The other variable, creativity, can be assessed in various ways.

3.1 Studies in which creativity is assessed by creativity tests

The best known of these studies and the one which inspired a large volume of research was that of Getzels and Jackson (1962). They criticized the intelligence test, believing that the single measure is limited, it does not measure all functions and it takes no account of different kinds of intellectual ability. They therefore embarked on a research project with adolescent school children in which they set out to identify two groups of subjects differing significantly in kind of intellectual functioning - in this case "intelligence" and "creativity". These two groups, despite a 23 point difference in mean I.Q., performed equally well on standard measures of achievement. In summarising their findings Getzels and Jackson say,

> "It is clear that the intellectual functioning of adolescents can be differentiated not only into quantitative categories of high and low I.Q. but also into qualitative categories among which are 'high I.Q. without concomitantly high creativity' and 'high creativity without concomitantly high I.Q.' The intellectual functioning represented by these two categories bears resemblance to Guilford's factors of 'convergent' and 'divergent' thinking."

Although Getzels and Jackson's findings were soon confirmed in six of eight replications by Torrance, their study has been criticized chiefly because their group was untypical being well above average in intelligence. Cyril Burt (1962) in a careful critique of this work sums up by saying that the weight of evidence is strongly against the somewhat simplified interpretation that there are just two basic cognitive or intellective types.

Wallach and Kogan (1965) criticized the Getzels and Jackson study because the five creativity tasks which they used as their criterion did not correlate strongly among themselves, and that there was therefore no evidence for arguing that the creativity instruments were any more strongly related to one another than to general intelligence. In their own careful study they attempted to eliminate this and did succeed in obtaining higher correlations between their measures of creativity and between their measures of intelligence (.4 and .5), and a low correlation between the two sets of measures. (.1) They divided their subjects into four groups for each sex i.e. high creativity, high intelligence, high both and low both. These groups showed different behavioural characteristics and they believe that one needs to know if creativity is present in the context of high or low intelligence and say,

> "One must seriously question therefore the Getzels and Jackson procedure of defining a 'high creative' group as children who are high in creativity <u>but</u> low in intelligence, and defining a 'high intelligent' group as children who are high in intelligence <u>but</u> low in creativity. If one wishes to establish generalizations about the nature of creativity and of intelligence as distinct characteristics, one cannot afford to ignore those children who are high in both and who are low in both."

Hasan and Butcher (1966) gave tests similar to those used by Getzels and Jackson to 175 Scottish children with a mean I.Q. of 102. Correlation between I.Q. and measures of creativity were much higher, in spite of a smaller range of ability. Contrary to expectations the "high creativity" group was lower in attainments.

Hudson (1966) gave tests of creativity and intelligence to English schoolboys and found that divergence coincided with the arts and divergence with science.

Edwards and Tyler (1965) used two creativity tests from Torrance's battery and administered them to 181 9th grade students along with School and College Achievement Tests (SCAT) and Sequential Tests of Educational Progress (STEP) batteries. The most important conclusion that they drew from these tests is that the generalizability of the Getzels and Jackson and the Torrance findings about the relationship of creativity scores to academic achievement is limited. They say that they apparently do not apply to all kinds of students, all kinds of schools, and all kinds of intelligence and creativity tests.

Cicirelli (1965) investigated the interaction between creativity and I.Q. as they affect achievement, and I.Q. thresholds where creativity begins to affect achievement and where I.Q. itself has no further effect. The study involved 609 6th grade pupils (I.Q. range 70 - 162), using a factorial design with 8 levels of I.Q. and 3 levels of creativity (Minnesota Tests of Creative Thinking). Measures of achievement were Gates Basic Reading tests and the California tests of Arithmetic and Language. Twelve combinations of creativity and achievement measures were used for separate analyses of variance. At the .05 level, results generally implied additivity and linearity instead of interaction and thresholds. The relationships between creativity and achievement was weaker than some previous studies suggested and varied with the measure used.

This is in conflict with Hudsons (1967) view that at the higher I.Q. levels the relationship between I.Q. and accomplishment dwindles, but at different points for different subjects.

Bentley (1966) attempted to clarify the relationship between creative abilities and academic achievement in a study with 75 graduate students in education. He obtained creativity test scores, Millers Analogies Scores (MAT) and achievement scores representing Guilford's categories of Cognition, Memory, Divergent Thinking and Evaluation. Results indicated that creativity test scores correlated significantly with divergent thinking and evaluative abilities; no correlation was found between creativity and cognitive and memory scores. MAT scores correlated with all mental operation categories although the relationship was less for divergent thinking and evaluative categories. No differences were found between MAT scores and creativity scores in predicting academic achievement. He concluded that since most academic examinations favour memory and cognitive abilities, the highly creative student is often penalized unduly. He further observes,

> "Perhaps even more serious is a possible thwarting or suppressing of the creative ability since other abilities are continually exercised and tested and therefore emphasized and rewarded."

3.2 Studies in which creativity is assessed by actual creative performance.

In the study of Skager and Schultz (1965) their criterion of creativity was actual performance based on biographical information. They scored for Quantity (number of accomplishments) and Quality (the level of a single most outstanding accomplishment). The meaningfulness of this distinction is dependent upon inter-correlation of the scores and their differential correlations with other variables. For a sample of entering college freshmen Quality and Quantity scores were significantly correlated, but Quality was more highly related to academic aptitude whereas Quantity was more highly related to a measure of intellectual stimulation in the home.

Holland (1961) made a study of talented adolescents. His criterion of academic performance was high school grades during the first three years of high school, and his criteria of creative performance were derived from a checklist of accomplishments assumed to require creative or original behaviour. His results suggest that creative performance at high school level occurs more frequently among students who are independent, intellectual, expressive, asocial, consciously original, and who have high aspirations for future achievement. Students who are persevering, sociable, responsible, and whose parents hold somewhat authoritarian attitudes and values, are more frequently academic achievers. He believes that the negligible relationship found between academic aptitude level suggest the need to use non-intellectual criteria in the selection of students for scholarships and fellowships.

3.3 Studies of some personality attributes and academic achievement

No studies could be found in which the "creative personality", as measured by a standardised personality test, was related to academic achievement. However there are a number of studies which relate types of personality to achievement and some representative examples of these follow.

Astington (1960) used ratings of personality by teachers and classmates. He studied 300 boys in 5 primary schools and 700 boys in grammar school, and found that at all levels, successful boys received significantly higher ratings than unsuccessful boys for persistence, independence and interest. Dominance seemed to have no consistent connection with academic achievement. Successful boys showed a slight tendency to be considered more nervous but more emotionally stable. Successful older boys tended to consider themselves less extraverted and less sociable, than their unsuccessful fellows. Ratings made in the second year of grammar school predicted G.C.E. performance better than I.Q., but less well than second year examination performance.

Savage (1962) gave the Maudsley Personality Inventory to first year students at an Australian University over three years and scores on this were related to their academic performance at the end of their first year. Analysis of variance and correlation techniques showed that high scores on neuroticism and extraversion were negatively related to academic performance. Results further suggested that an optimum level of neuroticism exists for successful academic achievement and that there is a U-shaped relationship between the variables.

Butcher et al (1963) tested 12-14 year old British and American children with Cattell's HSPQ and compared their mean scores on 14 personality factors and two second-order factors (extraversion and anxiety) with school achievement. Although significant differences were found on a number of factors, the same factors were in general found to be related to school achievement. (B, G and Q2)

Butcher also gives a list of reasons why studies involving the two broad factors of anxiety and extraversion-introversion are conflicting. These reasons are likely to be applicable to studies involving creativity and will therefore be quoted. They are -

(a) Different cultural patterns. For example extraversion may be more of an asset in American schools than British.

(b) Changing conditions of work e.g. introversion may be more of an asset at sixth form and university level.

(c) Different definitions of variables and in particular blurring of the distinction between anxiety and neuroticism.

(d) Non-linear relations between the variables.

(e) Varying effects against different criteria, e.g. English or Arithmetic.

(f) Sex differences. Women were found to have higher average scores on introversion. It is also possible that the relation between introversion and school achievement shows a sex difference.

Savage (1966) found in a study of 93 school children (average age 7 years 11 months, S.D. 6 months) that it appeared that high extraversion is related to a higher intellectual level and higher academic attainment in these children.

Rushton (1966) in a study of 458 eleven year old children, found that well adjusted extravert children have higher scholastic attainment.

Ainsworth (1966) used the High School Personality Questionnaire in a study with American and British children. She found American children to be significantly more friendly, more conscientious and less dominant than British children. Conscientiousness and self-sufficiency were the most promising factors as predictors of school attainment.

Entwistle and Cunningham (1968) made a study of 2,995 children aged about 13 years. They gave them the Junior Eysenck Personality Inventory. School attainment was measured by teachers average rank order in class, scaled on a verbal reasoning test. The relationship between attainment and the personality dimensions of neuroticism and extraversion were examined. Evidence is presented which suggests that the relationship between neuroticism and attainment is linear; high attainment in this age group was associated with stability. The results for extraversion showed a sex difference, which they felt might explain earlier conflicting findings. Girls who were stable extraverts and boys who were stable introverts formed superior groups. These relationships were also present among the brightest children. They concluded that extraversion shows no significant correlation with school attainment, because a distinct sex difference produces an overall non-linear relationship. Extraverted girls and introverted boys tend to be more successful in school work than children with the opposite personality characteristics.

CHAPTER 4

RESEARCH DESIGN AND EXPERIMENTAL PROCEDURES

4.1 Aims and hypotheses

The principal aim of this study was to investigate the relationship between creativity, as measured by personality tests (the Children's Personality Questionnaire and the High School Personality Questionnaire) and school performance as measured by end-of-the-year marks awarded by the schools themselves.

More rigorously this means testing the following research and statistical hypotheses:

1. H_{r1} That a positive linear relationship exists between creativity and school performance.

   H_{o1} That a positive linear relationship does not exist between creativity and school performance.

2. A further aim was to investigate the significance of the difference between the means of the creativity scores of boys and of girls.

   More rigorously:

   H_{r2} There is a significant difference between the means of the creativity scores of boys and of girls.

   H_{o2} There is no significant difference between the means of the creativity scores of boys and of girls.

In this study, after testing for curvilinearity it was accepted that a linear relationship existed between creativity and school performance throughout the age range of the study.

4.2 Description of sample

The sample consisted of almost all the English speaking scholars in Grahamstown from Standard 2 to Standard 10. (The only Afrikaans school was not included because of the impossibility of obtaining suitable tests in Afrikaans and because the numbers were relatively small.) A small parallel medium junior school was also omitted as the number of English speaking children was extremely small. Thus the seven English speaking schools in Grahamstown were tested. None of these schools are co-educational, there being four boys schools and three girls schools.

Two of the schools are government schools (Schools 1 and 7) and the rest are private church schools. The numbers rise in the upper standards due to the increase in the number of boarders. The private schools draw their pupils from all over the Republic and beyond. The same, to a slightly lesser degree can be said of the government schools and all cater for the surrounding farming areas.

The sample is thus not a completely typical one, having a high proportion of children from the higher socio-economic brackets, especially in the higher standards but it is fairly representative of South African education. Although the schools do not depart greatly from the usual pattern in South Africa, there are some aspects of education in Grahamstown which are worth noting. It is an accepted educational centre having for its size a large number of well-known schools, a University and a Training College. Some of the private schools are famous throughout South Africa and this has an effect on the others which tend to compete. Thus the atmosphere is highly competitive both between the various schools and within them. Almost all the schools hold formal prize-givings. Mark readings are held regularly and education is generally along formal lines.

There was a small wastage of children who did not complete the tests or whose examination marks were not available. Final numbers used were as follows:-

FINAL NUMBERS USED

School	Std 2	Std 3	Std 4	Std 5	Std 6	Std 7	Std 8	Std 9	Std 10
Boys									
1	33	27	40	43	62	65	56	52	31
2	14	16	25	35	65	68	49	38	56
3	12	9	11	13	34	32	20	30	24
4	12	14	35	59	78	85	76	87	57
BOYS TOTAL	71	66	111	150	239	250	201	207	168
Girls									
5	14	18	29	36	26	22	23	18	15
6	10	16	10	27	28	27	27	25	23
7	31	32	29	44	62	78	63	65	48
GIRLS TOTAL	55	66	68	107	116	127	113	108	86
T O T A L	126	132	179	257	355	377	314	315	254

Boys 1,463
Girls 846
TOTAL 2,309

4.3 Description of tests

The tests administered were the Children's Personality Questionnaire, 1963 Edition and the High School Personality Questionnaire, First South African Edition 1964/65. (See Appendix A)

(a) The Children's Personality Questionnaire or "CPQ" has been developed by the Institute for Personality and Ability Testing, Illinois, U.S.A. It is designed for children between the ages of eight and twelve and in this study was used for all the children from Standards 2 to 5 whose age range is approximately eight to twelve years. This test has not yet been standardised for South African children and therefore the Interim Manual for the CPQ (Porter and Cattell 1963) and the Tabular Supplement (Institute for Personality and Ability Testing 1968) with Norms for American children were used. Two forms of the test were available at the time of testing, A and B. In all cases Form A was used for this study. Each form consits of two parts with seventy questions in each part.

The CPQ measures fourteen personality factors, each measuring a dimension whose functionally independent nature has been established by factor-analytic research. Each factor has a technical name, a common name (or several such names) and an alphabetic symbol for convenience of reference.

BRIEF DESCRIPTION OF THE FOURTEEN CPQ PERSONALITY FACTORS:

Low sten score description	Letter identifying factor	High sten score description
A child with low score is:		A child with a high score is:
Reserved, Detached, Critical, Cool	A	Outgoing, Warmhearted, Easygoing, Participating
Less intelligent, Concrete-thinking, Lower scholastic mental capacity	B	More intelligent, Abstract-thinking, Bright, Higher scholastic mental capacity
Affected by feelings, Emotionally less stable, Easily upset, Changeable, Lower ego strength	C	Emotionally stable, Faces reality, Calm, Higher ego strength

A child with low score is:		A child with a high score is:
Phlegmatic, Deliberate, Inactive, Stodgy, Phlegmatic temperament	D	Excitable, Impatient, Demanding, Overactive
Obedient, Mild Conforming, Submissive	E	Assertive, Independent, Aggressive, Stubborn, Dominant
Sober, Prudent, Serious, Taciturn	F	Happy-go-lucky, Heedless, Gay, Enthusiastic
Disregards rules, Undependable, By-passes obligations, weaker superego strength	G	Conscientious, Persevering, Staid, Rule-bound, Stronger superego strength
Shy, Restrained, Diffident, Timid	H	Venturesome, Socially bold, Uninhibited, Spontaneous
Tough-minded, Self-reliant, Realistic, No-nonsense	I	Tender-minded, Dependent, Over-protected, Sensitive
Vigorous, Goes readily with group, Zestful, Given to action	J	Doubting, Obstructive, Individualistic, Reflective, Internally restrained, Unwilling to act
Forthright, Natural, Artless, Sentimental	N	Shrewd, Calculating, Worldly, Penetrating
Self-assured, Placid, Secure, Serene, Untroubled adequacy	O	Apprehensive, Worrying, Depressive, Troubled, Guilt proneness
Casual, Careless of social rules, Untidy, Follows own urges, Low integration	Q_3	Controlled, Socially-precise, Self-disciplined, Compulsive, High self-concept control
Relaxed, Tranquil, Torpid, Unfrustrated	Q_4	Tense, Driven, Overwrought, Fretful

(b) The High School Personality Test or "HSPQ" was also originally developed by the Institute of Personality and Ability Testing but in this case Form A of the First South African Edition (1964-65) was used for the children in Standards 6 to 10. This test has been standardised for South African children by the National Bureau of Educational and Social Research and the Manual with Norms issued in 1967. Like the CPQ it measures a set of fourteen independent dimensions of personality. Most, but not all, correspond with the CPQ dimensions.

BRIEF DESCRIPTION OF THE FOURTEEN "HSPQ" PERSONALITY FACTORS

Low sten score (1-3)	Alphabetical designation of factor	High sten score (8-10)
A boy or girl with low score is:		A boy or girl with high score is:
Reserved, detached, critical, cool	A	Outgoing, warm-hearted, easy-going, participating
Less intelligent, concrete-thinking, of lower scholastic mental capacity	B	More intelligent, abstract-thinking, bright, of higher scholastic mental capacity
Affected by feelings, emotionally less stable, easily upset, changeable, of lower ego strength	C	Emotionally stable, faces reality, calm, of higher ego strength (not the same as egotistical)
Phlegmatic, deliberate, inactive, stodgy	D	Excitable, impatient, demanding, overactive
Obedient, mild, conforming, submissive	E	Assertive, independent, aggressive, stubborn, dominant
Sober, prudent, serious, taciturn	F	Happy-go-lucky, gay, enthusiastic, impulsively lively
Expedient, evades rules, feels few obligations, has weaker superego strength	G	Conscientious, persevering, staid, rule-bound, has stronger superego strength
Shy, restrained, diffident, timid	H	Venturesome, socially bold, uninhibited, spontaneous
Tough-minded, self-reliant, realistic, no-nonsense	I	Tender-minded, dependent, over-protected, sensitive
Vigorous, goes readily with the group, zestful, given to action	J	Doubting, Obstructive, individualistic, reflective, internally restrained, unwilling to act

A boy or girl with low score is:		A boy or girl with high score is:
Placid, confident serene, untroubled	O	Apprehensive, worrying, depressive, troubled, guilt prone
Group-dependent, a "joiner" and sound follower	Q_2	Self-sufficient, prefers own decisions, resourceful
Undisciplined self-conflict, careless of protocol, follows own urges, has low integration	Q_3	Controlled, socially-precise self-disciplined, compulsive, has high self-concept control
Relaxed, tranquil torpid, unfrustrated	Q_4	Tense, driven, overwrought, frustrated

Apart from these primary scource traits the tests are able to provide second-stratum factors. These are "broader and sometimes less definite and less exactly measurable patterns found among the primaries and standing in the background" (Cattell and Cattell 1969). Those given by Cattell and Cattell are Exvia, Anxiety, Cortertia, Independence.

More relevant to the present study, statistically expressed estimates and predictions can also be calculated from the primary scores, namely, School Achievement, Neuroticism, Delinquency (Proneness), Recovery from Delinquency, Creativity, Leadership (Potential). There are two ways of doing this.

(a) Estimation of Goodness of Criterion Performance (Performance Evaluation) and

(b) Calculation of Fit to an Ideal Type (Adjustment Evaluation).

The formula for finding a Creativity Score used in this study uses the second method, and was calculated by a method of Cattell and Eber (1957) from profiles for older students and adults only.

4.4 Administration of tests

The testing was done in slightly over two months, from July 25th 1968 to September 30th, 1968, inclusive. This meant that it was done during the third term for the government schools, which have four terms, and towards the end of the second term, or beginning of the third for the private schools, which have three terms.

