A STUDY OF THE CONCURRENT VALIDITY OF THE AC TEST
OF CREATIVE ABILITY IN A COLLEGE SITUATION

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A STUDY OF THE CONCURRENT VALIDITY OF THE AC TEST
OF CREATIVE ABILITY IN A COLLEGE SITUATION

THESIS

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

MASTER OF ARTS

By

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Denton, Texas
August, 1963
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CHAPTER I

INTRODUCTION

Need for the Study

The emphasis of the twentieth century on discovery and invention has been of heuristic value in the exploration of creativity. It is important that knowledge, which may be gained from studies pertaining to creative thinking, can be applied in an educational setting. It is necessary that a tool, for evaluating and assessing this ability, be validated for use in this type of situation before such investigations can be adequately pursued.

It would appear that the AC Test of Creative Ability might fill this need. The use of this instrument, as stated in the Administration Manual, is as follows:

The test measures the products of creative activity. It yields a measure of the number and the uniqueness of the ideas which an individual can develop for a given situation. As such, it can be used as an instrument for the selection of creative potential. . . . ¹

All of the validity studies which were reported in the manual were conducted with homogeneous groups of subjects. Most of these subjects were professional engineers, or advanced engineering students. Four of the five studies used entirely

¹AC Test of Creative Ability, Test Administration Manual (Chicago, 1959), pp. 11-12.
persons in the employ of the AC Spark Plug Division of General Motors.

Cronbach states that with respect to the question of validity generalization, regardless of "how well a selection procedure is validated and cross-validated in the original situation, it must be validated anew when it is carried into a new situation."2

The Problem

The purpose of this study is twofold. First, it is to obtain further evidence of the concurrent validity of the AC Test of Creative Ability. Further, and more specifically, it is concerned with the generalization of previously indicated validity of the AC Test to a college situation.

It is the purpose of validation studies to indicate the degree to which a test can achieve given aims. The scope of the present study focuses on the concurrent validity of this test in a college population. A distinction has been made between predictive validity and concurrent validity.

Predictive validity is evaluated by showing how well predictions made from the test are confirmed by evidence gathered at some subsequent time . . . . Concurrent validity is evaluated by showing how well scores correspond to measures of concurrent criterion performance or status.3


The sources from which this study generated include the references which are cited in the preceding section, and the theoretical approach of organismic psychology. In theory there is basis for believing, as did Maslow,\(^4\) that people who reportedly have done more creative things will be able to produce a greater quantity of unique ideas. They will be more spontaneous and self-actualizing persons. It would, therefore, seem possible to make certain predictions about the concurrent validity of the AC Test of Creative Ability by defining the degree of creativity as the relative number of items, on a check list of productions, that an individual reportedly has accomplished.

From this same organismic point of view, it would appear to be necessary to assess the mental and emotional health or personal well-being of subjects, as well as the creative intellectual factors, in order to predict creative ability as opposed to creative potential. Such a study of predictive validity is beyond the scope of this paper. It should also be noted that concurrent validity cannot be considered synonymous with, nor indicative of, predictive validity.

Review of the Literature

A review of publications of related studies indicates the significance of the study of creativity. Drevdahl defines creative ability in a clear and concise manner.

Creativity is the capacity of persons to produce compositions, products, or ideas of any sort which are essentially new or novel and previously unknown to the producer. It can be imaginative activity or thought synthesis, where the product is not mere summation. It may involve forming of new patterns and combinations of information derived from past experience, and transplanting of old relationships to new situations and may involve the generation of new correlates. It must be purposeful or goal directed, and not mere idle fantasy—although, it need not have immediate practical application or be a perfect and complete product. It may take the form of artistic, literary or scientific productions or may be of a procedural or methodological nature.

The area of creative thinking was relatively unexplored by psychologists until recent years. In 1950 Guilford noted that "less then two-tenths of 1 per cent of the books and articles indexed in the Psychological Abstracts for the previous twenty-three years had dealt directly with the subject of creativity." There were apparently two major problems linked with this neglect. The first was one of definition, the second resulted from the difficulties involved in test technology. With regard to definition, the general concept of creative ability has often been equated with I. Q. scores, and the various assessments of intelligence which have pervaded the field of psychology in the past decades. Although a relationship exists between I. Q. test scores and creative ability, it has become apparent that there is no direct and

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significant correlation between the two capacities. Drewdahl interprets the results of his study as indicating that intellectual factors seem to be necessary, but insufficient factors for creativity. Guilford considers creative ability an intellectual function, but not one which has been sampled by intelligence tests. Another misconception in definition, which has been pointed out by Getzels and Jackson, is a result of failure to recognize that "there are cognitive functions related to creativity in areas other than artistic talent."

The second difficulty has been a methodological problem in devising tests to assess creativity. Guilford also recognized that there are some facets of creative ability which cannot be measured with complete objectivity. Multiple choice items provide the creator with a finished product, and prevent him from showing his own creation, thus constituting an invalid test. Completion items would seem to be the only feasible testing method. The scoring methods for even this type of testing must remain somewhat subjective for the very nature of the capacity calls for assessment of original and novel products. Scoring procedures which limit novelty would again invalidate the testing method; therefore, there

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7 Drewdahl, op. cit., p. 25.
8 Guilford, op. cit., p. 444.
remains only subjective judgement as a means for quantifying responses.

