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THE UNIVERSITY OF ALBERTA

INTERACTION OF PHYSICAL ENVIRONMENT WITH CREATIVITY AND INTELLIGENCE

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

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FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled, "Interaction of Physical Environment with Creativity and Intelligence" submitted by Madan Mohan in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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ABSTRACT

The purpose of the present study was to investigate whether environmental cues are related to creativity. If they are, it would point out to, among others, two things related to creativity: (1) an additional variable in the assessment of creativity; (2) a further insight into strategies used for fostering creativity through the manipulation of physical environment. The same applies to intelligence--a second factor included in the study.

The sample consisted of 719 children, who comprised the random population of 11 elementary schools from the Edmonton Public School Board, Edmonton, Alberta, Canada. Two contrasting groups, each of 32 subjects, called high and low creative, were selected through a combination of (a) peer nomination, (b) teacher nomination, and (c) the Canadian Lorge-Thorndike Intelligence tests. Each of the two groups was randomly divided into two equal-sized subgroups called EHC, CHC, ELC, and CLC. Physical objects, pictures, and posters, which were deemed to be relevant to the tasks in the Torrance Tests of Creative Thinking, Verbal Test, Form B, were displayed in a room. The Experimental subjects answered individually the Torrance Tests of Creative Thinking, Verbal Test, Form B in the cue-rich environment while the Control subjects were administered the tests individually in the same room after the physical cues had been removed. No time limit was used in

administering the test.

The design contained four factors, one of them having repeated measurements. The four factors were: (a) types of physical environment, (b) levels of creativity, (c) levels of intelligence, and (d) the three measures of creativity.

The major findings of the study were as follows:

1. Presence of interaction between environmental cues and creativity.
2. Absence of interaction between environmental cues and intelligence.
3. Presence of interaction between environmental cues and the three dimensions, fluency, flexibility, and originality of creativity.
4. Presence of interaction was due to the differential effect of cue-rich environment on high creative children and not so on low creative children.

The findings were interpreted as indicating that high and low creative subjects differed in that the former scanned the environment for relevant information while solving a problem creatively. The same did not apply to intelligence. A few implications for family and school environment and some ideas for further research are suggested.

ACKNOWLEDGMENT

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The final draft of the study was written while the author was research assistant professor at the Teacher Education Research Center, State University of New York at Fredonia. The author wishes to express his thanks to the Director of the Center, Dr. Kenneth G. Nelson for his encouragement.

And last, but not the least, he feels that thanks are due to his wife, Ved and two children (Ashwini and Neeru) who bore with him the hardships of graduate work.

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INTRODUCTION

The days of the controversy over the relative influence of heredity and environment on intelligence are now long past. It is now generally believed that individual differences in intelligence are associated with the interaction between the innate predispositions and the environment (Hunt, 1961; Bloom, 1964). One wonders whether environmental differences will also be related to differences in creative behavior. If so, the finding will substantiate Bloom's (1964) assertion that "the introduction of environment as a variable makes a major difference in our ability to predict the mature status of a human characteristic." The present study is a step in the direction of exploring the interaction of physical environment with creativity as well as intelligence.

The term 'environment' if considered as a global concept, will include all external stimuli which impinge upon the individual. The stimuli may be the most immediate or the most remote to the individual. A more fruitful way to look upon it is to consider it in terms of its social and physical aspects. The former will include those conditions in which "significant others" are present who, directly or indirectly, affect the reactions of the individuals. Physical environment, on the other hand, will include those conditions in which no "significant others" are present and, therefore, the responses

of an individual are largely affected by his inanimate surroundings. Some of the latter may be relevant to the task the individual is called upon to perform or is trying to engage in.

Much has been said and written about the importance of social environment. Theoretical developments such as Lewin's field theory (1936), Roger's self-concept theory (1951, 1961), Osgood's (1957) work with semantic differential, Festinger's theory of cognitive dissonance (1957), Heider's theory of interpersonal behavior (1958), Wylie's review and resolution of phenomenological positions on self-concept (1961), the ideas of Kelly (1963) about role and its constructs--all point to the importance of social interaction in relation to behavior in general. Essentially the same story is told by Piaget (1952) in his principle of assimilation and accommodation, Bandura and Walters (1962) in the role of imitation and modeling, and Backman and Secord (1968) in terms of peer group.

In relation to the specific area of creative behavior, the desirable aspects of environment are said to include permissiveness of new ideas (Royce, 1898), providing psychological safety and psychological freedom (Rogers, 1953), a warm and non-evaluative relation (Lasswell, 1959), and the personally open system (Anderson, 1965). A number of studies have been directed toward the possible influence of early environmental factors on the development of creativity.

Getzels and Jackson (1962) found that mothers of highly creative children less often than mothers of high IQ children report worries about the dangers in the world, recollections of insecurity in their own childhood, admiration for conventional qualities in children, vigilance regarding their children's school performance, and restrictions on their children's independence. Drevdahl (1964), while testing psychologists, and MacKinnon (1964) while testing architects, also found that their more creative subjects had enjoyed more independence and responsibility during childhood than the average child.

Thus there seems to be a general agreement about the kind of social environment conducive to creativity. The desirable aspects of such an environment seem to be friendliness, permissiveness, encouraging and supportive adult behavior so that children are not constrained in their creative self-expression.

A similar agreement in regard to physical environment does not seem to exist in regard to highly creative and/or highly intelligent persons. In fact, no research seems to have been done in these areas. Even serious thought does not appear to have been given to them (Ward, 1970). The present study originated in this realization.

From the above and also from reviewing the related literature, two points seemed to be obvious: (a) a number of studies have tried to examine the influence of the environment

on the development of creativity; (b) these studies have limited their scope to the social environment and have made no attempt to consider separately the physical aspects of the overall environment.

Considering the definition of creativity as production of many cognitive associates of relatively unique nature (Campbell, 1960; Mednick, 1962), one would like to be familiar with the factors which give rise to this variation in cognitive response processes. Could these variations be due to differences in perceptual and attentional processes of receiving and coding information as suggested by Campbell (1960) in his "blind-variation-and-selective-retention model" and found by MacKinnon (1961) between architects of differing creativity? Both these models suggest that (a) the variation will be increased if some individuals possess the capacity to receive and absorb a wider range of stimuli than others and that (b) the availability of more elements of sufficient strength would influence the associative linkage described by Mednick (1962).

The above rationale would indicate that creative children will show more scanning behavior than non-creative ones. Berlyne's (1954, 1960) formulation of two types of curiosity, perceptual and epistemic, and the fact that curiosity is supposed to be an integral element in creative thought (Torrance, 1960), also suggested the inevitability of scanning behavior by creative children. The rationale derives further

support from the incidental observations made by Ward (1969) who discovered wide individual differences in the use of environmental cues. Such differences are of crucial importance in fostering and measuring creative behavior.

It was, therefore, decided to study the effect of the physical environmental cues on creative behavior. The study was designed to answer the following basic question: What is the function of the cues in the physical environment in relation to the differential performance of high creative and low creative children on a test of creative thinking ability? It was hoped that such cues would be utilized much more often by highly creative children in comparison to those who are low in creativity and necessitated the use of a two factor design, each consisting of two levels. The levels of the first factor consisted of presence and absence of physical environmental cues. Those of the second factor were the contrasting groups of subjects--high creative and low creative.

The scope of the research was widened by trying to answer a similar question about intelligence. The low relationship between creativity and intelligence suggested long ago (Dearborn, 1898) and confirmed sporadically through the years (McCloy and Meier, 1939; Getzels and Jackson, 1959, 1962; Taylor and Holland, 1962; Torrance, 1962; Golann, 1963; McNemar, 1964; Wallach and Kogan, 1965; Hudson, 1966) raised the hope that the answer to this auxiliary question will be independent of that of the main question. The inclusion of

intelligence in the research accounted for the third factor in the design, again containing two levels--high and low on intelligence.

The criterion variables consisted of the three measures of fluency, flexibility, and originality on the Torrance Tests of Creative Thinking, Verbal Test, Form B. The measures were considered as constituting the fourth factor of the design and providing repeated measurements on it.

The study was, thus, conducted with the help of a four factor design, with repetitions on one factor and classifications on the remaining three. Such a design permitted the testing of fifteen null hypotheses--four related to the main effects and the remaining eleven to interactions. The rationale given above would indicate that the primary interest of the research was in the interactional hypotheses--hence the title of the thesis.

The study assumes that creative abilities can be measured fairly reliably by the Torrance Test and the data so obtained are on an interval scale.

Significance of the Study

Studies of twins and siblings, cross-sectional studies of groups of individuals living under contrasting conditions and longitudinal studies with periodic measurements on the individual seem to have yielded evidence in support of the influence of the environment on the development of human

beings. However, in these studies, the term environment has generally meant social environment. The present study attempts to break new ground as indicated below.

(1) The study attempts to look at the overall environment as consisting of two major components: social and physical, focusing attention primarily on those aspects of the latter which are relevant to creativity.

(2) It also investigates the interaction of such aspects of the physical environment with creativity. On the basis of personal correspondence cited in the next chapter, one could say that this area is relatively new and worth exploring.

(3) Apart from studying the interaction of environmental cues with creativity, it also studies the same with respect to intelligence.

(4) The contribution of the present research may also be looked at in relation to the methodology proposed to be used for studying the above interactions. Whereas studies on the influence of environment on human beings have used correlational techniques, analysis of variance was used in this study.

(5) The findings of the study have vital implications for planning educational as well as family environments.

CHAPTER II

THE REVIEW OF RELATED LITERATURE

It has been suggested in Chapter I that there seems to be a general agreement about the kind of social environment needed for fostering creativity and that no research seems to have been done on the likely interaction of the physical environment with creative behavior. The present chapter reviews the related literature.

Research Related to Instruments Used

Peer Nominations

Peer nominations as a technique for the identification of high creative and low creative groups has been used by many researchers. Torrance (1959) used a six item peer nomination questionnaire in grades one through six and found that at all grade levels, the most talkative "group" was perceived more frequently as having a lot of ideas for being naughty and a lot of wild and silly ideas.

Yamamoto (1964) also used a six item peer nomination questionnaire on three groups (N = 428). The groups had already been identified as High Creative, Middle Creative, and Low Creative on the basis of scores on the Torrance Tests of Creative Thinking (then known as Minnesota Tests of Creative Thinking). He found that, on the whole, peer nominations tended to support the grouping based on tests of creativity. His

findings also included the interesting fact that the above generalizations held true only for boys but not for girls at senior high school level.

The above procedure has been criticized by Wallach and Kogan (1965) who held it as a poor indicator of concurrent validity. Bloom (1964), on the other hand, felt that "these instruments are useful for the systematic gathering of evidence."

The present writer feels that if the dimensions of creativity are described clearly, peer nominations can be a useful way for the identification of creative talent.

Teacher Nominations

In educational setting, teacher nominations have been used in many research studies to identify creative and non-creative groups. In his research, Drevdahl (1954) identified two groups of creative and non-creative college subjects on the basis of teacher nominations. These two groups were then administered various objective tests. It was found that the creative group was superior to the non-creative group in verbal fluency, flexibility, and originality--all of them the well-known dimensions of creativity.

Torrance, et. al. (1958) also found that the High Creativity group, identified on the basis of teachers' ratings, scored significantly higher on the Creativity scale of the Personal Attitude Inventory developed by Torrance himself.

The study was conducted with 157 graduates who were rated by three independent judges into High Creative and Low Creative groups.

Holland (1959) studied the effectiveness of teacher ratings on a sample of 783 boys and 394 girls. He concluded that only a limited reliance could be placed on teacher ratings as identifiers of creativity. However, Holland's account does not tell the reader how well-informed the teachers were in his study. On the other hand, Yamamoto (1962) found that the ratings by teachers who were given enough time to get acquainted with the children, seemed to be able to distinguish the highly creative pupils from the less creative ones when asked to nominate them on the specific criteria of fluency, flexibility, and originality. The study involved 19 fifth-grade teachers and 569 pupils.

The study of Torrance and Gupta (1964), involved 31 fourth-grade teachers and 800 pupils and reported that the teachers were able to differentiate on fluency, flexibility, and originality but not on elaboration.

Studies of Sommers (1961), Klausmeier et. al. (1962), Torrance and Meyers (1962), Nelson (1963), Richards et. al. (1964) also found positive correlations between teacher ratings of creativity and performance on creativity tests.

On the basis of the above, one could conclude that if the dimensions of creativity are clearly formulated and meticulously described, leaving minimum scope for subjective

interpretations, the judgments of teachers can be relied upon for the purpose of identifying creative persons.

The Canadian Lorge-Thorndike Intelligence Tests

Owing to the short duration of existence of the Lorge-Thorndike Intelligence Tests, particularly the Canadian version, relevant researches are not many. The few published studies with the original U. S. edition include those of Knief and Stroud (1959), Gnauck and Kaczkowski (1961), Anderson (1962), Caplan, et. al. (1963), and Eagle (1966). All of them found the test to be a good and useful measure of intelligence.

The Torrance Tests of Creative Thinking

Besides a number of studies reported in the manual (Torrance, 1966), the Torrance Tests of Creative Thinking have been used quite extensively by researchers to identify creative potential, to examine the assumptions underlying these tests, to estimate the reliability and the validity of these tests, and to assess the effectiveness of various tasks that combine to make the tests. Moreover, the present research edition of the tests appears to have removed many of the limitations pointed out by Vernon (1964), Wallach and Kogan (1965). In fact, a recent study of Torrance and Aliotti (1969) found the test-retest reliability of Form A and Form B to range between .83 and .94 for males and .83 and .90 for females for the verbal battery. The study involved 59 male and 59 female fifth-graders. This justifies

the use of the present revised edition of the tests in the present study.

Environment in Relation to Intelligence

The findings in regard to this popular field of research can be summarized as follows:

(1) the similar heredity make-up accompanied by dissimilar environments result in somewhat different levels of measured general intelligence (Newman, Freeman, and Holzinger, 1937; Burt, 1958; Husen, 1959).

(2) though the estimates regarding the proportions of the variance attributable to heredity and environment vary, all studies point to one overall conclusion: a substantial portion of the total variance of intelligence measures is attributed to the effect of environment in which the children are reared (Burks, 1928; Leahy, 1935; Woodworth, 1941).

(3) a variety of nursery school experiences can be associated with the improvement in the intellectual functioning of culturally deprived children (Bereiter, 1966; Deutsch, 1963; Gray and Klaus, 1965).

(4) the increase in the functional intelligence associated with nursery school experiences is due to a reduction in the effects of debilitating motivational factors rather than a change in the rate of intellectual development (Zigler and Butterfield, 1968).

(5) the aspects of the environment that correlate with

individual differences in cognitive or mental development are: parental ability, maternal concern, energy, worrisomeness, and the concern of both parents with achievement (Baldwin, 1945; Sontag et. al, 1958; Hoznik, 1967).

(6) the nature of interaction between adults and children is more important than the classificatory variables such as social status, parents' occupation, or parents' education (Wolf, 1963).

Environment in Relation to Creativity

Getzels and Jackson (1962) conducted perhaps the first ever empirical study on certain variables in the family environment of highly creative (N = 24) and highly intelligent (N = 24) adolescents. They reported: "The overall impression was that the two groups of mothers were quite different: the mothers of the high IQ adolescents being less secure and less at ease with themselves and the world than were the mothers of the high creative adolescents." The authors maintained that "the differences between the two groups of children have their source not only in immediate school experiences but also in the family environment in which they grew up." The study, therefore, supported the positive role of the environment in the development of creative thinking abilities. However, the stress in the study was on the social environment and no attempt was made to consider separately the physical aspects of the environment.

While Getzels and Jackson (1962) studied systematically the nature of the family environment of their two contrasting groups of high IQ and high creativity children, Wallach and Kogan (1965) administered creativity tests constructed by them to 10 year-olds (N = 151) in an evaluation-free atmosphere. They concluded that creativity scores did depend upon the environment.

An indirect support for the effect of the environment on creativity was also found in Mendelsohn and Griswold (1964). In their study, 108 college subjects were given 30 anagrams to solve. Prior to the task, the subjects memorized 25 words while another list of 25 words was played in the background as a distractor. The results showed that the creative subjects, those who had scored high on the Remote Associates Test (Mednick, 1962), solved more anagrams whose solutions were cued on the distractor list than did uncreative subjects and that there were no significant differences in rote recall. The results were interpreted as reflecting the wider deployment of attention and less screening out of "irrelevant" past experiences by the high creatives during problem solving.

Like the study of Mendelsohn and Griswold, Laughlin (1967) investigated the effect of creativity and intelligence on incidental concept formation. However, it differed from the former in that it introduced direct controls for intelligence and also used intelligence as a covariate in the analysis of data. The subjects were 148 undergraduates. They

were differentiated into three groups on the basis of scores on the Remote Associates Test, and into three intelligence groups using Terman Concept Mastery Test (Terman, 1956). The analysis of the data supported the hypothesis that the ability to form, retain, and utilize remote associations is the underlying process in both creativity and learning and that this ability is independent of high level verbal intelligence. Thus the study tangentially supported the research premise of the present investigation in that the utilization of the cues was the underlying process in creativity.

In an investigation conducted by Kogan and Morgan (1969), a total of 104 fifth grade children, divided into two groups, were administered two creativity tasks of an associative type--one of the groups in a game-like condition and the other in a test-like condition in order to test two hypotheses: (a) the game-like contexts induced higher creativity levels than did test-like contexts; (b) in game-like contexts, creative and intellective performances were unrelated to each other, whereas in test-like contexts, these two kinds of performance were positively related. The results indicated that the testing context interacted with creative performance.