The children were tested in school time, generally in their own classrooms, although sometimes several classes were combined in a larger room to make testing easier. Arrangements were made with the schools beforehand and the classes were usually expecting the tester.

On entering the classroom the tester introduced him or herself and then said, "Your class has been chosen along with others in Grahamstown to take part in an investigation into what you think about certain things, for example some school subjects. This should help us in improving teaching.

You will be asked some questions which will not affect your school marks in any way. We are only interested in finding out about school children in general, so we are only asking for your name so that the tests don't get mixed up. All the results are confidential."

The tests were administered in a definite order, the personality test always coming first. The booklets for the personality tests were then handed out face down.

Procedure for Standards two and three

These standards were given the CPQ Form A. Parts one and two and were handed printed booklets with the questions, each with two or three alternative answers and boxes in which they could mark their choice. (See Appendix A) They were then told to fill in on the booklet, their name, age, standard and whether they were boy or girl. The tester walked around the room while this was being done and gave any help required. The instructions for administering the test starting on page 2 of the Interim Manual for the CPQ were then followed. Care was taken to help poor readers, as instructed. (Porter and Cattell 1963)

Procedure for Standards four and five

This was the same as for Standards two and three except that they were given a separate answer sheet and were told not to write in the question booklet. Names, etc., were written on the answer sheet and they were told to circle the "A" on the upper right hand corner as the answer sheet is the same for Forms A and B. It was carefully explained where their answers were to be filled in.

Procedure for Standards six to ten

These standards were given Form A of the HSPQ and procedure was the same as for Standards four and five as they were again given question booklet and answer sheet. Instructions for administration on page 3 of HSPQ Manual were followed. (Madge, 1967)

4.5 Scoring

Scoring was done using the scoring keys directly on the answer booklet or answer sheet. Instructions in the manuals were followed and raw scores obtained. These were converted to stens (standard scores on a ten-point scale) on the appropriate tables of norms for boys and girls together, so that comparisons could be made between boys and girls.

For the CPQ the American norms provided in the Tabular Supplement with Norms for CPQ (IPAT, 1968) - table on page 10 were used. For the HSPQ the norms for Form A, boys and girls together, on page 9 of the Manual for the Junior-Senior High School Personality Questionnaire were used. (Madge, 1967)

4.6 School marks

As the object of the research was to compare the creative personality (as measured by the CPQ and HSPQ) with actual performance at school, final examination marks for 1968 were collected from all the schools. For those Standard eight and Standard ten pupils writing an external examination, such as Junior or Senior Certificate, the marks from the last internal examination, written about September, were used.

Some difficulty was encountered in processing these marks as the schools offer a variety of subjects, and have different systems of assessment. No real problems arose up to Standard five as within each school all the children take all the subjects. From Standard six onwards there is choice of subject within each school, and it is difficult to compare marks. The schools solve this problem in various ways. As the object was to compare the creative personality with actual performance, the principle was adopted of accepting the school's assessment. These school assessments, sound or unsound, assume great importance in the school situation, and

even beyond it. They are used for promotions, streaming, form orders, mark readings, report cards, prize givings and some scholarships. Beyond the confines of the school, headmasters testimonials are influenced by examination results and sometimes recent school reports are required from school leavers. This emphasis on marks also has less tangible, and more difficult to measure, emotional effects.

In most cases marks were accepted as they stood apart from converting to a percentage.

The principle of accepting the school's assessment was difficult to adhere to when there were several classes, taking different subjects for one standard and no attempt was made by the school to achieve a common maximum for all classes. In these cases some adjustment had to be made and this was done by accepting the highest total as the maximum and expressing all marks as a percentage of this.

CHAPTER 5

STATISTICAL TREATMENT OF DATA

5.1 Calculation of creativity criterion

The personality test scores, having been converted to stens were entered on sheets prior to punching on computer cards. The creativity scores were calculated by computer in 1969. The formula for calculating creativity for the CPQ was supplied by the Institute for Personality and Ability Testing, in a letter dated 20th December, 1968, from Samuel E. Krug, Staff Psychologist, who says,

> "The appropriate weights would be -
> CREATIVITY = $-.48A + .51B + .26C + .29D + .28E - .61F - .48G + .25H + .69I + .11J - .26N + .14Q_3 + 1.76$
> The weights on this equation are to be applied to sten scores on the primaries and will give a creativity score which will be approximately in stens."

The creativity formula for the HSPQ was taken from the HSPQ Handbook (Cattell and Cattell 1969) as follows:
CREATIVITY = $-.2A + .4B + .2C + .2D + .3E - .4F - .4G + .2H + .4I + .1J - .30 + .1Q_2 + .1Q_3 + 1.7$

5.2 Correction of achievement scores

End-of-the-year marks from all the schools were obtained, and where necessary were converted to percentages. These marks had to be corrected for differences in standard from school to school. A "best-fitting" prediction line was calculated for each standard in each school and also a "best-fitting" line for each standard, regarding the seven schools as one large group. (See Table (a) in Appendix "D")

Prediction Lines were fitted by the method of Least Squares. (Blommers and Lindquist, 1965, 412-9) An example of the method used for Standard 7, School 1, follows.

N=65

$\Sigma X = 381.1$

$\bar{X} = 5.863$

$\Sigma x^2 = 2389.29$

$\frac{(\Sigma X)^2}{N} = \frac{145237.21}{65}$

$= 2234.4186$

$\Sigma Y = 3206$

$\Sigma XY = 18823.7$

$\frac{(\Sigma X)(\Sigma Y)}{N} = \frac{1221806.6}{65}$

$= 18797.024$

$\Sigma xy = 18823.7 - 18797.024$

$= 26.676$

$\bar{Y} = 49.3231$

$b = \frac{\Sigma xy}{\Sigma x^2}$

$= \frac{26.676}{154.8714}$

$= .1722$

$c = \bar{Y} - (b)(\bar{x})$

$= 49.3231 - 1.0096$

$= 48.3135$

$Y = .1722X + 48.3135$

If X = a pupil's creativity score and Y = the pupil's achievement score and $Y = b_1X + c_1$ represents the prediction line for a particular standard in a particular school and $Y = b_2X + c_2$ represents the prediction line for the same standard but regarding all the schools as one large group, the adjustment was made according to the following formula:

Adjusted Score = Original Score - $(b_1X + c) + (b_2X + c_2)$ when X was the creativity score of the pupil under consideration. An example of such a calculation follows for pupil 1 of School 1, Standard 7.

Standard 7 : $Y = 1.0991X + 45.8253$

School 1 : $Y = .1722X + 48.3135$

Pupil 1 : $Y = 54 + (-2.4882) + (.9269)(6.2)$

$= 54 - 2.4882 + 5.7474$

$= 57.259$

5.3 Testing for significant differences between boys and girls

The next step was to see if boys and girls could be combined, or if there were significant differences in frequency pattern between them in achievement, and in creativity. The adjusted achievement scores and creativity scores were therefore plotted on scattergrams, a separate scattergram being made for each Standard. (See Appendix)

> "Chi-Square can be used to test the significance of the difference between two observed frequency distributions but this simply becomes a 2xk table with expected values computed from the marginal totals as previously indicated."
>
> (McNemar, 1949)

The calculation for Standard 3 is given as an example of the test for significant differences in frequency distribution of achievement. Scores are grouped where necessary to avoid frequencies in cells being too low.

STANDARD 3

Achievement Score	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Boys & Girls	2	1	1	3	8	9	9	23	21	21	19	9	6	
			15									15		
Boys	2	0	1	1	2	3	5	12	11	12	9	5	3	
Girls		1	0	2	6	6	4	11	10	9	10	4	3	
Observed boys					6	3	5	12	11	12	9	8		
Expected boys					7.5	4.5	4.5	11.5	10.5	10.5	9.5	7.5		
(o-e)					-1.5	-1.5	.5	.5	.5	1.5	- .5	.5		
$(o-e)^2$					2.25	2.25	.25	.25	.25	2.25	.25	.25		
$\frac{(o-e)^2}{e}$					.300	.500	.056	.022	.024	.214	.026	.033		

For test between boys, and boys and girls : $\chi^2 = 1.175$ .....(a)

Test between girls, and boys and girls : $\chi^2 = 1.175 \times \frac{\text{No. of boys}}{\text{No. of girls}}$

$= 1.175 \times \frac{66}{66}$

$= 1.175$ .....(b)

Test between boys and girls : $\chi^2 = 1.175 + 1.175$ ... (a+b)

2.350

df = 7

p = .93

"If p is between .05 and .95 the fit is said to be satisfactory." (McNemar, 1949)

Therefore no significant difference between frequency pattern of boys and girls in achievement was found. This process was repeated with the other Standards with the following results:

Standard	2	P = .04
"	3	P = .93
"	4	P = .20
"	5	P = .72
"	6	P = .65
"	7	P = .30
"	8	P = .25
"	9	P = .20
"	10	P = .90

Thus no significant differences in frequency pattern were found between boys and girls in achievement for any Standard.

With regard to creativity the same procedure was adopted with the following results:

Standard	2	P<.01	Unsatisfactory fit
"	3	P<.01	
"	4	P<.001	
"	5	P<.001	
"	6	.05>P>.01	

Standard 7	$.30 > P > .20$	Satisfactory fit
8	$P \simeq .30$	
9	$.50 > P > .30$	
10	$.70 > P > .50$	

Thus only in Standards 7 to 10 was it permissible to put boys and girls together for the purpose of correlating creativity with achievement.

5.4 Calculation of correlation coefficients

Research outlined in Chapter 3, notably that of Savage (1962), Butcher et al (1963) and Entwistle and Cunningham (1968) suggest that a linear relationship between various personality attributes, such as neuroticism, and academic achievement can by no means be taken for granted. It was for this reason that it was considered necessary to test for linearity in this study, in which academic achievement is compared with a creativity score based on personality factors.

> "An appreciable correlation between two variables which are linearly related implies that the slopes of the regression lines are not zero, which in turn implies that the variance of predicted values is large enough to have some kind of statistical significance. The variance technique may be used as a test of the significance of linear regression." (McNemar, 1949)

The technique described by McNemar (1949) on pages 259-262 as an illustrative problem of analysis of variance was followed. On the basis of this the following calculations were carried out:

1. Calculation of 'r' - the Pearson Product-Moment Correlation Coefficient.
2. Calculation of 'η' - correlation ratio.
3. Test of significance of linear correlation i.e. 'r'.
4. Test of significance of correlation ratio i.e. 'η'.
5. Test of linearity of regression, to determine whether or not a curvilinear relationship exists. (McNemar, 1949, 255-262)

STANDARD 4 : GIRLS AND BOYS

fd^2x	2	4	117	224	650	720	1078	1792	1458	1000	1331	1296	845	10517			
fdx	2	2	39	56	130	120	154	224	162	100	121	108	65	1283			
dx	1	2	3	4	5	6	7	8	9	10	11	12	13				
fx	2	1	13	14	26	20	22	28	18	10	11	9	5	fy	dy	fdy	f
13						1	2					4		7	13	91	1
12		1			1	2	3	1	2	1	3		1	15	12	180	2
11			1		2	1	3	5	2	1	1	1	1	18	11	198	2
10				2	1	3	2	6	2	1	3	1	3	24	10	240	2
9			1	2	8	1	4	5	2	2	2			27	9	243	2
8	1		3	4	4	5	3	5	5	4	1	1		36	8	288	2
7			3	5	5	3	2	4	4		1			27	7	189	1
6	1		4		4	3	2	1	1			1		17	6	102	
5				1		1	1							3	5	15	
4					1			1		1				3	4	12	
3														0	3	0	
2			1									1		2	2	4	
	1	2	3	4	5	6	7	8	9	10	11	12	13	179		1562	14
ΣY_2	14	12	91	110	211	171	206	250	158	87	110	89	53	1562			
ΣY_2^2																	
$(\Sigma Y)^2/n$	98.00	144.00	637.00	864.29	1712.35	1462.05	1928.91	2232.14	1386.89	756.90	1100.00	880.11	561.80	13764.			
	196	144	8281	12100	44521	29241	42436	62500	24964	7569	12100	7921	2809				
	2	1	13	14	26	20	22	28	18	10	11	9	5				

$$r = \frac{(179)(11533) - (1283)(1562)}{\sqrt{(179)(10517)-(1283)^2}\ \sqrt{(179)(14478) - (1562)^2}}$$

$$= \frac{2064407 - 2004046}{\sqrt{1882543 - 1646089}\ \sqrt{2591562 - 2439844}}$$

$$= \frac{60361}{\sqrt{236454}\ \sqrt{151718}} = \frac{60361}{486.2 \times 389.5}$$

$$= \frac{60361}{189374.90} = .318738$$

1. $14478 - \frac{(1562)^2}{179} = 14478 - \frac{2439844}{179}$

   $= 14478 - 13630.4134$

   $= 847.5866$

2. $14478 - 13764.44 = 713.56$

3. $13764.44 - 13630.4134 = 134.0266$

   $\eta^2 = \frac{134.0266}{847.5866} = .15812732$

   $\eta = .3976$

   $r^2 = .3187^2 \quad .101570$

4. $.101570 \times 847.5866 = 86.089371$

5. $(1-.101570)\ 847.5866 = .898430 \times 847.5866$

   $= 761.497229$

6. $(.158127 - .101570)\ 847.5866 = .056557 \times 847.5866$

   $= 47.936955$

Source	Sum of Squares	df	Variance Estimate
Linear regression	86.089	1	86.089
Deviation of means from line	47.937	11	4.358
Between-array means	134.027	12	11.169
Within arrays	713.560	166	4.299
Residual from line	761.497	177	4.302
TOTAL	847.587	178	

$$F_3 = 1.014$$

$$n_1 = 11 \qquad n_2 = 166$$

$$p > .05$$

Thus the apparent departure from linearity is not great enough to lead to rejection of the hypothesis of linearity.

$$F_1 = 2.589$$

$$n_1 = 12 \qquad n_2 = 166$$

$$.01 > p > .001$$

As the hypothesis of linearity is not rejected (F_3=1.014, n_1 = 11, n_2 = 166, $p > .05$), there is no need to interpret the significance of the correlation ratio.

$$F_2 = 20.011$$

$$n_1 = 1, \qquad n_2 = 177$$

$$p < .001$$

'r' is therefore significant

This was repeated for boys, girls, and boys and girls together for each standard with results shown on Table (b), Appendix D.

5.5 Creativity score means

Table 2 on page 58 gives the means for each class tested and Table 3 on page 59 the means for each standard and means for boys and girls for each Standard. To test whether differences between the means of boys and girls were significant the standard deviations were first calculated using the formula:

$$s^2 = \frac{\Sigma X^2}{n} - \bar{X}^2 \qquad \text{(Smith, 1962)}$$

For example in Standard 2:

Boys $s^2 = \frac{\Sigma X^2}{N} - \bar{X}^2$

$= \frac{1062.88}{71} - 2.693^2$

$= 14.970140 - 7.25249$

$= 7.717891$

Therefore $s = 2.778$

Girls $s^2 = \frac{\Sigma X^2}{N} - \bar{X}^2$

$= \frac{3147.21}{55} - 52.446564$

$= 57.222 - 52.446564$

$= 4.775436$

Therefore $s = 2.185$

The standard deviations for all the Standards, boys, girls and together are given in Table 4, page 60.

The standard error of each sample mean was then computed as follows:

$s_{\bar{X}_1} = \frac{s_1}{\sqrt{N - 1}}$

$= \frac{2.778}{\sqrt{71-1}}$

$= \frac{2.778}{8.367}$

$= .33201844$

$s_{\bar{X}_2} = \frac{s_2}{\sqrt{N - 1}}$

$= \frac{2.185}{\sqrt{55 - 1}}$

$= \frac{2.185}{7.348}$

$= .29735982$

Where $s_{D\bar{x}}$ equals the standard error of the difference between two means for uncorrelated data and $s_{\bar{x}_1}$, $s_{\bar{x}_2}$ equals the standard errors of the two sample means,

$$s_{D_{\bar{x}}} = \sqrt{s_{\bar{x}_1}^2 + s_{\bar{x}_2}^2}$$

$$= \sqrt{.332^2 + .297^2}$$

$$= \sqrt{.110224 + .088209}$$

$$= \sqrt{.198433}$$

$$= .4455$$

Next the deviation was changed into standard score units as follows:

$$Z = \frac{Dx}{s_{D_x}}$$ where $D_{\bar{x}}$ equals the difference between the the two means and $s_{D_{\bar{x}}}$ equals the standard error of the difference between the two means. Thus,

$$Z = \frac{\bar{x}_1 - \bar{x}_2}{s_{D_x}}$$

$$= -\frac{2.693 + 7.242}{.4455}$$

$$= \frac{4.549}{.4455}$$

$$= 10.2109988$$

$$Z > 3.291$$

Therefore the difference is significant ($P < .001$)

Standards 3 to 10 were treated in the same way with results shown in Table 3 on page 59.

With the exception of the calculation of the creativity criteria all calculations had to be done by desk calculator as computer facilities were not available at this stage. All calculations were checked.

TABLE 1

PRODUCT-MOMENT CORRELATION COEFFICIENTS

	Boys	Girls	Boys and Girls
Std. 2	.289^	.164	(.282*)
3	.081	.072	(.056)
4	.264*	.309*	(.319+)
5	.104	.125	(.124^)
6	.158^	.134	(.153*)
7	.160^	.180^	.168+
8	.188*	.241^	.205+
9	.176^	.233^	.192+
10	.299+	.365+	.320+

^ Of doubtful significance ($.05 > P > .01$)

* Significant ($P < .01$)

+ Significant ($P < .001$)

( ) indicates χ^2 test shows a difference in frequency distribution pattern between boys and girls, therefore combination of boys and girls inadmissable, but shown, although open to doubt.