A review of more current literature in the field of psychology, as well as in related disciplines such as education or industry, reveals abounding interest in the subject of creativity. It would appear that the stimulating work of Guilford, in 1950, is at least in part responsible for this revolution. Investigators of creative ability have approached the subject in various ways. According to Pine and Holt, studies may be categorized as falling under one of three major headings, depending on the investigator's point of concentration. In the first category are those who have selected to focus on the creative process, or the "dynamic events which surround the creative act itself and the phases of creativity." Others have studied the created product, often qualitatively. Studies of this type are represented by one of Pine's investigations in which he correlates the quality of productions with drive content and drive control. Many current researchers, including Guilford, have chosen to emphasize the creative individual.

Guilford contends that the individual cannot be separated from the ability.

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12 Ibid.

In a narrow sense, creativity refers to the abilities that are most characteristic of creative people. Creative abilities determine whether the individual has the power to exhibit creative behavior to a noteworthy degree. Whether or not the individual who has the requisite abilities will actually produce results of a creative nature will depend upon his motivational and temperamental traits ... the psychologist's problem is that of creative personality.\(^{14}\)

Personality is defined by Guilford as a person's unique set of traits, and a trait is any distinguishable, relatively enduring way in which individuals differ one from another. This approach, therefore, emphasizes individual differences. The primary interest of psychologists lies in behavior traits, that is, those traits that are manifest in performance. He further believes that factor analysis, which starts with information regarding concomitant variations of performance, is the most defensible way of discovering dependable trait concepts.

Some hypotheses concerning the primary traits related to creativity were presented by Guilford in 1950; these were subsequently reviewed in light of more current information.

The following aptitudes for creative thinking were reviewed and discussed:

1. A generalized sensitivity to problems which initiates productive thinking, but plays no constructive part in this thinking, was found to be indicated best by asking examinees to state problems, defects, or deficiencies in common objectives, social institutions, or actions.

\(^{14}\)Guilford, op. cit., p. 454.
2. Fluency of thinking has been divided into four fluency factors.

   a. Word fluency is an ability to produce words each containing a specified letter or combination of letters.

   b. Associational fluency is indicated best in a test that requires the examinee to produce as many synonyms as he can for a given word in a limited time.

   c. Expressional fluency is best measured by a test calling for the production of phrases or sentences.

   d. Ideational fluency is the ability to produce ideas to fulfill certain requirements in limited time. A test of this factor may ask examinees to name objects that are hard, white, and edible or to give various uses for a common brick, or to write appropriate titles for a given story plot.

3. Flexible thinking has been divided into two abilities.

   a. Spontaneous flexibility is defined as the ability or disposition to produce a great variety of ideas, with freedom from inertia or from perseveration. In tests which require the examinee to name uses for a brick, he can jump readily from one category of response to another—the brick used as building material, as a weight, as a missile, or as a source of red powder, and so on.

   b. Adaptive flexibility facilitates the solution of problems. This is shown best in a type of problem that requires a most unusual type of solution, that is, one in which conventional or familiar methods will not work.

4. Originality is measured by unusualness of responses in a statistical sense.

5. Redefinition is an ability to give up old interpretations of familiar objects in order to use them or their parts in some new way. Improvising, in general, probably reflects the ability to redefine.

6. Originally the general ability to analyze and the general ability to synthesize were postulated.
The result does not refute the existence of these two kinds of operations. What it does indicate is that individuals do not differ systematically from one another with respect to a general ability to analyze in connection with many tasks nor do they differ systematically in a general ability to synthesize.\(^{15}\)

In the field of Education, Lowenfeld has recently written an article in which he discusses eight attributes which according to interpretation of his studies serve to differentiate creative individuals from non-creative individuals. These seem to be quite consistent with Guilford's findings.

1. Sensitivity to problems, or an awareness of defects, needs, deficiencies, the odd or the unusual.

2. Fluency of ideas, as tested by the number of different ideas when the subject was thinking of or using one item.

3. Flexibility or one's ability to adjust quickly to new situations.

4. Originality, usually tested by looking for uncommonness in responses.

5. The ability to rearrange, redefine, or shift the function of an object and use it in a new way. This includes experimentation and new combination.

6. Analysis or ability to abstract details from wholes.

7. Synthesis and closure, combining several elements to form a whole.

8. Coherence of organization, one aspect of which is conciseness.\(^{16}\)


Most tests or batteries of tests which are used to single out creative individuals for experimental or selection purposes are based on these or similar attributes. Getzels and Jackson\textsuperscript{17} have done a prolonged series of studies on creative adolescents and children for the purpose of differentiating between a highly intelligent, but not highly creative group, and a highly creative group, but not highly intelligent group. They assessed these groups for various factors such as aspiration, school achievement, and sense of humor. The battery of tests which were used to measure creative ability required faculty in dealing with (a) rapid verbal associations to stimulus words, (b) ability to structure quickly an incomplete or distorted perceptual stimulus, and required (c) remote, clever, or original responses to complex verbal situations, and (d) suggestions of all of the mathematical problems which could be solved by information supplied in a complex paragraph involving numerical values.

Their work resulted in some significant differences between the two groups. Some interesting findings on intellectual and personality correlates have been reported by these men.

The high creatives tend to express more aggression and violence. In this connection, it is not merely the presence or absence of violence that should be noted but that whereas the pictures of the high creatives seem to have personal meaning the pictures of the high IQ's seem only

\textsuperscript{17}Getzels and Jackson, op. cit., pp. 75-77.
superficial representations. Clearly, there are very real and striking differences in the verbal and non-verbal imaginative productions of the two groups—differences that may be understood both in cognitive and motivational terms . . . . The creative adolescent seemed to need to free himself from the usual, to diverge from the customary behavior; he seemed to enjoy the risk and uncertainty of the untried and the unknown. In contrast, the high IQ non-creative adolescent seemed to possess to a high degree the ability and the need to focus on the usual and to be "channeled and controlled" in the direction of the "right" answer, the socially accepted solution. He appeared to shy away from the risk and uncertainty of the unknown and to seek the safety and security of the already established and the known. 18

Several investigators have used select and homogeneous groups of individuals, such as groups of artists, scientists, or engineers, for their studies. This method lends itself easily to quantifying creative ability by means of supervisor rating scales. The groups are generally professional and therefore may be rated on the basis of quantity and quality of their ideas or productions. By this means Stein and Meer investigated "Perceptual Organization in a Study of Creativity" on the hypothesis that more creative individuals (those with more available resources) will develop more hypotheses and better gestalten under varying degrees of ambiguity than less creative individuals (those with less resources available).