In another study (Elkind, et. al, 1970), it was found that at least some putative measures of "creativity" were extraordinarily susceptible to motivational or anticipatory variables. The study was conducted on 32 children who were

administered three tests (the class concept, similarities and alternate uses tests) from the Kogan and Wallach (1965) creativity battery. Each child was tested twice: once when taken from the ongoing "interesting" task and again when taken from an ongoing "uninteresting" task. The results supported the hypothesis of the effect of the context on the measures of creativity. When the children expected to return to an "uninteresting" task they were found to be almost twice as creative as they were when they anticipated the resumption of an "interesting" activity.

A research by Ward (1969) is perhaps the only one which is really related to the present study. Using 21 male and 32 female nursery school children, it investigated the effect of environmental cues on the creative and uncreative children. The subjects were identified on the basis of a creativity measure called Uses Test. One-half of the children were, then, given Instances Test in a cue-poor environment and the other half were given the same test in a cue-rich environment. Analyses of data showed a significant interaction between creativity and the richness of the environment and it was concluded that the use of cues available in the testing situation was a strategy peculiar to those children who were labeled as creative. It was suggested by Ward (1969, p. 546) that "the effect of environmental richness was largely direct, rather than mediated; that is, the presence of a cue (e.g., a ball) did not lead to a substantial number

of associatively related ideas that were not directly represented (for example, baseball, football)." Ward did not, however, pay any attention to the effect of environment on measures of originality.

One could perhaps generalize from the above as follows: (1) peer nomination and teacher nomination as a means to constitute contrasting groups have been found particularly useful in those studies in which the dimensions of creativity were clearly defined and the raters had ample opportunity to observe the behavior of the ratees. (2) Though the relevant research about the Canadian Lorge-Thorndike Intelligence Tests is very sparse due to its brief existence so far, the test does seem suitable for measuring intelligence. (3) The Torrance Tests of Creative Thinking seemed clearly superior to other creativity measuring devices for lower grade levels. (4) The study of physical environmental cues in relation to creative behavior has so far attracted the attention of only one researcher. This conclusion was further supported by personal correspondence with Kogan, Torrance, Wallach, and Ward in 1970.

CHAPTER III

DESIGN, INSTRUMENTS AND PROCEDURES

As indicated in the preceding chapters, the present research aimed at studying the interaction of the cues in the physical environment with creative behavior. The present chapter describes the design of the study, the instruments used, and the procedures employed. The hypotheses, their testing, and the results will form the subject matter of Chapter IV.

Design

The purpose of the study was to test the hypothesis that appropriate cues, if present in the physical environment, would be utilized much more by highly creative children in comparison to those who are very low in creativity. For this purpose, a high creativity and a low creativity group was needed. Since a similar hypothesis was intended to be tested in regard to intelligence also, the design had to include high and low IQ groups as well. Each of the four groups had to be divided randomly into two sub-groups--one to act as the control group and the other as the experimental group. Each subject was asked to answer a creativity test. The subjects in the experimental groups did so in a cue-rich environment and those in the control groups in a testing environment having no such cues. The criterion was provided by the Torrance Tests of Creative Thinking, Verbal Test, Form B. These tests yielded

three separate measures, each constituting a level of an additional factor of the design. Thus the study used a four-fixed-factor design with repeated measurements on one of the factors. The factors were:

Factor A: It had two levels: a_1 and a_2 - cue-rich and cue-poor environments, respectively

Factor B: It had two levels: b_1 and b_2 - highly creative subjects and those very low in creativity, respectively

Factor C: This factor also had two levels: c_1 and c_2 - subjects with above-mean and below-mean IQ's

Factor D: It had three levels: d_1, d_2, and d_3 - measures on fluency, flexibility and originality, and provided repeated measures. The design is illustrated in Figure 1.

			d_1 Fluency	d_2 Flexibility	d_3 Originality
a_1 Cue-rich Environment	b_1 High Creative	c_1 High IQ			
		c_2 Low IQ			
	b_2 Low Creative	c_1 High IQ			
		c_2 Low IQ			
a_2 Cue-poor Environment	b_1 High Creative	c_1 High IQ			
		c_2 Low IQ			
	b_2 Low Creative	c_1 High IQ			
		c_2 Low IQ			

Figure 1: The Factors in the Design of the Study Classified by Their Levels

Instruments

The instruments employed in the study were:

a. peer nomination questionnaire

b. teacher nomination questionnaire

c. Canadian Lorge-Thorndike Intelligence Tests, Verbal Test, Form 1, Level C, and

d. Torrance Tests of Creative Thinking, Verbal Test, Form B.

Peer Nomination Questionnaire

This instrument consisted of four parts, each designed to provide data pertaining to a student's status on each of the four dimensions of creativity: fluency, flexibility, originality, and elaboration (see pages 21-22). Part I required the students of a class to nominate five students from their own class whom they considered "to come up with the most ideas" and five students whom they considered "to come up with the least ideas." Its other parts elicited similar nominations on flexibility, originality, and elaboration. However, to improve the reliability of the nominations, two precautions were taken:

(1) Each of the four dimensions was described clearly in terms of observable behaviors. For example, fluency was defined in terms of the maximum number of ideas. The subjects were told that fluent children were those who seemed to be "just running over with ideas," (though not always the most talkative), and

that some of their ideas may not be of very high quality.

(2) The investigator tried to train the students in how to use the nomination questionnaire. The questionnaire is reproduced below.

PEER NOMINATION QUESTIONNAIRE

Student _____ Grade _____

School _____ Date _____

1. Which children in your class come up with the most ideas? These are children who seem to be "just running over with ideas," though not always the most talkative. Some of their ideas may not be of very high quality.

   (1) _____ (2) _____ (3) _____

   (4) _____ (5) _____

   Which with the least ideas?

   (1) _____ (2) _____ (3) _____

   (4) _____ (5) _____

2. Which children in your class are the most likely to find a new way of meeting the problem if the situation changed or if a solution to a problem would not work?

   (1) _____ (2) _____ (3) _____

   (4) _____ (5) _____

   Which are the least likely?

   (1) _____ (2) _____ (3) _____

   (4) _____ (5) _____

3. Which children in your class have the most original or unusual ideas? They think of ideas and solutions which are different from others in the class and from the text.

   (1) _____ (2) _____ (3) _____

   (4) _____ (5) _____

Which have the least original ideas?

(1) _____ (2) _____ (3) _____

(4) _____ (5) _____

4. Which children in your class are best at thinking of all the details involved in working out a new idea and thinking of all of the consequences?

(1) _____ (2) _____ (3) _____

(4) _____ (5) _____

Which are the least able to think of details?

(1) _____ (2) _____ (3) _____

(4) _____ (5) _____

Teacher Nomination Questionnaire

This instrument consisted of four parts, each designed to provide data pertaining to a student's status on fluency, flexibility, originality, and elaboration separately (see pages 23-24). In Part I, each teacher was asked to nominate five students of his own class whom he considered to be the most fluent and five the least fluent. Similar nominations were requested for the other three dimensions also in the remaining questionnaire. Here again, two precautions were taken so that the nominations could have higher reliability:

(1) The concepts were defined in terms of observable behaviors. For example, in asking school teachers to make such nominations, one of the questions used was: "Which children in your class are the most fluent in the production of ideas? These are the children who seem to be 'just running over with ideas,' though not always the most talkative. Some of their

ideas may not be of high quality."

(2) The questionnaire was "sold" to the teachers. For this purpose, the investigator met the teachers and explained to them the meaning of the terms used in the questionnaire and impressed upon them the importance of their nominations for the identification of appropriate subjects. The questionnaire is reproduced below.

TEACHER NOMINATION QUESTIONNAIRE

Teacher _____ Grade _____

School _____ Date _____

1. Which children in your class are the most fluent in the production of ideas? These are children who seem to be "just running over with ideas," though not always the most talkative. Some of their ideas may not be of very high quality.

   (1) _____ (2) _____ (3) _____

   (4) _____ (5) _____

   Which are the least fluent?

   (1) _____ (2) _____ (3) _____

   (4) _____ (5) _____

2. Which children in your class are the most flexible in their thinking, and in the production of ideas? When one plan or procedure fails, they come up immediately with a different approach. They employ a variety of strategies or approaches in solving problems. They readily abandon unproductive approaches although they do not abandon the goal; they simply find some other way of achieving the goal.

   (1) _____ (2) _____ (3) _____

   (4) _____ (5) _____

Which are the least flexible?

(1) _____ (2) _____ (3) _____

(4) _____ (5) _____

3. Which children in your class are the most original in their thinking? They are able to get away from the obvious and the commonplace and break away from the beaten path. They see relationships and think of ideas and solutions which are different from others in the class and from the textbook. Many, though not all, of their ideas prove to be useful. Some of their ideas are quite surprising, though true.

(1) _____ (2) _____ (3) _____

(4) _____ (5) _____

Which are the least original?

(1) _____ (2) _____ (3) _____

(4) _____ (5) _____

4. Which children in your class are the best in elaborating ideas? They are able to take an idea or a task and spell out the detail. They can take a simple idea and "embroider" it or make it fancy and attractive. Their drawings are very detailed and they are able to develop very detailed or thorough plans for projects.

(1) _____ (2) _____ (3) _____

(4) _____ (5) _____

Which are the least able to elaborate?

(1) _____ (2) _____ (3) _____

(4) _____ (5) _____

Canadian Lorge-Thorndike Intelligence Tests,

Verbal Test, Form 1, Level C

This test is the Canadian version of the Lorge-Thorndike Intelligence tests, 1964 edition. Published in 1967, it is essentially the original, U. S. edition. The verbal battery

comprises five sub-tests referred to as Word Knowledge, Sentence Completion, Verbal Classification, Verbal Analogies, and Arithmetic Reasoning. It has a separate level for each grade. Level C (meant for fifth grade) was used here. The split-half reliability of this Level based on a representative sample is cited in the manual to be .915. Its validity against the Stanford-Binet and the WISC (Verbal Scale) is reported in the high 70's and low 80's (Manual, 1969). With the Iowa Tests of Basic Skills, its validity ranged from .56 to .87 (Gnauck and Kaczkowski, 1961).

The authors claim that the tests provide "a good and useful measure of the ability to deal with abstractions presented in verbal form" (Lorge-Thorndike, 1962, p. 3).

Torrance Tests of Creative Thinking, Verbal Test, Form B

There are currently many creativity tests available. The development of most of them has been inspired by the factor-analytic approach of Guilford. Some examples are: Mednick's Remote Associates Test (Mednick and Mednick, 1964) based upon associative theory; Flanagan's Ingenious Solutions to Problems Test (Flanagan, 1958), assessing creative thinking through multiple choice responding; the AC test of Creative Ability (Buhl, 1960), useful for the identification of talents in engineering. However, the only one useable at all the educational levels is the Torrance Tests of Creative Thinking (Torrance, 1966). Originally known as the Minnesota Tests of

Creative Thinking, Torrance Tests of Creative Thinking, Verbal Test, Form B (along with Verbal Test, Form A; Figural Test, Form A; Figural Test, Form B), are modifications and extensions of Guilford-type tests (Guilford, 1950; 1959). They consist of the following five tests of creativity:

1. Ask and Guess Test. This test requires the subject to ask those questions about the picture shown, which could not be answered merely by looking at the picture. He is also asked to make guesses about events preceding and following the action depicted in the picture. Successful performance on this test appears to require the ability to sense what cannot be found by just looking at the picture and to ask questions that will enable one to fill in the gaps in knowledge. The "Guess Causes" and "Guess Consequences" activities appear to require the ability to formulate hypotheses concerning cause and effect.

Scoring is carried out for fluency, flexibility, and originality. The number of relevant responses produced by a subject yields a measure of fluency, the number of shifts in thinking or the number of different categories of questions, causes, or consequences gives a measure of flexibility and the statistical infrequency of these questions, causes, or consequences or the extent to which the response represents a mental leap or departure from the obvious and commonplace gives a measure of originality (Torrance, 1966, p. 11).

2. Product Improvement Test. In this test the subjects are shown a stuffed toy monkey, the picture of the toy

monkey being already in the test booklet. They are asked to think of the changes which would make the toy more fun to play with. Successful performance on this test appears to require the ability to "regress in the service of the ego" and to play with ideas that they would not dare to express in a more serious task.

Scoring is carried out for fluency, flexibility, and originality. The fluency score is the number of relevant responses produced; the flexibility score is the number of different approaches used in producing the ideas for improvement, and the originality score is based on the statistical infrequency as well as the appropriateness of the ideas produced.

3. Unusual Uses Test. This test is a fairly direct modification of Guilford's Brick Uses Test, bricks having been replaced by tin cans. Subjects are required to write down as many interesting and unusual uses as they can think of for tin cans. Creative performance on this test appears to require the ability to free one's mind from a well-established set.

Scoring is carried out for fluency, flexibility, and originality in a manner similar to that described for the Ask and Guess Test.

4. Unusual Questions Test. In this test, the subjects are required to ask novel and unusual questions about the various aspects of tin cans. The test is an adaptation of a

technique developed by Burkhart and Bernheim (1963) to measure divergent power and productive spontaneity. Successful performance on this test appears to require the ability to ask questions which do not lead to a factual right or wrong answer.

Scoring is carried out for fluency and originality only. The fluency score is the number of questions asked about various aspects of tin cans and the originality score is determined after the technique developed by Burkhart (1961).

5. Just Suppose Test. This test resembles Guilford's Consequences Test (Guilford, 1959) in that the subject is asked to predict the possible outcomes of an unusual situation. However, in the case of the Torrance Test, the situation is not merely described verbally, but the child is also presented with a drawing of the situation. For successful performance on this test, the subject must "play with" the possibility and imagine all of the things that would happen as a consequence, a kind of ability which seems to be highly important in creative behavior.

Scoring is carried out for fluency, flexibility, and originality in a manner similar to that described for the Ask and Guess Test.

Reliability

The evidence concerning the reliability of the Torrance Tests of Creative Thinking is reviewed in the Manual (Torrance,

1966). Scorer reliabilities have been rather consistently above .90 which is highly encouraging. The same applies to test-retest reliability in the various studies in which emotional, physical, motivational, and mental health factors have been adequately handled (Torrance, 1966).

Validity

There have been several reviews of the validity problem as it affects creative thinking ability tests in general (Taylor and Barron, 1963; Taylor, 1964; Mackler and Shontz, 1965; Wallach and Kogan, 1965; Yamamoto, 1965). A number of reviews of the conceptual problems in the assessment of creativity have also been attempted (Rhodes, 1961; Jackson and Messick, 1964). All of these reviews, though pointing to the complexity of the problem, despair one of convincing and reassuring measures of validity. In contrast to these reviews, the Torrance Tests of Creative Thinking make the problem of validity approachable by considering creativity as a process requiring different kinds of abilities for its successful operation in various situations or for the production of various kinds of products and their qualities. Content validity can be looked at by taking into consideration available findings of theory and research concerning the lives of eminent creative people, and the nature of performance regarded as creative (Torrance, 1966). Besides, there is deliberate and consistent effort to keep the test-tasks free of technical

or subject matter content. The construct, concurrent, and predictive validities are also cited in the Manual. However, a longitudinal study (analogous to the famous Terman et. al. Study of Genius, 1926- . . .) is necessary to establish the validity of creativity tests.

Population and Sample

The population consisted of all the fifth graders in the 114 schools in the Edmonton Public School Board, Edmonton, Alberta, Canada. A random sample of 11 of the 114 schools was drawn and taken together, they contained 719 students.

Identifying the High and Low Creativity Groups

The first three of the instruments described above were administered in the following manner. The peer nomination questionnaire was first administered to each fifth grade in the 11 schools. It took about 30 minutes in each class. After an hour's break, the same class was administered the Canadian Lorge-Thorndike Intelligence Tests, Verbal Test, Form 1, Level C. The instructions in the Manual were meticulously followed. On the same day, the teachers concerned also completed the teacher nomination questionnaire.

Administration and Scoring of the First Three Instruments

The first three instruments were scored by the investigator in the following manner. For each individual on each of the four dimensions, a favorable nomination was scored +1 and

an unfavorable nomination as -1. The pluses and the minuses were added algebraically to obtain the overall rating on creativity for each subject judged from the point of view of the peers.

A similar procedure was adopted for scoring the nominations made by the teachers on the Teacher Nomination Questionnaire. A student could get a maximum score of +4 and a minimum score of -4 on the teacher nominations.

The answer sheets of the Canadian Lorge-Thorndike Intelligence Tests, Verbal Test, Form 1, Level C were scored by the investigator using the key for Level C.

Use of Nominations and Intelligence Measures

On the basis of peer nominations, teacher nominations, and the raw scores on verbal intelligence, 64 students were selected from the total of 719. Thirty-two of them were in the high creativity and 32 in the low creativity groups. The procedure used was as follows:

The students who were in the top 10% of the net or overall peer nominations in each class were considered as potentially highly creative and the bottom 10% as potentially low on creativity. Of these top 10% on peer nominations, those who had received at least two favorable teacher nominations were considered as being highly creative. Similarly, of the bottom 10%, those receiving at least two unfavorable teacher nominations were considered as being low in creativity. The verbal intelligence raw scores of these subjects were examined. If

there were two or more subjects with nearly the same verbal intelligence raw score, only one of these was selected randomly and included in the final sample. The children who were recent immigrants from non-English speaking countries were excluded from the final sample. In this way, two contrasting groups of 32 high creative and 32 low creative children were formed. Sixteen children in each group had intelligence scores above the mean and 16 below mean. Data related to categories 1 and 2 are given in Appendix A. Those of category 3 are summarized in Table 1 which gives mean = 57.61 and SD = 14.17 and range from 18.00 to 90.00.