TABLE 2

CREATIVITY SCORE MEANS FOR EACH CLASS TESTED

	BOYS				GIRLS		
School	1	2	3	4	5	6	7
Standard 2	2.681	3.193	2.233	2.600	6.243	6.550	7.916
3	3.611	4.756	4.233	4.243	6.533	6.456	5.225
4	5.350	4.064	4.309	4.331	7.834	7.880	6.479
5	4.272	4.803	4.846	4.963	6.825	6.693	6.741
6	5.894	5.943	6.188	5.997	5.081	5.257	5.582
7	5.863	6.397	5.872	6.007	6.345	6.304	5.479
8	5.748	6.208	5.955	6.030	4.774	5.663	5.643
9	5.683	6.174	5.787	6.237	6.489	6.500	5.683
10	6.658	6.898	6.229	6.705	6.927	6.374	6.038

TABLE 3

CREATIVITY SCORE MEANS FOR EACH STANDARD : BOYS, GIRLS AND TOTALS

	Boys	Girls	Boys and Girls	Difference
Standard 2	2.693	7.242	4.679	4.549+
3	4.108	5.880	4.994	1.772+
4	4.636	7.263	5.634	2.627+
5	4.717	6.757	5.567	2.040+
6	5.983	5.391	5.790	.592*
7	6.058	5.805	5.973	.253
8	5.988	5.471	5.802	.517^
9	6.021	6.006	6.016	.015
10	6.693	6.283	6.554	.410

^ Of doubtful significance ($.05 > P > .01$)

* Significant ($P < .01$)

+ Significant ($P < .001$)

TABLE 4

STANDARD DEVIATIONS

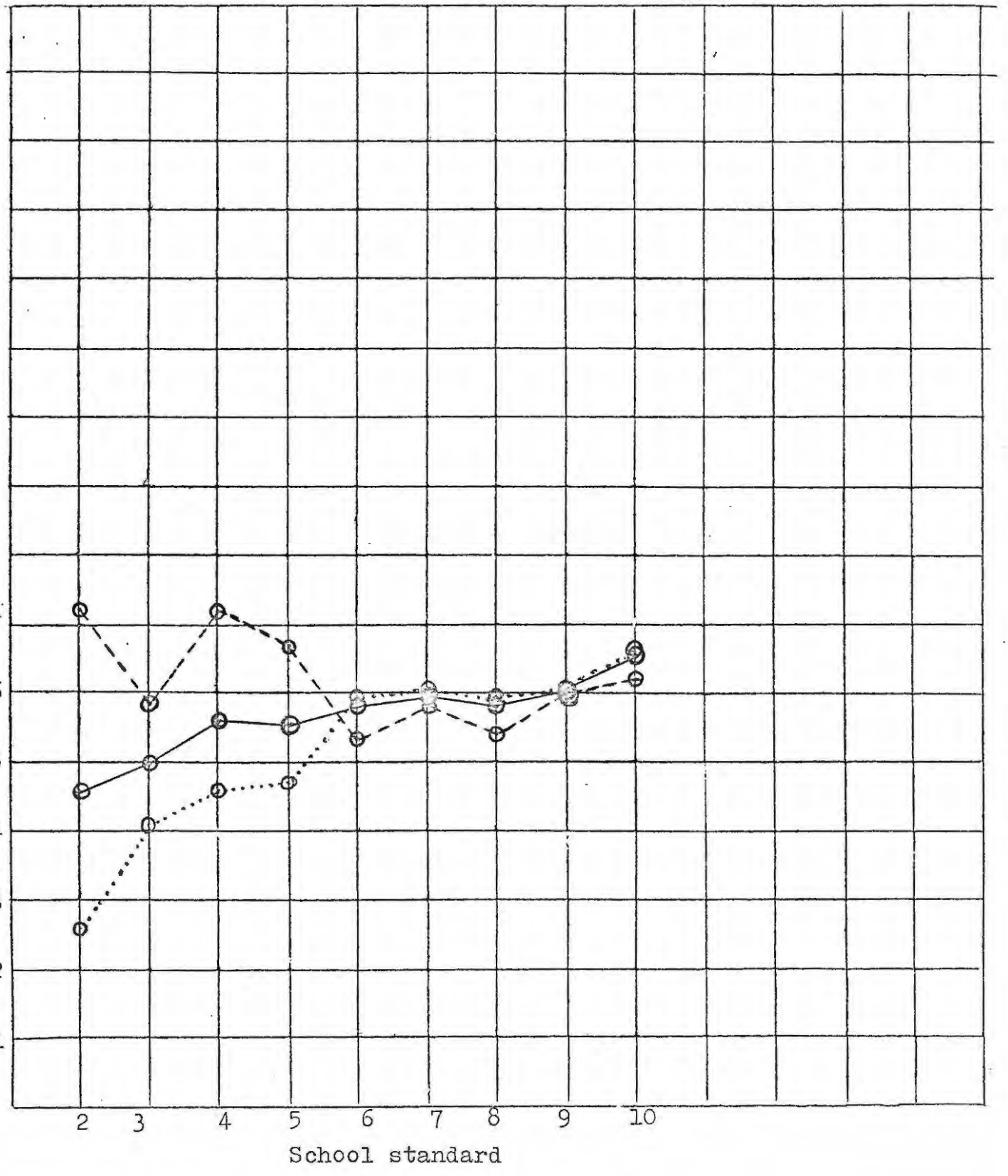
	Boys	Girls	Boys and Girls
Standard 2	2.778	2.185	3.394
3	2.309	2.712	2.669
4	2.218	2.693	2.726
5	2.142	2.644	2.569
6	1.766	1.707	1.768
7	1.706	1.738	1.720
8	1.756	1.874	1.817
9	1.773	1.837	1.795
10	1.747	1.855	1.796

GRAPH SHOWING RELATIONSHIP BETWEEN SCHOOL STANDARD AND CREATIVITY

Girls and Boys ——————

Boys .....

Girls - - - - - -



CHAPTER 6

RESULTS AND DISCUSSION

6.1 Summary of results (Refer Table 1 on page 57)

The hypothesis, that a positive linear relationship exists between creativity and school performance, can be accepted from Standards 7 to 10 for boys and girls combined. ($p < .001$)

For Standards 2 to 6, girls and boys could not be combined because of differences in frequency distribution pattern between boys and girls on creativity scores.

In considering boys and girls separately, positive linear relationships ($p < .001$) were found to exist between creativity and school performance in Standard 10, for both boys and girls.

For Standard 4 boys, Standard 4 girls and Standard 8 girls there were also positive linear relationships ($p < .01$)

In the other groups there was either a relationship of doubtful significance or none at all.

The hypothesis that there is a significant difference in the mean creativity scores for boys and girls can be accepted for Standards 2 to 5 ($p < .001$). (See Table 3 on page 59). In Standard 6 a significant difference ($p < .01$) between the creativity means of boys and girls was apparent. In Standard 8 the difference is of doubtful significance and in Standards 7, 9 and 10 there was no significant difference between the means.

6.2 Background considerations

In considering these results certain facts should be born in mind.

1. Two different tests were used - the CPQ from Standard 2 to 5 and the HSPQ from Standard 6 to 10. These tests are described in Chapter 4.3, but it must be pointed out here that no South African norms were available for the CPQ and therefore the norms for American children had to be used. In this connection it is of note that American schools are usually co-educational while the schools in this sample were not. Results up to Standard 5 are therefore likely to be slightly less reliable. The change-over from the CPQ to the HSPQ coincides with the move from primary to high school. However, the graph (on page 61) of the means

for boys and girls together, shows remarkable constancy in gradient, and proceeds without dislocation, from CPQ results to HSPQ results. This seems to lend support to the use of American norms.

2. In the primary school years personality is not yet "set". For example Porter and Cattell (1959) make it clear that reliabilities and validities are not as high for 9 year olds as for high school children and adults on the same factors.

3. The norms tables used were those for boys and girls together so that comparisons could be drawn.

4. In this sample, boys probably have to make a bigger adjustment than girls to primary school. The first three years of schooling are spent at infant schools with women teachers and usually attached to a girls' school. (All the three girls' schools in this sample have infant schools attached to them.) Girls therefore very often continue in the same atmosphere but boys have to adjust to an almost all-male world.

5. In Standard 6, for this sample, children have to make another adjustment to high school.

6. By the time they enter high school girls have usually reached puberty but boys reach it approximately two years later.

6.3 Correlation coefficients

It can be seen from Table 1 that a highly significant, ($p < .001$) but low, correlation is found for boys, girls and boys and girls together, in Standard 10 only. Information Bulletin 10 (1963) of the Institute for Personality and Ability Testing says,

> "At the high school leve, where psychologists will commonly be asked to advise on creativity in the general sense, the selection is best based on the HSPQ."

This seems to imply that it can be used throughout the high school. However the formula used in this study was the latest available (Cattell and Cattell, 1969) and was calculated from

"older students and adults only". It would therefore appear to be most reliable at the upper age limit of those tested, and this may be one of the reasons for the higher correlation in Standard 10. Another reason may be the "dropping out" of pupils in the upper standards. Those who drop out are usually low achievers and this would lead to an increase in correlation only if they were also high creatives. An examination of the scattergrams (see appendix) for Standard 7, 8 and 9 i.e. those standards in which "dropping out" is likely to occur, shows that the low achievers (for e.g. below 35 per cent) are not particularly low on creativity, but average or above. Therefore if they do drop out the correlation coefficient will rise. An analysis of drop-outs was beyond the scope of this study and therefore this explanation can only be offered very tentatively. Research into the creative potential of "drop-outs" is indicated.

Other environmental factors, which might account for the significant correlations in Standard 10, such as subtle conditioning towards creativity in the schools, seem unlikely. In fact there is research evidence that creativity is discouraged in that the highly creative pupils are liked less by their teachers than the highly intelligent ones as discussed further on page Though these studies refer to American and British schools they might also apply here.

It seems more likely that the changing nature of personality means that the same factors may not be indicative of creativity at all ages. Characteristics which distinguish the creative individual at one age may not be the same as those at another age level. In this connection the work of Parloff et al (1968) is relevant. They studied adolescents and adults, divided into more and less creative groups and their findings suggest that,

> "...a particular personality dimension may be conducive to creative performance at one age level and may be less relevant or even inimical to creative performance at a later age."

The fact that a significant correlation was found at the Standard 10 level, where results are most likely to be accurate, but not at other levels, throws doubt on the ability of the HSPQ to predict creativity at all the levels at which it is applicable. At its lower limit, Standard 6, which is at the 12 or 13 year old stage, it was not possible to group boys and girls together (see Chapter 4.6). The means, Table 3 on page 59, also show a significant difference between boys and girls in Standard 6.

The correlations tend to get progressively lower going down the age range, and below Standard 7 few are significant. There is one notable exception; an examination of Table 1 on page 57 shows that the correlations in Standard 4 are almost as high as in Standard 10. Preliminary findings of a growth study program (Diederich, 1970) are that,

> "Independent or creative achievements in Grade 12 were best predicted by creative achievements in Grades 7 and 9 and were moderately correlated with scores on academic skills in grade 7."

As grade 7 is about equivalent to Standard 5, this is close enough to give some support to these findings, allowing for cultural and environmental differences.

6.4 Implications

What are the implications of the rather low correlation between school performance and creativity? If the rewards offered by schools to the high achievers (rewards such as prizes, high marks, streaming) can be regarded as encouragement, then it would seem that the creative child is not encouraged. Torrance (1964) says,

> "Individuals tend to achieve along those lines in which they are rewarded. When rewarded for originality, sixth-grade children produced about twice as many original ideas as when they were rewarded for quantity rather than quality.

> When rewarded for the originality and interest of their stories, other groups of sixth-grade children wrote more interesting and original stories but made more errors in usage, spelling, and mechanics than children rewarded for correctness."

On the other hand some investigators suggest that creativity thrives when there are obstacles to overcome. McKinnon (1967) says that not all his creative subjects had happy homes and favourable life circumstances, and Hudson (1967) refers to the "cutting edge" of insecurity, competition and resentment. Barron (1969) says,

> "While in some respects creativity seems to be a hardy plant and even to flourish in the midst of hardship and privation, a developing body of testimony from educators and from psychologists in the school system suggests that much potential is made to wither by an unfavourable climate both in the classroom and in society at large."

Getzels and Jackson (1962) say that the creative child is not liked by his teachers and this, if true, constitutes further evidence for the discouragement of creativity in schools. They say,

> "The data are quite clear-cut. The high I.Q. group stands out as being more desirable than the average student, the high creativity group does not. It is apparent that an adolescent's desirability as a student is not a function only of his academic achievement. Even though the scholastic performance is the same, the high I.Q. students are preferred over the average students by their teachers, the creativity students are not. This result is quite striking, for if anything, the reverse should be true. Here is a student - the high I.Q.

> one who is doing scholastically only what can be expected of him. Here is another student - the high creativity one - who is doing scholastically better than can be expected of him. Yet it is the former rather than the latter who is enjoyed more than the average student by his teachers."

Feshbach (1969), in a study with student teachers, seems to corroborate this. She found that the student teachers preferred pupils whose behaviour reflected rigidity, conformity, and orderliness or dependency, passivity, and acquiescence than pupils whose behaviour reflected flexibility, non-conformity, and untidiness or independence, activity and assertiveness. Comparing these results with the profile of the creative on the HSPQ test it can be seen that some of the characteristics disliked by the student teachers coincide with some of those displayed by creative individuals. The most relevant are high E (assertive, independent, aggressive, stubborn, dominant) and low G (expedient, evades rules, feels few obligations, has weaker super-ego strength).

Further confirmation comes from Hasan and Butcher (1966) who attempted to replicate Getzels and Jacksons study with Scottish children, again finding that teachers preferred the high I.Q. group.

Cattell and Butcher (1968) point out that the high dominance of the creative child has some delinquent associations in the classroom. The high E individual is seen as disobedient and going his own way. Other creative characteristics are associated with introverted withdrawal and this profile is actually negatively correlated with the profile of the most popular pupil among peers, and, to some extent among teachers.

Further evidence of the discouragement of creativity comes from Taylor and Holland (1964) who say,

> "Not only creative students but also creative teachers may encounter more than their share of complicating factors in the school setting. Frank Jex reported at the 1959 conference that high school science teachers with high creativity test scores were rated below average in overall teaching performance by their principals and immediate supervisors."

In much of Western society the popular extrovert is seen as the ideal, thus discouraging introversion and possibly, thereby, the creative individual. To quote Getzels again,

> "It is expected by the school....that the child will work hard in order to achieve to the fullest extent of his intellectual potentiality and creativity. Accordingly, the child must be motivated to sacrifice immediate ease for ultimate attainment. Recent commentaries suggest, however, that our cultural values are coming to prize ease and sociability more than intellectual independence and achievement. In this sense, the criteria of worth in the classroom and in society at large are incongruent, and to the extent of such incongruence, both teacher and pupil are subject to conflict."
>
> (Quoted by Kellsall and Kelsall, 1969)

Wallach and Kogan (1965) whose work was described in Chapter 1 (Related Research) divided their subjects into four groups and summarised their descriptions of them as follows,

> "High creativity - high intelligence; These children can exercise within themselves both control and freedom, both adultlike and childlike kinds of behaviour. High creativity - low intelligence; These children are in angry conflict with themselves and with their school environment and

> are beset by feelings of unworthiness and inadequacy. In a stress-free context, however, they can blossom forth cognitively.
> Low creativity - high intelligence: These children can be described as "addicted" to school achievement. Academic failure would be perceived by them as catastrophic, so that they must continually strive for academic excellence in order to avoid the possibility of pain.
> Low creativity - low intelligence: Basically bewildered, these children engage in various defensive maneuvers ranging from useful adaptations such as intensive social activity to regressions such as passivity or psychosomatic symptoms."

These findings emphasize the importance of personality in the realization of creative potential. Two of these groups (the high creativity - low intelligence group and the low - low group) demonstrate the need for a less stressful school environment. It is those children who are high in creativity but low in intelligence who cause concern in an educational system (such as ours) which chiefly rewards academic achievement. Their findings would seem to support the need for early identification in that the group who are highly creative but not highly intelligent and who have inadequate personalities could be helped to realise their potential.

Of course we cannot be sure that Wallach and Kogan's criteria are valid, as true creativity must involve some product, i.e. some actual creative achievement. In the same way, in the present study, we cannot say that those who have a high creativity score will continue to exhibit this personality pattern into adulthood or produce anything truly "creative". Thus there is a need for both types of measures to be administered to the same subjects and for follow up studies right to adulthood and beyond.

How can the discouragement of creativity with its consequent waste of talent and bad effect on mental health be stopped? One of the answers would seem to be a reduction in competition and in this regard Wallach and Kogan say,

> "The authors have emphasized that those psychological processes associated with creative functioning require, for their optimal operation, a context free from or minimally influenced by the stresses that arise from academic evaluation and a fear of the consequences of error. To further this kind of goal within education, then, is to fashion a learning and teaching environment that will permit children to minimize the bind produced by negative sanctions for error. To be sure, it would be desirable to further such a goal with regard to the traditional domain of intelligence, too. We recognize that it is harder to do so in that area, however, since so much of the nature of the thinking involved is of necessity focused upon the elimination of erroneous influences. Nevertheless, conventional intellectual functioning would most likely profit from a reduction in this kind of stress as well. For the stress in question inevitably makes it difficult for a child to be interested in problems for their own sake rather than in order to win a competitive advantage by his success. The basic need, then, is to view education as an end in itself rather than as a means for achieving such external ends as raising one's status, increasing one's earning power, or enhancing the prestige of one's nation."

The change of focus consequent on a reduction in the importance of competition may cause a change in climate in which creative children would no longer be so unpopular with their teachers.

6.5 Discussion of means

In examining the means shown in Table 2 on page 58, it can be seen that results from school to school for a given standard are fairly constant (considering boys and girls separately). There are statistically significant differences between boys and girls up to Standard 6, with girls having a higher mean creativity score up to Standard 5. In Standard 2 the difference between the girls and boys is 4.5 and in Standard 3, 1.8.

As the changeover from girls scoring higher on creativity than boys, to boys scoring higher than girls occurs between Standards 5 and 6, it coincides with the changeover from the CPQ using American norms to the HSPQ using South African norms and thus no assumptions can be made. However it does continue a tendency for the boys' mean score to rise and the girls' mean score to drop, as can be seen in Table 3 on page 59, and the graph on page 61. From this graph it can also be seen that considering boys and girls together there is a gradual rise in the mean creativity score. This smooth rise seems to indicate that despite the use of American norms for the primary school, results could be valid. From Standard 7 to 10, although the boys' mean is higher, the difference is not statistically significant except in Standard 8 where it is of doubtful significance. Thus it is in the Standard 2 to Standard 5 range that the difference between boys and girls is greatest, particularly in Standard 2 which might again be connected with the adjustment to primary school. A personality test standardised for South African children is badly needed for this age range.

The importance of the I factor has been described in Chapter 2.3 and it would seem that it is the I factor which is largely responsible for making the girls' creativity scores higher than the boys' in the primary school. It must be noted that

despite their higher creativity scores these creativity scores do not correlate more highly than the boys' scores do with achievement.

6.6 Implications

No comparable studies of growth of personality with regard to those factors favourable to creativity could be found, but it is of interest to look at the means from Standard 2 to Standard 5 in the light of Torrance's (1963 and 1964) work with elementary school children. He and his associates used various tests of creativity and in 1963, in a progress report, stated they had seven developmental curves in which they had reasonable confidence (ideational fluency, spontaneous flexibility, originality, curiosity or questioning casual hypotheses, and constructiveness). The general pattern of most of the curves showed a steady incline from the first to the third grades. Boys became increasingly superior to girls from the first grade to the third, and in some cases this superiority lasted through the fourth. In general there was a dip during the fourth grade, and then a tremendous spurt, particularly for girls between the fourth and fifth grades on most of the measures. They also comment that this seems to be in harmony with other facts known in developmental psychology.