The study seemed to indicate that creative people show a greater freedom in offering perceptual hypothesis, and in the level of organization of their responses than do less creative people. This appears to be a function of personality factors. They suggest that "the real difference between high and low creative individuals may be a function of defensiveness or overcriticalness which inhibits the generation and communication of hypothesis."

The stated purpose of a study which was done by Drevdahl was to "find relationships between ratings of creativity in a high level population, and objectively measured personality and intellectual factors." His subjects were divided into two groups, a creative group and a non-creative group, by means of ratings. Drevdahl went a step further than many investigators have gone. The creative group was divided into subgroups of creative artists and creative scientists, and the non-creative group was divided into non-creative artists and non-creative scientists. Personality factors, measured by the Cattell Sixteen Personality Factor Questionnaire, varied somewhat within the subgroups. Basically, however, individuality or non-conformity seemed to be desirable for creativity and, characteristically, the creative group appeared to be more withdrawn, quiescent, and primarily concerned with ideas as opposed to people.

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Intellectual factors, in Drewdahl's study, were assessed by the Thurstone Primary Mental Abilities Test and by tests selected from Guilford's Factor Analytic Study of Creative Thinking. The results were reported as indicating that intelligence seems to be a necessary, but insufficient, factor for creativity. Further, creative individuals were superior to non-creative individuals in (1) verbal facility and fluency, which involve a wide range of concepts expressed in words, (2) adaptive flexibility, and (3) originality. The finding that is most related to the present study resulted from a comparison of creative subgroups. Drewdahl reports that creative artists and creative scientists "possess nearly the same intellectual characteristics."

Carl Rogers defines the creative process as the "emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people, or circumstances of his life on the other." He identifies three qualities which seem to him characteristic of a potentially creative person.

1. Openness to experience: extensionality. This is the opposite of psychological defensive-ness, when to protect the organization of the self certain experiences are prevented from coming into awareness except in a distorted fashion. In a person who is open to experiences each stimulus

21Ibid., p. 27.

is freely relayed through the nervous system, without being distorted by any process of defensiveness.

B. An internal locus of evaluation. Perhaps the most fundamental condition of creativity is that the source or locus of evaluative judgement is internal. The value of his product is, for the creative person, established not by praise or criticism of others, but by himself. This does not mean that he is oblivious to, or unwilling to be aware of, the judgements of others. It is simply that the basis of evaluation lies within himself, in his own organismic reaction to and appraisal of his product.

C. The ability to toy with elements and concepts. Associated with the openness and lack of rigidity described under A is the ability to play spontaneously with ideas, colors, shapes, relationships—to juggle elements into impossible juxtapositions, to shape wild hypotheses, to make the given problematic, to express the ridiculous, to translate from one form to another, to transform into improbable equivalents. It is from this spontaneous toying and exploration that there arises the hunch, the creative seeing of life in a new and significant way.  

Rogers contends that these characteristics may be found in problem-solving groups of any sort. His purpose in this attempt to discover conceptual order and stating it in the form of a theory is to permit the development of objectively testable hypotheses. He suggests the following general hypotheses.

1. Individuals who exhibit a measurably greater degree of conditions A, B, and C (openness, internal locus of evaluation, ability to toy with materials) will, over any given period of time spontaneously form more products judged to be novel and creative, than a matched group who exhibit a lesser degree of A, B, and C.

2. The product of the first group will not only be more numerous, but will be judged to be more significant in their novelty.

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23Ibid., pp. 75-76.
3. Condition A (openness to experience) can be predicted from conditions B or C, which are more easily measurable.\textsuperscript{24}

It is theoretically impossible, from an organismic point of view, to predict and describe behavior on the basis of a differentiated or isolated part because the organism always behaves as a whole. The laws that govern whole functions cannot be found in parts. A healthy organism, according to Goldstein, is motivated by self-actualization or self-realization of potentialities, and is, therefore, the creative aspect of human nature by which the individual becomes more complete and fully developed.\textsuperscript{25}

Maslow believed that it was necessary to study healthy, integrated individuals in order to understand human nature because, from this theoretical approach, pathological states are disorganized states of the organism. For this reason he began his studies by selecting individuals who were obviously self-actualizing, mature, healthy individuals. Self-actualizing creativity, according to Maslow, is general in nature; it is apparent in everything the individual does, and springs rather directly from the personality. He considers creativity a characterological concept. He, therefore, discourages an all-or-none approach because he feels that there is more or less of it in every individual, if only as potential which has been suppressed. He says "self-actualizing creativeness

\textsuperscript{24}Tbid., p. 81.

\textsuperscript{25}Calvin Hall and Gardner Lindzey, \textit{Theories of Personality} (New York, 1961), p. 298.
is hard to define because sometimes it seems synonymous with health itself. 26

It has been the purpose of Chapter I to present the problem with which this study is concerned, and to review the theory and related research which served as sources for it. Chapter II will discuss the methods and subjects as they were used in the investigation.

