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A COMPARISON OF MEDNICK'S REMOTE ASSOCIATES TEST
AND PETTIGREW'S CATEGORY-WIDTH TEST

by

John W. Sesney

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Psychology

Approved:

UTAH STATE UNIVERSITY
Logan, Utah

1968

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May I take this opportunity to thank those who have contributed notably to the completion of this study. I am especially grateful to Dr. Arden Frandsen for his counseling and timely advice; to Dr. David Stone and Dr. Glendon Casto for their consultation and encouragement; to Mr. Ian Griggs and Dr. Michael Uhes for their support and assistance and to Helen Heaps for her typing and correction.

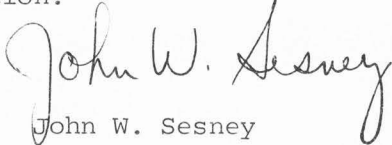

John W. Sesney

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ABSTRACT

A Comparison of Mednick's Remote Associates Test
and Pettigrew's Category-Width Test

by

John W. Sesney, Master of Science

Utah State University, 1968

Major Professor: Dr. Arden Frandsen
Department: Psychology

The present study was designed to examine the relationship between Mednick's Remote Associates Test and Pettigrew's Category-Width Test. The sample was made up of 36 educational psychology students enrolled in the Utah State Summer School.

The correlation for males and females was made independently. Although the males showed a higher correlation between the two tests than did the females (males, .296 and females, .058), the correlations were not statistically significant.

No full explanation was given for the lack of correlation between the category-width scores and the RAT scores except for the qualification that the RAT may be measuring a different type of creativity than what the category-width test is measuring.

(28 pages)

INTRODUCTION

Recently, there has been an increasing amount of research on the properties and dimensions of creativity. To facilitate the identification of "gifted" individuals, creativity tests have been devised to measure different abilities than what have been originally thought were needed to choose the "gifted;" namely, intelligence or achievement testing. These creativity tests attempt to sample inventive abilities of a subject. Although there are many types of creativity tests, almost all have certain elements that are thought to constitute creativity. These abilities are characterized as unusual answers to different problems and are measured in similar ways.

A brief description of some of the most influential creative batteries follows. Torrance's Minnesota Tests of Creative Thinking contains such verbal parts as: (1) Ask and Guess--ask as many questions about a picture and guess as many possible causes as you can. (2) Product Improvement--list clever and unusual ways of improving a toy or product. (3) Unusual Uses--list as many unusual uses for a cardboard box as you can. (4) Unusual Questions--ask many questions concerning a topic. (5) Just Suppose--an improbable situation is presented and the subject is to imagine what the consequences might be. What if clouds had strings that hung down to earth?

There are also performance parts: (1) Picture Completion--a piece of colored paper is presented and the subject is told to make some unusual picture with it. (2) Incomplete Figures--a few incomplete figures are

given and the subject is told to complete an unusual figure. (3) Parallel Lines--sets of parallel lines are given and the subject is told to make an interesting picture.

The parts of the battery are scored by the following criteria:

- (1) Fluency--the number of relevant offered responses.
- (2) Flexibility--the number of spontaneous shifts from one category of meaning to another.
- (3) Originality--the relative infrequency of the responses offered.

For a slightly different interpretation, we turn to Guilford who has identified many different types of thinking by careful testing and factor analysis. He found that fluency, flexibility, and originality factors were closely associated with creativity and that all these factors came under the heading of "divergent thinking," which Guilford describes as "the kind that goes off in different direction." There are certain tests that Guilford has created that are heavily loaded with these factors that are associated with creativity. A sample of these tests are as follows.

Word fluency requires the subject to write words containing a given letter. The score is the total number of acceptable responses written in the time allowed. Ideational fluency requires a subject to name things that belong to a certain class. Association fluency is the ability to provide words similar in meaning to a given word.

Flexibility tests require the subject to change drastically from one item to the next, such as, finding concealed parts in a complex picture. Spontaneous flexibility is said to measure the avoidance of repeating one's self.

Originality is the ability to give unconventional, clever, or remotely associated responses to test items. An example of this type of test is giving remote consequences to events or providing "punch lines" to cartoons.