These findings of Torrance's can be compared with the present study (see graph on page 61). The present study is of course based on personality but, in general, agrees with Torrance's findings. Standard 2, being the fourth year of formal schooling is about comparable with the fourth grade, Standard 3 with the fifth grade and so on. Unfortunately this study only starts in Standard 2 but some comparisons can be made. It can be seen that the boys are very low in Standard 2, (equated with Torrance's slump in fourth grade) while the girls are very high, (comparable with Torrance's spurt between the fourth and fifth grades). The boys have their spurt a year later, though it still does not reach the level of the girls. Some explanation may come from Torrance (1964) when he points out that the shape of the developmental curve differs from culture to culture and says,

> "Where there is a high degree of cultural continuity, development of these abilities is continuous. Drops in the curve coincide with severe discontinuities in development."

The same may be the case with personality development and the low score of the boys in Standard 2 could be due to the rather traumatic entry into primary school referred to earlier. The boys' spurt then takes place in Standard 3, but it is impossible to evaluate without further research whether this retardation has any serious consequences. Research in co-educational schools for the purpose of comparison would be valuable.

In a later article Torrance (1967) points out that one educator recently advocated that boys be kept out of school a year longer than girls because girls are superior to boys in practically every area of development until they are well into their teens. Torrance and his associates refute this having found boys superior in some important ways. However he refers to the undesirable effect of the emphasis on sex roles, and it is possible that this is enhanced, particularly for boys in single sex schools, such as those in this sample. He says (1964)

> "Both boys and girls suffer in their creative development from our society's over-emphasis or misplaced emphasis on sex roles. Both simply shut out certain areas of awareness and refuse to think about them. Creativity, by its very nature, requires both sensitivity and independence of thinking. In our culture, sensitivity is definitely a feminine virtue, and independence is a masculine one. Thus, highly creative boys are likely to appear more effeminate than their peers and highly creative girls, more masculine than theirs."

This quotation refers to American culture with its co-educational school system. Where boys and girls are separated at an early age, this undesirable effect may be enhanced. On the other hand, it could be argued that the presence of the other sex might have an inhibiting effect, that is, boys may be afraid to try and do something when girls are present who can do it better, and vice versa. Perhaps the ideal is a co-educational system where competition is reduced to a minimum. Torrance also points out the bad effect on creativity of success orientation and the fear of failure. Another inhibitor of creativity which he points out is peer-orientation. He says,

> "Evidence of the inhibiting effects that peer pressures towards conformity exert on creative thinking is too obvious to need enumerations; it appears when we observe children, when we conduct experiments, when we do sociometric studies, and when we study the creative writings of children. It is likely that pressures for conformity are responsible in large part for the sharp drop found in the developmental curves found in the fourth grade and again in the seventh. At about the time a child reaches the fourth grade, his need for consensual validation is intensified. He becomes almost afraid to think until he learns what his peers are thinking. Unusual or original ideas are common targets of peer pressures to conformity."

It can be argued that all these bad effects are increased in a school system where children are put into single sex schools at the equivalent of the fourth grade. It is particularly the case with boys, who usually move to a completely new environment.

The effect of the early school years on the development of creativity should not be under estimated - to quote Torrance once more,

> "There is rather general consensus that the elementary school years are critical in the development of creative talent."

McKinnon (1967) concurs, expressing concern that "the patterns of traits and dispositions and temperament and motivational structure which make for creativity or its opposite are set so early in life that we shall not be able through experimental programs and the creation of special educational atmosphere to effect the degree of change which we so fervently desire."

6.7 Suggestions for further research

A basic need is for a personality test for primary school children to be standardised for South African children. This would make results, in studies similar to the present one, more accurate. As the HSPQ is already standardised for South African children, the CPQ which precedes it, is the obvious choice. The standardisation of the Early School Personality Questionnaire for even younger children would usefully extend the age range. In the present study, for example, it was found to be a disadvantage that the very low mean creativity score for the boys in Standard 2 could not be viewed in the light of their score while in Standard 1. Personality tests standardised for South Africa for all ages would mean that the whole age range could be carefully studied.

The present study was carried out in single sex English speaking schools in Grahamstown. It could be replicated in other areas with children from other language groups and possibly in co-educational schools.

The greatest research need is for a long term longitudinal study which would follow up the same children from an early age. Such studies are presently in progress in England and America (Cattell and Butcher, 1968, Preface) and it would be desirable to have a similar study in South Africa. Such a study would need to use a wide variety of tests, including intelligence, creativity

and personality tests, so that over the years it could be ascertained which were most useful, both for predicting creativity and for studying its development.

No studies could be found in which creativity tests and personality tests were administered to the same subjects and even a short term piece of research along these lines would be useful. It might throw some light on the question as to whether there are individuals who have innate ability but not the personality to make use of it. This was suggested by the research of Wallach and Kogan, (1965), but they used ratings of personality and not personality tests.

Another possible line of research would be on the relative effect on creativity of single sex and co-educational schooling. This would present certain difficulties as it would be virtually impossible to see the same children in both situations but could possibly be done by matching. In a long term longitudinal study there would be a certain number of children who would change from one school system to another in the natural course of events, and these children could be followed up.

The effects of competition on creativity seems to be a subject of prime importance. This could be studied by controlled experiments and also by assessing schools in terms of the importance given to competition and seeing in which type creativity flourished.

A study of drop-outs would be valuable. It needs to be ascertained whether those (generally low-achievers) who drop out of school early, are also low in creativity, or whether some of them are potentially creative and have been frustrated.

A study of the I factor in greater detail is another possibility for research. More needs to be known about its sex-linked nature and its role in creativity. This would be best achieved as part of a longitudinal study.

CHAPTER 7

SUMMARY

Research on creativity has increased a great deal over the last decade, and has implications for education and clinical psychology.

Two separate types of intellectual functioning, namely creativity and intelligence, have been postulated but not proved. Some investigators have produced evidence that both the highly creative and the highly intelligent achieve well at school. At the same time it is held that creativity in school life is often discouraged. Many of these theories are based on studies in which creativity is assessed by creativity tests. Other investigators have produced convincing evidence that creativity in adult life does not only depend on innate ability but on a typical creative personality pattern which is remarkably similar over diverse fields. They have applied these findings to personality tests for adults and children and believe that creative personality can be measured.

This study set out to (1) establish whether there is a linear relationship between creativity, as measured by personality tests, and school performance, as measured by school examination marks, (2) that, if linear, this relationship is positive and significant and (3) to investigate the development of the creative personality; in particular, whether there are significant differences in the means for boys and girls.

For this purpose, 2,309 English speaking children in Grahamstown, from 7 schools (4 boys' schools and 3 girls' schools) from Standard 2 to Standard 10 were tested. Those from Standard 2 to Standard 5 were given the Children's Personality Questionnaire, and those from Standard 6 to Standard 10 were given the High School Personality Questionnaire. Creativity scores were computed from the personality scores using formulae supplied by the Institute for Personality and Ability Testing, Illinois, U.S.A. Examination marks were obtained from all the schools and statistically adjusted to eliminate differences in standard between schools. The creativity scores and achievement scores were tested for significant differences in frequency distribution

pattern between boys and girls. No significant differences were found in achievement throughout the age range. In creativity there were significant differences between boys and girls in Standards 2 to 6 and in these Standards boys and girls had to be considered separately.

Pearson's product-moment correlation 'r' and the correlation ratio 'η' were calculated for each standard for boys and girls together, and separately. The possibility of curvilinearity was tested.

It having been established that a linear relationship could be accepted between creativity and school performance the correlation coefficients were tested for significance. In Standard 10 significant ($p < .001$) but low correlations were found (boys .299, girls .365, boys and girls together .320). Significant at the same level, but lower correlations were found for boys and girls together in Standards 7 to 9 (.168, .205, .192).

At the lower level of significance ($p < .01$) low correlations were found in Standard 4 for boys and girls separately (.264, .309) and for boys in Standard 8 (.188). Other correlations were of doubtful significance, or not significant. Mean creativity scores were significantly higher for girls from Standard 2 to 5, boys were significantly higher in Standard 6 and the other differences were not statistically significant. There was a gradual rise in the overall mean creativity score.

The difference in personality development between boys and girls was apparent and the need for more research on how the creative personality develops was indicated.

- - - -

What You Do and What You Think

Print Your Name: First_____ Last_____

Your Age_____ Grade in School_____ Boy or Girl_____

Read each statement and mark an ☒ on the side that fits you better. Some questions will not have the words just the way you want them but mark every one the best you can. You may ask for help if you don't know a word. Just raise your hand and the teacher will come to your desk. Do not work long on one question. Mark it and go right on to the next one. MARK EVERY ONE. Most of the questions have two boxes to choose from but other questions have three boxes. Always look at ALL the boxes and pick just one of them for your answer.

1.	When visiting a new building do you like to have someone show you around	☐	or	☐ do you like to find your own way
2.	When a child laughs at you do you feel badly	☐	or	☐ do you laugh too
3.	Do you think you could do well at almost anything	☐	or	☐ just a few things
4.	In a game on the playground, do you stand around	☐	or	☐ run a lot
5.	Does your mother think you are too lively and restless	☐	or	☐ quiet and calm
6.	Do you feel nervous at school	☐	or	☐ are you happy
7.	Do you work slowly	☐	or	☐ quickly
8.	In your group is someone else the leader	☐	or	☐ are you the leader
9.	Do you have many friends	☐	or	☐ just a few good friends
10.	Do you think you smile a great deal	☐	or	☐ do not smile much

GO RIGHT ON TO THE NEXT PAGE.

DO NOT WRITE BELOW THIS LINE.

FACTOR	A	B	C	D	E	F	G	H	I	J	N	O	Q_3	Q_4
Part A_1 Raw Score														
Part A_2 Raw Score														
Form A Raw Score = (A_1 + A_2)														
Standard Score														
10	•	•	•	•	•	•	•	•	•	•	•	•	•	•
9	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PROFILE 7	•	•	•	•	•	•	•	•	•	•	•	•	•	•
IN 6	•	•	•	•	•	•	•	•	•	•	•	•	•	•
5	•	•	•	•	•	•	•	•	•	•	•	•	•	•
STENS 4	•	•	•	•	•	•	•	•	•	•	•	•	•	•
3	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1	•	•	•	•	•	•	•	•	•	•	•	•	•	•
FACTOR	A	B	C	D	E	F	G	H	I	J	N	O	Q_3	Q_4

In every question, mark just one box.

1. Usually means the same as generally ☐ or seldom ☐ or always ☐
2. Do you sometimes speak angrily to your parents ☐ or ☐ is it wrong to do so
3. Does your teacher think you are good at sitting still ☐ or ☐ that you run around too much
4. When your friends argue, do you join the argument ☐ or ☐ keep quiet till they finish
5. Foot is to leg as hand is to wrist ☐ or finger ☐ or arm ☐
6. When someone is slow does it bother you ☐ or ☐ does it not bother you
7. Would you rather hunt birds ☐ or ☐ draw pictures of birds
8. Do you go to buy your own toys ☐ or ☐ does mother do it
9. The next number in 7, 5, 3, __,is 9 ☐ or 1 ☐ or 0 ☐
10. In your family are you the happy one ☐ or ☐ the one in trouble
11. Would you rather talk with your teacher ☐ or ☐ talk with a good friend
12. If two children were fighting on the playground, would you let them fight ☐ or ☐ go and tell the teacher
13. Which one of these does not belong with the others: cold, hot, wet, warm warm ☐ or cold ☐ or wet ☐
14. If people push you in a bus, do you just smile ☐ or ☐ do you get mad
15. Would you like better to have bears here now ☐ or ☐ to hear stories about bears
16. Would you rather work with books in a library ☐ or ☐ be a General in the Army
17. If Mary's uncle is my father, what relation is Mary's sister to me cousin ☐ or niece ☐ or auntie ☐
18. Do they say you shout at people when you get excited ☐ or ☐ do they think you are patient
19. Is mother's way of doing things always better ☐ or ☐ is your own new way sometimes better
20. Would you rather be a tap dancer ☐ or ☐ a soldier

GO RIGHT ON TO THE NEXT PAGE.

Do not write here.
B____ D____ E____ F____

In every question, mark just one box.

31.	Would you rather go to the movies	☐	or	☐ to a church
32.	Are you doing as well as you should in your work	☐	or	☐ could you do better
33.	Which story would you like better, one about killing Indians	☐	or	☐ how Indians made clothing
34.	Do loud noises scare you	☐	or	☐ do you just laugh at them
35.	Do you obey the rules all the time	☐	or	☐ only when someone is looking
36.	Are your feelings easily hurt	☐	or	☐ not easily hurt
37.	Would you rather collect stamps	☐	or	☐ play football
38.	If people wanted you to do something you did not want to do, would you get angry	☐	or	☐ just go along
39.	If you begin a job and it becomes hard, do you give up	☐	or	☐ keep on working
40.	Do new teachers frighten you	☐	or	☐ do you usually like them
41.	Would you rather ride a bicycle	☐	or	☐ listen to music
42.	Do teachers scold you	☐	or	☐ think you are all right
43.	When mother calls, do you wait a while	☐	or	☐ do you come right away
44.	Are most children kind to you	☐	or	☐ are they sometimes unkind
45.	Would you rather read a book	☐	or	☐ play ball
46.	If someone has a new idea, do you say it is good	☐	or	☐ wait a while to make sure
47.	If you know the answer, do you raise your hand	☐	or	☐ wait to be called on
48.	Are your parents always ready to hear you talk	☐	or	☐ are they sometimes too busy
49.	In a play would you rather be a speed pilot	☐	or	☐ a famous writer
50.	If a trick is played on you, do you laugh	☐	or	☐ get a little angry

GO RIGHT ON TO THE LAST PAGE.

Do not write here.

G____ H____ I____ J____

In every question, mark just one box.

1.	Would you like to go fishing by yourself	☐	or	☐ play games with children
2.	When you say, "I bet I'm right," are you, in the end, right most of the time	☐	or	☐ wrong most of the time
3.	School life is hard	☐	or	☐ easy
4.	In your school work do you often forget	☐	or	☐ do you feel sure you can remember things
5.	If you were a wild animal, would you rather be a lion	☐	or	☐ a fast horse
6.	Can you do most things well	☐	or	☐ can others do things better
7.	Would you rather go to school	☐	or	☐ work at home
8.	In dreams do animals chase you	☐	or	☐ are dreams nice
9.	Are grown-ups always happy to listen to you	☐	or	☐ do they get angry when you talk
10.	Can you easily stand up in class and talk	☐	or	☐ do you feel shy
11.	Would you rather read funny books	☐	or	☐ do arithmetic
12.	When a small thing upsets you, do you get so mad you want to throw things	☐	or	☐ can you keep calm
13.	Do you like to listen to long stories	☐	or	☐ do you get tired
14.	Do your plans often not work	☐	or	☐ do they work out well
15.	At home would you first help wash the dishes	☐	or	☐ listen to music or TV
16.	When you are hurried do you still put your clothes away	☐	or	☐ just leave them
17.	Do you wish school would not be such a bother	☐	or	☐ is school all right as it is
18.	Do people think that you make many mistakes	☐	or	☐ few mistakes
19.	When you read, do you find it hard to keep your mind on it	☐	or	☐ can you read right on to the end
20.	When mother calls you in the morning, do you just jump right up	☐	or	☐ find it hard to wake up

DID YOU PUT ONE MARK DOWN FOR EVERY STATEMENT? CHECK BACK AND SEE.

Do not write here.

N____ O____ Q_3 ____ Q_4 ____

IPAT

CPQ, Form A
(1963 Edition)

Part A_2

What You Do and What You Think

Print Your Name: First_____ Last_____

Your Age_____ Grade in School_____ Boy or Girl_____

Read each statement and mark an ☒ on the side that fits you better. Some questions will not have the words just the way you want them but mark every one the best you can. You may ask for help if you don't know a word. Just raise your hand and the teacher will come to your desk. Do not work long on one question. Mark it and go right on to the next one. MARK EVERY ONE. Most of the questions have two boxes to choose from but other questions have three boxes. Always look at ALL the boxes and pick just one of them for your answer.

1.	Do you finish your school work quickly	☐	or	☐ does it take you too long
2.	When losing a game, do you sometimes give up and save your energy	☐	or	☐ always play harder
3.	Can you easily persuade your friends to accept your plans	☐	or	☐ is it difficult
4.	Do you think many children do better work than you	☐	or	☐ are you as good as anyone else
5.	If the teacher lets another child do a job you want to do, do you feel badly	☐	or	☐ soon forget about it
6.	Do grown-ups think you are naughty	☐	or	☐ well-behaved
7.	Do you find other children take advantage of you	☐	or	☐ are they kind to you
8.	Do you make a lot of mistakes	☐	or	☐ just a few
9.	Do people like your ideas	☐	or	☐ do they not like them
10.	If you got lost, would you know what to do	☐	or	☐ would you be scared

GO RIGHT ON TO THE NEXT PAGE.

DO NOT WRITE BELOW THIS LINE.

FACTOR	A	B	C	D	E	F	G	H	I	J	N	O	Q_3	Q_4
Part A_1 Raw Score														
Part A_2 Raw Score														
Form A Raw Score = (A_1 + A_2)														
Standard Score														
PROFILE IN STENS 10	•	•	•	•	•	•	•	•	•	•	•	•	•	•
9	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8	•	•	•	•	•	•	•	•	•	•	•	•	•	•
7	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6	•	•	•	•	•	•	•	•	•	•	•	•	•	•
5	•	•	•	•	•	•	•	•	•	•	•	•	•	•
4	•	•	•	•	•	•	•	•	•	•	•	•	•	•
3	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1	•	•	•	•	•	•	•	•	•	•	•	•	•	•
FACTOR	A	B	C	D	E	F	G	H	I	J	N	O	Q_3	Q_4

In every question, mark just one box.

1. Collect is the opposite of spread ☐ or gather ☐ or save ☐
2. If it is wrong to do something do you still do it sometimes ☐ or ☐ not do it
3. Would you rather be a school teacher ☐ or ☐ a great hunter
4. Can you work where people laugh and talk ☐ or ☐ would you rather they keep still
5. Listen is to hear as look is to walk ☐ or notice ☐ or see ☐
6. Does teacher sometimes say you are careless and untidy ☐ or ☐ does she never say so
7. On a playground do you make a lot of noise ☐ or ☐ play quietly, without so much noise
8. Do you think you could learn to fly an airplane ☐ or ☐ would it be too difficult
9. The next number in 12, 9, 6, —, is 4 ☐ or 3 ☐ or 5 ☐
10. If people pester you, do you just laugh it off ☐ or ☐ do you get angry
11. Would you rather write a book ☐ or ☐ be the main actor in a play
12. Are you good at walking a fence or a log ☐ or ☐ are others better
13. Which one of these does not belong with the others: swim, run, sit, fly run ☐ or fly ☐ or sit ☐
14. In class, do you sit quietly ☐ or ☐ do you like to move about
15. When you get a new game as a present, do you like to try it first yourself ☐ or ☐ have someone show you how to play it
16. Would you rather own a small, friendly dog ☐ or ☐ a big, powerful dog
17. Tom is younger than Bill. Jim is younger than Tom. Who is the oldest Bill ☐ or Jim ☐ or Tom ☐
18. Are you disappointed often ☐ or ☐ hardly ever
19. If teacher scolded you badly, would you cry when you told mother ☐ or ☐ just laugh when you told her
20. Would you rather be the captain of a peaceful ocean liner ☐ or ☐ captain of a sub in war

GO RIGHT ON TO THE NEXT PAGE.