CHAPTER II

SUBJECTS AND METHODS

Subjects

The members of two introductory psychology classes at North Texas State University in Denton, Texas, were selected as subjects. Both of these classes were scheduled to meet for one hour three times a week, one class at eight o'clock and one at twelve o'clock noon, during the Spring Semester of 1962-1963. Introductory psychology is a freshman-level course at North Texas State University. The total number of subjects was fifty-nine, thirty of whom were females and twenty-nine of whom were males. The ages ranged from eighteen to forty-six years; however, forty-two of the fifty-nine subjects were eighteen to nineteen years old.

The classes were told that they would be given the opportunity to take some psychological group tests, and by this experience that they might learn something about the field of psychology. These tests were to be given in a regularly scheduled class meeting and as a part of their class work. Each class was asked to decide, as a group, whether or not they would like to take the tests. Both classes elected to do so.
Criterion Check-List

The Things I Have Done Check-List was devised for the purpose of this study. The purpose and the method of the proposed study were explained to a graduate psychology class in Research Methods. The check-list was discussed, and the instructor and class members were asked to submit items for it. Other items were obtained, over a period of approximately two months, from home economics and industrial arts students, and from books on crafts, hobbies, literary productions, art, home improvement, and various other subjects. The items were examined and a rough draft of the check-list was made. It was felt that the following categories, which were quite loosely defined and arbitrary in nature, should be represented by one or more items: (1) literary, (2) arts and crafts, (3) decoration and design, (4) household and miscellaneous hobbies, (5) music, (6) science, and (7) social and personal.

Each question was reexamined for clarity, conciseness, and face-validity. After several revisions, a final draft of The Things I Have Done Check-List resulted. These instructions were printed at the top of the check-list:

Check the appropriate answer for each item. These must be things you have done in approximately the last five years. They must have been done very largely on your own initiative, without clear-cut or specific directions from another person.

Three alternative responses were listed. The response "never" received no credit in scoring; "once" was allowed one point credit; and "more than once" was given two points credit.
The check-list was re-administered to one of the classes of subjects two weeks subsequent to the first administration in order to evaluate the reliability. The twenty members who were present at both class meetings composed the subjects for this part of the study. A Pearson's product moment coefficient of correlation was computed for the results of the reliability study. A positive .94 correlation was obtained. It was observed that the retest scores were rather consistently higher for most of the subjects. A \( t \) test of the difference between means, however, resulted in a \( t \) of .128 which was insignificant.

**The AC Test of Creative Ability**

The AC Test of Creative Ability was developed at the AC Spark Plug division of General Motors by Richard Harris, director of Employee Research for the General Motors Corporation, and A. L. Simberg, supervisor of Personnel Research and Development at AC Spark Plug. The test was part of the AC Creativity Project which was initiated in 1953. It was designed to measure the quantity of unique ideas that an individual can produce in a given situation, his imagination, open-mindedness, and constructive discontent. This test is a pencil-and-paper test which can be administered to groups or individually. There are two parallel forms, each of which contains five parts. Each part is separately timed; the total time for the complete test is eighty minutes. Form A, which was used in short form for this study, will be found in the Appendix.
The Test Administration Manual\(^1\) indicates that good discrimination of creative ability is possible by the use of the short form of this test. The short form includes Parts I, II, and V, and takes forty-five minutes to administer. The contracted scoring procedure involves the Quantity or "Q" score only. The "Q" score is the total number of relevant responses which the subject makes. A degree of subjective judgement is necessitated because the scorer must decide as to the relevance of each response; however, this method is much less subjective than the long scoring procedure which requires judgement as to the degree of uniqueness and quality of responses. It is considered that very little loss of significant information results from the use of only the Quantity scores for the short form of this test. Parts I, II, and V of the test showed consistently good discrimination between the criterion groups in the various validation studies. The correlation between the more objective Quantity scores and the Uniqueness scores obtained from the same parts of the test are all +.8 or over, and are significantly greater at the .01 level of confidence than the average correlation between either the Uniqueness (.475) or the Quantity scores (.428) from different parts of the test.\(^2\)

The reliability of the test was found to be .922 by the Kuder-Richardson estimate of internal consistency. The correlation between the scores from the parallel forms was .749.\(^3\)

\(^1\)AC Spark Plug Division, General Motors Corp., AC Test of Creative Ability: Test Administration Manual (Chicago, 1959), p. 9.  
\(^2\)Ibid.  
\(^3\)Ibid., p. 12.
Five studies are reported in the Manual as evidence of the validity of the AC Test of Creative Ability. The Manual should be consulted for more complete information, but the techniques used in the studies will be briefly summarized. The primary study used thirty-six men from the Automotive Engineering Division and Master Mechanic's Section as subjects. Eighteen of these men were rated by their supervisors as consistently producing a quantity of unique ideas, and eighteen were rated as seldom producing any ideas. The $t$ score for these two groups was computed, and considered to be indicative of test validity. The secondary validation group was composed of thirty-five employees in the Manufacturing Development Section of the AC Spark Plug Division. These men were rated by the chief engineer and his assistant as to their over-all performance on creative tasks, and $t$ score was again computed. A third study involved twenty-eight matched pairs of AC hourly employees, and used good and poor suggestion records (quantity of suggestions) as a criterion. The results of this study was again presented as $t$ score computation. Thirty-eight engineers from the AC Spark Plug Division Defense Engineering Personnel were divided into two groups according to the estimated amount of time spent by each in developmental versus routine engineering work. According to their supervisor, those spending the greater part of their time in developmental work had demonstrated ingenuity, inventiveness, and many ideas. Those spending more than 50 per cent of their time at
developmental tasks made up the high group and those who were spending less than 30 per cent of their time on developmental work were considered the low group. A $t$ test of the difference between means was computed. In the last study reported, forty-five senior engineering students enrolled in a course, which required imaginative thinking, at the Massachusetts Institute of Technology were given the AC Test of Creative Ability. The relationship between final grades and test scores are presented as evidence of test validity.