Table 1

Frequency Distribution of Raw Scores on the Canadian Lorge-Thorndike Intelligence Tests, Verbal Tests, Form 1, Level C (N = 719)

Class Interval	Frequency
18 - 25	12
26 - 33	25
34 - 41	65
42 - 49	109
50 - 57	121
58 - 65	139
66 - 73	157
74 - 81	77
82 - 89	13
90 - 97	1
	N = 719

It should be noted that mean and standard deviation of 550 from the standardization sample were 49.76 and 13.85 respectively (Wright, 1967, p. 29). The group used in this study was clearly superior to the standardization sample though not more varied than the latter. The present group did not give a good fit to the normal curve ($\chi^2 = 46.010$, df = 8, p = 0.0). This could possibly be due to the fact that the sample contained quite a few children of immigrants to Canada, especially the ones from non-English speaking countries. This fact was taken into consideration in identifying the contrasting groups.

Sixteen children from the highly creative group (8 with intelligence score above mean and 8 below mean) and 16 children from the low creative group (8 with intelligence score above mean and 8 below it) were selected randomly and designated as Experimental High Creative group (EHC) and Experimental Low Creative group (ELC) respectively. The remaining two groups were similarly called Control High Creative (CHC) and Control Low Creative group (CLC) respectively. These groups then answered the Torrance Tests of Creative Thinking, Verbal Test, Form B in the manner described below.

Experimental Treatment and Environmental Cues

Before obtaining the criterion measures on the Torrance Tests of Creative Thinking, Verbal Test, Form B, each experimental subject was asked to enter the testing room which

contained the environmental cues and wait there for about 10 minutes. No mention was made about the nature of the things in the room or why they were there. The only thing they knew was that the waiting was necessitated by the fact that the experimenter was not yet ready to test them. Each subject was tested individually, seated at the same fixed location with respect to the environmental cues. The testing room was specially set aside in the Education Building of the University of Alberta. Each subject had to be persuaded to come there by appointment for the experiment. The subjects could, however, make use of the cues at any time during the test period. They could get up from the seat and move about in the room if they so desired.

The richly cue-providing environment contained objects and words many of which were relevant to the tasks forming the Torrance tests. It also contained pictures embedded with response information relevant to the tasks. The selection of the physical cues was done initially by the investigator after examining the manual carefully. Some objects which are the keyed responses to the test-tasks were collected. The cue-providing objects, pictures, etc., and the tests themselves were presented to interested graduate students and faculty members. Their opinions were incorporated in the final preparation and selection of the environmental cues. They are given below.

1. A mirror
2. A time piece
3. A flower
4. A stuffed bird

5. A stuffed monkey
6. A pair of shoes
7. A flower vase
8. A ribbon
9. A hat
10. A milk bottle
11. A cup
12. An ash tray
13. A piggy bank
14. A pepper shaker
15. A piece of wire
16. A marriage photo
17. A piece of polka dotted cloth
18. A poster of a bed
19. A picture of a car
20. A lipstick
21. A poster of a circus
22. A poster of cats
23. A poster of dogs
24. A poster of a school
25. A poster of a T.V. set
26. A picture of a tree
27. A poster of a movie
28. A picture of a negro girl
29. A picture of slave sale
30. A poster of war scene
31. A poster depicting rains
32. A poster showing smugglers
33. A poster showing coffee house scene
34. A picture of Abraham Lincoln
35. A poster of a dating club
36. A poster of travel
37. A poster depicting accident
38. A poster of a barbershop
39. A picture of a policeman
40. A poster of a tree
41. A picture of a musical instrument
42. A poster of clouds
43. A picture of a person laughing
44. A picture of person kissing
45. A picture of an eye
46. Five written words on the blackboard: Hindu, Symbol, foreign students, India
47. A big book titled INDIA

While each experimental subject in EHC and ELC answered the Torrance Tests of Creative Thinking, Verbal Test, Form B in the cue-rich environments, each control subject in groups

CHC and CLC answered the same tests in the same testing room after all the environmental cues had been removed from it.

The test was administered consistently without a time limit and this was the only departure from the manual. The following instructions were given to the subjects:

> Today we will play games with words. The activities in this booklet will give you a chance to use your imagination in thinking up ideas and putting them into words. There are no 'right' or 'wrong' answers like there are in most things that we do. We want you to see how many ideas you can think of and we think you will find this fun. Try to think of interesting, unusual, and clever ideas--something that no one else will think of. There is no time limit. Do not worry about grammar or spelling.

Scoring of the Torrance Tests

Torrance Tests of Creative Thinking are based on the following definition.

> Creativity is a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on: identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies; testing and re-testing them, and finally communicating the results. (Torrance, 1966, p. 6)

Responses to them were evaluated on fluency, flexibility and originality. Elaboration was omitted--chiefly because the author of the tests does not encourage the use of such a score (Torrance, 1966, p. 16).

Here fluency refers to the total number of relevant responses; flexibility to the total number of different categories into which the responses fall. Originality is defined as the uncommonness (low frequency) of a response;

elaboration to subject's ability to develop, embroider, or embellish ideas.

Scoring was done by the investigator himself. Separate scores were obtained on fluency, flexibility and originality for each subject. Their algebraic sum gave the overall creativity score.

To sum up, 64 students were identified out of a random sample of 719 fifth graders to form two contrasting groups on the basis of (1) peer nomination, (2) teacher nomination, and (3) the Canadian Lorge-Thorndike Intelligence Tests. They were called: Experimental High Creative, Control High Creative, Experimental Low Creative, and Control Low Creative. These subjects were then individually administered the Torrance Tests of Creative Thinking, Verbal Test, Form B--the CHC and CLC in cue-poor environment and EHC and ELC in cue-rich environment. The responses were scored on fluency, flexibility and originality--three of the four well-known dimensions of creativity.

The next chapter describes the hypotheses, the analyses of the data and the results.

CHAPTER IV

HYPOTHESES, ANALYSIS OF DATA AND RESULTS

As pointed out in Chapter I and also in Chapter III, the present study used a four factor design. Three of the four factors were status or classificatory in nature, the fourth contained repeated measurements on fluency, flexibility, and originality. The design generated fifteen hypotheses. They are:

Four main effects hypotheses

Six hypotheses on the first order or two factor interactions

Four hypotheses on the second order or three factor interactions

One hypothesis on the third order or four factor interaction

The hypotheses are listed in Table 2. It should be pointed out that even though all the fifteen hypotheses were actually tested, some of them were of primary interest. They were:

Hypothesis No. 1. A. The nature of the physical environment is not relevant to creativity score. That is, the mean performance on creativity shown by subjects answering the Torrance Tests of Creative Thinking, Verbal Test, Form B did not differ significantly whether the subjects answered it in cue-rich or cue-poor environment.

Table 2

The Hypotheses Arising From the Four Factor Design with Repetitions on One Factor

Hypothesis Serial No.		Sources of Variation Examined
		Between Subjects
1.	A	Types of Physical Environment - cue-rich and cue-poor
2.	B	High and Low Creativity groups
3.	AB	Environment-Creativity interaction
4.	C	Above and Below Mean IQ groups
5.	AC	Environment-Intelligence interaction
6.	BC	Creativity-Intelligence interaction
7.	ABC	Interaction between Environment, Creativity, and Intelligence
		Within Subjects
8.	D	Measures of Creativity - Fluency, Flexibility and Originality
9.	DA	Interaction of Creativity measures with the type of Physical Environment
10.	DB	Interaction of Creativity measures with the level of Creativity of the groups
11.	DC	Interaction of Creativity measures with the level of Intelligence of the groups
12.	DAB	Interaction between levels of Creativity of groups, types of Physical Environment and the measures of Creativity
13.	DAC	Interaction between Creativity measures, types of Environment and levels of Intelligence
14.	DBC	Interaction between Creativity measures, levels of Creativity and levels of Intelligence
15.	DABC	Interaction between all the four factors put together

Hypothesis No. 3. AB. There was no interaction between the type of physical environment and the level of creativity of the groups on the criterion. That is, the mean performance of the high and low creativity groups on the overall criterion does not depend upon the type of physical environment in which the subjects answered the tests.

Hypothesis No. 4. C. The high and low intelligence groups did equally well on the criterion.

Hypothesis No. 5. AC. There was no interaction between the two types of environment and the two levels of intelligence on the criterion. That is, the mean performance of the high and low intelligence groups on the overall criterion does not depend upon the type of physical environment in which the subjects answered the tests.

Hypothesis No. 9. DA. There was no interaction between the types of environment and the three measures of creativity. That is, the mean performance of the experimental and control groups on each of the three measures of creativity was the same in the cue-rich and the cue-poor environments.

Hypothesis No. 12. DAB. There was no interaction between the two types of physical environment, the two levels of creativity and the three criterion measures (of creativity).

Hypothesis No. 13. DAC. There was no interaction between the environment, intelligence, and measures of creativity.

Intercorrelation Between Fluency, Flexibility and Originality

Fluency, flexibility, and originality scores produced the intercorrelation matrix given in Table 3.

Table 3

Intercorrelations Between Fluency, Flexibility, and Originality Scores (N = 64)

	Fluency	Flexibility	Originality
Fluency	-		
Flexibility	.937	-	
Originality	.931	.881	-

In view of the very high correlations between these three dimensions of creativity, the scores on all of them could be added together for each individual to obtain a single overall creativity measure.

Intercorrelation of Intelligence with Fluency, Flexibility, Originality, and Creativity

Table 4 below gives intercorrelations of intelligence with fluency, flexibility, originality and overall creativity.

Table 4

Intercorrelations of Intelligence with Fluency, Flexibility, Originality and Creativity

	Fluency	Flexibility	Originality	Creativity
Intelligence	.278	.336	.289	.301

It may be noted from Table 4 that intelligence scores gave rather low correlations with fluency, flexibility, originality and overall creativity score. Such correlations clearly indicate that the Torrance Tests of Creative Thinking, Verbal Test, Form B give measures which have very little in common with intelligence as measured by Canadian Lorge-Thorndike Intelligence Tests. This finding is consistent with those of other researchers in this field (Wallach and Kogan, 1965).

The Homogeneity of Variance-Covariance Matrix

A repeated measurements design "has implicit in it homogeneity assumptions on variance-covariance matrices associated with the repeated measures" (Winer, 1962, p. 338). As the intercorrelations matrix between fluency, flexibility, and originality was homogeneous, it was inferred that the variance-covariance matrix was also homogeneous with respect to the repeated measures. Therefore, the four way analysis of variance with repeated measurements on one factor was used to analyze the data, using "within subjects" error term for analysis of effects due to factor D and its associated interactions.

Application of the Four Factor Design, Having Repetitions on One Factor

The structural model of the four way fixed factor design with repetitions on one factor has the following form:

$$Y = M + A + B + AB + C + AC + BC + ABC + EABC + D + DA + DB + DC + DAB + DAC + DBC + DABC + DEABC$$

where

M: a constant, analogous to the grand mean

A: the main effect due to types of physical environment

B: the main effect due to levels of creativity

AB: the first order interaction of A and B

C: the main effect due to levels of intelligence

AC and BC: similar other first order interactions in the "between subjects" part of the analysis

ABC: the second order interaction due to A, B, and C

EABC: mean sum square between subjects (error between)

D: the main effect due to the repeated measurements - measures of fluency, flexibility, and originality

DA: the first order interaction due to A and D

DB and DC: similar other first order interactions in the "within subjects" part of the analysis

DAB: the second order interaction due to A, B, and D

DAC and DBC: similar other second order interactions in the "within subjects" part of the analysis

DABC: the third order interaction due to factors A, B, C, and D

DEABC: Mean Sum Square within subjects (error within)

As stated earlier, it is a fixed factor design and therefore, EABC is the error for each of the seven "between subjects" hypotheses and DEABC that for the eight "within subjects" hypotheses. The summary of the results from Analysis of Variance is presented in Table 5.

Table 5

Summary of Analysis of Variance

Hypothesis No.	Source of Variation	Degree of Freedom	Deviation Sum of Squares	Mean Sum Squares	F
	Between Subjects				
1	A (Environment)	1	11071.69	11071.69	33.009
2	B (Creativity)	1	28616.33	28616.33	85.317
3	AB	1	5611.69	5611.69	16.731
4	C (Intelligence)	1	1.33	1.33	<1
5	AC	1	88.02	88.02	<1
6	BC	1	30.08	30.08	<1
7	ABC	1	379.69	379.69	1.132
	EABC (Subjects w. groups error between)	56	18783.08	335.51	
	Within Subjects				
8	D	2	25118.45	12559.22	256.771
9	DA	2	981.97	490.98	10.038
10	DB	2	3839.14	1919.57	39.245
11	DC	2	9.64	4.82	<1
12	DAB	2	926.66	463.33	9.473
13	DAC	2	24.57	12.29	<1
14	DBC	2	16.57	8.29	<1
15	DABC	2	32.84	16.42	<1
	DEABC (Dx Subj. w. groups error within)	112	5478.17	48.91	
	TOTAL	191	101009.92		

"Between Subjects" Hypotheses

The level of significance used was .05. The critical value of F for df (1, 56) at $\alpha = .05$ is 4.00. It was, therefore, concluded that the main effects for factors A, B,

and interaction AB were statistically significant. From Table 5, it is also found that the main effect for factor C and interaction AC of environment x intelligence and BC of creativity x intelligence were statistically non-significant. The same applies to the second order interaction ABC: interaction between environment, creativity and intelligence.

AB Interaction

The significance of AB interaction indicated that the effect of physical environment was different in the two creativity groups. Thus, hypothesis No. 3 was not accepted. Because of the presence of AB interaction, simple main effects for A were examined. The results are given in Table 6.

Table 6

Means, Standard Deviations, and Sample Sizes on Overall Criterion Classified by Types of Physical Environment and Levels of Creativity

	Levels of Creativity	
	High Creativity Group	Low Creativity Group
Physical Environment: cue-rich	N = 16 Mean = 187.31 SD = 48.17	N = 16 Mean = 81.50 SD = 16.07
Physical Environment: cue-poor	N = 16 Mean = 105.88 SD = 23.77	N = 16 Mean = 68.50 SD = 27.56

Test of Simple Main Effect for Low Creativity Groups: AB_2 Effect

The difference between the criterion scores of those who were low in creativity but some of whom answered the tests in the cue-rich and the others in cue-poor environments can be judged from t where

$$t = \frac{81.5 - 68.50}{\sqrt{\frac{2}{n} \times MS_{bet.}}}$$

$$= \frac{81.5 - 68.5}{\sqrt{\frac{2}{16} \times 335.41}}$$

$$= \frac{13.00}{6.67}$$

$$= 1.95$$

The critical value for this test is $t_{.95}(56) = 2.01$ (two-tailed test). Thus the data indicated absence of significant difference between the low creative groups answering in cue-rich and cue-poor environments. This meant that the subjects who were low on creativity were not more productive in a cue-rich than in a cue-poor environment.

Test of Simple Main Effect for Highly Creative Groups: AB_1 Effect

A test of significance for the difference between the mean criterion scores for subjects who were highly creative and who answered the tests in cue-rich and cue-poor

environments is given by

$$t = \frac{187.30 - 105.93}{\sqrt{\frac{2}{n} \times MS_{bet}}}$$

$$= \frac{81.37}{6.67}$$

$$= 12.21$$

The obtained t is statistically significant both at $\alpha = .05$ and $\alpha = .01$. One could, therefore, infer that the performance of the creative group answering under cue-rich environment is significantly higher than that of the group answering under cue-poor environment. This, additionally, meant that the AB interaction was mainly due to the association of the cues in the physical environment with the highly creative children.

From Table 5, it is evident that hypotheses No. 4, 5, 6, and 7 were found to be admissible and were accepted. Of these, hypotheses No. 4 and 5 were of primary interest.

"Within Subjects" Hypotheses

From Table 5, it is also noted that the main effect for factor D (measures of creativity) is statistically significant which was expected to be the case since the three measures were not in the same metric--they had different means and standard deviations (Torrance, 1966, p. 69).

Inspection of this table also shows that of the seven possible interaction hypotheses in this part of the analysis, three gave significant F. They were:

(1) DAB--levels of creativity of groups, physical environment and the measures of creativity

(2) DA--creativity measures with the types of physical environment

(3) DB--creativity measures with the levels of creativity of the groups.

All other interactions were statistically non-significant.

Simple Effects for Fluency, Flexibility, Originality

Analysis of DAB interaction enables one to study the association of the environment with the levels of creativity of the groups, as reflected in measures of fluency, flexibility and originality scores considered separately. In view of this interaction being significant, it became necessary to examine simple effects for each level of factor D.

The mean fluency scores of the two creativity groups answering in the two types of physical environment are given in Table 7.