Do not write here.
B____ D____ E____ F____

In every question, mark just one box.

31.	If a dog were barking at you, would you shout, "Shut up!"	☐	or	☐ say, "He's trying to be a good dog"
32.	Do you forget your troubles quickly	☐	or	☐ do you pout for a long time
33.	Can you touch a big bug	☐	or	☐ would you dislike to touch one
34.	Do you wish you were better looking	☐	or	☐ are you good-looking now
35.	Do you usually go straight home	☐	or	☐ play along the way
36.	Do you have a hard time deciding which games to play	☐	or	☐ do you make up your mind quickly
37.	Would you rather go to school	☐	or	☐ go on a long trip in a car
38.	If you were high up on a big rock, would you be scared	☐	or	☐ would you like looking around
39.	When Christmas presents are under the tree, do you ever try to open them	☐	or	☐ do you wait
40.	Do you feel afraid of things that might happen to you	☐	or	☐ are you satisfied with things as they are
41.	Would you rather be an animal doctor	☐	or	☐ a piano player
42.	Do you have fainting spells	☐	or	☐ do you not
43.	When mother is annoyed with you, is it often her fault	☐	or	☐ do you generally feel you were wrong
44.	Does your father do things with you	☐	or	☐ do you not like to bother him when he is busy
45.	When you hear a sad story, do tears come to your eyes	☐	or	☐ are you not bothered
46.	Do people pay enough attention to you	☐	or	☐ do you have to do things to make them notice you
47.	When children ask for help in an exam do you let them do their own work	☐	or	☐ help them unless teacher is watching
48.	If people ask you to do too many things, do you find a way to do them	☐	or	☐ do you get all mixed up
49.	Would you rather be a space pilot	☐	or	☐ an artist
50.	First thing in the morning are you ready for fun	☐	or	☐ are you still tired and sleepy

GO RIGHT ON TO THE LAST PAGE.

Do not write here.

G____ H____ L____ J____

AGE 8

In every question, mark just one box.

51.	Would you rather read short stories	☐	or	☐ a long book
52.	Do you succeed in most things you try	☐	or	☐ do things often go wrong for you
53.	If a classmate calls you a bad name, do you usually fight	☐	or	☐ pretend you do not care
54.	At a loud bang, do you jump	☐	or	☐ just look around
55.	Do you laugh when others make mistakes	☐	or	☐ not laugh at them
56.	Would you rather be called clever	☐	or	☐ nice and kind
57.	Would you rather learn a lesson in school	☐	or	☐ watch a game
58.	When people talk about a place you know well, do you start telling them about it too	☐	or	☐ do you keep quiet until they finish
59.	Are you good because you like to be good	☐	or	☐ because you get into trouble if you are bad
60.	Are you getting along well	☐	or	☐ do you have many problems
61.	Would you rather have someone else keep your room tidy	☐	or	☐ do it yourself
62.	If you don't like the food, do you complain	☐	or	☐ eat it anyway
63.	Do people like best those who are good	☐	or	☐ those who tell clever jokes
64.	Does mother say you talk too much	☐	or	☐ are you quiet
65.	Are you happy to stay with young children	☐	or	☐ won't you stay with them
66.	If friends borrow your things without asking, is it all right	☐	or	☐ are you angry
67.	Do you like better a teacher who is easy to get by	☐	or	☐ one who is strict
68.	When a problem is too hard, do you give it up for a while and forget it	☐	or	☐ keep working on it
69.	When people play a joke on you do you get all upset	☐	or	☐ take it quietly
70.	If you were angry, would you go quietly to your room	☐	or	☐ would you slam the door as you went

DID YOU PUT ONE MARK DOWN FOR EVERY STATEMENT? CHECK BACK AND SEE.

Do not write here.

N____ O____ Q_3 ____ Q_1 ____

C.P.-S.637956 1-1964-65-50,000-4.

N.B. 452.

Form A.

Jr.–Sr.

IPAT H. S. P. Q. First South African Edition

What to do: You have a Booklet and an Answer Sheet. Write your name, age, etc., on the Answer Sheet where it tells you to.

We want to know what sort of a person you are. The paper before you has questions about your interests and your likes and dislikes. First, we shall give you two examples so that you will know exactly what to do. After each question there are three answers. Although you are to read the questions in *this* Booklet, *you must put your answers on the Answer Sheet*, alongside the same number as in the Booklet. Read the following examples and mark a – for your answers on the Answer Sheet where indicated.

Examples:

1. Would you rather—
   (*a*) visit a zoo; (*b*) uncertain;
   (*c*) go up in an airplane?

2. If you have a quarrel, do you make friends again quickly?
   (*a*) yes; (*b*) in between; (*c*) no.

As you see from these examples, there are usually no right and wrong answers. Each person is different and has only to say what is true for *him*. You can always find one answer that suits you a *little* better than the others, so never leave a question without marking one of the answers.

Inside you will find more questions like the ones above. When you are told to turn the page, begin with number 1 and go on until you finish all the questions. In answering them, please keep these four points in mind:—

(1) Answer the questions frankly and truthfully. There is no advantage in giving the wrong impression. Never give an untrue answer about yourself because you think it is the "right thing to say". There are ways of detecting such unfair answers.

(2) Please answer the questions as quickly as you can. Do not spend time puzzling over them. Give the first, natural answer as it comes to you. Some questions are a bit similar to others but no two are exactly alike and your answers will often differ in these cases.

(3) Use the middle answer *only* when it is *absolutely impossible* to lean toward one or the other of the answer choices. In other words, the "yes" (or "a") or the "no" (or "c") answer should be used for *most* cases.

(4) Do not skip any questions. Occasionally a statement may not seem to apply to you or your interests, but answer every question, somehow.

If there is anything you want to ask about what you have to do, ask now. If there is nothing now, but you meet a word later on you do not understand, stop and ask then.

——DO NOT TURN PAGE UNTIL TOLD TO DO SO——

National Bureau of Educational and Social Research

1. Have you understood the instructions?
   (*a*) yes; (*b*) uncertain; (*c*) no.
2. At a picnic would you rather spend some time--
   (*a*) exploring the woods alone; (*b*) uncertain; (*c*) playing around the campfire with the crowd?
3. When you write an essay about your personal thoughts and feelings, do you—
   (*a*) enjoy telling about yourself; (*b*) uncertain; (*c*) prefer to keep some ideas to yourself?
4. When you do a foolish thing, do you feel so bad that you wish the earth would just swallow you up?
   (*a*) yes; (*b*) perhaps; (*c*) no.
5. Do you find it easy to keep an exciting secret?
   (*a*) yes; (*b*) sometimes; (*c*) no.
6. Compared to other people, do you make up your mind—
   (*a*) with hesitation; (*b*) in between; (*c*) with certainty?
7. When things go wrong and upset you, do you believe in—
   (*a*) just smiling; (*b*) in between; (*c*) making a fuss?
8. If friends' ideas differ from yours, do you keep from saying yours are better, so as not to hurt their feelings?
   (*a*) yes; (*b*) sometimes; (*c*) no.
9. Do you laugh with your friends more in class than other people do?
   (*a*) yes; (*b*) perhaps; (*c*) no.
10. Do most people seem to enjoy your company?
    (*a*) yes, a lot; (*b*) just average; (*c*) no.
11. Which of these says better what you are like?
    (*a*) a dependable leader; (*b*) in between; (*c*) charming, good-looking.
12. Do you sometimes feel, before a big party or outing, that you are not so interested in going?
    (*a*) yes; (*b*) perhaps; (*c*) no.
13. When you rightly feel angry with people, do you think it's all right for you to shout at them?
    (*a*) yes; (*b*) perhaps; (*c*) no.
14. When classmates play a joke on you, do you usually enjoy it as much as others without feeling at all upset?
    (*a*) yes; (*b*) perhaps; (*c*) no.
15. Are there times when you think, "People are so unreasonable, they can't even be trusted to look after their own good"?
    (*a*) true; (*b*) perhaps; (*c*) false.
16. Can you always tell what your real feelings are, for example, whether you are tired or just bored?
    (*a*) yes; (*b*) perhaps; (*c*) no.
17. Do you think there is a fair chance that you will be a well-known, popular figure when you grow up?
    (*a*) yes; (*b*) perhaps; (*c*) no.
18. When you are given higher marks than you usually get, do you feel that the teacher might have made a mistake?
    (*a*) yes; (*b*) perhaps; (*c*) no.
19. Would you rather be—
    (*a*) a travelling play-actor; (*b*) uncertain; (*c*) a medical doctor?
20. Do you think that life has been a bit happier and more satisfying for you than for many other people?
    (*a*) yes; (*b*) perhaps; (*c*) no.
21. Do you have trouble remembering someone's joke well enough to tell it yourself?
    (*a*) yes; (*b*) sometimes; (*c*) no.

(End, column 1 on answer sheet.)

22. Have you enjoyed being in drama, such as school plays?

(*a*) yes; (*b*) uncertain; (*c*) no.

23. "Mend" means the same as—

(*a*) repair; (*b*) help; (*c*) patch.

24. "Truth" is the opposite of—

(*a*) fancy; (*b*) falsehood; (*c*) denial.

25. Do you completely understand what you read in school?

(*a*) yes; (*b*) usually; (*c*) no.

26. When chalk screeches on the blackboard, does it make you feel queer?

(*a*) yes; (*b*) perhaps; (*c*) no.

27. When something goes badly wrong, do you get very angry with people before you start to think what can be done about it?

(*a*) often; (*b*) sometimes; (*c*) seldom.

28. When you finish school, would you like to—

(*a*) do something that will make people like you, though you are poor; (*b*) uncertain; (*c*) make a lot of money?

29. Do you dislike going into narrow caves or climbing to high places?

(*a*) yes; (*b*) sometimes; (*c*) no.

30. Are you always ready to show, in front of everyone, how well you can do things compared with others?

(*a*) yes; (*b*) perhaps; (*c*) no.

31. Do you like to tell people to follow proper rules and regulations?

(*a*) yes; (*b*) sometimes; (*c*) no.

32. Can you talk to a group of strangers without stammering a little or without finding it hard to say what you want to?

(*a*) yes; (*b*) perhaps; (*c*) no.

33. Do some types of movies upset you?

(*a*) yes; (*b*) perhaps; (*c*) no.

34. Would you enjoy more watching a boxing match than a beautiful dance?

(*a*) yes; (*b*) perhaps; (*c*) no.

35. If someone has been unkind to you, do you soon trust him again and give him another chance?

(*a*) yes; (*b*) perhaps; (*c*) no.

36. Do you sometimes feel you are not much good, and that you never do anything worth-while?

(*a*) yes; (*b*) perhaps; (*c*) no.

37. In the first grade, did you always go to school without your mother having to make you?

(*a*) yes; (*b*) perhaps; (*c*) no.

38. Do you tend to be quiet when out with a group of friends?

(*a*) yes; (*b*) sometimes; (*c*) no.

39. Do people say that you are a person who can always be counted on to do things exactly and methodically (carefully)?

(*a*) yes; (*b*) perhaps; (*c*) no.

40. If someone puts on noisy music while you are trying to work, can you still go on working?

(*a*) yes; (*b*) perhaps; (*c*) no.

41. Would you rather spend some spare pocket money on—

(*a*) a popular dance record; (*b*) uncertain; (*c*) a book to show how you could earn more pocket money?

(End, column 2 on answer sheet.)

42. Do you feel hurt if people borrow your things without asking you?

(*a*) yes; (*b*) perhaps; (*c*) no.

43. "Firm" is the opposite of—

(*a*) hard; (*b*) kind; (*c*) loose.

44. "Rich" is to "money" as "sad" is to—

(*a*) trouble; (*b*) friends; (*c*) land.

45. Have you always get along really well with your parents, brothers, and sisters?

(*a*) yes; (*b*) perhaps; (*c*) no.

46. If your friends leave you out of something they are doing, do you—

(*a*) think they made a mistake; (*b*) in between; (*c*) feel hurt and angry?

47. Do people say you are sometimes careless and untidy, though they think you are a fine person?

(*a*) yes; (*b*) perhaps; (*c*) no.

48. Have you ever told your parents that some teachers are too old-fashioned to understand modern young people like you and your friends?

(*a*) yes; (*b*) perhaps; (*c*) no.

49. Which would you rather be—

(*a*) the most popular person in school; (*b*) uncertain; (*c*) the person with the highest marks?

50. In a group of people, are you generally one of those who tells jokes and funny stories?

(*a*) yes; (*b*) perhaps; (*c*) no.

51. Are you usually patient with people who speak very fast or very slowly?

(*a*) yes; (*b*) sometimes; (*c*) no.

52. Are your feelings easily hurt?

(*a*) yes; (*b*) perhaps; (*c*) no.

53. In a play, would you rather act the part of a famous teacher of art than a tough pirate?

(*a*) yes; (*b*) perhaps; (*c*) no.

54. Which course would you rather take—

(*a*) practical mathematics; (*b*) uncertain; (*c*) foreign language or drama?

55. Would you rather spend free time—

(*a*) by yourself, on a book or stamp collection; (*b*) uncertain; (*c*) working under others in a group project?

56. Do you feel that you are getting along well, and that you do everything that could be expected of you?

(*a*) yes; (*b*) perhaps; (*c*) no.

57. Do you find yourself humming tunes someone else started?

(*a*) yes; (*b*) perhaps; (*c*) no.

58. When a new fad starts, for example in dress or way of speaking, do you—

(*a*) start early and go along with it; (*b*) uncertain; (*c*) wait and watch before deciding if you will follow it?

59. Would you like to be extremely good-looking, so that people would notice you wherever you go?

(*a*) yes; (*b*) perhaps; (*c*) no.

60. Do you feel that most of your wants are reasonably well satisfied?

(*a*) yes; (*b*) perhaps; (*c*) no.

61. When you read an adventure story, do you—

(*a*) get bothered whether it is going to end happily; (*b*) uncertain; (*c*) just enjoy the story as it goes along?

(End, column 3 on answer sheet.)

62. In dancing or music, do you pick up a new rhythm easily?

(*a*) yes; (*b*) sometimes; (*c*) no.

63. " Sun " is to " shine " as " ship " is to—

(*a*) anchor; (*b*) float; (*c*) roll.

64. If Joan's mother is my father's sister, what relation is Joan's father to me?

(*a*) father; (*b*) brother; (*c*) uncle.

65. Do you often make big plans and get excited about them, only to find that they just won't work out?

(*a*) yes; (*b*) occasionally; (*c*) no.

66. Can you work hard on something, without being bothered if there's a lot of noise around you?

(*a*) yes; (*b*) perhaps; (*c*) no.

67. Do you often remember things differently from other people, so that you have to disagree about what really happened?

(*a*) yes; (*b*) perhaps; (*c*) no.

68. Do you prefer having teachers tell you how things should be done?

(*a*) yes; (*b*) perhaps; (*c*) no.

69. When you are ready for a job, would you like one that--

(*a*) is steady and safe, even if it needs hard work; (*b*) uncertain; (*c*) has lots of change and meetings with lively people?

70. In group activities, which do you prefer—

(*a*) to be a good leader; (*b*) in between; (*c*) to be a good follower?

71. If you found another pupil doing a job you had been told to do, would you—

(*a*) ask him to let you do it; (*b*) uncertain; (*c*) let him keep on until the teacher could come to decide?

72. Can you work just as well, without making more mistakes, when people are watching you?

(*a*) yes; (*b*) perhaps; (*c*) no.

73. When you see something very sad in a play, do you—

(*a*) find it hard to keep the tears away; (*b*) in between; (*c*) say, " Oh, this is just a lot of make-believe "?

74. Would you rather spend an afternoon by a lake--

(*a*) watching dangerous speed boat racing; (*b*) uncertain; (*c*) walking by the lovely shore with a friend?

75. When you are in a group, do you spend more time--

(*a*) enjoying the friendship; (*b*) uncertain; (*c*) watching what happens?

76. Which of these changes in school would you rather vote for--

(*a*) putting slow people in classes of their own; (*b*) uncertain; (*c*) doing away with unnecessary punishment?

77. When things are going wonderfully, do you--

(*a*) actually almost " jump for joy "; (*b*) uncertain; (*c*) feel good inside, while appearing calm?

78. Would you rather be—

(*a*) a builder of bridges; (*b*) uncertain; (*c*) a member of a travelling circus?

79. When something is bothering you, do you think it's better to—

(*a*) try to hold it until you're in a calmer state; (*b*) uncertain; (*c*) blow off steam?

80. Do you sometimes say silly things, just to see what people will say?

(*a*) yes; (*b*) perhaps; (*c*) no.

81. When you do badly in an important game, do you—

(*a*) say, " This is just a game "; (*b*) uncertain; (*c*) get angry and " kick yourself "?

(End. column 4 on answer sheet.)

82. Do you go out of your way to avoid crowded buses and streets?
(*a*) yes; (*b*) perhaps; (*c*) no.

83. "Usually" means the same as—
(*a*) sometimes; (*b*) always; (*c*) generally.

84. If all firs are coniferous trees, and all coniferous trees are evergreens, which of the following is true?
(*a*) all firs are evergreens; (*b*) all evergreens are firs; (*c*) all coniferous trees are firs.

85. Are you satisfied that you come up to what people expect from someone of your age?
(*a*) yes; (*b*) perhaps; (*c*) no.

86. If you keep breaking and accidentally wasting things when you are making something, do you keep calm just the same?
(*a*) yes; (*b*) perhaps; (*c*) no, I get furious.

87. Do you tell schoolmates who are getting too noisy to keep quiet?
(*a*) often; (*b*) sometimes; (*c*) seldom.

88. In a trip with naturalists, would you find it more fun to—
(*a*) catch birds and preserve them in a collection; (*b*) uncertain; (*c*) make artistic photos and paintings of birds on the wing?

89. Would you rather—
(*a*) read a story of wild adventure; (*b*) uncertain; (*c*) actually have wild adventures happen to you?

90. Are you "steady and sure" in what you do?
(*a*) seldom; (*b*) sometimes; (*c*) always.

91. With people who take a long time to answer a question, do you—
(*a*) let them take their own time, however long; (*b*) in between; (*c*) try to hasten their answers, and get cross if they don't move?