Design of the Study

Two testable hypotheses were formulated for the purpose of studying the concurrent validity of the AC Test of Creative Ability:

1. The high creative group, that is, those who score in the upper one-third on the Things I Have Done Check-list, will have a higher mean score on the AC Test of Creative Ability than will the low creative group, or those who score in the lower one-third on the check-list.

2. There will exist a positive relationship between the variations in scores on the Things I Have Done Check-list and the scores on the AC Test of Creative Ability.

For the purpose of this investigation, creative ability is defined as the characteristic measured by the Things I Have Done Check-list. The reliability of this check-list
is indicated by a correlation coefficient of .94 and a t of .128 in a test-retest situation.

The AC Test and Check-list were administered to fifty-nine subjects. In order to test the first hypothesis, the group was divided into thirds on the basis of the scores obtained on the check-list. These scores ranged from 12 to 123. The scores in the high group ranged from 84 to 123, and the low group ranged from 12 to 59. The high group was composed of nineteen subjects, and the low group of twenty subjects. This hypothesis would be accepted if a significant difference were found to exist between the means.

In order to test the second hypothesis the scores obtained on the AC Test were correlated with the scores on the check-list. If a positive relationship were found to exist, this hypothesis would be accepted on the strength of that relationship.

If these two hypotheses were acceptable, then this study would be considered as further evidence of the concurrent validity of the AC Test of Creative Ability. It would also be considered an indication that the results from previous validation studies, which were conducted at the AC Spark Plug Division in connection with the test construction, probably could be generalized to include a college population.

The subjects and methods which were used in this study have been described, the hypotheses were stated, and creativity was defined operationally in this chapter. The results which
were obtained, and the conclusions and implications will be considered in Chapter III.
CHAPTER III

RESULTS, CONCLUSIONS, AND IMPLICATIONS

Results

The mean and standard deviation for both the high and the low creative groups were computed. The results are indicated in Table I.

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scatter diagram of the scores of the two means of assessment was made. These data are presented in Table II. This diagram indicates that the relationship is essentially linear in nature. A Pearson's product moment coefficient of correlation was subsequently computed, and this resulted in an r of .41.

**TABLE II**

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<td>2</td>
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<td>59</td>
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</tbody>
</table>

*Y = Scores on the Things I Have Done Check-list.

**X = Scores on the AC Test of Creative Ability.
This is significant at the .01 level of confidence. According to Guilford\(^4\) the interpretation of the size of \(r\) varies with the purpose for which it was computed. Generally speaking, however, the strength of the relationship which exists when \(r = .40\) to \(.70\) is considered indicative of a moderate correlation and a substantial relationship. He further states that the validity coefficient for a single test may be expected within the range from \(.00\) to \(.60\). Most often they will fall in the lower half of that range. On this basis, hypothesis number two is supported to a moderate degree.

These results are interpreted as partially substantiating both hypotheses. In accord with the stated purposes of this study, this is considered to be further evidence of the concurrent validity of the AC Test of Creative Ability, and as indicating some basis for generalizing this validity to a college situation.

Conclusions and Implications

On the basis of this study, it would appear that the AC Test of Creative Ability can most adequately be used to select high and low creative groups. Such a tool could be beneficial for use in further research. For example, the test might be used as a criterion for group selection in order to test hypotheses regarding personality correlates of creative individuals.

Further evidence of the validity of the AC Test is needed. Concurrent validity might be studied in a college situation by means of instructor ratings. Art, music, journalism, home making and industrial arts classes would probably provide student's productions which could be rated most easily. The validity of the AC Test could be studied by the correlation of these ratings with test scores. The results from the present study cannot be considered evidence of predictive validity. A study of this type is needed.

The correlation coefficient of .41 would seem to indicate that the AC Test alone is not necessarily adequate for the selection of creative ability on an individual basis. Two implications could be noted here. In the first place, it may be that a battery of tests is required for selection. Such a battery might well include evaluation of personality and motivation level. A second area which needs further exploration is the means by which creative ability was measured in this study. The Things I Have Done Check-list may not have assessed creativity sufficiently. In any case, one method or study cannot be considered anything more than suggestive of validity.

Although the check-list was devised for this study, it is entirely possible that, with further refinement, this check-list could be useful in the selection and evaluation of creative ability. A high reliability was obtained, but only the face validity of this instrument was examined. The
individual items and categories need to be carefully studied in order to determine if and where biases and weightings exist. It is also possible that some areas have been overlooked, while others may have been too heavily represented.

The purpose of this chapter was to discuss the results which were obtained, and the conclusions and implications of the study. A summary of the investigation in its entirety will compose Chapter IV, and will conclude the body of this thesis.
CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The significance of the study of creativity was discussed and a review was made of current related literature. It was pointed out that this subject was essentially unexplored prior to about 1950, but that in more recent years abounding interest has been remarkably apparent. Confusion in defining this ability, and difficulty in devising tests to assess it were felt to be partly responsible for the earlier neglect.