Elaboration requires a subject to complete a task or add objects until a problem is solved. The common denominator of all these tests is the ability to change the direction of thinking and reject common responses so as to become more open and cognizant of a number of responses.

Mednick (1962) offers the following theory of creativity. A creative person has access to a greater number of associations to a stimulus than the less creative person. He proposes that a person with a great number of associations has a much better chance of reaching a creative solution than one who has few associations. Mednick has constructed a test, the Remote Associates Test (RAT) which measures this phenomenon.

Pettigrew (1958) has found that when Ss are asked to estimate the extremes of a number of diverse categories--from length of whales to annual rainfall in Washington, D. C.--they evidence a significant tendency to be consistent in their category-widths relative to the total sample. Pettigrew followed by devising a category-width test that purports to distinguish between people who view items in a broad fashion and people who view items in a more narrow fashion. It was not noted as a measure of creativity but it seems to have a similarity to Mednick's theory of creativity. Because of these similar definitions, the two variables might be related. The dimension of category-width seems to be a consistent phenomenon and possibly could be related to a creativity measure. It would seem plausible that a person who consistently viewed categories in

such a broad manner would also entertain many more potential associations in those categories.

Purpose of the present study

The purpose of this study is to examine the relationship between Pettigrew's Category-Width and Mednick's Remote Associates Test.

REVIEW OF LITERATURE

Mednick's RAT

One of the most important facets of an associative basis for creativity is the tendency for the creative person to give many different responses for one stimulus and for the less creative to give one popular response to the stimulus followed by less common responses. Mednick explains this by an associative hierarchy which shows how responses are distributed. If a person is given a stimulus such as, "chair," and is asked to make an associative response, the individual who answers, with the dominant response, "table," is said to have an associative hierarchy with a steep slope. After giving a dominant, conventional response the individual's associative strength to other words or ideas drops steeply. On the other hand, one who has a response that is not overly dominant has the potentiality of being able to get less probable and more remote kinds of associations and hence has a flat associative hierarchy.

Mednick says that the creative person should be characterized by less stereotyped answers and the less creative by more common responses. This concept is supported by a study by Mednick, Gough, and Woodworth (1958). Research scientists rated for creativity were divided into relatively high (n = 15) and relatively low (n = 15) groups. The low creative group gave more stereotyped responses on 80 percent of a group of 36 test words from the Kent-Rosanoff Word Association norms. This research led to the development of the Remote Association Test in which a testee is asked to perform creatively by forming associative elements into new combinations by providing mediating connective links.

The subject is provided stimulus elements from mutual remote associative clusters and told to find a criteria-meeting link to combine them. One example might be: Example 1: rat blue cottage

The subject is required to find a fourth word which could serve as a specific kind of associative connective link between these disparate words. The answer to Example 1 is "cheese." "Cheese" is a word which is present in the word pairs "rat-cheese," "blue-cheese," and "cottage-cheese." There are 30 such items; the subject is allowed 40 minutes, his score is the number right.

In comparisons with other criteria, an earlier form of the RAT was administered to architectural students at the University of California at Berkeley and correlated with ratings of creativity by faculty members who had been working with these students at least a year. The ratings and the RAT scores correlated significantly ($r = .70$, $df = 19$, $p < .01$). The ratings showed a very low relationship to the Terman Concept Mastery Test scores as well as to grade point averages. The RAT was also compared with ratings of creativity by faculty research supervisors of graduate psychology students at the University of Michigan and Northwestern University. A creative rating scale (CRS) measuring research creativity with high internal reliability of .93 was found to correlate .55 ($p < .005$) with the RAT, while correlations between RAT scores and the Miller Analogies Test scores and grade point averages were .41 and $-.11$, respectively.

In other studies, Andrews (1962) found that the number of contract proposals written by research scientists was related to RAT performance ($r = .29$; $p < .05$). Dodd (1962) also found a significant correlation ($r = .44$; $p < .05$) between RAT scores and number of suggestion awards won

at various IBM installations. These findings were supported by Gorden (1966), who stated that scores by scientists were related to the number of proposals written ($p < .001$) and number of contracts won ($p < .05$).