92. Do you sometimes feel unwilling to try something, though you know it is not really dangerous?
(*a*) yes; (*b*) perhaps; (*c*) no.

93. Do you stand up before class without looking nervous and ill-at-ease?
(*a*) yes; (*b*) perhaps; (*c*) no.

94. Which would you rather watch on a fine evening—
(*a*) car racing; (*b*) uncertain; (*c*) an open air musical play?

95. Have you ever thought what you would do if you were the only person left in the world?
(*a*) yes; (*b*) not sure; (*c*) no.

96. When you have to wait in line, do you often—
(*a*) wait patiently; (*b*) uncertain; (*c*) fidget and think of going away instead of waiting?

97. Do you wish you could learn to be more carefree and light-hearted about your school work?
(*a*) yes; (*b*) perhaps; (*c*) no.

98. Are you, like a lot of people, slightly afraid of lightning?
(*a*) yes; (*b*) perhaps; (*c*) no.

99. Do you ever suggest to the teacher a new subject for the class to discuss?
(*a*) yes; (*b*) perhaps; (*c*) no.

100. Would you rather spend a break between morning and afternoon classes in—
(*a*) a card game; (*b*) uncertain; (*c*) catching up on homework?

101. When you are walking in a quiet street in the dark, do you often get the idea you are being followed?
(*a*) yes; (*b*) perhaps; (*c*) no.

(End, column 5 on answer sheet.)

102. In talking with your classmates, do you dislike telling your most private feelings?
(*a*) yes; (*b*) sometimes; (*c*) no.

103. When you go into a new group, do you —
(*a*) quickly feel you know everyone; (*b*) in between; (*c*) take a long time to get to know people?

104. Look at these five words: mostly, gladly, chiefly, mainly, highly. The word that does not belong with the others is—
(*a*) mostly; (*b*) gladly; (*c*) highly.

105. Do you sometimes feel happy and sometimes feel depresssed without real reason
(*a*) yes; (*b*) uncertain; (*c*) no.

106. When people around you laugh and talk while you are listening to the radio—
(*a*) can you listen without being bothered; (*b*) in between; (*c*) does it spoil things and annoy you?

107. If you accidentally say something odd in company, do you stay uncomfortable a long time, and find it hard to forget?
(*a*) yes; (*b*) perhaps; (*c*) no.

108. Are you known among your friends for going "all out" for things that take your fancy?
(*a*) yes; (*b*) perhaps; (*c*) no.

109. Are you best regarded as a person who—
(*a*) thinks; (*b*) in between; (*c*) acts?

110. Do you spend most of your allowance each week for fun (instead of saving much of it for future needs)?
(*a*) yes; (*b*) perhaps; (*c*) no.

111. Do other people often get in your way?
(*a*) yes; (*b*) perhaps; (*c*) no.

112. How would you rate yourself?
(*a*) inclined to be moody; (*b*) in between; (*c*) not at all moody?

113. In school, do you feel your teachers —
(*a*) approve of you; (*b*) uncertain; (*c*) hardly know you are there?

114. Do your interests—
(*a*) roam widely over many things; (*b*) in between; (*c*) settle strongly on one or two important things?

115. Do you get into trouble more often through saying to a group wanting to do something—
(*a*) "Let's go!"; (*b*) uncertain; (*c*) "I'd rather not join in"?

116. When you were growing up, did you expect the world to be—
(*a*) more kind and considerate than it is; (*b*) uncertain; (*c*) more tough and hard than it is?

117. Do you find it easy to go up and introduce yourself to an important person?
(*a*) yes; (*b*) perhaps; (*c*) no.

118. Do you think that a committee often makes poorer decisions than one person would do and also takes too much time?
(*a*) yes; (*b*) perhaps; (*c*) no.

119. Do you usually—
(*a*) follow your own ideas of what is right; (*b*) uncertain; (*c*) do the same as other people?

120. Do you sometimes go on and do something you very much want to do, even though you feel a bit ashamed of yourself?
(*a*) yes; (*b*) perhaps; (*c*) no.

121. When someone is disagreeing with you, do you—
(*a*) let him say all he has to say; (*b*) uncertain; (*c*) tend to interrupt before he finishes?

(End, column 6 on answer sheet.)

122. Would you rather live—
(*a*) in a deep forest, with only the song of birds; (*b*) uncertain; (*c*) on a busy street corner, where a lot happens?

123. When a new teacher comes to your class, does he or she soon notice who you are and remember you?
(*a*) yes; (*b*) perhaps; (*c*) no.

124. Look at these five words: below, beside, above, behind, between. The word that does not belong with the others is—
(*a*) below; (*b*) between; (*c*) beside.

125. If someone asks you to do a new and difficult job, do you—
(*a*) feel glad and show what you can do; (*b*) in between; (*c*) feel you will make a mess of it?

126. When you raise your hand to answer a question in class, and many others raise their hands too, do you get excited?
(*a*) sometimes; (*b*) not often; (*c*) never.

127. In school would you rather be—
(*a*) a librarian, looking after the reading books; (*b*) uncertain; (*c*) an athletic coach?

128. On your birthday, do you prefer—
(*a*) to be asked beforehand, so that you can choose the present you want; (*b*) uncertain; (*c*) to have the fun of getting a present as a complete surprise?

129. Are you very careful not to hurt anyone's feelings or startle anyone, even in fun?
(*a*) yes; (*b*) perhaps; (*c*) no.

130. If you were working with groups in class, would you rather—
(*a*) walk around to carry things from one person to another; (*b*) uncertain; (*c*) specialize in showing people how to do one difficult part?

131. Do you take trouble to be sure you are right before you say anything in class?
(*a*) always; (*b*) generally; (*c*) not usually.

132. Are you so afraid of consequences that you avoid making decisions one way or the other?
(*a*) often; (*b*) sometimes; (*c*) never.

133. Do you have periods of feeling just "run down"?
(*a*) seldom; (*b*) sometimes; (*c*) often.

134. When a close friend prefers someone else's company to yours on a special day, do you—
(*a*) complain to him for neglecting you; (*b*) in between; (*c*) take it in a "matter of fact" way?

135. Would you like better, when in the country—
(*a*) running a class picnic; (*b*) uncertain; (*c*) learning to know all the different trees in the woods?

136. In group discussions, do you often find yourself—
(*a*) taking a lone stand; (*b*) uncertain; (*c*) agreeing with the group?

137. Do your feelings get so bottled up that you feel you could burst?
(*a*) often; (*b*) sometimes; (*c*) seldom.

138. Which kind of friends do you like? Those who like to—
(*a*) "kid around"; (*b*) uncertain; (*c*) be more serious?

139. If you were not a human being, would you rather be—
(*a*) an eagle on a far mountain; (*b*) uncertain; (*c*) a seal, in a seal colony by the seashore?

140. Do you think that to be polite you must learn to control your feelings?
(*a*) yes; (*b*) perhaps; (*c*) no.

141. Do small troubles sometimes "get on your nerves" even though you know that they are not very important?
(*a*) yes; (*b*) perhaps; (*c*) no.

142. Are you sure you have answered every question?
(*a*) yes; (*b*) perhaps; (*c*) no.

THE SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

"The 16PF Test"

This test was developed by the Institute for Personality and Ability Testing, Champaign, Illinois, U.S.A. It is designed to take over from the HSPQ and test adolescents from 16 or 17 years upwards and adults. As its name suggests, it measures sixteen separate dimensions of personality and these are listed below.

	Factor A	
Cyclothymia, A+ (warm, sociable)	Versus	Schizothymia, A- (aloof, stiff)
	Factor B	
General intelligence, B+ (bright)	Versus	Mental defect, B- (dull)
	Factor C	
Emotional stability or ego strength, C+ (mature, calm)	Versus	Dissatisfied emotionality, C- (emotional, immature, unstable)
	Factor E	
Dominance or ascendance, E+ (aggressive, competitive)	Versus	Submission, E- ("milk-toast", mild)
	Factor F	
Surgency, F+ (enthusiastic, happy-go-lucky)	Versus	Desurgency, F- (glum, sober, serious)
	Factor G	
Character or super-ego strength, G+ (conscientious, persistent)	Versus	Lack of rigid internal standards, G- (casual, undependable)
	Factor H	
Parmia, H+ (Adventurous, "thick-skinned")	Versus	Threctia, H- (shy, timid)
	Factor I	
Premsia, I+ (sensitive, effeminate)	Versus	Harria, I- (tough, realistic)
	Factor L	
Protension (paranoid tendency), L+ (suspecting, jealous)	Versus	Relaxed security, L- (accepting, adaptable)

	Factor M	
Autia, M+ (Bohemian introverted, absent-minded)	Versus	Praxernia, M- (Practical, concerned with facts)
	Factor N	
Shrewdness, N+ (sophisticated, polished)	Versus	Naïveté, N- (simple, unpretentious)
	Factor O	
Guilt proneness, O+ (timid, insecure)	Versus	Confident adequacy, O- (confident, self-secure)
	Factor Q1	
Radicalism, Q1+	Versus	Conservatism of temperament, Q1-
	Factor Q2	
Self-sufficiency, Q2+ (self-sufficient, resourceful)	Versus	Group dependency, Q2- (sociably group dependent)
	Factor Q3	
High self-sentiment formation, Q3+ (controlled, exacting will power)	Versus	Poor self-sentiment formation, Q3- (uncontrolled, lax)
	Factor Q4	
High ergic tension, Q4+ (tense, excitable)	Versus	Low ergic tension, Q4- (phlegmatic, composed)

TABLE N-7 : Norms for
BOYS + GIRLS: FORM A (A1 + A2)
N = 2834

Factor	Age	Sten Score 1	2	3	4	5	6	7	8	9	10	Factor	Mean	σ
		Raw Score												
A		0-2	3	4	5	6	7	8	9	-	10	A	6.7	1.9
B	8-10½	0-2	3	4	5	6	7	8	9	-	10	B	6.5	2.0
	10½-13	0-3	4	5	6	7	8	9	-	10	-		7.5	
C		0-1	2	3	4	5-6	7	8	9	-	10	C	6.0	2.1
D	8-10½	0	-	1	2	3	4-5	6	7	8	9-10	D	3.9	2.3
	10½-13	0	1	2	3	4	5	6	7-8	9	10		4.6	2.2
E	8-10½	0	1	2	3	4	5	6	7	-	8-10	E	4.1	2.2
	10½-13	0-1	-	2	3	4-5	-	6	7	8	9-10		5.0	
F	8-10½	0	1	-	2	3	4	5	6	7	8-10	F	3.7	2.5
	10½-13	0-1	2	-	3	4	5	6	7	8	9-10		4.8	2.3
G		0-2	3-4	5	6	7	8	9	-	10	-	G	7.3	2.0
H		0-1	2	3	4	5	6	7	8	9	10	H	5.6	2.0
I	8-10½	0-1	-	2	3-4	5	6	7	8	9	10	I	5.2	2.7
	10½-13	0	1	2	3	4	5	6	7	8	9-10		4.6	
J		0	1	-	2	3	4	5	6	7	8-10	J	3.7	1.8
N		0	-	1	2	3	4	5	6	7	8-10	N	3.3	2.1
O		0	1	-	2	3-4	5	6	7	8	9-10	O	4.3	2.2
Q_3	8-10½	0-1	2-3	4	5	6	7-8	9	-	10	-	Q_3	6.7	2.4
	10½-13	0-1	2	3	4-5	6	7	8	9	-	10		6.3	2.3
Q_4	8-10½	0	-	1	2	3	4-5	6	7	8	9-10	Q_4	3.9	2.2
	10½-13	0	1	2	3	4	5	6	7	8	9-10		4.4	
		1	2	3	4	5	6	7	8	9	10			
		Sten Score												

TABLE 7.3

FORM A: BOYS AND GIRLS TOGETHER (N=2153)

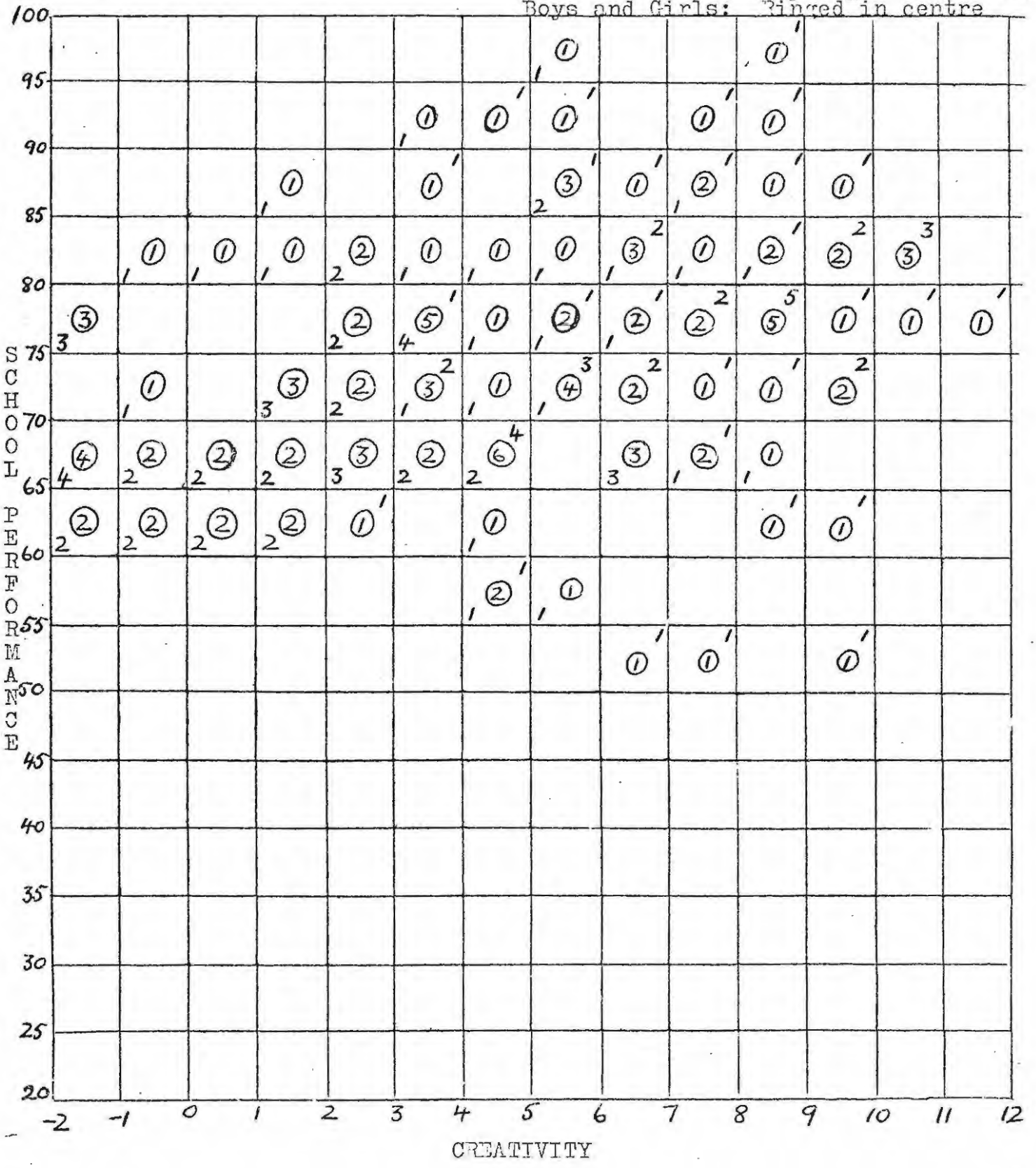
Factor	Sten Score 1	2	3	4	5	6	7	8	9	10	Factor
A	0-3	4	5-6	7-8	9	10-11	12-13	14-15	16	17-20	A
B	0-3	4	5	6	7	8	-	9	-	10	B
C	0-2	3-4	5	6-7	8-9	10-11	12-13	14	15-16	17-20	C
D	0-2	3-4	5-6	7-8	9-10	11	12-13	14-15	16-17	18-20	D
E	0-1	2-3	4	5	6-7	8-9	10	11-12	13-14	15-20	E
F	0-2	3-4	5	6-7	8	9-10	11-12	13-14	15	16-20	F
G	0-5	6	7-8	9	10-11	12-13	14	15-16	17	18-20	G
H	0-1	2-3	4-5	6	7-8	9-10	11-12	13-14	15-16	17-20	H
I	0-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17	18-20	I
J	0-2	3	4	5-6	7	8-9	10-11	12	13-14	15-20	J
O	0-4	5	6-7	8	9-10	11-12	13-14	15	16-17	18-20	O
Q_2	0-3	4-5	6	7-8	9	10-11	12	13-14	15	16-20	Q_2
Q_3	0-4	5-6	7-8	9	10-11	12	13-14	15	16-17	18-20	Q_3
Q_4	0-3	4	5-6	7	8-9	10-11	12	13-14	15	16-20	Q_4

STANDARD 2

Boys: Lower left hand corner

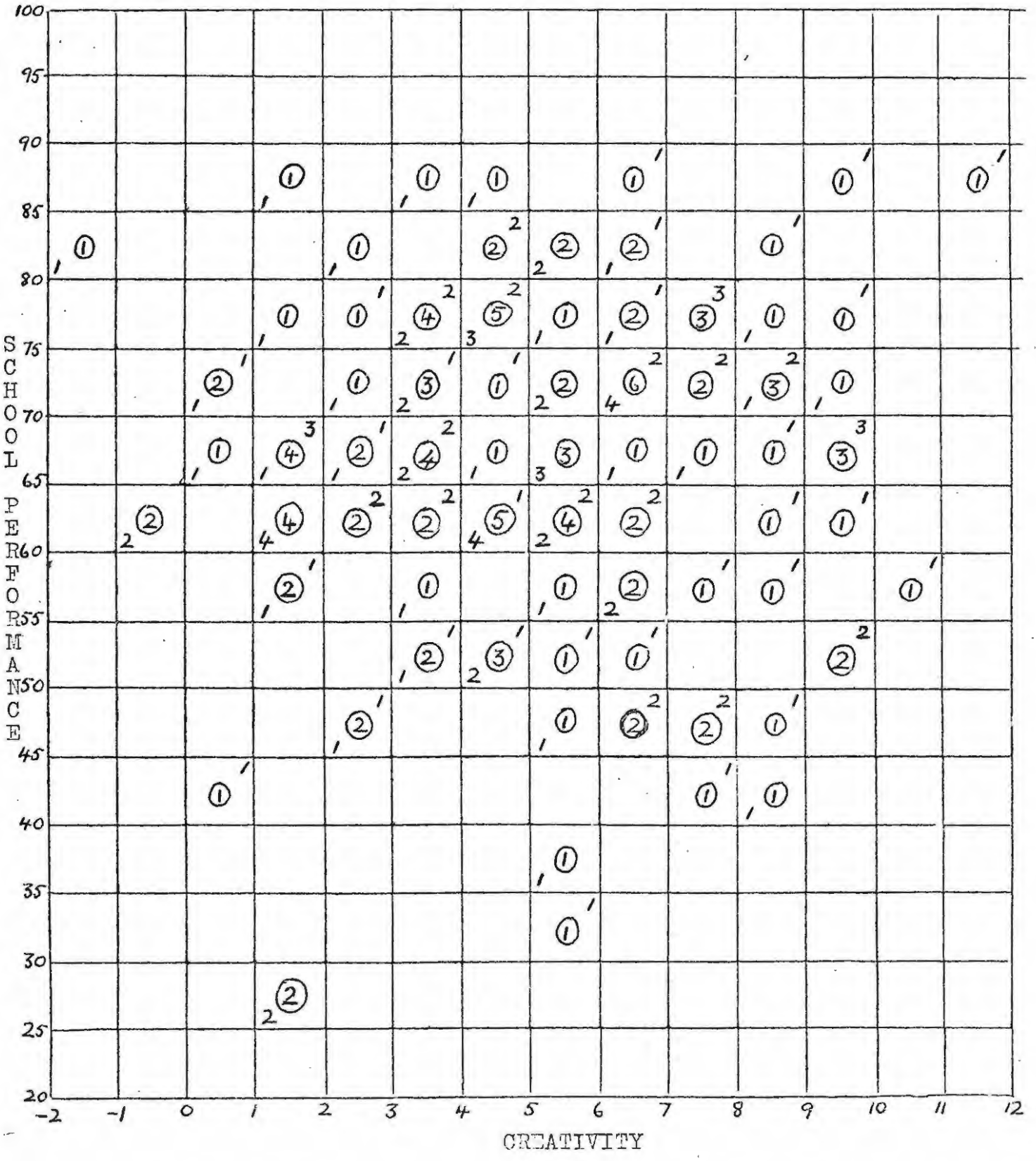
Girls: Top right hand corner

Boys and Girls: Ringed in centre



STANDARD 3

Boys: Lower left hand corner
Girls: Top right hand corner
Boys and Girls: Ringed in centre