Among the definitions of creativity which were cited was that of Rogers, who defines the creative process as "the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand and the materials, events, people, or circumstances of his life on the other."¹

Both intellectual and personality factors appear to be involved in creative activity. From an organismic point of view, the organism behaves as a whole, and behavior cannot be studied on the basis of isolated parts. Further, actualization of an individual's potential is a correlate of mental and emotional health. The purpose of the present study was

first, to obtain further evidence of the concurrent validity of the AC Test of Creative Ability, and more specifically to study the possibility of generalizing previously indicated evidence to a college situation. As the assessment of the personality factors of the subjects was beyond the scope of this study, it was not concerned with predictive validity.

In accord with the stated purpose, the following testable hypotheses were formulated:

1. The high creative group, i. e., those who score in the upper one-third of the subjects studied on the Things I Have Done Check-list, will have a higher mean score on the AC Test of Creative Ability than will the low creative group, i. e., those who score in the lower one-third on the Things I Have Done Check-list.

2. There will exist a positive relationship between the variations in the scores on the Things I Have Done Check-list and the scores on the AC Test of Creative Ability.

In order to test these hypotheses, a Things I Have Done Check-list was devised. The items on this check-list included various possible creative productions. Fifty-nine male and female subjects who were members of two introductory psychology classes at the North Texas State University in Denton, Texas, during the Spring Semester of 1962 were used. They were asked to check the applicable alternative responses to each item on the check-list. The possible responses were (1) "never", which was scored as no credit, (2) "once", which
was given one point credit, and (3) "more than once", scored as two points. This check-list was readministered to twenty of the subjects in order to establish a measurement of reliability. A correlation coefficient of .94 and a $t$ score of .128, which was significant, were obtained from this part of the study.

Creativity was defined as the characteristic measured by the Things I Have Done Check-list, and the subjects were divided into three groups by means of the scores obtained on the check-list. The AC Test of Creative Ability was administered to the subjects. In order to test the first hypothesis, the mean and standard deviation of the scores obtained on the AC Test were computed for the high and low creative groups. A $t$ score of the difference between means was significant at the .01 level of confidence. The first hypothesis was accepted. A coefficient of correlation of the scores on the Check-list and AC Test was computed and an $r$ of .41 which was significant at the .01 level resulted. This was considered to be indicative of a positive moderate and substantial relationship. On this basis the second hypothesis was accepted as being partly, but not wholly, supported.

Conclusions

Based upon the data as presented, the following conclusions seem to be justifiable:

1. This study is further evidence of the concurrent validity of the AC Test of Creative Ability.
2. Some basis exists for generalizing this validity to a college situation.

3. The AC Test alone does not appear to be adequate for the selection of creative ability on an individual basis.

4. The high reliability and face validity of the Things I Have Done Check-list may warrant investigation of this as a means of assessing creativity.

Recommendations

The foregoing conclusions have been assembled in support of the following recommendations:

1. A need exists for further investigation of both predictive and concurrent validity of the AC Test of Creative Ability in a college situation.

2. Refinement and validation beyond the scope of the present study is needed if this tool is to be used for evaluating creativity.
APPENDIX

THINGS I HAVE DONE CHECK-LIST

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Sex</th>
<th>Never</th>
<th>Once</th>
<th>More than once</th>
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</table>

Instructions: Check the appropriate answer for each item. These must be things you have done in approximately the last five years. They must have been done very largely on your own initiative, without clear-cut or specific directions from another person.

1. Written poems
   - Written stories
   - Written critical abstracts
   - "Made up" an original story to entertain a child
   - Written a play
   - Done research on a topic (which was not assigned)
   - "Made up" a jingle or a joke
   - Pantomimed a story, song, etc.
   - Worked out a code language that was original