Mednick reports other studies concerning associative measures: Craig and Manis (1960) found that when the RAT (as a criterion of creativity) was administered to 38 college students along with an associative task in which the subjects were given one minute to write as many associations as possible to each of 20 words, the correlation obtained between the number of associations made by the students and their RAT scores was .38 ($p < .01$).

There are other studies that have found significant correlations using RAT scores and anagrams (the change of one word or phrase into another by the transposition of its letters) Karp (1960), Higgins (1966), and Kowalski (1960).

The RAT has been negatively correlated with grades in a few studies. In a sample of highly creative practicing architects, RAT scores correlated $-.34$ with their self-reports of college grades. In a group of engineering students RAT scores and grade point average correlated $-.27$. For a group of psychology graduate students, grade point average and the RAT correlated $-.11$. Generally, the relationship of creativity as measured by the RAT and standard measures of intelligence with high verbal content has been close to $.40$ in most studies.

Mednick stated that in a variety of studies that attempted to relate scores on the RAT to personality measures, the most reasonable conclusion appears to be that there are no specific personality characteristics associated with creative potential as measured by the RAT. The major

exception to this general statement concerns the tendency of high RAT scorers to evidence independence, autonomy, and nonconformity in some cases.

Pettigrew's Category-Width

In developing a paper pencil test to measure category-width Pettigrew was trying to replicate what Bruner and Rodrigues (1956) had found in the laboratory--that Ss reveal marked individual consistency in the range or width of their cognitive categories. Pettigrew found that when Ss were told an average of some diverse occurrence and asked to state what the least amount of this occurrence might be, the Ss were significantly consistent in the breadth of their estimates. An example would be:

1. It has been estimated that the average width of windows is 34 inches. What do you think?
 - a. Is the width of the widest window:

(1) 1,363 inches (3)	(3) 48 inches (0)
(2) 341 inches (2)	(4) 81 inches (1)
 - b. Is the width of the narrowest window:

(1) 3 inches (2)	(3) 11 inches (1)
(2) 18 inches (0)	(4) 1 inch (3)

The largest figure under widest window is No. 1 (1,363) which receives a (3) score because it is the extreme of the category, thus, broader. The same is true for the "b" part No. 4 (1 inch) which is also an extreme. There are 20 items to the test, scores "a" and "b" are added together for total scores. The higher the score, the broader the category-width.

To obtain criterion validity Pettigrew performed the following experiment:

Twenty-six undergraduates were tested on five categories such as, estimates of the weight of ostrich eggs with fixed set of weights or the pitch extremes of women's singing voices and factory whistles from fixed alternatives generated by an audio-oscillator. Rankings of the Ss according to their range estimates across these five categories proved to be significantly consistent. Kendall's $W = .334$ $p < .02$. The Ss were later administered C-W scales. Of the 20 C-W items, 19 correctly discriminated between the criterion's broad and narrow widths. The rank order correlation between the total C-W scale and the total criterion ranking was $.57$ ($p < .01$). (Pettigrew, 1958)

Rokeach (1956) found that comprehensive categorizers, as measured by his "narrow-minded" task, scored significantly higher ($p < .05$), than narrow and isolated categorizers taken together. Tresselt and Mayzner (1955) found the "self concept span" (the number of adjectives checked as self-descriptive) using the Gough Adjective Check list correlated $.30$ ($p < .01$) with category width. Tresselt and Mayzner (1959) also found that Ss were consistent in categorizing verbal stimuli using two different judgmental techniques.

Pettigrew found that C-W had a significant, though low, correlation of $.17$ with total ACE scores, which was chiefly due to a higher correlation of $.26$ between C-W and the ACE Quantitative Score. He also found a difference between sexes; males tended to have significantly broader C-W than females ($p < .001$). Wallach and Caron have also found sex differences using a children's form of C-W among sixth-graders.

Pettigrew points out that the intensive use of numbers and the particular choice of categories may lead the quantitatively gifted and males to scoring higher. Alternatively, however, these relationships may indicate that highly quantitative people and males do tend to be more broadly tuned to their environment. As suggested by Wheeler's interesting work (1956), individuals with developed mathematical skills may achieve

an uniquely broad sense of category variance. Males, too, may be more reinforced than females in our culture for wide category ranges.