Table 7

Means and Sample Sizes on Fluency Classified By Type of Physical Environment and Level of Creativity (ABD_1)

Physical Environment	Levels of Creativity: High Creativity Group	Levels of Creativity: Low Creativity Group
cue-rich	N = 16 Mean = 87.75	N = 16 Mean = 39.44
cue-poor	N = 16 Mean = 50.94	N = 16 Mean = 32.00

Test of Simple Effect for Low Creativity Group in Cue-rich and Cue-poor Environments for Fluency: AB_2D_1 Effect

A test on the difference between fluency scores between low creativity groups in cue-rich and cue-poor environment is given below:

$$t = \frac{39.44 - 32.00}{\sqrt{\frac{2}{n} \times MS_{within}}}$$

$$= \frac{7.44}{\sqrt{\frac{2}{16} \times 48.91}}$$

$$= \frac{7.44}{2.47}$$

$$= 2.60$$

The critical value for this test is:

$$t_{.95}(112) = 1.98 \text{ (two-tailed test)}$$

Thus the data indicated a statistically significant

difference in the fluency scores of low creativity groups in cue-rich and cue-poor environments.

Test of Simple Effect for High Creativity Group on Fluency in Cue-rich and Cue-poor Environments: AB_1D_1 Effect

A test on the difference between mean fluency scores between highly creative groups in cue-rich and cue-poor environments is given below:

$$t = \frac{87.75 - 50.94}{2.47}$$

$$= \frac{36.81}{2.47}$$

$$= 14.90$$

The critical value for this test is:

$$t_{.95}\ (112) = 1.98 \text{ (two tailed test)}$$

Thus the data indicated a statistically significant difference in the fluency scores of the highly creative groups in cue-rich and cue-poor environments.

It should be noted, however, that for the low creativity group the effect is non-significant at $\alpha = .01$. There is clearly a large difference between the probabilities of the two creativity groups for being different on fluency.

The mean flexibility scores of the two creativity groups in two types of environment are given in Table 8.

Table 8

Means and Sample Sizes on Flexibility Classified By Type of Physical Environment and Level of Creativity (ABD_2)

	Levels of Creativity: High Creativity Group	Low Creativity Group
Physical Environment: cue-rich	N = 16 Mean = 42.31	N = 16 Mean = 24.19
Physical Environment: cue-poor	N = 16 Mean = 28.25	N = 16 Mean = 19.50

Test of Simple Effect for Low Creativity Group on Flexibility in Cue-rich and Cue-poor Environments: AB_2D_2 Effect

A test on the difference between mean flexibility scores between low creativity groups in cue-rich and cue-poor environment is given below:

$$t = \frac{24.19 - 19.50}{2.47}$$

$$= \frac{4.69}{2.47}$$

$$= 1.90$$

The critical value for this test is

$$t_{.95}(112) = 1.98 \text{ (two tailed test)}$$

Thus the data indicated a statistically non-significant difference in the flexibility scores of low creativity groups in cue-rich and cue-poor environments.

Test of Simple Effect for Highly Creative Group on Flexibility in Cue-rich and Cue-poor Environment: AB_1D_2 Effect

A test on the difference between flexibility scores between highly creative groups in cue-rich and cue-poor environment is given below:

$$t = \frac{42.31 - 28.25}{2.47}$$

$$= 5.69$$

The critical value for the test is

$$t_{.95}\ (112) = 1.98 \text{ (two tailed test)}$$

Thus the data indicated a statistically significant difference in flexibility scores of highly creative groups in cue-rich and cue-poor environments.

It should be noted, however, that for the high creativity group, t is significant at $\alpha = .01$ also. There is clearly a large difference between the probabilities of the two creativity groups for being different on flexibility.

The mean originality scores and sample sizes of two creativity groups in two levels of environment are given in Table 9.

Table 9

Means and Sample Sizes on Originality Classified By Type of Physical Environment and Level of Creativity (ABD_3)

	Levels of Creativity: High Creativity Group	Levels of Creativity: Low Creativity Group
Physical Environment: cue-rich	N = 16 Mean = 57.25	N = 16 Mean = 18.00
Physical Environment: cue-poor	N = 16 Mean = 26.69	N = 16 Mean = 17.00

Test of Simple Effect for Low Creativity Groups on Originality in Cue-rich and Cue-poor Environment: AB_2D_3 Effect

A test on the difference between mean originality scores of low creativity groups answering in cue-rich and cue-poor environment is given by

$$t = \frac{18.00 - 17.00}{2.47}$$

$$= \frac{1}{2.47}$$

$$= 0.4$$

The critical value for this test is

$$t_{.95}\ (112) = 1.98 \text{ (two tailed test)}$$

Thus the data indicated a statistically non-significant difference in originality scores of low creativity groups operating in cue-rich and cue-poor environments.

Test of Simple Effect for Highly Creative Groups on Originality in Cue-rich and Cue-poor Environment: AB_1D_3 Effect

A test on the difference between mean originality scores of highly creative groups answering in cue-rich and cue-poor environments is given below:

$$t = \frac{57.25 - 26.69}{2.47}$$

$$= 12.36$$

The critical value of this test is

$$t_{.95}\,(112) = 1.98 \text{ (two tailed test)}$$

indicating a statistically significant difference.

The above can be summarized by saying that on fluency, flexibility and originality for the low creativity group, the differences in the mean performance on each of these criteria in cue-rich and cue-poor environments were statistically non-significant at $\alpha = .01$ but significant at .05 level in the case of fluency only. However, for the highly creative groups the same results did not apply. The association of cue-rich environment with the highly creative group is thus unmistakable.

DA and DB Interaction

The significant DB interaction between membership in one of the two contrasting creativity groups and measures of creativity is a mere artifact and was expected because, as stated earlier, measures of fluency, flexibility, and originality

were not in the same metric, having different means and standard deviations. The significant DA interaction between environment and measures of creativity was further examined. The means corresponding to this interaction effect are shown in Figure 2. Table 10 gives the means and sample sizes for each of the three measures of creativity in two levels of environment.

Table 10

Means and Sample Sizes on Three Measures of Creativity in Two Types of Physical Environment

Physical Environment	Measures of Creativity: Fluency	Flexibility	Originality
cue-rich	N = 32 Mean = 64.09	N = 32 Mean = 33.25	N = 32 Mean = 37.62
cue-poor	N = 32 Mean = 41.47	N = 32 Mean = 23.88	N = 32 Mean = 21.84

Test of Simple Effect for Factor A on Fluency:

AD_1 Effect

A test on the difference between the mean fluency scores in two types of physical environment is given by t where

$$t = \frac{64.09 - 41.47}{\sqrt{\frac{2}{n} \times MS_{within}}}$$

$$= \frac{22.62}{\sqrt{\frac{2}{32} \times 48.9122}}$$

$$= \frac{22.62}{1.75}$$

$$= 12.94$$

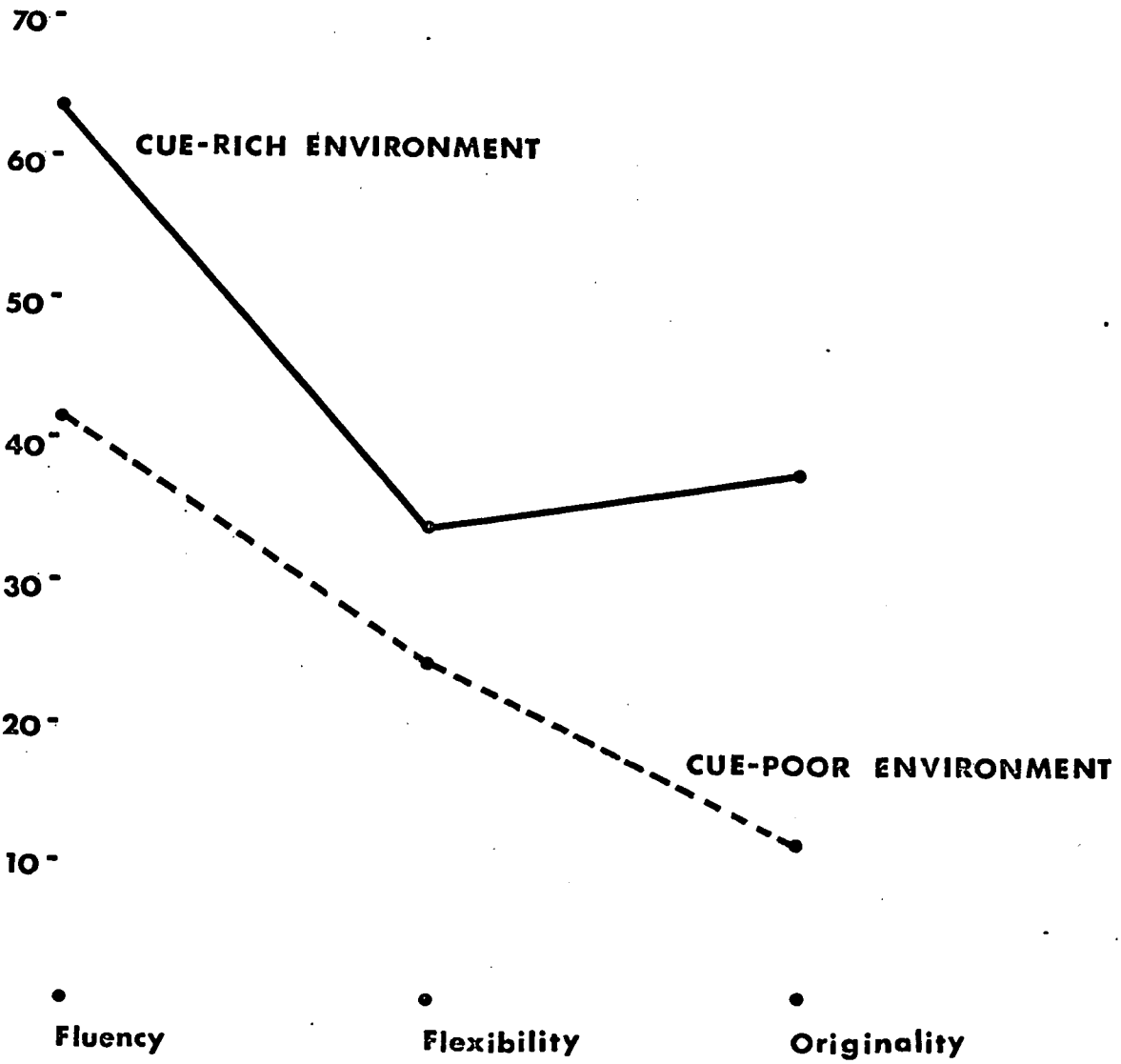

FIGURE 2. PROFILES OF DA INTERACTION

The critical value for this test is

$$t_{.95}(112) = 1.98 \text{ (two tailed test)}$$

Thus the data indicated a statistically significant difference on fluency scores in cue-rich and cue-poor environments.

Test of Simple Effect for Factor A on Flexibility Scores: AD_2 Effect

A test on the difference between the mean flexibility scores in cue-rich and cue-poor environments is given below.

$$t = \frac{33.25 - 23.88}{1.75}$$

$$= \frac{9.37}{1.75}$$

$$= 5.36$$

The critical value for this test is

$$t_{.95}(112) = 1.98 \text{ (two tailed test)}$$

Thus the data indicated a statistically significant difference on the flexibility scores in cue-rich and cue-poor environments.

Test of Simple Effect for Factor A on Originality Scores: AD_3 Effect

A test on the difference between mean originality scores in cue-rich and cue-poor environments is given below.

$$t = \frac{37.62 - 21.84}{1.75}$$

$$= \frac{15.78}{1.75}$$

$$= 9.03$$

The critical value for this test is

$$t_{.95}\ (112) = 1.98 \text{ (two tailed test)}$$

Thus the data indicated a statistically significant difference in the originality scores in cue-rich and cue-poor environments.

Summary

The present chapter can be summarized by bringing together the results related to the fifteen null hypotheses. Of the eleven interactions, only four were significant. They were AB, DA, DB, and DAB. All other interactions were non-significant. The analysis also showed significant effects due to A, B, and D factors while the effect due to factor C was found to be non-significant. Simple effects were, therefore, examined where applicable, using student's t test. An examination of simple effects of AB showed that the effect of the richness of the environment was more on creative group than on non-creative group. Simple effects of DA showed that the higher fluency, flexibility, and originality scores were associated with the cue-rich environment. From the simple effects of DB, it was found that significantly higher scores on each of the three dimensions were obtained by those subjects who were identified to be highly creative on the basis of teacher and peer nominations. The results were identical for DAB interaction.

It was interesting to note that all the null hypotheses

involving factor C alone and those in which C's interactions with one or more of the other three factors were considered failed to be rejected. The reverse was true about those null hypotheses which did not involve factor C. This finding suggests that the performance on the Torrance Tests of Creative Thinking was not associated with intelligence. This throws a very favorable light on the validity of these tests.

These results are further discussed and interpreted in the next chapter.

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS AND SUGGESTIONS

Summary

The present study investigated the interactions of the physical environment with creativity and intelligence. It used a fixed design having four factors with repeated measures on one factor. The factors and their levels were:

Factor A: two levels: cue-rich and cue-poor environments

Factor B: two levels: highly creative subjects and those very low in creativity

Factor C: two levels: subjects with above-mean and below-mean IQ

Factor D: three levels--measures on fluency, flexibility and originality--constituting the repeated measures.

It was hoped that cues in the physical environment would be utilized more often by highly creative children in comparison to those who were low in creativity, when answering the Torrance Tests of Creative Thinking, Verbal Test, Form B. It was also hoped that the same would not be true for children high and low in intelligence.

A random sample of 11 elementary schools was drawn from all of 114 schools in the Edmonton Public School Board, Edmonton, Alberta, Canada. Seven hundred and nineteen fifth

graders who were studying in these 11 schools were administered a peer nomination questionnaire and the Canadian Lorge-Thorndike Intelligence Test, Form 1, Level C. The grade 5 teachers in the 11 schools also completed a teacher nomination questionnaire. On the basis of peer and teacher nominations and the Canadian Lorge-Thorndike Intelligence Tests, Verbal Test, Form 1, Level C, 64 fifth graders were selected. Thirty-two of them were highly creative and 32 low in creativity. Each of these two groups was further subdivided into two equal subgroups designated as Experimental High Creative, Experimental Low Creative, Control High Creative and Control Low Creative. Finally, each of these four groups was divided into two equal subgroups of 8 subjects each--those above mean IQ forming one subgroup and those below mean IQ forming another.

The Directions Manual and Scoring Guide of the Torrance Tests of Creative Thinking, Verbal Test, Form B was consulted for the selection of physical cues. The cues which were deemed relevant for scoring high on the test were collected. This collection was shown to the interested graduate students and faculty members. The final selection of the physical cues incorporated their suggestions. The cues, then, were displayed in a room especially set aside for this purpose. The arrangement of the cues was the same for each experimental subject.

The subjects answered the Torrance Tests of Creative

Thinking, Verbal Test, Form B. The Experimental subjects did this individually in the cue-rich environment--that is, when the cues were displayed in the room and the control groups answered in the same room after the cues had been removed. Each child was brought to the room and was free to look around for ten minutes. During this time, the investigator did not talk with the child and pretended to be busy with his work. The test was administered individually and no time limit was placed in answering the test.

The design generated fifteen null hypotheses. Eight of the hypotheses involved factor C alone or in combination with one or more of the other factors. Seven of the hypotheses did not involve the factor C. The assumption of homogeneity of variance-covariance matrices of the repeated measures was found tenable when examined.

Conclusions and Their Implications

Eight of the 15 null hypotheses were retained. All of them involved factor C. On the contrary, none of the seven null hypotheses rejected involved factor C. The present results are thus in agreement with those of many researches in which the correlation between intelligence and creativity has been found to be small (Wallach and Kogan, 1965; Kogan and Morgan, 1969).

The conclusions and the associated implications of the seven hypotheses which were of primary interest in this research

are dealt with in the following sections.

AB Interaction and Related Simple Main Effects

The interaction between factors A and B--the two types of environment and the two levels of creativity--was found significant. An examination of simple effects for highly creative children (AB_1 effect) indicated that the latter scored higher on the overall criterion if they answered the test in the cue-rich environment. The same was not found true about the low creativity groups of children (AB_2 effect). A major explanation of this finding seems to be that children when present in an environment embedded with cues, habitually scan the latter and utilize them when given a chance. These results support the findings of Ward (1969, p. 545) and seem to have a number of implications. For example, the findings undergrid the importance of the physical aspects of the home and school environment for fostering creative thinking ability among young children. While the effect of visual reinforcements on creativity score is clearly brought, much further research needs to be done to answer questions about the type of cues, distance of cues from the observer, the variety of cues and the arrangement of cues in the environment. Also, no attempt was made in the present study to answer the questions regarding the optimum number of cues that should be presented and whether they should be presented all at once or presented in parts over a period of time. As those who were identified

as highly creative in cue-poor environment also turned out to be highly creative in cue-rich environment, it means that the relative performance of a potentially high creative child on creativity test is not significantly affected by the physical aspects of the testing environment. This means that while environment affects the scores of the highly creative children and confounds the interpretation of these scores when referred to norms, it creates no problem if the scores are interpreted with respect to the mean of the groups. This finding supports the well known principle of educational and psychological measurement, namely the necessity of standardized testing environment.

Overall Main Effects for Factor A
(Types of Environment)

The t-test indicated that in the cue-rich environment, the overall creativity scores of the children were significantly higher in comparison to those answering in cue-poor environment. Thus, it was concluded that the performance on the Torrance Tests of Creative Thinking, Verbal Test, Form B was associated with the kind of the testing environment--a finding which is also supported by study of Wallach and Kogan (1965). This implies that the testing environment should be identical for all subjects who are administered creativity tests for purposes of identification of creative potential.