2. Done ceramics, sculpture, etc.
   - Made a mobile from a wire coat hanger, pipe cleaners, etc.
   - Made a lamp from bottle, drift wood, etc.
   - Made hand puppets and/or a stage
<table>
<thead>
<tr>
<th>Activity</th>
<th>Never</th>
<th>Once</th>
<th>More than once</th>
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<tbody>
<tr>
<td>Made mosaics from tile, sand, beads, etc.</td>
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<tr>
<td>Made tile ash trays, dishes, tables, etc.</td>
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<td>Carved wood or soap into animals, etc.</td>
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<tr>
<td>Hammered copper trays, pictures, etc.</td>
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<tr>
<td>Done paintings, sketches, etc.</td>
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<td>Done trick, or unusual photography</td>
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<tr>
<td>Done block or textile painting</td>
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<tr>
<td>Built a scale model</td>
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<td>Draw comic cards</td>
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<td>Draw cartoons</td>
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<td>Made a college</td>
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<td>Drawn a picture or made a floor plan of a &quot;dream house&quot;</td>
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<td>3. Decorated for a party or holiday using your own ideas</td>
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<tr>
<td>Decorated a bulletin board for a class or hall</td>
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<tr>
<td>Redecorated a room or a house</td>
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<tr>
<td>Arranged furniture in a planned and tasteful way</td>
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<tr>
<td>Wrap gifts in an original way</td>
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<td>Decorate cakes or cookies</td>
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<tr>
<td>Made a center piece for a table, etc.</td>
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<td>Arranged flowers in an attractive way</td>
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<tr>
<td>Designed a costume for a party</td>
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<td>Activity</td>
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<td>Planted flowers in an attractive way</td>
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<td>Made a poster</td>
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<td>4. Refinished furniture</td>
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<tr>
<td>Made toys for a child</td>
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<tr>
<td>Made an original piece of furniture</td>
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<tr>
<td>Kept a scrapbook or notebook</td>
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<tr>
<td>Made jewelry from sea shells, beads</td>
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<tr>
<td>Assemble prefab. radio kits</td>
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<td>Mold things from plastic</td>
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<td>Make articles on a metal lathe</td>
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<td>Worked with guns (e.g. turn barrel down, install gun sites, etc.)</td>
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<td>Done fancy lettering</td>
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<tr>
<td>Upholster furniture, make drapes, or make curtains</td>
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<tr>
<td>Make vases, wall decorations, etc. from egg shells, plastic, or other materials</td>
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<td>Done copper enameling</td>
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<td>Make candles</td>
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<td>Done origami or nomkiri</td>
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<td>Done woodburning</td>
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<td>Done plaster casting</td>
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<tr>
<td>Created decorative designs for leather or metal tooling or other purposes</td>
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<tr>
<td>Made rag dolls or stuffed toys</td>
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<tr>
<td>Activity</td>
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<tr>
<td>Made a piece of needle work</td>
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<td>Made a dress, hat, shirt, etc.</td>
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<tr>
<td>Improvised or made up recipes</td>
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<tr>
<td>Designed a dress</td>
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<tr>
<td>Made an electric motor</td>
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<tr>
<td>Grew crystals</td>
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<td>5. Written music</td>
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<tr>
<td>Picked out an original tune on some instrument</td>
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<tr>
<td>Made a musical instrument out of bamboo, etc.</td>
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<td>6. Planned an experiment or research (not assigned)</td>
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<tr>
<td>Grafted a plant or rooted one from a cutting</td>
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<tr>
<td>Cross bred different strains of plants</td>
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<td>7. Organized a trip or tour</td>
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<tr>
<td>Created new hair-dos</td>
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<tr>
<td>Solved a problem dealing with a hobby such as a design or special tool</td>
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<tr>
<td>Fixed toys with materials at hand</td>
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<td>Originated an organized game</td>
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<tr>
<td>Repaired broken equipment with some material not originally meant for that purpose</td>
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<tr>
<td>Offered a suggestion in a problem discussion in a church, club or class</td>
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<tr>
<td>Helped another person to adopt new ways in dress or grooming</td>
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<tr>
<td>Helped another person figure out a solution to a personal problem</td>
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<tr>
<td>Figured out a new play in a game or sport</td>
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<td>Figured out a way to repair a car, lawn mower, boat, etc.</td>
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<tr>
<td>Figured out a way to overcome an obstacle on a camping trip, vacation, party, etc.</td>
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<tr>
<td>Offered a way out of embarrassment in an awkward social situation</td>
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<tr>
<td>Suggested a course of action in an accident</td>
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<tr>
<td>Organized, or helped to organize, a club</td>
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AC TEST OF CREATIVE ABILITY
(Form A)

Please fill in:
Name ____________________________
Age ________ Sex ________ Date ______
Occupation ________________________

Directions:

On the inside pages there are 5 parts of a test of creative ability. You will take the test one part at a time beginning when the examiner gives the signal and stopping when the examiner says "Stop"! The length of time allowed will be found at the top of the page where that part of the test begins. Pace yourself so that you have enough time to try all of the problems in each part. Do not spend all of your time on one or two problems.

If you should be writing when the signal to stop is given, time will be allowed for you to complete the item upon which you are working.

DO NOT TURN THIS PAGE UNTIL YOU GET THE SIGNAL

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PART I - 20 MINUTES

Below are listed five situations, some of which are usual occurrences and others not so common. After each situation, please indicate as many possible consequences as you can. You can supply any information or details that you wish. In other words, you are to think of all the things that might happen as a result of the situation.

A. Two men, their arms loaded with packages, are approaching each other along two sides of a building. The sidewalk is icy and it is certain that the men will bump into each other at the corner of the building.

1. .................................................. 8. ..................................................
2. .................................................. 9. ..................................................
3. .................................................. 10. ............................................... 
4. .................................................. 11. ............................................... 
5. .................................................. 12. ............................................... 
6. .................................................. 13. ............................................... 
7. .................................................. 14. ............................................... 

B. In a large industrial plant the addressograph machines which are normally used to address paychecks broke down on a Thursday. Paychecks were to be issued on Friday. It becomes obvious that no checks can be issued on the regular pay day.

1. .................................................. 8. ..................................................
2. .................................................. 9. ..................................................
3. .................................................. 10. ............................................... 
4. .................................................. 11. ............................................... 
5. .................................................. 12. ............................................... 
6. .................................................. 13. ............................................... 
7. .................................................. 14. ...............................................
C. Late at night a small fire breaks out in one of the closets of a man's house. While the damage is not severe, all of his clothes are destroyed. It is certain that he cannot obtain any clothing until the next day.

D. In a final assembly department normally employing sixteen women inspectors, only seven came to work on a given day. The job is sufficiently complex that no replacements can be obtained for that day.

E. At a large drawbridge over a navigation channel, two small boys have tampered with the electrical system which lowers a traffic gate prior to the raising of the bridge. A ship is approaching the drawbridge, traffic is heavy on the bridge. It is apparent that the bridge tender will raise the bridge not knowing that the warning system is out of order.
PART II - 10 MINUTES

Below are listed a number of statements which you are to assume are true. Give as many reasons or explanations as you can to explain the truth of these statements.

A. Students who suffer from allergies (hay fever, asthma, etc.) generally rate five to ten percent higher in intelligence tests than non-allergic students.

1. _____________________________________________________________
2. _____________________________________________________________
3. _____________________________________________________________
4. _____________________________________________________________
5. _____________________________________________________________
6. _____________________________________________________________
7. _____________________________________________________________

B. April is the month of the fewest accidents of all kinds in the U.S.

1. _____________________________________________________________
2. _____________________________________________________________
3. _____________________________________________________________
4. _____________________________________________________________
5. _____________________________________________________________
6. _____________________________________________________________
7. _____________________________________________________________
C. There is a significantly smaller percentage of fat men in jail than any other physical type.
1. 
2. 
3. 
4. 
5. 
6. 
7. 