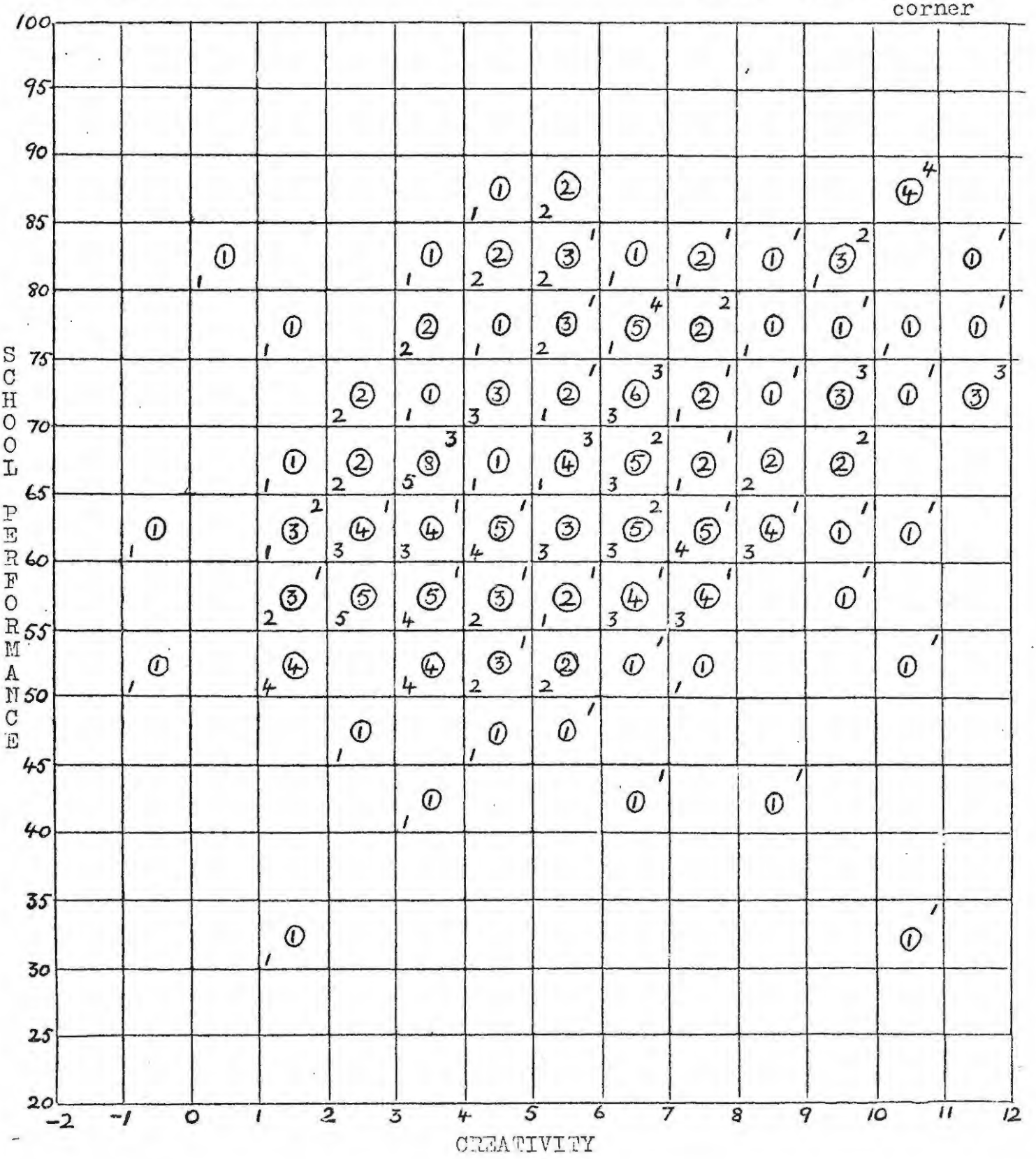


STANDARD 4

Boys and Girls: Ringed in centre

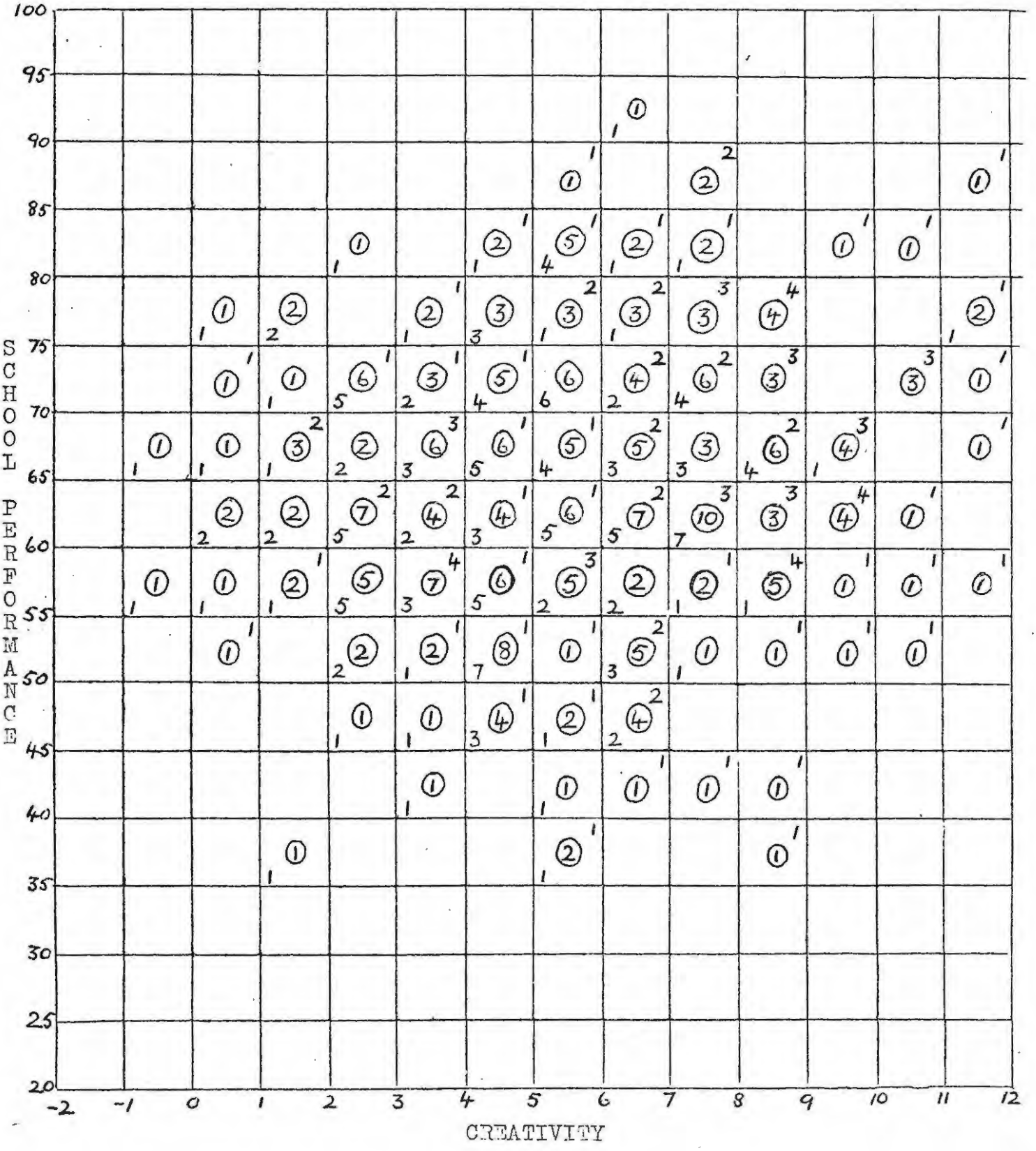
Boys: Lower left hand corner

Girls: Top right hand corner



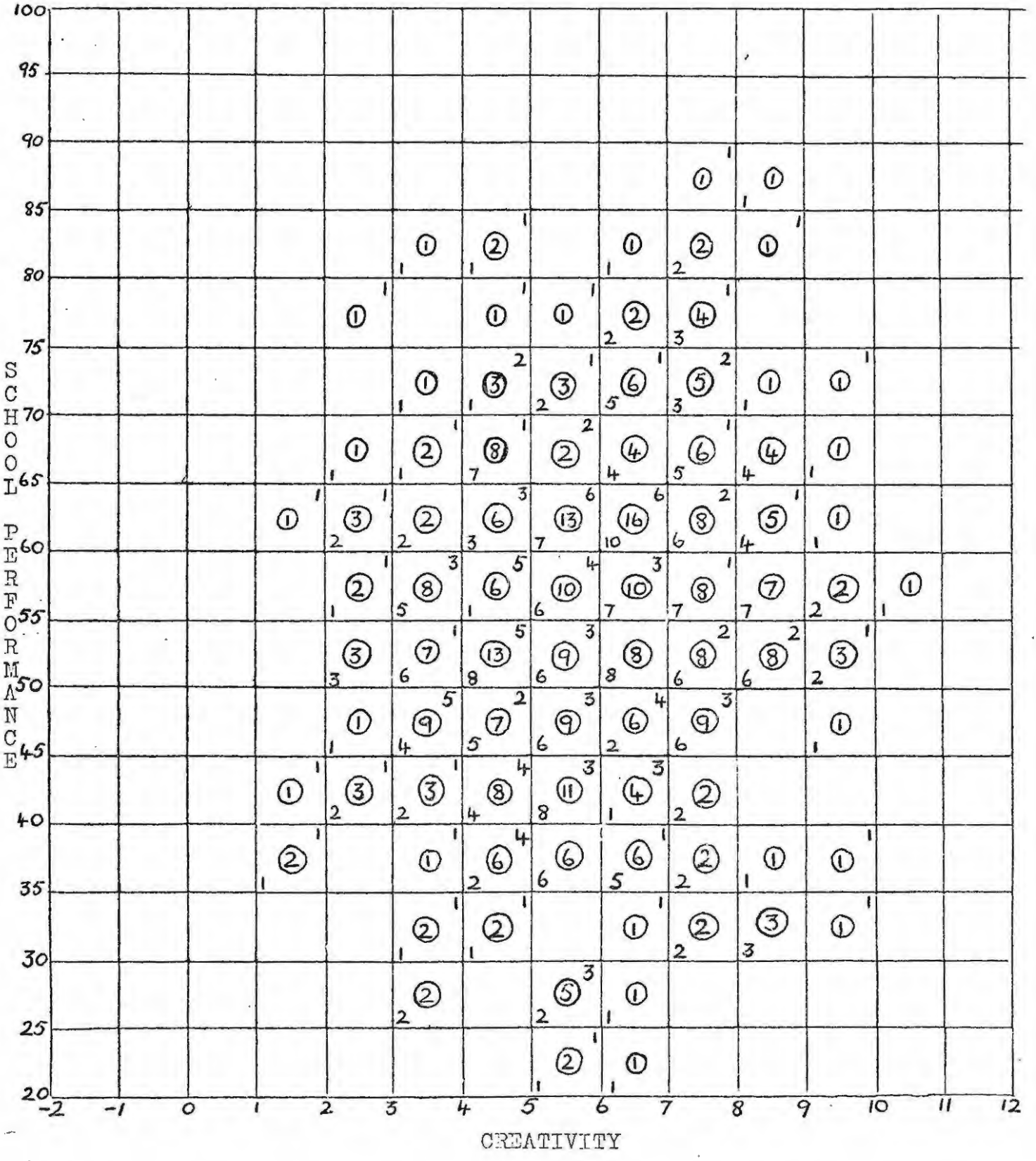
STANDARD 5

Boys: Lower left hand corner
Girls: Top right hand corner
Boys and Girls: Ringed in centre



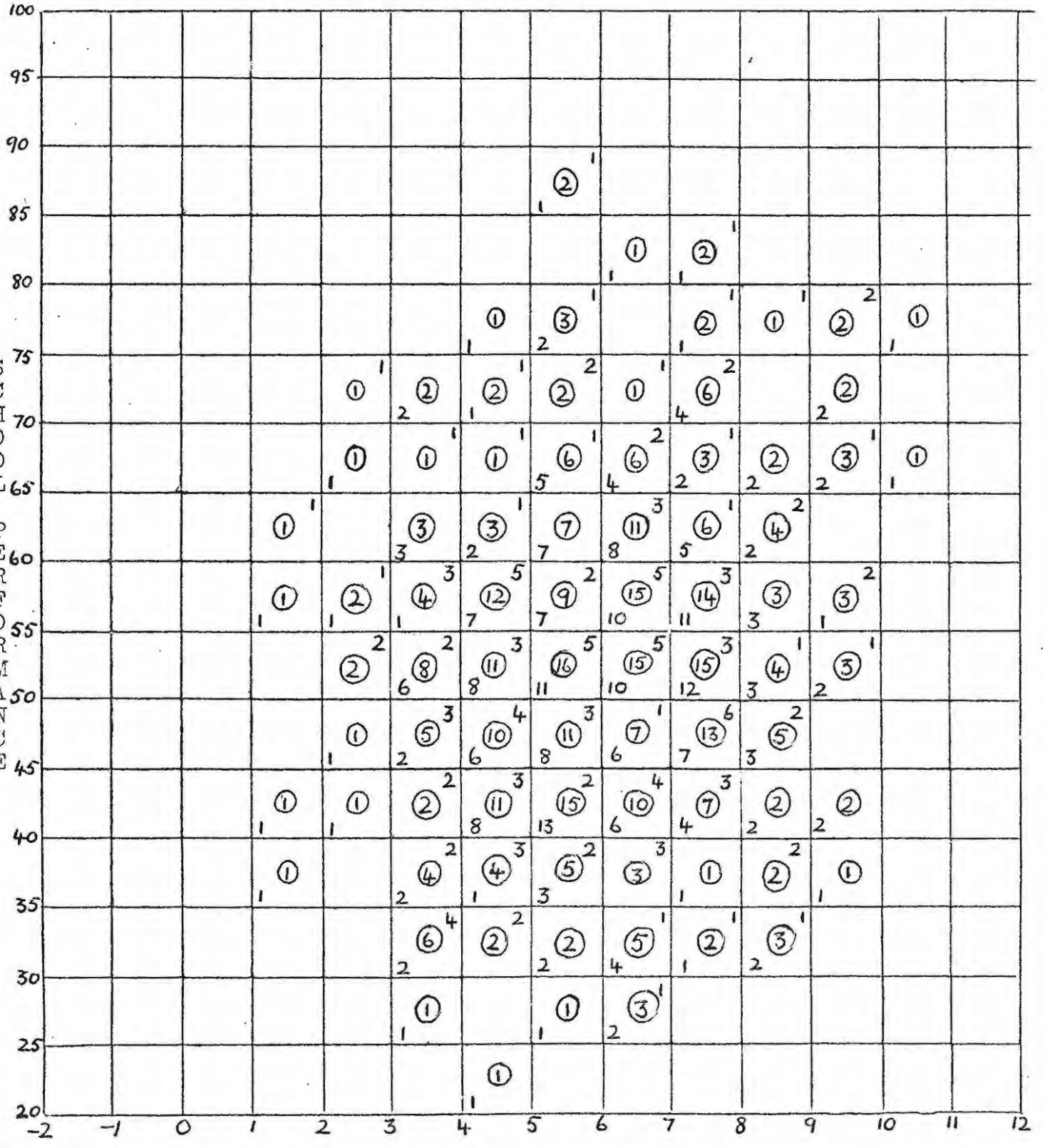
STAINDARD 6

Boys: Lower left hand corner
Girls: Top right hand corner
Boys and Girls: Ringed in centre