Overall Main Effects for Factor B (Levels of Creativity)

The t-test indicated that the performance on the Torrance Tests of Creative Thinking, Verbal Test, Form B was higher for the high creative group than for the low creative group. This was expected to be so if the instruments used to identify the two contrasting groups were valid. Thus, it was concluded that the performance on the creativity test was affected by the membership in high creative or low creative group as identified by peer and teacher nominations. The results, therefore, indirectly established the validity of peer and teacher nomination techniques as used for the identification of high creative and low creative subjects in the present study. This is in agreement with the studies of Holland (1959), Nelson (1963), Torrance (1966), and Yamamoto (1964). These findings are consistent with Bloom's (1964) assertion about the usefulness of these techniques and contradict Wallach and Kogan (1965) who have shown opposition to the use of nominations as indicators of concurrent validity.

DAB Interaction

The DAB interaction between the types of physical environment, levels of creativity of the respondents and measures of creativity was statistically significant necessitating an examination of the simple interaction effects for DA and separately for DB. It was found that high creative

children scored statistically higher on fluency, flexibility and originality in cue-rich environment, while environmental richness had no significant effect on flexibility and originality for children low in creativity. However, the environmental richness had significant effect for low creative group on fluency at $\alpha = .05$ though not at $\alpha = .01$.

It means that the pattern of performance on fluency, flexibility, and originality dimensions of the Torrance Tests in the two creativity groups depended upon the kind of environment. These results support the findings of Ward (1969) insofar as the effect of environmental cues on fluency scores of creative children is concerned. However, for children low on creativity, the results are in agreement at $\alpha = .01$ and not at $\alpha = .05$. The present study goes beyond in suggesting that environmental richness has effect on flexibility scores of creative children which is contrary to the suggestions of Ward (1969, p. 546) that "the effect of environmental richness was largely direct, rather than mediated; that is, the presence of a cue (e.g., a ball) did not lead to a substantial number of associatively related ideas that were not directly represented (for example, baseball, football)." This implies that one of the ways to foster creativity is to so manipulate the physical environment in the home or the school as to enhance creativity. These results are also in agreement with the studies of Mendelsohn and Griswold (1964) and Laughlin (1967) in which it was found that the utilization of the cues was the

underlying process in creativity.

Simple Effects for DA

Examination of simple main effects for fluency indicated that mean fluency score of children in cue-rich environment was greater than mean fluency score in cue-poor environment. Thus, it was concluded that fluency was affected by environmental richness. Similarly, on examination of the simple main effects for flexibility and originality it was found that mean flexibility and mean originality scores of children in cue-rich environment were significantly higher than that of their counterparts in cue-poor environment. It may be noted that the findings are much stronger than that of Ward (1969). A possible explanation is that the subjects in Ward's study were still in an egocentric stage and, therefore, not stimulated much by external stimuli. However, the subjects in the present study were older and had passed that stage. "The important thing in the Ward study is that this habit of scanning the environment and using cues from it begins early." (Torrance, 1971). It was, therefore, concluded that fluency, flexibility and originality scores were significantly affected by environmental richness--a finding also brought out by Wallach and Kogan (1965), Kogan and Morgan (1969), and Elkind, et. al. (1970). The results support Bloom's (1964) assertion about the importance of environment in the growth and development of human characteristics.

Comparisons Showing Non-significant Differences

From Table 5 in Chapter IV, it is found that eight main and interaction effects were non-significant. Of these, the three effects which are of primary interest in the present study are discussed below.

Overall Main Effect for Factor C (Intelligence)

The main effect for factor C (intelligence) was non-significant. This indicated that the pattern of performance on the Torrance Tests of Creative Thinking, Verbal Test, Form B did not depend upon intelligence as measured by the Canadian Lorge-Thorndike Intelligence Test. This conclusion supports a number of earlier researches, e.g., Getzels and Jackson (1959, 1962); Taylor and Holland (1962); Torrance (1962); Golann (1963); Wallach and Kogan (1965); Hudson (1966) in which little, if any relationship was found between intelligence and creativity. Thus, it was concluded that the high and low intelligence groups did equally well on the overall criterion. It implies that the mean performance on creativity test does not depend upon the membership in high or low intelligence groups and, as stated above, the findings are consistent with many research studies in the area.

AC Interaction

The AC interaction between physical environment and intelligence was found to be statistically non-significant.

This indicated that there was no interaction between environment and intelligence as far as performance on the Torrance Tests of Creative Thinking, Verbal Test, Form B was concerned. This means that the pattern of performance on the creativity test in the two intelligence groups did not depend upon the kind of environment. The non-significant AC interaction, then, was taken as an evidence to support hypothesis No. 5. Contrasting non-significant AC interaction with significant AB interaction, it is found that the use of cues available in the testing situation is a strategy peculiar to highly creative children and not to highly intelligent children. This finding offers another observable behavior in which creative and intelligent children may be different.

DAC Interaction

The DAC interaction between environment, intelligence and measures of creativity was found to be statistically non-significant. This indicated that there was no interaction between environment, intelligence and measures of creativity. This means that DA interaction between environment and measures of creativity does not depend upon high or low intelligence. The results supported hypothesis No. 13 and were consistent with other findings of the present study.

In summary, one could conclude that the richness of physical environment, levels of creativity interactions were all significant when judged on the criterion variable. An

examination of simple effects of creativity scores, fluency scores, flexibility scores and originality scores for high creative and low creative subjects indicated that these results were closely linked with the presence of environmental cues. The same did not apply to the same extent to those low in creativity. In fact, it was found that for low creative children, fluency scores in cue-rich environment were significantly different than in cue-poor environment at $\alpha = .05$. However, at $\alpha = .01$, the differences were non-significant.

This finding supports the major research premise of the study; namely, that high creative children habitually scan the environment for relevant information and use these casual observations in showing creative behavior. The same is not true to the same extent in regard to low creative children. It was also concluded that environment and creativity showed interactions in their influence on the Torrance Tests of Creative Thinking, Verbal Test, Form B and that there was interaction between environmental richness and creativity, fluency, flexibility, and originality. It was also concluded that there was no interaction between environment and intelligence in their influence on the Torrance Tests, thus suggesting that intelligence and creativity are two different dimensions.

In view of differential effect of environmental richness on creative children in its influence on creativity, fluency, flexibility, and originality, it is suggested that this finding can be used to identify creative potential and foster creativity.

For identification purposes, a testing environment can be created in which subjects are asked to answer a putative measure of creativity. The environment can be embedded with cues to the responses and those subjects who make use of the cues will be identified as high creative subjects and those who do not utilize cues will be considered as low creative subjects. Similarly for fostering creativity, individuals can be provided with different objects in their environment so that their habitual scanning of the environment is further developed and their curiosity is not stifled.

Suggestions for Further Research

On the basis of the experiences derived in the present study, it is suggested that studies should be carried out on:

(1) the relationship between the location (distance as well as direction) of the respondent vis-a-vis cues in the environment using fluency, flexibility, and originality as criterion. For example, it would be a useful study to examine the effect of those cues which are behind the individual, on his sides or at a longer distance on the criterion variables. If the high creative subjects habitually scan the environment as found in the present study, they would make use of cues in these different locations as well.

(2) the relationship between the size and the complexity of the cues on the criterion variables. That is, to examine the effect of the size of the cues and the nature (e.g., concrete

objects, pictures, posters, and abstract and complex posters) on fluency, flexibility, and originality scores. It is felt that high creative children will make use of cues embedded in the environment more often than children who are low in creativity.

(3) the relationship between environmental cues and creativity at various age levels rather than just at one level. Such a study will enable us to investigate whether the findings of the present study are also true for other age levels not considered in this study. For this purpose, age can be treated as an additional factor in the design.

(4) sex as a variable in interaction between environment and creativity. The purpose of such a study will be to examine if differences exist between sexes as far as use of environmental cues is concerned. As differences have been found between the sexes in many other traits, it will be useful to investigate this aspect as well. This can be achieved by treating sex as an additional factor in the design.

(5) Another interesting study can be the duration of scanning to see if there are differences in the duration of scanning between high creative and low creative children. It is felt that high creative children might be using a different scanning schedule and strategy while utilizing cues in the environment. Such a study will require optical equipment and will prove very useful.

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APPENDICES

APPENDIX A

RAW DATA

(Used for Identifying the Two Contrasting Groups)

Subjects	Net Peer Fluency Nominations 1	Net Peer Flexibility Nominations 2	Net Peer Originality Nominations 3	Net Peer Elaboration Nominations 4	Net Peer Nominations Total 5	Net Teacher Fluency Nominations 6	Net Teacher Flexibility Nominations 7	Net Teacher Originality Nominations 8	Net Teacher Elaboration Nominations 9	Net Teacher Nominations Total 10
01102	+01	-01	+01	+03	+04	+0	+0	+0	+0	+0
01103	-01	+00	+02	+01	+02	+0	+0	+0	+0	+0
01104	+04	+03	+04	+03	+14	+1	+0	+0	+0	+1
01105	+04	+04	+05	+03	+16	+1	+1	+0	+0	+2
01106	-03	-03	-01	-02	-09	+0	+0	+0	+0	+0
01107	-03	-04	-02	-04	-13	-1	+0	+0	+0	-1
01108	-01	+00	+00	-01	-02	+0	+0	+0	+0	+0
01109	+01	+02	-03	+01	+01	+1	+0	+0	+0	+1
01110	-02	-05	-04	-05	-16	-1	-1	+0	+0	-2
01111	+02	+00	+02	-01	-03	+0	+0	+0	+1	+1
01112	-01	-01	+02	+02	+02	+0	+0	+0	-1	-1
01201	-14	-12	-08	-11	-45	-1	+0	+0	-1	-2
01202	-01	-04	-01	-11	-17	+0	-1	-1	+0	-2
01203	-01	-01	+04	+00	+02	+0	+1	+1	+0	+2
01204	+04	+07	+03	+06	+20	+0	+0	+1	+1	+2
01206	-05	+00	+00	-03	-08	-1	+0	-1	-1	-3
01207	+03	+00	-01	-01	+01	+0	+0	+0	+0	+0
01208	+00	+00	-01	-02	-03	+0	+0	+0	+0	+0
01209	-01	-04	-02	-08	-15	+1	+0	+1	+0	+2
01210	+01	+00	+02	-01	+02	-1	-1	-1	+0	-3
01211	+01	+03	-01	+06	+09	+0	+0	+0	+0	+0
01213*	-20	-10	-08	-12	-50	-1	+0	-1	+0	-2
01214	+16	+09	+07	+10	+42	+0	+0	+1	+1	+2
01215	+05	+00	+04	+01	+10	+0	+0	+0	+0	+0
01216	-05	-04	-06	-04	-19	+0	+0	+0	+0	+0
01217*	+19	+18	+13	+17	+67	+1	+1	+1	+1	+4
01218	+02	-01	-06	+01	-04	+0	+0	+1	+1	+2
01219	+03	-04	+02	+00	+01	+1	+0	+1	+0	+2
01220	+04	+01	+04	+02	+11	+0	+0	+1	+1	+2
01221	-03	-02	+02	-04	-07	+0	+0	+0	+0	+0
01222	+05	+06	+05	+03	+19	+1	+1	+1	+0	+3
01223	-20	-12	-09	-12	-53	+0	-1	-1	+0	-2
01224	-01	+01	+02	+04	+06	+1	+0	+1	+0	+2
01225*	+22	+16	+12	+20	+70	+0	+1	+1	+0	+2

Subjects	1	2	3	4	5	6	7	8	9	10
01226	-01	+00	+03	-01	+01	+0	+0	+0	+0	+0
01227	-05	+01	-03	-01	-08	+0	+0	+0	+0	+0
01229	+06	+14	+04	+10	+34	+0	+1	+1	+0	+2
01230	-08	-05	-02	-05	-20	+0	+0	+0	+0	+0
01232	-06	-07	-07	-05	-25	-1	+0	-1	-1	-3
01301	+00	+01	-01	-03	-03	+0	+0	+0	+0	+0
01302	-05	-02	-09	-06	-22	-1	-1	-1	+0	-3
01303	+00	+00	-04	+00	-04	+0	+0	+0	+0	+0
01304	+04	-02	+02	-02	+02	+1	+0	+0	+0	+1
01305	-11	-11	-10	-11	-43	-1	+0	-1	-1	-3
01306	-05	-04	-03	-08	-20	-1	-1	-1	+0	-3
01307	-13	-07	-03	-08	-31	+0	+0	-1	-1	-2
01308	-10	-07	-09	-13	-39	+0	-1	-1	-1	-3
01309	-11	-10	-05	-08	-34	+0	+0	+0	+0	+0
01310	-08	-09	-07	-09	-33	-1	-1	+0	-1	-3
01311	-01	-02	+01	-02	+00	+0	+0	+0	+0	+0
01312*	-14	-09	-15	-10	-48	-1	-1	+0	-1	-3
01313	-06	-02	+00	-02	-10	+0	+0	+0	+0	+0
01314	-01	+00	-02	+02	-01	+0	+0	+0	+0	+0
01315	+08	+01	+03	+05	+17	+1	+1	+1	+0	+3
01316	+00	+00	-01	+00	-01	+0	+0	+0	+1	+1
01317	-01	-01	+00	+00	-02	+0	+0	+0	+0	+0
01319*	+23	+17	+16	+21	+77	+1	+1	+1	+1	+4
01320	+12	+14	+08	+16	+50	+0	+0	+0	+0	+0
01321	-03	+04	+02	+05	+08	+1	+0	+0	+0	+1
01322	-05	-07	-06	-03	-21	+0	+0	+0	+0	+0
01323	-05	-03	-02	-06	-16	+0	+0	+0	+0	+0
01324	+04	+03	+02	+10	+19	+0	+0	+0	+1	+1
01325	+13	+15	+10	+09	+47	+0	+1	+1	+0	+2
01326*	+18	+09	+09	+11	+47	+0	+1	+1	+1	+3
01327	-02	-03	-02	-04	-11	+0	+0	+0	+0	+0
01328	-03	+01	+00	-01	-03	+0	+0	+0	+0	+0
01329	+00	-04	+04	+03	+03	+0	+0	+0	+0	+0
01330	+21	+16	+16	+19	+72	+0	+1	+1	+1	+3
02101*	-12	-14	-08	-11	-45	+0	-1	-1	-1	-3
02102*	+03	+03	+17	+08	+31	+1	+0	+1	+1	+3
02103	-01	-02	-01	-04	-08	+0	+0	+0	+0	+0
02104*	-07	-06	-02	-08	-23	+0	-1	+0	-1	-2
02105	-05	-02	-02	-03	-12	+0	+0	+0	+0	+0
02106	-08	-14	-04	-07	-33	-1	+0	-1	-1	-3
02107*	-05	-05	-02	-08	-20	-1	+0	+0	-1	-2
02108	-01	-01	-03	+02	-03	+1	+1	+1	+0	+3
02109	+13	+08	+05	+09	+35	+0	+0	+0	+0	+0
02110	+04	+05	-02	+04	+11	+0	+0	+0	+1	+1
02111	+12	+13	+00	+10	+45	+0	+0	+0	+0	+0
02112	-06	+02	+03	-08	-09	+0	-1	-1	+0	-2
02113	-06	-03	+00	-05	-14	+0	+0	+0	+0	+0
02114*	+22	+20	+04	+18	+64	+0	+1	+1	+1	+3
02115	-05	-04	-03	-08	-20	-1	-1	-1	+0	-3

Subjects	1	2	3	4	5	6	7	8	9	10
02116	-01	+00	-01	+01	-01	+0	+0	+0	+0	+0
02117	+01	-02	+01	-01	-01	+0	+0	+0	+0	+0
02118	+05	+04	-02	+05	+12	+0	+0	+0	+0	+0
02119	-13	-09	-06	-08	-36	+0	+0	+0	+0	+0
02120	+08	+10	+07	+03	+28	+0	+1	+1	+0	+2
02121	+01	+05	+04	+04	+14	+0	+0	+0	+0	+0
02122	-10	-02	-03	-11	-17	+1	+0	+0	+1	+2
02123	+09	+04	+01	+12	+26	+0	+1	+0	+0	+1
02124	+00	-02	+06	+00	+04	+0	+0	+0	+0	+0
02125	-05	-04	-02	-06	-18	-1	+0	-1	-1	-3
02126	-06	-06	-05	-07	-24	+0	+0	+0	+0	+0
02127	-10	-10	-02	-06	-19	+0	-1	+0	+0	-1
02128	+04	+04	+00	+00	+08	+1	+0	+0	+0	+1
02129*	+21	+08	+06	+17	+52	+0	+1	+0	+1	+2
02130	+06	-02	+02	+05	+11	+1	+1	+1	+0	+3
02131*	-15	-09	-01	-12	-37	+0	-1	-1	+0	*2
02132	+02	+04	-03	+04	-07	+0	+0	+0	+0	+0
02133	+02	+02	+04	-01	-07	+0	+0	+0	+0	+0
03101	+05	-03	+06	-02	+06	+0	-1	+0	+0	-1
03102	+01	-12	+06	-04	-09	+1	-1	+1	+0	+1
03103	-01	+00	+04	-01	+02	-1	-1	+0	+0	-2
03104*	-09	-02	-07	-08	-26	-1	+0	-1	+0	-2
03105	+00	+00	-03	+00	-03	+0	+0	+0	-1	-1
03106*	+10	+10	+05	+09	+34	+1	+1	+1	+1	+4
03107	-03	+01	+04	+00	-06	-1	+0	+0	+0	-1
03108	+00	+00	+00	+00	+00	+0	+0	+0	+0	+0
03109	-08	-08	-07	-07	-30	+0	+0	+0	-1	-1
03110	+00	+01	+01	+02	+04	+1	+0	+0	+0	+1
03111	-03	+00	-02	+04	-01	-1	+0	-1	+0	-2
03112*	-08	-09	-02	-09	-28	-1	+0	+0	-1	-2
03113	+01	-02	+00	+03	+02	+0	-1	+1	+0	+0
03114	-05	-02	-04	+00	-11	+0	+0	-1	+0	-1
03115	-01	+03	+05	+03	+10	+0	+0	+0	+0	+0
03116	+12	+13	+03	+11	+39	+0	+1	+0	+1	+2
03117*	-11	+12	+05	+10	+38	+1	+1	+0	+1	+3
03118	-06	-01	-03	-07	-17	+0	+0	-1	+0	-1
03201	+08	+03	+01	+03	+15	+0	+0	+0	+0	+0
03202	-06	-05	-04	-06	-21	-1	+0	-1	+0	-2
03203	-04	-06	+02	-09	-17	+0	+0	+0	+0	+0
03204	+03	+00	-05	-01	-03	+0	+0	+0	+0	+0
03205	-01	+01	+01	+00	+01	+0	+0	+0	+0	+0
03206	+09	+08	+08	+04	+29	+1	+0	+1	+1	+3
03207	-03	+00	-01	+03	-01	-1	+0	+0	+0	-1
03208*	-08	-06	-06	-05	-25	+0	+0	-1	-1	-2
03209	-01	-10	-03	-01	-15	-1	-1	-1	-1	-4
03210	+00	+02	-05	+03	+00	+0	+0	+0	+0	+0
03211	+07	+02	+03	+08	+20	+0	+0	+0	+0	+0
03212	-01	+01	+01	+02	+03	+1	+1	+1	+1	+4
03213	+04	+04	-01	+03	+10	+0	+0	+0	-1	-1