D. There is a larger percentage of suicides on very bright days than on gloomy or cloudy days.
1. 
2. 
3. 
4. 
5. 
6. 
7. 

E. Great quantities of antlers are shed each year by members of the deer family, but few such antlers are ever seen or found.
1. 
2. 
3. 
4. 
5. 
6. 
7.
PART III - 15 MINUTES

Below are listed a number of common machines or appliances. Please list after each one all the things that you think are wrong with them or could be improved over the existing designs.

A. Automatic Toaster

1. ____________________________
2. ____________________________
3. ____________________________
4. ____________________________
5. ____________________________
6. ____________________________
7. ____________________________
8. ____________________________
9. ____________________________
10. ____________________________
11. ____________________________
12. ____________________________
13. ____________________________
14. ____________________________

B. Lawn Mower (Not motor driven)

1. ____________________________
2. ____________________________
3. ____________________________
4. ____________________________
5. ____________________________
6. ____________________________
7. ____________________________
8. ____________________________
9. ____________________________
10. ____________________________
11. ____________________________
12. ____________________________
13. ____________________________
14. ____________________________
C. Gas Furnace

1. ____________________________ 8. ____________________________
2. ____________________________ 9. ____________________________
3. ____________________________ 10. ____________________________
4. ____________________________ 11. ____________________________
5. ____________________________ 12. ____________________________
6. ____________________________ 13. ____________________________
7. ____________________________ 14. ____________________________

D. Electric Razor

1. ____________________________ 8. ____________________________
2. ____________________________ 9. ____________________________
3. ____________________________ 10. ____________________________
4. ____________________________ 11. ____________________________
5. ____________________________ 12. ____________________________
6. ____________________________ 13. ____________________________
7. ____________________________ 14. ____________________________

E. Electric Refrigerator

1. ____________________________ 8. ____________________________
2. ____________________________ 9. ____________________________
3. ____________________________ 10. ____________________________
4. ____________________________ 11. ____________________________
5. ____________________________ 12. ____________________________
6. ____________________________ 13. ____________________________
7. ____________________________ 14. ____________________________
Below are listed a number of problem situations. For each set there are a number of possible solutions. You are asked to give the solution that is both least expensive and least time consuming. You can assume the availability of any kind of special materials that you may need in solving these problems.

1. The Air Force had established an advanced Air Base on an island in the Atlantic Ocean. Aviation fuel was supplied to this Air Base by means of Navy Tankers. Because there were no harbor facilities it was necessary to transfer the fuel from the tankers to shore by means of an off-shore pipe line. The base of this pipe line was anchored on the ocean floor approximately four miles from shore and at a depth of 200 feet.

   During the height of a storm the portion of this line protruding from the water was broken. After the storm had subsided, the end of the pipe line could not be found. Divers were sent down in the general area and were unable to locate the pipe line. Efforts to trace the line out from the shore failed. What method would you use to locate the end of the submerged line?

2. A painter was commissioned to redecorate the interior of a large church. The church was quite old and all blueprints and dimensions had been lost. There were numerous irregularities in the height of the ceiling.

   The painter was faced with the problem of determining exactly the various height dimensions at several points in the church. He has to know exactly the size and height of his scaffolds. To get these dimensions by use of ladders at various places seemed to him to be too expensive and time consuming. What method would you suggest for determining these dimensions quickly and accurately? (The painter had no knowledge of mathematics.)
3. In a large three-story house, a woman was cleaning a third story room. The electricity in this room suddenly went off due to a faulty fuse. The fuse box was located in the basement and it contained fourteen fuses for various parts of the house. The woman had no way of knowing which fuse was bad.

Her problem was to find the bad fuse, that is, the fuse governing the circuit in that room. She did not want to replace each fuse one at a time and make a number of trips up and down the stairs to determine if the power was on. Remembering that she could not visually spot the bad fuse, what method could she use to find it without having to make numerous trips up and down stairs?

4. In remodeling an old home, the plasterers somehow completely covered the metal electrical outlets. There were no blueprints available to show the number of these outlets or their location in the room.

Without tearing out the walls at random to find these, what would be a quick way to determine the exact location and number of these outlets?

5. A city's water supply was suddenly partially cut off. After thorough checks it became clear that the pipeline some six miles long from the reservoir to the city pumping station is blocked. All efforts failed to clear the pipe.

It became obvious that the exact location of the block must be found and this section of pipe dug up and cleared. There was no map or diagram showing the route of the pipe underground. How can this blocked section be located quickly without digging up the whole pipeline?
Below are listed several common objects. You are to list all the possible uses to which these objects might be put (both uses that you have seen and uses that you can imagine).

A. A rubber tire

1. ___________________________  9. ___________________________

2. ___________________________  10. ___________________________

3. ___________________________  11. ___________________________

4. ___________________________  12. ___________________________

5. ___________________________  13. ___________________________

6. ___________________________  14. ___________________________

7. ___________________________  15. ___________________________

8. ___________________________  16. ___________________________

B. A red brick

1. ___________________________  9. ___________________________

2. ___________________________  10. ___________________________

3. ___________________________  11. ___________________________

4. ___________________________  12. ___________________________

5. ___________________________  13. ___________________________

6. ___________________________  14. ___________________________

7. ___________________________  15. ___________________________

8. ___________________________  16. ___________________________
C. A wooden ruler

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D. A hammer

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E. A wire coat hanger

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Sum IQ, IIQ, VQ* S. Scores
BIBLIOGRAPHY

Books


Articles


Manuals