Although sex differences on the C-W test have been found, there are different interpretations as to why these occur. Wallach and Kagan offer one explanation. The issues with which the items deal, involving as they do estimations of quantities, magnitudes, and rates, are ones that possess less familiarity for women than for men. With low confidence as a general baseline for the females' category-width judgments, then, we find that broader categorizing is carried out by the less confident females. This inverse direction of the category-width confidence relationship suggests that broader categorizing may be reflecting a desire for reduction of uncertainty. Individuals of lower confidence opt for errors of inclusions on the Pettigrew test, and also bias their probability judgments toward greater extremity on the extremity confidence instruments. In the former case, we find that a desire for certainty favors an inclusion rather than an exclusion bias. On intuitive grounds, we may reason that an ideal way of reducing uncertainty is to make sure that every conceivable member of the category has been included. We may conclude, therefore, that the Pettigrew test taps somewhat different dimensions in the sexes-- more strictly cognitive in males, more motivational in females.

This explanation is contrary to what would be normally expected, i.e., one who uses broad categories has the "courage" to be wrong if he includes too much. Whatever the underlying reason may be; the question might be asked, "Does the broad categorizer score higher on a test such as the RAT?"

It seems that if the category-width test consistently measures differences between broad categorizers and narrow categorizers, it might also differentiate between one who has a great number of associations versus one who has a lesser number of associations. If there are a great number of associations within these broad categories, it seems likely that a person might arrive at some unusual associations according to Mednick.

HYPOTHESIS

1. There will be a positive correlation between RAT scores and people having broad category-widths.
2. Males will have broader category-widths than females.

PROCEDURE

The Remote Associations Test and Pettigrew's Category-Width Test were administered to 36 (22 females, 14 males) educational psychology students enrolled in the summer school session at Utah State University. The standard administration was performed as stated in the manuals.

RESULTS

The correlation of the RAT scores and Pettigrew's Category-Width test is presented in Table 1.

Table 1. Pearson product-moment correlation of the Remote Associates Test and Pettigrew's Category-Width Test

Test	N	Mean	Standard deviation	Range	Correlation
Category-Width	36	63.7	14.7	27-93	r = .014
RAT	36	15.0	4.4	3-23	

The correlation of .014 was not sufficient for suspecting a relationship between RAT scores and C-W scores.

An F test was computed to find the significance between sexes on the Category-Width test and is reported in Table 2.

Because of this highly significant F ratio, the sexes were correlated independently on category-width scores and RAT scores. These data are presented in Table 3.

Although the males showed a higher correlation between RAT scores and C-W scores than females, the difference was not statistically significant.

The split-half reliability of both the Category-Width Test and the RAT Test was .85.

Table 2. The differences in sex on the RAT and the Category-Width

Sex	N	Mean	Standard deviation	Range	Difference
Females	22	60.2	14.9	27-93	F = 12.6
Males	14	69.0	4.4	50-86	

Table 3. A Pearson product-moment correlation of RAT scores and C-W scores as expressed by males and females

Sex	Correlation
Females	.058
Males	.296

DISCUSSION

There appears to be no confirmation of the hypothesis that broad categorizers have significantly higher RAT scores. However, these findings seem to give support to the hypothesis that males exhibit broader category-width estimates. When the sexes are isolated and compared to the RAT, the males show a positive trend toward correlation, but it is not significant. Yahav (1966) offers an interesting point in reporting on the RAT. He says, ". . . that there may be a crucial difference between 'free association' and 'goal directed association' in terms of motivation and its related consequences." Although this point is not elaborated upon, it seems to this writer that "goal directed association" is exactly what the RAT measures; the process of entertaining a wide range of associations followed by a condensation of ideas that leads to one mediating link or answer. The "free associations" might be brought about in the same manner, but are not culminated by one response; rather they remain fluid or undifferentiated until produced in a divergent manner. Perhaps, category-width would be correlated with another creativity measure that is not as restrictive as the RAT.