Subjects	1	2	3	4	5	6	7	8	9	10
03214	+00	-04	+00	-02	-06	+0	+0	+1	+0	+1
03215	-03	+00	+01	+00	-02	+0	+0	+0	+0	+0
03216	-01	-01	+04	-06	-04	+0	+0	+0	+0	+0
03217*	-07	-01	-05	-05	-18	+0	-1	+0	-1	-2
03218	+01	+02	-01	+07	+09	+0	+0	+1	+1	+2
04101	+06	+05	+03	+02	+16	+0	-1	+1	+0	+0
04102	+01	-05	+06	-07	-05	+1	+1	+1	+1	+4
04103	-04	+01	-04	+00	-07	-1	+0	+0	+0	-1
04104	+00	+00	-03	+01	-02	+1	+0	+0	+0	+1
04105	-06	-04	-09	-07	-26	+0	+0	+0	+0	+0
04106	+15	+07	+22	+12	+56	+0	+0	+0	+0	+0
04107	+01	+06	-01	+08	+14	+0	+0	+0	+1	+1
04108	+06	+01	+02	+04	+13	+1	+1	+1	+1	+4
04109	-13	-09	-07	-12	-41	-1	-1	-1	+0	-3
04110	+08	+05	+03	+05	+21	+1	+0	+0	+0	+1
04111	-07	-03	+01	-07	-16	-1	+0	-1	+0	-2
04112	-07	-04	-03	-03	-17	-1	+0	-1	+0	-2
04113	+04	+01	+03	+06	+14	+0	+0	+0	+1	+1
04114	+02	+02	+01	+00	+05	+0	+0	-1	-1	-2
04115	+07	+05	+07	+02	+21	-1	+0	-1	-1	-3
04116	+10	+08	+01	+07	+26	+0	+0	+0	+0	+0
04117	+00	-02	+05	+00	+03	+0	+0	+1	+0	+1
04118	-07	-04	-12	-11	-34	+0	+0	+0	+0	+0
04119	+07	+00	+01	+02	+10	+1	+0	+0	+0	+1
04120	-04	-03	-02	+01	-10	+0	+0	+0	+0	+0
04121	-04	-03	-02	+00	-09	+0	+0	+0	+0	+0
04122	-02	-04	-03	-01	-10	+1	+1	+1	+1	+4
04123	+06	+07	+07	+11	+31	+0	+0	+0	+0	+0
04124*	+13	+09	+03	+09	+34	+0	+1	+0	+1	+2
04125	-06	-07	-04	-08	-25	+0	+0	+0	+1	+1
04201	+08	-01	+01	+02	+10	+1	+0	+1	+1	+3
04202	+03	+07	+07	+07	+24	+0	+0	+0	+0	+0
04203	+01	+09	+02	+07	+19	+0	+1	+0	+0	+1
04204	-01	-01	+00	-02	-04	+0	+0	+0	+0	+0
04205	-15	-09	-05	-04	-33	-1	+0	-1	-1	-3
04206	-05	+01	-04	+03	-05	-1	-1	+0	+0	-2
04207	+05	+02	+05	+05	+17	-1	+0	+0	-1	-2
04208	-05	-09	-02	-06	-22	+1	+0	+0	+0	+1
04209	-02	+05	+00	+03	+06	+1	+0	+0	+0	+1
04210	+08	+10	+04	+09	+31	+0	+1	+0	+1	+2
04211	+05	+06	+09	+09	+29	+0	+1	+1	+0	+2
04212	+01	+00	-01	+00	+00	+0	+0	+0	+0	+0
04213	+06	-02	+06	+01	+09	+0	+0	+0	+0	+0
04214	+03	+01	+02	+01	+07	+1	+1	+0	+0	+2
04215	-01	-02	-02	-02	-07	-1	+0	-1	-1	-3
04216	-04	+02	-03	+01	-04	+0	-1	+0	+0	-1
04217	+04	+02	+03	+05	+14	+0	+0	+0	+1	+1
04218*	-08	-10	+00	-10	-28	+0	-1	-1	+0	-2
04219	-04	-07	-10	-11	-32	+0	+0	+0	+0	+0

Subjects	1	2	3	4	5	6	7	8	9	10
04220	+03	+06	-01	+04	+12	+1	-1	+0	+0	+0
04221	+03	-01	+00	+02	+04	+0	+0	+0	-1	-1
04222	-02	+04	-09	-05	-12	+0	+0	+1	+1	+2
04223	-09	-10	-10	-16	-45	+0	+0	+0	-1	-1
04301	-02	+05	-02	+02	+03	+0	+0	+0	+0	+0
04302	+09	+06	+19	+02	+36	+1	+1	+1	+0	+3
04303	+11	+10	+00	+06	+27	+0	+1	-1	+0	+0
04304	-03	-04	-03	-05	-15	+0	+0	+0	+0	+0
04305	-05	-03	-02	-06	-16	+0	-1	+0	+0	-1
04306	+04	+05	+01	+04	+14	+0	+0	+0	+0	+0
04307	+10	+06	+04	+03	+23	+0	+0	+1	+0	+1
04308	+02	+04	-04	+04	+06	+0	+0	+0	+1	+1
04309	+15	+12	+14	+11	+52	+0	+0	+0	+1	+1
04310	+09	+06	+06	+06	+27	+0	+1	+0	+0	+1
04311	-01	+05	+01	+08	+13	-1	+0	+0	+0	-1
04312	-07	-09	-08	-08	-32	+0	+0	+0	+0	+0
04313	-08	-03	-03	-03	-17	-1	+0	+0	-1	-2
04314	+00	+00	+00	+00	+00	+0	+0	+0	+0	+0
04315	+04	+02	+11	-03	+14	+1	+1	+1	+0	+3
04316	-11	-11	-07	-11	-40	+0	+0	+0	-1	-1
04317	-05	-04	-01	-05	-15	+1	+1	+1	+0	+3
04318	-02	-02	+00	+02	-02	+0	+0	+0	+0	+0
04319	-15	-09	-08	-04	-36	-1	-1	-1	-1	-4
04320	+06	+02	+01	+03	+12	+0	+0	+0	+1	+1
04321	+01	-09	-01	-02	-11	+1	-1	-1	+0	-1
04322	-09	-04	-08	-02	-23	-1	+0	-1	-1	-3
04323	-05	-05	-07	-06	-23	+0	-1	+0	+0	-1
04324	-06	-09	-08	-09	-32	-1	+0	+0	+0	-1
04325	+10	+11	+05	+14	+40	+1	+0	+0	+1	+2
04401	+03	+11	+02	+07	+23	+0	+0	+0	+0	+0
04402	+04	+03	+04	+09	+20	+0	+1	+1	+1	+3
04403	-01	+07	+04	+02	+12	+0	+0	+0	+0	+0
04404	+05	+08	+01	+07	+21	+0	-1	+0	+0	-1
04405	-02	-02	+00	-04	-08	-1	+0	+0	+0	-1
04406	+03	+04	+03	+05	+15	+0	+1	+0	+1	+2
04407	-10	-12	-08	-08	-38	-1	+0	-1	-1	-3
04408	+03	+00	-03	+02	+02	+0	+0	+0	+0	+0
04409	+06	+04	+00	+12	+22	-1	+0	+0	+0	-1
04410	-18	-20	-22	-20	-80	-1	+0	-1	-1	-3
04411	-09	-04	-06	-07	-26	+0	+0	+0	+0	+0
04412	+03	+00	+01	+03	+07	+0	+0	+0	+0	+0
04413	+05	+06	+05	+06	+22	+1	+0	+0	-1	+0
04414	+04	+06	+05	+09	+24	+1	+0	+0	+0	+1
04415	+05	-01	+05	-02	+07	+1	+1	+1	+0	+3
04416	+05	+02	+05	+04	+16	+1	+0	+0	+1	+2
04417	-20	-13	-17	-16	-66	+0	+1	+0	+1	+2
04418	+07	+04	+07	+00	+18	+0	+0	+0	-1	-1
04419	-04	+00	-03	-05	-12	+0	-1	+0	-1	-2
04420	-07	-07	-09	-03	-26	+0	-1	-1	+0	-2

Subjects	1	2	3	4	5	6	7	8	9	10
04421	-02	-03	-02	+00	-07	+0	-1	+0	-1	-2
04422	+08	+09	+14	+02	+33	+0	-1	+0	+0	-1
04423	-01	-02	-03	-04	-10	+0	+0	+1	+0	+1
04424*	+23	+22	+22	+20	+87	+1	+1	+1	+0	+3
04425	+12	+02	+07	+02	+23	+0	+0	+0	+0	+0
04426	-17	-20	-15	-18	-70	-1	+0	+0	+0	-1
04427	-03	-05	+02	-01	-07	+0	+0	+0	+0	+0
04501	-06	+00	-03	-06	-15	-1	+0	-1	+0	-2
04502	+04	+06	+05	+11	+26	+1	+0	+1	+1	+3
04503	-13	-09	-11	-11	-44	-1	-1	-1	+0	-3
04504	+06	+01	+03	+07	+17	+1	+0	+0	+1	+2
04505	+01	+03	-05	+01	+00	+0	-1	+0	-1	-2
04506	+01	+03	+04	+06	+14	+0	+1	+0	+1	+2
04507	-05	-01	-07	-03	-16	+0	+0	+0	+0	+0
04508	+08	+03	+06	+02	+19	+0	+1	+1	+0	+2
04509	+08	+04	+08	+01	+21	+1	+1	+1	+1	+4
04510	-02	-05	+00	-01	-08	+1	+0	+0	-1	+0
04511	-13	-10	-10	-08	-41	-1	-1	-1	-1	-4
04512	-01	+02	+03	-02	+02	-1	-1	-1	-1	-4
04513	-04	-10	-04	-08	-26	-1	-1	-1	-1	-4
04514	+10	+11	+08	+12	+41	+1	+1	+1	+1	+4
05101	-06	-03	-03	-03	-15	-1	-1	-1	+0	-3
05102	+04	+00	-02	+00	+02	+0	+1	+0	+1	+2
05103	+02	+01	-03	+00	+00	+1	+1	+1	+1	+4
05104	+08	-03	+05	-02	+08	+1	+0	+1	+0	+2
05105	+02	+03	+02	+05	+12	+0	+0	+0	+0	+0
05106	+06	+01	+08	+02	+17	+1	-1	+0	-1	-1
05107	-05	+00	-04	-03	-12	+1	-1	-1	-1	-2
05108	+01	+02	+01	+05	+09	+0	+0	+0	+0	+0
05201	+02	+02	+04	-02	-06	-1	+0	+0	+0	-1
05202*	+10	+12	+10	+13	+45	+1	+1	+1	+1	+4
05203	-05	-02	+02	-02	-07	+0	-1	+0	+0	-1
05204	+06	+03	+04	+01	+14	+0	+0	+1	+0	+1
05205	-06	-03	-03	-02	-14	-1	+0	-1	-1	-3
05206	-16	-13	-09	-17	-55	+1	+0	+0	+0	+1
05207	+03	+00	+02	+01	+06	+0	+0	+0	+0	+0
05208*	-15	-10	-10	-10	-45	-1	-1	-1	+0	-3
05209	+02	+03	-01	+01	+05	+0	+0	+0	+0	+0
05210	+08	+06	+05	+08	+27	+0	+0	+0	+0	+0
05211	+05	+14	+04	+19	+42	+0	+0	+0	+1	+1
05212	-02	-04	+01	-01	-06	+0	+0	+0	+1	+1
05213	+03	+01	-01	+01	+04	+0	+0	-1	+0	-1
05214	+06	+02	+00	+03	+11	+0	+0	+0	+0	+0
05215	+00	-03	+02	+00	-01	+0	+0	+0	+0	+0
05216	+07	+10	+04	+11	+32	+0	+1	+0	+0	+1
05217	+00	+00	+01	+00	+01	+0	+0	+0	+0	+0
05218	-02	+03	+01	+02	+04	+0	+0	+0	+0	+0
05219	+00	+01	-03	-01	-03	+0	+0	+0	+0	+0
05220	-07	-07	-02	-06	-22	+0	+0	+0	-1	-1

Subjects	1	2	3	4	5	6	7	8	9	10
05221	-03	+01	-02	-01	-05	+0	+0	+0	+0	+0
05222	+02	-01	-01	+02	+02	+0	+0	+0	+0	+0
05223	+00	+00	+00	-03	-03	+0	+0	+0	+0	+0
05224*	+14	+15	+04	+18	+51	+0	+1	+1	+0	+2
05225	+02	-03	-02	-01	-04	+0	+0	+0	+1	+1
05226	-03	-04	-01	+00	-08	+0	+0	+0	+0	+0
05227	+01	+03	+02	+01	+07	+0	+1	+0	+0	+1
05228	-10	-05	-06	-08	-29	+0	+0	+0	+0	+0
05229	+05	+01	+02	+00	+08	+1	+0	+1	+1	+3
05230	-01	+03	-01	+02	+03	+0	+0	+0	+0	+0
05231	+01	+04	-01	+02	+06	+0	+0	+0	+0	+0
05232	-12	-14	-08	-11	-45	+0	+0	+0	+0	+0
05233	-16	-12	-04	-15	-47	+0	+0	+0	-1	-1
05234	+02	-01	+06	-02	+05	-1	+0	-1	-1	-3
05235	+09	+07	-01	+05	+20	+1	+0	+0	+0	+1
06101	-04	-03	-07	-05	-19	+0	+0	+0	+0	+0
06102	+00	+00	+01	+01	+02	+0	+0	+0	+0	+0
06103	-02	-02	+02	-02	-04	+0	+0	+0	+0	+0
06104	+11	+09	+12	+09	+41	+1	+0	+0	+0	+1
06105	+05	+03	+05	+01	+14	+1	+0	+1	+1	+3
06106	+01	+02	+04	+01	+08	+0	+0	+0	+0	+0
06107	+00	+04	+00	+00	+04	+0	+0	+0	+0	+0
06108	+00	-01	-02	-04	-07	+0	+0	+0	+0	+0
06109	+12	+13	+09	+12	+46	+1	+1	+1	+1	+4
06110	+07	+03	+04	+01	+15	+0	+1	+1	+1	+3
06111	+13	+11	+07	+11	+42	+0	+1	+0	+0	+1
06113	-02	+00	+01	+01	+00	-1	+0	-1	-1	-3
06114	+17	+12	+08	+14	+51	+1	+1	+0	+1	+3
06115	+00	+02	+03	+02	+07	+0	+0	+1	+0	+1
06116	+01	+02	+01	+00	+04	+0	-1	+0	+0	-1
06117	-08	-08	-04	-04	-24	+0	+0	+0	+0	+0
06118	+00	+02	+01	+00	+03	+0	+0	+1	+0	+1
06119	-01	-01	-02	-01	-05	+0	+0	+0	+0	+0
06120	+11	+07	+04	+06	+28	+1	+1	+0	+1	+3
06201	-15	-08	-02	-15	-40	-1	+0	+0	+0	-1
06203	-04	-01	-03	-03	-11	+0	-1	+0	-1	-2
06204	+04	+03	+01	+04	+12	+0	+0	+0	+0	+0
06205	-02	-02	-01	-02	-07	+0	+0	+0	+0	+0
06206	-03	-01	-06	-05	-15	+0	+0	-1	-1	-2
06207	+08	+05	+04	+06	+23	+0	+0	+1	+0	+1
06208	+07	+09	+07	+10	+33	+0	+0	+0	+0	+0
06209	+03	+03	+04	+04	+14	+0	+0	+0	+0	+0
06210	+00	+01	-01	-02	-02	+0	+0	+0	+0	+0
06211	+06	+00	+00	+04	+10	+0	+0	+0	+0	+0
06212	-01	+03	-01	+01	+02	+0	+0	+0	+0	+0
06213	-02	-01	-02	+00	-05	+0	+1	+0	+1	+2
06214	+08	+11	+04	+08	+31	+1	+1	+1	+0	+3
06215	+01	+00	+02	+01	+04	+0	+0	+0	-1	-1
06216	-02	-03	-02	-03	-10	+0	+1	+0	+1	+2