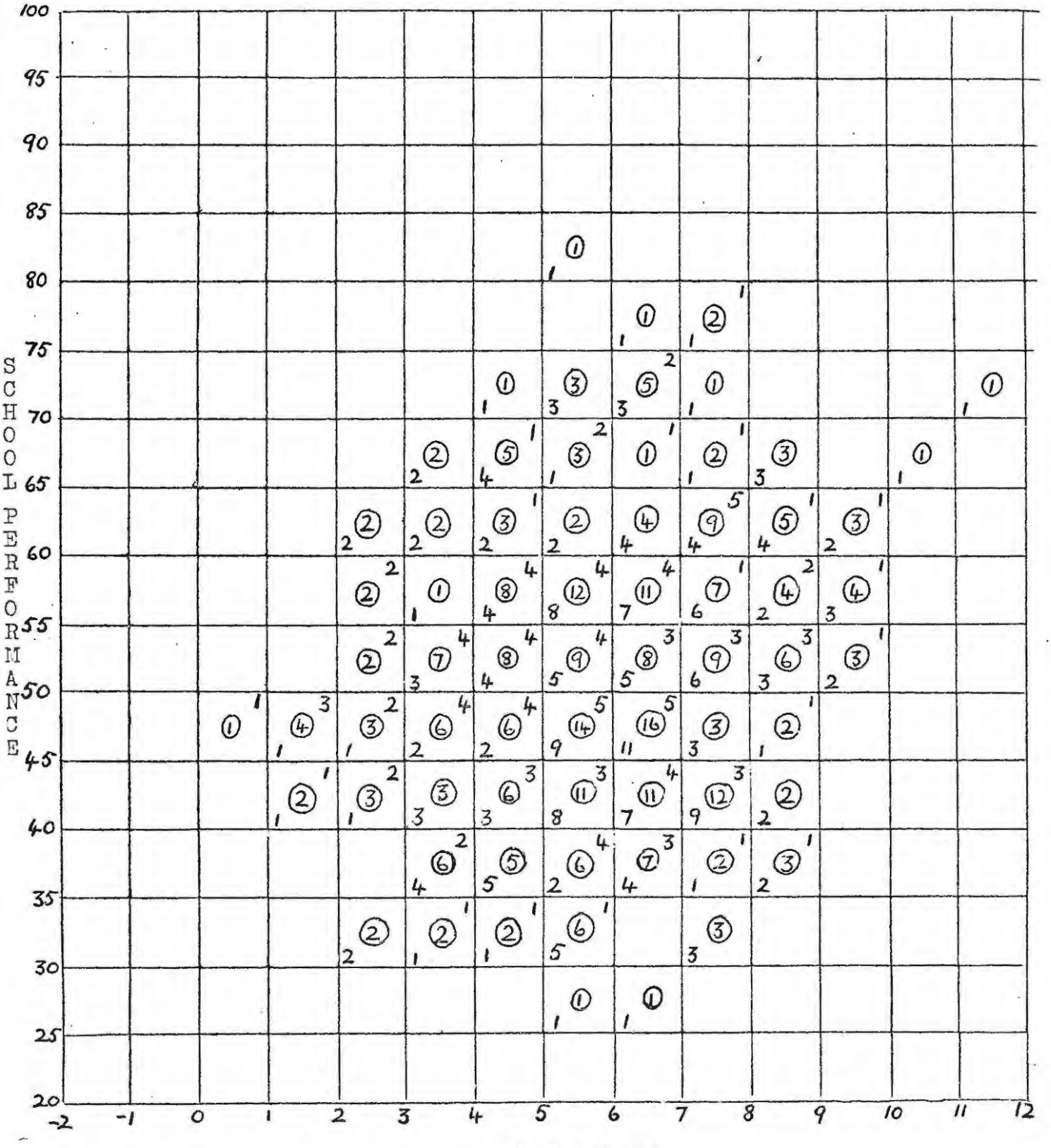
STANDARD 7

Boys: Lower left hand corner
Girls: Top right hand corner
Boys and Girls: Ringed in centre



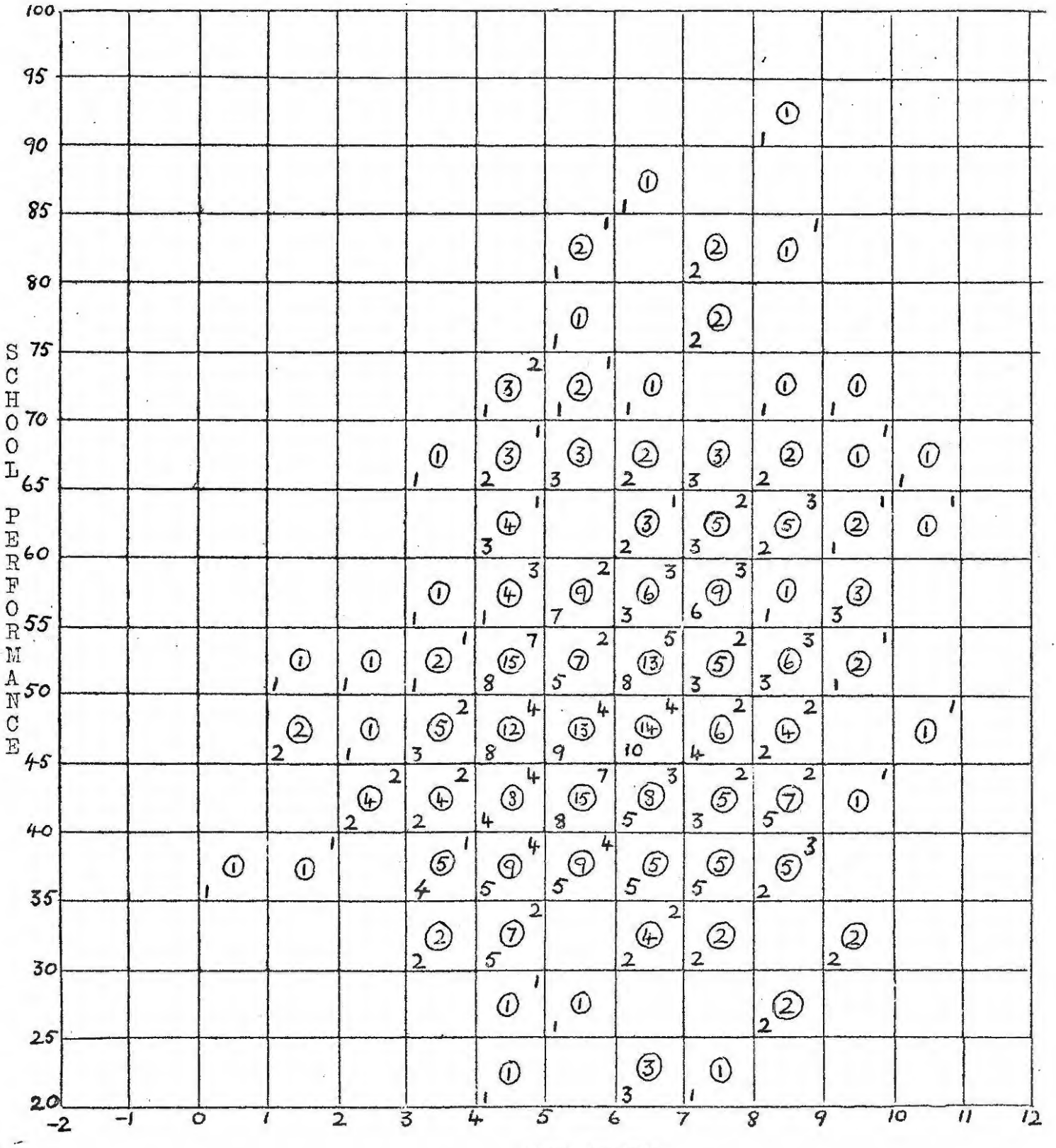
STANDARD 8

Boys: Lower left hand corner
Girls: Top right hand corner
Boys and Girls: Ringed in centre



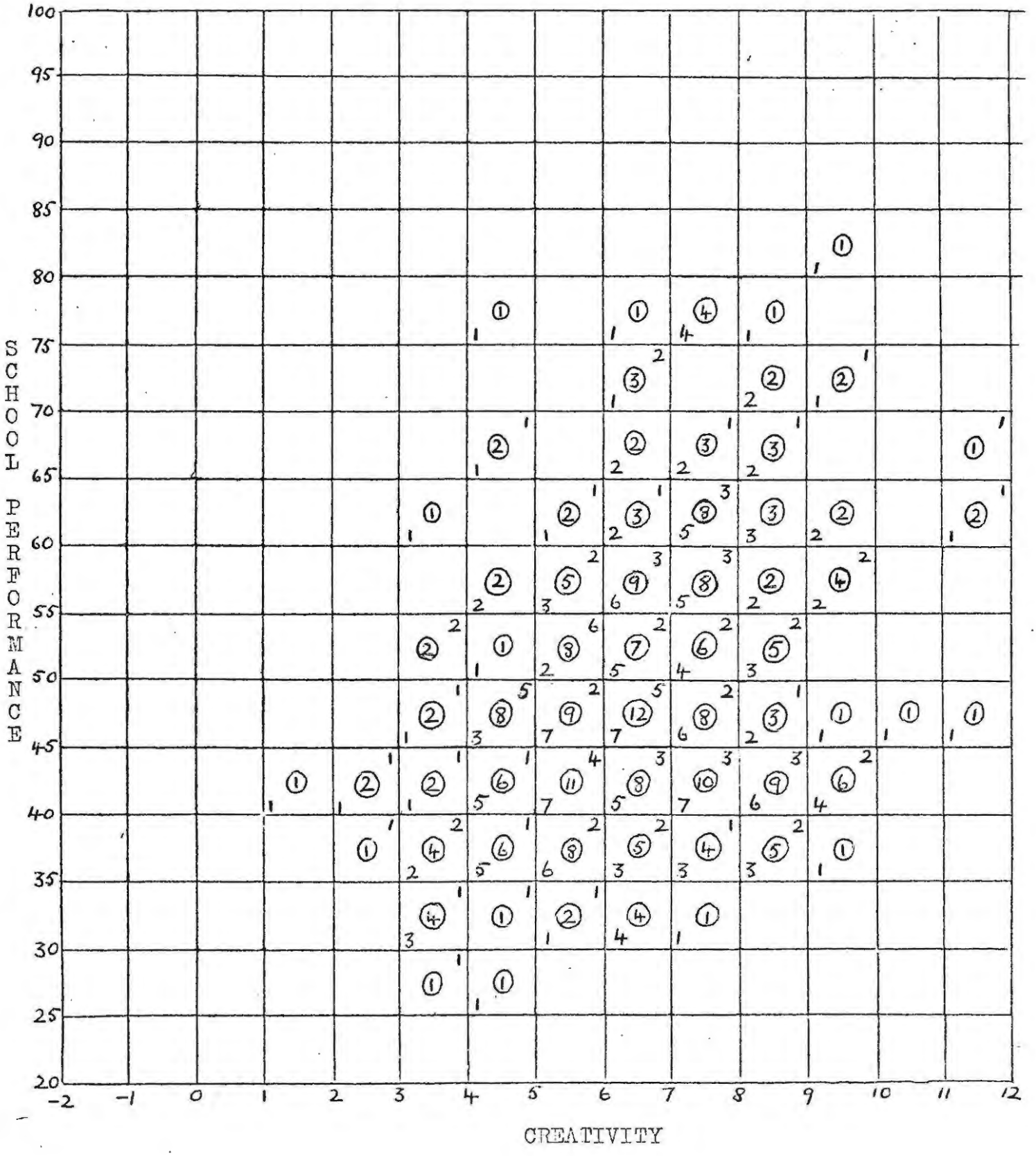
STANDARD 9

Boys: Lower left hand corner
Girls: Top right hand corner
Boys and Girls: Ringed in centre



STAINDARD 10

Boys: Lower left hand corner
Girls: Top right hand corner
Boys and Girls: Ringed in centre



REGRESSION LINES OF SCHOOL PERFORMANCE PLOTTED AGAINST CREATIVITY

STANDARD		School 1	School 2	School 3	School 4
2	.84435x + 70.18455	.3760x + 75.5068	-2.1899x + 79.3491	.7532x + 53.9012	1.1156x + 69.7661
3	.4424x + 64.6242	1.7711x + 60.1600	2.7663x + 52.3426	1.0747x + 54.1172	.7205x + 65.9430
4	1.2376x + 58.4408	1.3968x + 56.1021	1.3235x + 55.0213	-3.2335x + 68.2971	.3462x + 61.0433
5	.5437x + 61.1175	.5265x + 58.5647	-.1144x + 64.4066	.1314x + 49.6709	-.0598x + 64.9578
6	1.0841x + 47.7318	1.2138x + 49.7659	1.8605x + 45.3275	1.6658x + 38.3682	.8789x + 43.9981
7	1.0991x + 45.8253	.1722x + 48.3135	2.6718x + 33.3053	.6075x + 46.6828	1.7038x + 37.5651
8	1.1700x + 43.7725	-.2340x + 49.8630	3.3291x + 31.0058	1.5182x + 38.3591	.7730x + 44.2728
9	1.3447 + 40.8024	1.3493x + 45.7554	2.2263x + 34.0979	3.5379x + 20.1605	1.0661x + 39.3165
10	1.8439x + 36.9587	1.5906x + 34.7325	2.3708x + 34.8223	1.3047x + 37.7062	3.3882x + 30.0181

TABLE (a)

REGRESSION LINES OF SCHOOL PERFORMANCE PLOTTED AGAINST CREATIVITY

School 5	School 6	School 7
-1.5692x + 75.83669	.7282x + 79.930	.9029x + 73.240
-1.4360x + 73.7707	-.3252x + 74.4114	.3875x + 69.7434
- .2997x + 69.0377	.6509x + 73.0709	.6779x + 69.8491
.7874x + 61.2093	-.2849x + 65.7215	-.1627x + 70.3240
.3245x + 48.8513	1.1202x + 55.361	1.5801x + 46.8729
.0024x + 55.1212	1.2269x + 54.9697	1.0588x + 52.5444
.6522x + 49.7563	.6430x + 55.0252	2.4886x + 36.1158
1.5532x + 41.6435	-.1465x + 53.4325	.9333x + 46.1422
-1.9261x + 68.4748	.9313x + 43.4553	1.2043x + 36.8332

TABLE (a) continued

SIGNIFICANCE LEVELS FOR (i) Correlation ratio (F_1)
(ii) Pearson correlation coefficient (F_2)
(iii) Departure from linearity (F_3)

Standard	Boys F_1	Boys F_2	Boys F_3	Girls F_1	Girls F_2	Girls F_3	Boys and Girls F_1	Boys and Girls F_2	Boys and Girls F_3 F_3=1.038
2	F_1=1.480 n_1=10 n_2=69 $p>.05$	F_2=6.308 n_1=1 n_2=69 $.05>p>.01$	F_3=.949 n_1=9 n_2=60 $p>.05$	F_1=.829 n_1=9 n_2=45 $p>.05$	F_2=1.465 n_1=1 n_2=53 $p>.05$	F_3=.756 n_1=8 n_2=45 $p>.05$	F_1=1.784 n_1=13 n_2=113 $p>.05$	F_2=10.695 n_1=1 n_2=124 $.01>p>.001$	n_1=12 n_2=112 $p>.05$
3	F_1=2.227 n_1=11 n_2=54 $.05>p>.01$	F_2=.420 n_1=1 n_2=64 $p>.05$	F_3=2.508 n_1=10 n_2=54 $p\simeq.05$	F_1=1.084 n_1=11 n_2=54 $p>.05$	F_2=.333 n_1=1 n_2=64 $p>.05$	F_3=1.159 n_1=10 n_2=54 $p>.05$	F_1=.921 n_1=13 n_2=118 $p>.05$	F_2=.407 n_1=1 n_2=130 $p>.05$	F_3=.964 n_1=12 n_2=118 $p>.05$
4	F_1=2.243 n_1=11 n_2=99 $.05>p>.01$	F_2=8.165 n_1=1 n_2=109 $.01>p>.001$	F_3=1.606 n_1=10 n_2=99 $p>.05$	F_1=.894 n_1=10 n_2=57 $p>.05$	F_2=6.987 n_1=1 n_2=66 $p\simeq.01$	F_3=.292 n_1=9 n_2=57 $p>.05$	F_1=2.598 n_1=12 n_2=166 $.01>p>.001$	F_2=20.011 n_1=1 n_2=177 $p<.001$	F_3=1.014 n_1=11 n_2=166 $p>.05$
5	F_1=.572 n_1=11 n_2=138 $p>.05$	F_2=1.609 n_1=1 n_2=148 $p>.05$	F_3=.474 n_1=10 n_2=138 $p>.05$	F_1=.647 n_1=11 n_2=95 $p>.05$	F_2=1.675 n_1=1 n_2=105 $p>.05$	F_3=.551 n_1=10 n_2=95 $p>.05$	F_1=.983 n_1=12 n_2=244 $p>.05$	F_2=3.984 n_1=1 n_2=255 $.05>p>.01$	F_3=.716 n_1=11 n_2=244 $p>.05$
6	F_1=2.003 n_1=9 n_2=299 $p>.01$	F_2=6.100 n_1=1 n_2=237 $.05>p>.01$	F_3=1.479 n_1=8 n_2=229 $p>.05$	F_1=1.414 n_1=8 n_2=107 $p>.05$	F_2=2.100 n_1=1 n_2=114 $p>.05$	F_3=1.310 n_1=7 n_2=107 $p>.05$	F_1=2.495 n_1=9 n_2=345 $.05>p>.01$	F_2=8.496 n_1=1 n_2=353 $.01>p>.001$	F_3=1.727 n_1=8 n_2=345 $p>.05$
7	F_1=1.527 n_1=9 n_2=240 $p>.05$	F_2=6.533 n_1=1 n_2=248 $.05>p>.01$	F_3=.904 n_1=8 n_2=240 $p>.05$	F_1=2.179 n_1=8 n_2=118 $p\simeq.01$	F_2=4.171 n_1=1 n_2=125 $.05>p>.01$	F_3=1.865 n_1=7 n_2=118 $p>.05$	F_1=2.775 n_1=9 n_2=367 $.05>p>.01$	F_2=10.932 n_1=1 n_2=375 $p<.001$	F_3=1.733 n_1=8 n_2=367 $p>.05$
8	F_1=1.280 n_1=10 n_2=190 $p>.05$	F_2=7.276 n_1=1 n_2=199 $.01>p>.001$	F_3=.628 n_1=9 n_2=190 $p>.05$	F_1=1.324 n_1=9 n_2=103 $p<.001$	F_2=6.851 n_1=1 n_2=111 $.05>p>.01$	F_3=.655 n_1=8 n_2=103 $p>.05$	F_1=1.862 n_1=11 n_2=302 $p\simeq.05$	F_2=13.716 n_1=1 n_2=312 $p<.001$	F_3=.690 n_1=10 n_2=302 $p>.05$
9	F_1=1.128 n_1=10 n_2=196 $p>.05$	F_2=6.530 n_1=1 n_2=205 $.05>p>.01$	F_3=.542 n_1=9 n_2=196 $p>.05$	F_1=.857 n_1=9 n_2=98 $p>.05$	F_2=6.080 n_1=1 n_2=106 $.05>p>.01$	F_3=.247 n_1=9 n_2=98 $p>.05$	F_1=1.613 n_1=10 n_2=304 $p>.05$	F_2=11.966 n_1=1 n_2=313 $p<.001$	F_3=.483 n_1=9 n_2=304 $p>.05$
10	F_1=1.997 n_1=10 n_2=157 $.01>p>.001$	F_2=16.310 n_1=1 n_2=166 $p<.001$	F_3=.459 n_1=9 n_2=157 $p>.05$	F_1=2.462 n_1=8 n_2=77 $.05>p>.01$	F_2=12.951 n_1=1 n_2=84 $p<.001$	F_3=.968 n_1=7 n_2=77 $p>.05$	F_1=3.417 n_1=10 n_2=243 $p<.001$	F_2=28.665 n_1=1 n_2=253 $p<.001$	F_3=.651 n_1=9 n_2=243 $p>.05$

TABLE (b)

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