SUMMARY

The present study was designed to examine the relationship between Mednick's Remote Associates Test and Pettigrew's Category-Width Test. The Ss were 36 educational psychology students enrolled in the Utah State Summer School. The hypothesis that broad categorizers would score higher on the RAT was rejected when the Pearson product-moment correlation was found to be .014. The hypothesis that males would have broader category-width than females was accepted when a highly significant F ratio of 12.6 was found. The correlation for males and females was then made independently. Although the males showed a higher correlation between the two tests than did the females, the correlations of .296 for males and .058 for females, were not statistically significant.

No full explanation was given for the lack of correlation between the category-width scores and the RAT scores except for the qualification that the RAT may be measuring a different type of creativity than what the category-width test is measuring.

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APPENDIX

ESTIMATION QUESTIONNAIRE

1. It has been estimated that the average width of windows is 34 inches. What do you think:
 - a. is the width of the widest window . . .

1. 1,363 inches	3. 48 inches
2. 341 inches	4. 81 inches
 - b. is the width of the narrowest window . . .

1. 3 inches	3. 11 inches
2. 18 inches	4. 1 inch

2. Ornithologists tell us that the best guess of the average speed of birds in flight would be about 17 m.p.h. What do you think:
 - a. is the speed in flight of the fastest bird . . .

1. 25 m.p.h.	3. 73 m.p.h.
2. 105 m.p.h.	4. 34 m.p.h.
 - b. is the speed in flight of the slowest bird . . .

1. 10 m.p.h.	3. 12 m.p.h.
2. 2 m.p.h.	4. 5 m.p.h.

3. The average length of whales in the Atlantic Ocean has been estimated by zoologists to be roughly 65 feet. What do you think:
 - a. is the length of the longest whale in the Atlantic Ocean . . .

1. 120 ft.	3. 86 ft.
2. 190 ft.	4. 75 ft.
 - b. is the length of the shortest whale in the Atlantic Ocean . . .

1. 6 ft.	3. 52 ft.
2. 43 ft.	4. 21 ft.

4. Shipping authorities have calculated that the average weight of merchant ships registered with the U. S. Maritime Commission in 1946 was 5,705 tons. What do you think:
 - a. is the weight of the heaviest ship registered with the commission .

1. 10,500 tons	3. 23,000 tons
2. 62,000 tons	4. 7,500 tons
 - b. is the weight of the lightest ship registered with the commission .

1. 3,900 tons	3. 2,700 tons
2. 1,100 tons	4. 2 tons

5. Weather officials report that during this century Washington, D. C. has received an average rainfall of 41.1 inches annually. What do you think:
 - a. is the largest amount of rain that Washington has received in a single year during this century . . .

1. 32.4 inches	3. 63.7 inches
2. 45.8 inches	4. 51.2 inches
 - b. is the smallest amount of rain that Washington has received in a single year during this century . . .

1. 20.2 inches	3. 9.9 inches
2. 36.3 inches	4. 29.7 inches

6. An average of 58 ships entered or left New York harbor daily during the period from 1950 through 1955. What do you think:
- was the largest number of ships to enter or leave New York in a single day during this period . . .
 - 69 ships
 - 153 ships
 - 76 ships
 - 102 ships
 - was the smallest number of ships to enter or leave New York in a single day during this period . . .
 - 34 ships
 - 3 ships
 - 16 ships
 - 43 ships
7. For the past twenty years, Alaska's population has increased an average 3,210 people per year. What do you think:
- was the greatest increase in Alaska's population in a single year during these twenty years . . .
 - 6,300
 - 21,500
 - 3,900
 - 4,800
 - was the smallest increase in Alaska's population in a single year during these twenty years . . .
 - 470
 - 1,960
 - 980
 - 2,520
8. Boating experts estimate that the average speed of all sailing craft in America is around 4.1 knots. What do you think:
- is the speed of the fastest sailing boat in America . . .
 - 8.2 knots
 - 30.7 knots
 - 5.9 knots
 - 21.3 knots
 - is the speed of the slowest sailing boat in America . . .
 - 3.3 knots
 - 0.6 knots
 - 2.2 knots
 - 1.2 knots
9. Book review editors guess that around 300 new American novels have appeared annually since World War II. What do you think:
- is the largest number of novels to be published in America in a single year during this period . . .
 - 380 novels
 - 495 novels
 - 870 novels
 - 620 novels
 - is the smallest number of novels to be published in America in a single year during this period . . .
 - 145 novels
 - 205 novels
 - 90 novels
 - 260 novels
10. Between 1900 and 1940 there was an average of 48 lynchings per year in the United States. What do you think:
- was the largest number of lynchings in any one year during this period in the United States . . .
 - 79
 - 63
 - 53
 - 135
 - was the smallest number of lynchings in any one year during this period in the United States . . .
 - 1
 - 11
 - 33
 - 19