Subjects	1	2	3	4	5	6	7	8	9	10
06217	+13	+02	+03	+07	+25	+0	+0	+1	+0	+1
06218	-04	-01	-03	-03	-14	+0	+0	+0	+0	+0
06219	+00	-02	+04	-01	+01	+0	+0	+0	+0	+0
06220	+01	+04	-01	+00	+04	+0	+0	+0	+0	+0
06221	-03	+03	+01	+04	+05	+0	+0	+0	+0	+0
06222	+07	+02	+06	+02	+17	+0	+0	+0	+0	+0
06223	+04	+02	-01	+03	+08	+0	+0	+0	+0	+0
06224	+03	+05	+04	+03	+18	+1	+0	+0	+1	+2
06225	+07	+00	+04	+04	+15	+0	+0	+0	+0	+0
06226*	-09	-07	-05	-10	-31	-1	-1	-1	+0	-3
06227	+13	+01	+12	+07	+33	+0	+0	+0	+0	+0
06301	+07	+02	+03	+05	+17	+0	+0	-1	-1	-2
06302	-01	+01	+02	+01	+04	+0	+0	+0	+0	+0
06303	-12	-08	-10	-10	-40	-1	+0	+0	-1	-2
06304	+02	+00	-01	+00	+01	+0	+0	+0	+0	+0
06305	-02	-03	-03	-03	-11	+0	-1	-1	+0	-2
06306	+09	+06	+08	+10	+33	+0	+0	+1	+0	+1
06307	+20	+15	+14	+20	+69	+0	+0	+1	+0	+1
06308	+04	+01	+05	+04	+14	+0	+0	+0	+0	+0
06310	-03	-01	+00	+03	-01	+0	+0	+0	-1	-1
06311	+06	+08	+04	+06	+24	+0	+0	+0	+1	+1
06312	+02	+00	+02	-02	+02	+0	+0	+0	+0	+0
06313	+01	+03	+02	+01	+07	+0	+0	+0	+0	+0
06314	+05	+05	+08	+05	+23	+1	+0	+0	+0	+1
06316	+06	+06	+03	+03	+18	+0	+1	+0	+0	+1
06317	+01	-01	+04	+00	+04	+0	+0	+1	+0	+1
06319	+01	+01	+00	+02	+04	+0	+0	+0	+0	+0
06320	+01	+00	+00	-01	+00	+0	+0	+0	+0	+0
06321	-11	-11	-08	-11	-41	-1	+0	+0	+0	-1
06322	+07	+04	+05	+05	+21	+0	+0	+0	+1	+1
06323	+05	+04	+06	+03	+18	+0	+0	+0	+0	+0
06324*	-15	-12	-15	-15	-57	-1	-1	+0	+0	-2
06325	+00	-02	+02	-02	-02	+0	+0	+0	+0	+0
06326	-02	+02	-01	-01	-02	+0	+0	+0	+0	+0
06327	+02	+05	+03	+04	+14	+1	+0	+1	+0	+2
06328	+03	+02	+02	+00	+07	+0	+0	+0	+0	+0
06329	+06	+06	+01	+10	+23	+0	+1	+0	+0	+1
06401	+06	+06	+04	+04	+20	+1	+1	+0	+0	+2
06402	+01	+02	+01	-02	+02	+0	+0	+0	+0	+0
06403	-01	+01	-01	+01	+00	+0	+0	+0	+1	+1
06404	-04	-04	-01	-04	-13	+0	+0	+0	+0	+0
06405	-06	-04	-06	-04	-20	+0	+0	+0	+0	+0
06406	-01	-06	-02	-02	-11	+1	+0	+0	+0	+1
06407	-01	-02	+00	+00	-03	+0	+0	+1	+0	+1
06408	+02	+03	+05	-01	+09	+1	+0	+0	+1	+2
06409	-05	-01	-05	-05	-16	+1	+1	+1	+0	+3
06411	+00	-01	+07	-01	+05	+0	+0	+0	+0	+0
06412	-04	+03	-04	+00	-05	+0	+0	+0	+0	+0
06413	+06	+03	+00	+06	+15	+0	+0	+0	+0	+0

Subjects	1	2	3	4	5	6	7	8	9	10
06414	+15	+10	+05	+15	+45	+0	+0	+0	+1	+1
06415	-04	-02	-03	-05	-14	+0	+0	+0	-1	-1
06416	-07	-02	+01	-06	-14	-1	+0	-1	-1	-3
06417	+02	+03	+02	+05	+12	+0	+0	+0	+0	+0
06418	+03	+02	+01	+04	+10	+0	+0	+0	+0	+0
06419	-01	-04	-01	-02	-08	+0	+0	+0	+0	+0
06420	+02	+01	+06	+04	+13	+0	+0	+0	+0	+0
06421	-03	+00	-01	-02	-06	+0	-1	-1	+0	-2
06422	+06	-01	+02	+01	+08	+0	+0	+0	+0	+0
06423	+00	+01	+02	+01	+04	+0	+0	+0	+0	+0
06424	+13	+08	+05	+09	+35	+0	+0	+0	+0	+0
06425	-04	-04	+00	-05	-13	+0	+0	+0	+0	+0
06426	-03	-01	-03	+00	-07	+0	+0	+0	+0	+0
07101	+03	-01	-01	+00	+01	+0	+0	+0	+0	+0
07102	-01	+02	-01	+00	+00	+0	+0	+0	+0	+0
07103	-05	-05	-04	-03	-17	+0	-1	+0	+0	-1
07104	-02	+00	-01	+02	-01	+1	+0	+1	+0	+2
07105	+02	+01	+01	+00	+04	+0	+0	+0	+0	+0
07106	+00	-01	-04	-07	-12	+1	+0	+0	+0	+1
07107	-02	+01	-02	-05	-08	+0	-1	-1	-1	-3
07108	-02	-01	+00	-08	-11	+0	+0	+0	+0	+0
07109*	-22	-22	-09	-23	-76	+0	+0	-1	-1	-2
07110	-05	+00	-04	-02	-11	+0	+0	+0	+0	+0
07111	+02	+02	-01	+03	+06	+0	+0	+0	+0	+0
07112	+01	+02	+06	-01	+08	+0	+0	+0	+0	+0
07113	+03	+03	+03	+04	+10	+0	+0	+0	+0	+0
07114	+05	+05	+03	+00	+13	+0	+0	+0	+0	+0
07115	-04	+00	-02	-01	-07	+0	+0	+0	-1	-1
07116	+04	+00	+02	+05	+11	+0	+0	+0	+0	+0
07117	+05	+03	+03	+02	+13	+0	+0	+0	+0	+0
07118	+07	+04	+05	+03	+19	+0	+0	+0	+0	+0
07119	-02	+00	-05	-01	-08	-1	-1	+0	-1	-3
07120	+25	+22	+14	+25	+86	+1	+1	+1	+0	+3
07121	-04	-07	-07	-02	-20	+0	+0	+0	+0	+0
07122	-02	-04	-04	-05	-15	+0	+0	-1	+0	-1
07123	-04	-02	-03	-01	-10	+0	+0	-1	+0	-1
07124	+25	+24	+16	+23	+88	+1	+1	+1	+1	+4
07125	+02	+02	+03	+05	+12	+0	+0	+0	+0	+0
07126	+04	+07	+00	+05	+16	+0	+0	+1	+0	+1
07127	+01	+00	-01	-01	-01	+1	+1	+1	+0	+3
07128	-03	-03	+01	+00	-05	+0	+0	+0	-1	-1
07129	+06	+08	+04	+05	+23	+1	+0	+0	+0	+1
07130*	+13	+11	+06	+16	+46	+1	+1	+0	+0	+2
07131	-02	-02	-04	-05	-13	+0	+0	+0	+0	+0
07132	+00	-03	-06	-05	-14	+0	+0	+0	+0	+0
07133	-01	+00	+03	+02	+04	-1	+0	+0	-1	-2
07134	+09	+05	+06	+04	+24	+0	+0	+0	+0	+0
07135	+02	+00	+00	-01	+01	+0	+0	+0	+0	+0
07136	-01	+03	+03	-03	+02	+0	+0	+0	+0	+0

Subjects	1	2	3	4	5	6	7	8	9	10
07137	-01	+03	+02	+00	+04	-1	-1	-1	-1	-4
07138	+01	+01	+03	+02	+07	+0	+0	+0	+0	+0
07139	+09	+07	+11	+04	+31	+0	+0	+1	+0	+1
07140	+01	+01	-01	+01	+02	+1	+1	+1	+0	+3
07141	+07	+02	+04	+02	+15	-1	+0	+0	+0	-1
07142	+02	-06	+07	+01	+04	+1	+0	+0	+0	+1
07143	-05	-07	-03	-04	-19	-1	-1	-1	-1	-4
07144	+12	+06	+08	+12	+38	-1	+0	+0	-1	-2
07145	-04	-02	+00	+00	-06	-1	-1	+0	+0	-2
07146	-02	-01	+00	-01	-04	+0	+0	+0	+0	+0
07147	+05	+04	+04	+02	+15	+0	+0	+0	+0	+0
07148	+01	+03	+04	+04	+12	+1	+1	+1	+1	+4
07149	-02	+02	+01	+04	+05	+0	+0	+0	+1	+1
07150	-01	-01	+05	-06	-03	+0	+0	+0	-1	-1
07151	-01	-03	-01	-01	-06	+0	+0	+0	+0	+0
07152	-08	-05	-09	-13	-35	+0	+0	+0	+0	+0
07153	+04	+02	+06	+09	+21	+0	+0	+0	+0	+0
07154	+02	+09	+00	+03	+14	+0	+0	+0	+0	+0
07155	+02	-02	+01	+03	+04	+0	-1	-1	+0	-2
07156	-01	+00	-01	-05	-07	+1	+0	-1	+0	+0
07157	+01	+04	+09	+03	+17	-1	+0	-1	-1	-3
07158	+08	+07	+09	+08	+32	+0	+0	+0	+0	+0
07159	-04	-06	+00	+00	-10	+0	+0	+0	+0	+0
07160	-13	-15	-16	-19	-63	+0	+0	+0	-1	-1
07161*	-11	-09	-11	-06	-37	+0	+0	-1	-1	-2
07162	+02	-01	+02	+05	+08	+0	+0	+0	+0	+0
07163	+03	-02	+00	+00	+01	+0	+0	+0	+0	+0
07164	+12	+07	+08	+06	+33	+0	+0	+0	+0	+0
07165	+01	+03	-01	+00	+03	+1	+0	+0	+0	+1
07166	+01	+02	+01	+02	+06	+0	+0	+0	+0	+0
07167	-04	-04	-03	-02	-13	+0	-1	+0	+0	-1
07168	-01	-02	+02	-01	-02	+0	+0	+0	+0	+0
07169	-02	-04	-01	+02	-05	+1	+0	+0	+0	+1
07170	+04	+06	+04	+01	+15	+0	+0	+0	+0	+0
07171	+07	+06	+08	+08	+29	+1	+0	+1	+0	+2
07172	+09	+07	+06	+04	+26	+0	+0	+0	+0	+0
07173	+05	+01	+01	+03	+10	+0	+0	+0	+0	+0
07174	+07	+04	+04	+04	+19	+1	+0	+1	+1	+3
07175	-04	-02	-03	-02	-11	+0	+0	+0	+0	+0
07176	-04	+03	-04	+01	-04	+0	+0	+0	+0	+0
07177	+01	+00	+03	+00	+04	+1	+1	+0	+1	+3
07178	+03	+00	+02	-06	-01	+0	+0	+0	+0	+0
07179	+05	+07	+03	+03	+18	+0	+0	+1	+1	+2
07180	+06	+05	+11	+07	+29	+1	+0	+1	+1	+3
07181	+00	+03	+03	+02	+08	+0	+0	+0	+0	+0
07182	-02	-01	-02	-03	-08	+0	+0	+0	+0	+0
07183	+13	+07	+08	+06	+34	+1	+1	+1	+0	+3
07184	+00	+04	+02	+05	+11	+0	+1	+0	+0	+1
07185	+12	+11	+06	+07	+36	+0	+1	+0	+0	+1
07186	+06	+11	+06	+04	+27	+0	+0	+1	+1	+2

Subjects	1	2	3	4	5	6	7	8	9	10
07187	+03	+00	+00	+00	+03	+0	+0	+0	+0	+0
07188	+04	+08	+04	+07	+23	+0	+1	+1	+0	+2
07189	-01	-03	-02	-01	-07	+0	+0	+0	+0	+0
07190	-08	-05	-10	-10	-33	+0	+0	+0	+0	+0
07191*	-04	-04	-06	-08	-22	+0	+0	-1	-1	-2
07192*	-37	-23	-19	-20	-99	+0	+0	-1	-1	-2
07193	+02	+01	+01	+00	+04	+0	+0	+0	+0	+0
07194*	-07	-07	-07	-01	-22	-1	+0	-1	-1	-3
07195*	-13	-04	-14	-13	-44	-1	+0	+0	-1	-2
07196	+02	+02	+01	+01	+06	+0	+0	+0	+0	+0
07197	+03	+05	+07	+00	+15	-1	+0	+0	-1	-2
07198	+02	+02	-01	+04	+07	+0	+0	+0	+0	+0
08101	-07	-03	-04	-07	-21	+0	-1	+0	-1	-2
08102	+07	+02	+03	+05	+17	+0	+1	+0	+1	+2
08103	+15	+03	+05	+11	+34	+1	+1	+0	+0	+2
08104	-05	-02	-03	-05	-15	+0	+0	+0	-1	-1
08105	-17	-10	-08	-12	-47	-1	+1	+1	+1	+2
08106	+11	+08	+04	+03	+26	+0	+1	+0	+0	+1
08107*	+13	+09	+08	+08	+38	+1	+0	+0	+1	+2
08108	-12	-02	-01	-08	-23	+1	+0	+1	+1	+3
08109	+00	+01	+00	+01	+02	-1	+0	+0	+0	-1
08110	+01	+00	+00	-03	-02	+0	-1	+0	+0	-1
08111	+02	-01	+02	-01	+02	+0	+1	+0	+0	+1
08112	-01	-01	+00	-01	-03	+0	+0	+0	-1	-1
08113	+01	-01	+01	+00	-01	+0	-1	+0	+0	-1
08114	-01	-04	+01	+01	-03	+0	-1	+0	+0	-1
08115	+02	+04	+04	+00	+10	+0	+0	+0	-1	-1
08116*	+12	+04	+05	+05	+26	+0	+0	+1	+1	+2
08117	+06	+04	+05	+07	+22	+0	+0	+0	+0	+0
08118	-10	-05	-02	-11	-19	-1	-1	-1	+0	-3
08119	+00	+00	+04	-01	+03	+0	+0	-1	+0	-1
08120	-05	+04	-02	-01	-04	+0	+0	+0	+0	+0
08121	-04	-02	-01	-05	-12	+0	+0	+0	+0	+0
08122	-02	-04	-03	+00	-09	+0	+0	-1	+1	+0
08123	+00	+06	-03	+01	+04	+0	+0	+0	+0	+0
08124	-08	-09	-09	-06	-32	-1	+0	-1	+0	-2
08125	+03	+05	+03	+05	+16	+1	+0	+1	-1	+1
08126	-04	-01	-01	+00	-06	-1	+0	+0	+0	-1
08127	+14	+11	+06	+17	+48	+0	+0	+0	+0	+0
08201	-05	-02	-01	-01	-09	-1	+0	+0	+0	-1
08202	-03	+05	+06	+01	+09	+0	+0	+0	+0	+0
08203	-09	-06	-05	-08	-28	+0	+0	+0	+1	+1
08204	+00	+01	+03	+03	+07	+0	+1	+1	+0	+2
08205	-03	-01	+08	-03	+01	+0	+0	+0	+0	+0
08206	+00	+00	+00	+01	+01	-1	+0	+0	+0	-1
08207	+24	+19	+02	+18	+63	+1	+1	+1	+1	+4
08208	+05	+06	+04	+02	+17	+0	+1	+0	+0	+1
08209	-19	-13	-11	-15	-58	+0	+0	+0	+0	+0
08210	+03	-02	+01	-03	-01	+1	+0	+0	+0	+1

Subjects	1	2	3	4	5	6	7	8	9	10
08211	-05	-05	-11	-01	-22	+0	+0	-1	+0	-1
08212	-01	+00	+00	-03	-04	+0	-1	+0	+0	-1
08213	+16	+07	+04	+11	+38	+1	+1	+1	+1	+4
08214	-02	-01	+01	-01	-03	+0	+0	+0	-1	-1
08215	+00	-01	+01	+00	+00	+0	+0	+0	+0	+0
08216	+00	+00	+00	+00	+00	+0	+0	+0	+0	+0
08217	+15	+05	+07	+08	+35	+0	+0	+0	+1	+1
08218	+03	+05	+03	+06	+17	+0	+1	+1	+0	+2
08219	+00	+00	+00	+00	+00	+0	+0	+0	+0	+0
08220	-03	+01	+01	-05	-06	+0	+0	+0	-1	-1
08221	-02	-04	+06	-03	-03	+1	+0	+0	+0	+1
08222	+10	+06	+04	+06	+26	+0	-1	-1	+0	-2
08223	+00	+00	-03	+00	-03	-1	+0	+0	+0	-1
08224*	-17	-13	-10	-08	-48	+0	-1	+0	-1	-2
08225	+06	+08	+02	+05	+21	+0	+0	+0	+0	+0
08226	+01	+02	+02	-02	+03	+0	+0	+0	+0	+0
08227	+03	+01	-01	+04	+07	+1	+0	+1	+0	+2
08228	+01	+03	+02	-05	+01	+0	+0	+0	+0	+0
08229	+01	-02	-01	+00	-02	+0	+0	+0	+0	+0
08230	-06	-02	+00	-04	-12	+0	+0	-1	-1	-2
08231	+06	+02	+04	+05	+17	+0	+0	+0	+1	+1
08232	+04	+02	+02	+03	+11	+0	+0	+0	+0	+0
08233	+00	+04	+00	+01	+05	+0	+0	+0	+0	+0
08301	-03	-01	+00	-02	-06	-1	+0	-1	-1	-3
08302	+08	+05	+09	+05	+27	+0	+0	+0	+0	+0
08303	-01	+00	-04	-01	-06	+0	-1	+0	+0	-1
08304	+00	-02	-01	-02	-05	+0	+0	+0	+0	+0
08305	-02	-01	+02	-01	-02	+0	+1	+0	+0	+1
08306	+03	+03	+03	+05	+14	+0	+1	+0	+0	+1
08307	+04	+02	+03	+02	+11	+0	+0	+0	+0	+0
08308*	-10	-08	-06	-08	-32	+0	-1	+0	-1	-2
08309	+03	+08	+02	+05	+18	+0	+1	+1	+0	+2
08310*	+23	+16	+10	+15	+64	+1	-1	+1	+1	+2
08311	+02	-02	+05	-03	+02	+1	+0	+0	+0	+1
08312	+00	-01	+01	-01	-01	-1	+0	-1	+0	-2
08313	+09	+07	+06	+07	+29	+0	+0	+0	+1	+1
08314	+00	+01	+02	-03	+00	+0	+0	+0	+0	+0
08315	+01	-07	-02	+00	-08	+0	-1	-1	+0	-2
08316	+03	+06	+05	+07	+21	+0	+0	+1	+1	+2
08317	-03	-03	-05	-05	-16	-1	+0	+0	-1	-2
08318	-05	-04	-01	-04	-14	+1	-1	-1	-1	-2
08319	+01	+01	+04	+03	+09	+0	+0	+0	+0	+0
08320	+06	+03	+07	+06	+22	+0	+0	+0	+1	+1
08321	+00	+01	+00	+00	+01	+0	+0	+0	+0	+0
08322	-01	-01	+02	-01	-01	+0	+0	+0	+0	+0
08323	+18	+10	+08	+15	+51	+1	+1	+1	+1	+4
08324	-01	+01	+01	+03	+04	+0	+1	+0	+0	+1
08326	+00	-02	-03	-02	-07	+0	+0	+0	+0	+0
08328	-10	-03	-05	-09	-27	-1	+0	-1	-1	-3

Subjects	1	2	3	4	5	6	7	8	9	10
09101	-01	-05	-02	-02	-10	+0	-1	+0	-1	-2
09102	+08	+05	+02	+08	+23	+0	+0	+0	+0	+0
09103	+03	-04	+03	-01	+01	+0	+0	+0	+0	+0
09104	+03	+00	+00	+00	+03	+1	-1	+0	+1	+1
09105	+02	+03	+03	+06	+14	-1	+0	-1	+0	-2
09106*	+11	+06	+03	+11	+31	+0	+1	+1	+1	+3
09107	-02	-01	-01	-04	+00	+0	+0	+0	+1	+1
09108	+01	+03	+07	+03	+14	+1	+0	+0	-1	+0
09109*	-06	-07	-03	-04	-20	+0	-1	-1	-1	-3
09110	+00	+00	+01	-01	+00	+0	+0	+0	+0	+0
09111*	+07	+05	+05	+07	+24	+0	+1	+1	+0	+2
09201	+03	-04	+02	-02	-01	+0	+0	+0	+0	+0
09202	+02	+06	+06	+03	+17	-1	-1	-1	-1	-4
09203	+06	+05	+02	+04	+17	+0	+0	+0	-1	-1
09204*	-05	-05	-03	-05	-18	-1	-1	-1	-1	-4
09205	+00	+00	-03	-07	-10	+0	+0	+0	+0	+0
09206*	-07	-01	-05	-05	-18	-1	-1	+0	+0	-2
09207	+16	+10	+06	+18	+50	+1	+1	+1	+1	+4
09208*	-12	-04	-04	-14	-34	+0	-1	-1	+0	-2
09209	-01	+00	+02	+00	+01	+0	+0	+0	+0	+0
09210	+00	-01	-02	+01	-02	+1	+0	+1	+0	+2
09211	-05	-01	-01	+00	-07	-1	-1	-1	+0	-3
09212	+01	+01	-01	+00	+01	+0	+0	+0	+0	+0
09213	-01	-01	+03	-01	+00	+0	+0	+0	+0	+0
09214	+07	+00	+01	+01	+09	+0	+0	+0	+0	+0
09215	-02	-03	-01	-02	-08	-1	-1	-1	-1	-4
09216	+01	+03	+04	+02	+10	+1	+1	+1	+1	+4
09217	-03	-02	+01	-03	-07	+0	+0	+0	-1	-1
09218	+07	+05	+07	+03	+22	+1	+0	+0	+0	+1
09219	-01	+01	-04	-02	-06	+0	+0	+0	+0	+0
09220	-05	-05	+00	-03	-13	+0	+0	+0	+0	+0
09221	-05	-02	-03	-03	-13	-1	-1	-1	+0	-3
09222*	+08	+07	+02	+07	+24	+0	+1	+1	+1	+3
09223	-02	-02	+00	-01	-05	-1	+0	-1	+0	-2
09224	-02	-01	+00	+01	-02	+0	+0	+0	+0	+0
09225*	+05	+09	+05	+05	+24	+1	+1	+1	+0	+3
09226	-04	-05	-02	-04	-15	-1	-1	+0	+0	-2
09227	+02	+02	+02	+04	+10	+0	+1	-1	-1	-1
09228	+04	+02	+02	+05	+13	+1	+1	+1	+1	+4
09229	+04	+03	+05	+06	+18	+1	+0	+1	+1	+3
09230	+08	+08	+05	+09	+30	-1	+1	+1	+0	+1
09231	+04	-02	-04	+00	-02	+1	+1	+1	+1	+4
10101	-09	+00	-03	-02	-14	-1	+0	-1	+0	-2
10102	+03	+03	-01	+05	+10	-1	+0	+0	+0	-1
10103	-08	-03	-06	-03	-20	+0	-1	-1	-1	-3
10104	+00	+01	+02	+01	+04	-1	-1	-1	-1	-4
10105	-09	-04	-05	-07	-25	+0	-1	+0	+0	-1
10106*	+06	+04	+07	+04	+21	+1	+1	+0	+1	+3
10107	+07	-01	+04	+02	+12	-1	+0	-1	+0	-2

Subjects	1	2	3	4	5	6	7	8	9	10
10108*	+04	+01	+05	+02	+12	+1	+1	+1	+0	+3
10109	-08	-01	-02	-06	-17	+1	+1	+1	+1	+4
10201	-05	-01	-03	-04	-13	-1	+0	+0	+0	-1
10202	+08	+03	+07	+06	+24	+1	+1	+1	+1	+4
10203	-02	+00	+00	-03	-05	+0	-1	+0	+0	-1
10204	+01	-03	-02	-03	-07	+0	+0	+0	+0	+0
10205	-05	+00	-01	-01	-07	+0	+0	+0	+0	+0
10206	-09	-03	-03	-03	-18	-1	-1	-1	-1	-4
10207	-02	-01	+01	+01	-01	+0	+0	+1	+0	+1
10208	-02	-02	-01	-03	-08	+0	-1	+0	+0	-1
10209	-04	+00	-06	-04	-14	+0	+1	+0	+0	+1
10210	+10	+08	+09	+10	+37	+0	+0	+1	+0	+1
10211	+04	+02	+00	+02	+08	+0	-1	+0	-1	-2
10212*	+07	+11	+10	+12	+38	+1	+1	+0	+0	+2
10213*	-09	-09	-08	-11	-37	-1	+0	-1	-1	-3
10214	+04	+02	-02	-06	-02	+0	+0	+1	+1	+2
10215	+16	+08	+08	+09	+41	+0	+0	+1	+1	+2
10216	+03	+03	+04	+07	+17	+0	+0	+0	+0	+0
10217*	+16	+09	+11	+18	+54	+1	+0	+0	+1	+2
10218	-08	-07	-07	-12	-34	+0	+1	+0	+0	+1
10219	+06	+04	+06	+05	+21	+0	+0	+0	+0	+0
10220	-06	-04	-05	-07	-22	+0	+0	+0	-1	-1
10221	+01	-01	-02	+01	-01	+1	+1	+0	+0	+2
10222	-02	-04	-05	+00	-11	+0	+0	+0	-1	-1
10223	+04	+01	+00	-01	+04	+1	+0	+0	+0	+1
10224	-03	-01	+01	-02	-05	+0	+1	+0	+0	+1
10225	-03	+01	-02	+01	-03	+0	+0	+0	+0	+0
10226*	-16	-12	-09	-16	-53	-1	+0	-1	-1	-3
10227	+02	+04	+02	+00	+08	+0	+1	+0	+0	+1
10228	+05	+03	-03	+03	+08	+0	-1	+0	+0	-1
10229	-04	-01	-06	-01	-12	+0	-1	+0	+0	-1
10230	+01	+06	+01	+04	+12	+0	+0	+0	+0	+0
10231	-04	-04	-04	-02	-14	-1	+0	-1	+0	-2
10232	-05	-03	-06	-02	-16	-1	+0	-1	+0	-2
10233	+02	+04	+02	-01	+07	+1	+1	+0	+0	+2
10234*	+13	+09	+14	+14	+50	+0	+1	+0	+1	+2
10235	+25	+14	+23	+27	+89	+0	+0	+1	+1	+2
11101	-23	-24	-18	-20	-85	-1	-1	-1	+0	-3
11102	-01	+00	+04	-01	+02	+0	+0	+0	+0	+0
11103	+06	+06	+05	+08	+25	+0	+0	+0	+0	+0
11104	-03	-02	-01	-03	-09	+0	+0	+0	+0	+0
11105*	+06	+02	+05	+07	+20	+1	+0	+1	+0	+2
11106	-01	-02	-01	-03	-07	+0	+0	+0	+0	+0
11107	-02	+01	+02	-01	+00	+0	+0	+0	+0	+0
11108	+03	+00	+02	+00	+05	+0	+0	+0	+0	+0
11109	+22	+23	+13	+27	+85	+1	+1	+0	+0	+2
11110	-05	-05	-01	-01	-12	-1	+0	+0	+0	-1
11111	+00	+00	-01	+00	-01	+0	+0	+0	+0	+0
11112	+08	+04	+02	+01	+15	+0	+0	+0	+0	+0

Subjects	1	2	3	4	5	6	7	8	9	10
11113	+22	+24	+17	+16	+79	+1	+1	+1	+0	+3
11114	+13	+05	+05	+08	+31	+0	+0	+0	+0	+0
11115	+05	+05	+00	+04	+14	+0	+0	+0	+0	+0
11116	+06	+12	+03	+11	+32	+0	+0	+0	+0	+0
11117*	+07	+09	+08	+14	+38	+1	+1	+1	+1	+4
11118	+00	+02	+08	+00	+10	+0	+0	+0	+0	+0
11119	-06	-01	-03	-02	-12	+0	+0	+0	+0	+0
11120	+01	+02	+04	-01	+06	+1	+0	+0	+0	+1
11121	-04	+00	+00	+01	-03	+0	+0	+0	+0	+0
11122	+08	+05	+04	+04	+21	+1	+1	+1	+1	+4
11123	+00	+05	+03	+00	+08	+0	+0	+0	+0	+0
11124	-15	-14	-10	-11	-50	+0	+0	+0	+0	+0
11125	-05	-02	-04	-05	-16	+0	+0	+0	-1	-1
11126	+00	+00	+00	+00	+00	+0	+0	+0	+0	+0
11127	-11	-04	-07	-07	-29	-1	+0	+0	+0	-1
11128	-02	-02	+00	-01	-05	+0	+0	+0	+0	+0
11129	-06	-06	-08	-05	-25	+0	+0	+0	+0	+0
11130	-12	-09	-02	-09	-32	-1	+0	-1	+0	-2
11131*	-11	-13	-04	-06	-34	-1	-1	-1	-1	-4
11132	+02	+02	+00	-01	+03	+0	+0	+0	+0	+0
11133	-02	-07	+00	-05	-14	+0	-1	+0	+0	-1
11201	-10	-10	-09	-02	-31	+0	+0	+0	+0	+0
11202	+23	+10	+09	+22	+64	+1	+1	+0	+0	+2
11203	+04	+03	-01	+04	+10	+0	+0	+0	+0	+0
11204	-04	-01	-02	-01	-08	+0	+0	+0	+0	+0
11205	-09	-11	-06	-12	-38	-1	+0	+0	-1	-2
11206	+17	+17	+12	+17	+63	+1	+1	+1	+1	+4
11207	+02	+00	+00	-01	+01	+0	+0	+0	+0	+0
11208	-04	+01	-03	-04	-10	+0	+0	+0	+0	+0
11209	-02	-01	+00	-01	-04	+0	+0	+0	+0	+0
11210	+00	-01	+01	-02	-02	+0	+0	+0	+0	+0
11211	-08	-04	-08	-07	-27	-1	+0	+0	-1	-2
11212	-01	+00	+02	-04	-03	+0	+0	+0	+0	+0
11213	+02	+01	-01	+02	+04	+0	+0	+0	+0	+0
11214	-01	+02	+04	-09	-04	+0	-1	+0	+0	-1
11215	+20	+07	+04	+08	+39	+0	+1	+0	+0	+1
11216	-03	-05	+02	-04	-10	+0	+0	+0	+0	+0
11217	-05	-01	+02	-05	-09	+0	-1	+0	+0	-1
11218	-14	-08	-01	-11	-34	-1	+0	-1	-1	-3
11219	+05	+04	+02	+00	+11	+0	+0	+0	+0	+0
11220	+05	+05	+02	+06	+18	+1	+1	+1	+1	+4
11221*	+16	+07	+09	+11	+43	+1	+1	+0	+1	+3
11222	-03	-06	+00	-03	-12	+0	+0	+0	+0	+0
11223	-03	+02	+05	-03	+01	+0	-1	+0	+0	-1
11224	+04	+03	+02	+02	+11	+0	+0	+0	+0	+0
11225	+02	-02	-01	+01	+00	+0	+0	+0	+0	+0
11226	-14	-06	-06	-08	-34	+0	+0	+0	+0	+0

APPENDIX B

RAW DATA

(Used for Answering the Experimental Questions)

Subject	Verbal Intelligence Raw Score	Fluency Score	Flexibility Score	Originality Score	Creativity Score
01213	043	043	021	019	083
01217	078	054	035	048	137
01225	050	063	029	057	149
01312	046	037	023	014	074
01319	069	050	027	027	104
01326	056	076	038	057	171
02101	062	040	021	018	079
02102	046	074	035	057	166
02104	048	030	021	020	071
02107	061	026	015	009	050
02114	068	077	040	043	160
02129	055	061	041	039	141
02131	045	016	017	011	044
03104	066	043	031	016	090
03106	075	050	027	027	104
03112	055	048	022	032	102
03117	082	102	046	080	228
03206	054	048	032	029	109
03208	067	022	015	013	050
03217	045	041	028	029	098
04124	053	056	026	022	104
04218	060	045	027	029	101
04424	055	066	028	040	134
05202	052	135	061	087	283
05208	053	056	029	025	110
05224	065	122	046	079	247
06226	067	066	040	040	146
06324	064	034	023	014	071
07109	054	050	025	019	094
07124	077	096	045	053	194
07130	057	034	023	016	073
07161	060	031	017	014	062
07183	062	041	019	018	078
07191	063	032	022	014	068
07192	061	023	018	007	048
07194	044	051	030	015	096
07195	068	048	030	015	093
08107	069	080	049	058	187
08116	053	103	048	058	209
08124	034	016	012	010	038
08224	074	042	023	017	082
08308	050	032	023	022	077

Subject	Verbal Intelligence Raw Score	Fluency Score	Flexibility Score	Originality Score	Creativity Score
08310	085	098	048	059	205
08323	079	089	053	060	202
08328	050	032	019	014	065
09106	073	051	029	028	108
09109	036	032	022	012	064
09111	072	048	028	017	093
09204	072	017	009	015	041
09206	058	029	018	023	070
09208	058	033	018	019	070
09222	067	052	030	027	109
09225	051	053	029	023	105
10106	043	053	021	029	103
10108	065	038	024	015	077
10212	054	080	032	041	153
10213	037	042	023	012	077
10217	076	047	029	023	099
10226	031	036	021	018	075
10234	051	116	058	067	241
11105	033	020	014	012	046
11117	056	049	024	029	102
11131	059	030	022	013	065
11221	044	056	028	023	107