11. It has been calculated that the average time for all trains in 1953 from New York City to Washington, D. C. was 285 minutes (4 hours and 45 minutes). What do you think:
- was the time of the slowest train from New York City to Washington in 1953 . . .
 - 337 min.
 - 304 min.
 - 396 min.
 - 483 min.
 - was the time of the fastest train from New York City to Washington in 1953 . . .
 - 236 min.
 - 202 min.
 - 268 min.
 - 145 min.
12. The average number of births in the world per day during 1955 has been computed to be 27,440. What do you think:
- was the largest number of births in the world in any one day during 1955 . . .
 - 36,501
 - 28,207
 - 49,876
 - 30,023
 - was the smallest number of births in the world in any one day during 1955 . . .
 - 26,340
 - 24,725
 - 14,330
 - 19,704
13. When all of the world's written languages are considered, linguists tell us that the average number of verbs per language must be somewhere around 15,000. What do you think:
- is the largest number of verbs in any single language . . .
 - 21,000
 - 18,000
 - 50,000
 - 30,000
 - is the smallest number of verbs in any single language . . .
 - 1,000
 - 13,000
 - 5,000
 - 10,000
14. The average muzzle to tail length of a sample of 1,000 German Shepherd dogs is 40.3 in. What do you think:
- is the length of the longest Shepherd dog in the sample . . .
 - 60.4 inches
 - 47.8 inches
 - 44.1 inches
 - 54.2 inches
 - is the length of the shortest Shepherd dog in the sample . . .
 - 34.6 inches
 - 28.4 inches
 - 19.7 inches
 - 36.9 inches
15. The average population of South American countries is approximately 8.6 million people each. What do you think:
- is the population of the most populated country in South America . . .
 - 11.2 million
 - 54.7 million
 - 23.6 million
 - 129.1 million
 - is the population of the least populated country in South America . . .
 - 7,000
 - 6.2 million
 - 2.4 million
 - 29,000

16. A Stanford University home economist has estimated that the average American spends around 55 minutes of his day eating. What do you think:
- a. is the longest eating time of any single American . . .
 1. 185 minutes
 2. 125 minutes
 3. 245 minutes
 4. 90 minutes
 - b. is the shortest eating time of any single American . . .
 1. 16 minutes
 2. 4 minutes
 3. 38 minutes
 4. 27 minutes
17. In 1946 the average number of births per state was 68,000. What do you think:
- a. was the highest number of births in a single state . . .
 1. 87,000
 2. 122,000
 3. 71,000
 4. 254,000
 - b. was the lowest number of births in a single state . . .
 1. 29,000
 2. 53,000
 3. 14,000
 4. 900
18. Immediately after World War II, the average number of submarines owned by the largest seven navies in the world was 58. What do you think:
- a. was the largest number of submarines owned by one of these navies . . .
 1. 159
 2. 91
 3. 118
 4. 69
 - b. was the smallest number of submarines owned by one of these navies . . .
 1. 22
 2. 9
 3. 36
 4. 47
19. The average number of churches per religious denomination in the United States is estimated to be 511. What do you think:
- a. is the largest number of churches of a single religious denomination in the U.S.A. . . .
 1. 4,833
 2. 757
 3. 1,219
 4. 39,801
 - b. is the smallest number of churches of a single religious denomination in the U.S.A. . . .
 1. 313
 2. 146
 3. 1
 4. 23
20. In the years 1916 through 1946, according to the U. S. Weather Bureau, there was an average of 140 tornadoes a year in the United States. What do you think:
- a. was the largest number of tornadoes in a single year in the United States during this period . . .
 1. 154
 2. 243
 3. 312
 4. 197
 - b. was the smallest number of tornadoes in a single year in the United States during this period . . .
 1. 103
 2. 122
 3. 61
 4. 28