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A Preliminary Investigation into the Occupational Significance of the Contrast Response to a Free-Association Test

Earl McIntosh

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**A PRELIMINARY INVESTIGATION INTO THE OCCUPATIONAL
SIGNIFICANCE OF THE CONTRAST RESPONSE
TO A FREE-ASSOCIATION TEST**

A Thesis

**Submitted to the Graduate Faculty
of the University of North Dakota
in Partial Fulfillment of the
Requirements for
the degree of
Master of Science**

**by
Earl McIntosh**

July 1942

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This thesis is presented as a partial fulfillment of
the requirements for the degree of Master of Science at the
University of North Dakota.

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A PRELIMINARY INVESTIGATION INTO THE OCCUPATIONAL
SIGNIFICANCE OF THE CONTRAST RESPONSE
TO A FREE-ASSOCIATION TEST

INTRODUCTION

Origin of the Problem

The writer of this thesis became interested in the significance of the contrast response to a free-association test while working on a fellowship at the Human Engineering Laboratory in Boston, Massachusetts, during the winter of 1939-40. Here, he learned that the test used to measure objectivity and subjectivity was a free-association test scored on the basis of the number of contrasts but did not learn of any data that would validate the use of the test.

In Psychometrics, Johnson O'Connor (3), director of the Human Engineering Laboratory stated that salesmen average extremely objective in personality whereas scientists and research workers average extremely subjective. However, O'Connor is chiefly interested in the isolation of independent variables and has not yet submitted any technical report on the data upon which he basis his statement. Since such a test, if valid, would be of considerable value in vocational guidance, the present writer became interested in checking its validity.

O'Connor (3) describes the extremely objective person as "the hail-fellow-well-met, sales type, the group worker" and the opposite type, which he calls the extremely subjective person, as "the individualist, the lone worker". If these two extremes of personalities are due to comparatively constant differences in individuals and if the free-association test can be used to distinguish between the two types, the test would be of considerable value in helping young people choose between occupations requiring sales aptitude and those in which the individual works alone. Sales aptitude, as used in this thesis, shall be understood to mean the natural or acquired capacity--assuming there is such a factor--for influencing other people.

Previous Studies

In "A note on a Racial Factor in Responses in Word Association: I," H. V. Bice (1) made the observation that whites gave many contrasts and coordinates whereas negroes gave few of these and many supraordinates. No data was given, however, as to the extent or significance of the difference.

F. L. Wells (6) stated in his book Mental Tests in Clinical Practice that persons with generally rapid reaction times in the free-association test tend to respond with contrasts whenever such a response is apposite. He further writes, "In Murphy's calculations also the contrast associations correlate $-.50$, P.E. $.05$ with the egocentric category and $.36$, P.E. $.054$ with the miscellaneous group, indicating opposite mental mechanisms involved." No report by Murphy was located.

Johnson O'Connor (3), whose primary interest is in the isolation of mental elements, has done considerable work on free-association tests. He started by scoring individuals on the most common responses as determined by giving the test to a thousand persons. By repeated purifications of the test, he arrived at a list of 56 words with 70 responses that proved statistically consistent in measuring the same thing. Of these responses, 65 are, according to his definition,

contrasts. He defines contrasts as opposites, consisting of adjectives and adverbs; and coordinates, consisting of nouns and verbs that are clearly opposite in meaning or that are mutually exclusive tho belonging to the same supraordinate.

O'Connor (3) reports that he found a reliability of .86 and .81 for fifty men when the test was scored on fifteen opposites. He found a reliability of .83 and .78 for the same fifty men when the test was scored on fifteen coordinates. The correlation between the opposites and coordinates was .73 for the same population. Using the smaller reliabilities the correction for attenuation is .92, which indicates a very pronounced relationship between the two. The reliability for thirty contrasts, including both opposites and coordinates, is .90.

O'Connor (3) correlated his contrast-scored free-association test with his wiggly-block test (a test of structural visualization), with his English-vocabulary test, with his clerical-aptitude test (number checking), and with Seashore's tonal-memory test. No relationship was found with any of these tests.

The Problem

The problem of this thesis is to make a preliminary

check of the hypothesis that the contrast-scored free-association test is a measure of sales aptitude. In order to make the problem less cumbersome, it was decided to omit the middle ranges and compare the contrast-response scores made by persons whose work requires them to spend most of their time influencing other people with the scores made by workers who spend little, if any, of their time influencing others. In the first group are included salesmen, supervisors, and teachers; in the second group, research workers, janitors, bookkeepers, and clerical workers.

If there should prove to be a relationship between contrast responses and the type of occupation, it was considered possible that the contrast-response scores might correlate with extroversion or self-sufficiency. In order to find this out quickly, it was decided to administer a free-association test and the Bernreuter personality inventory to the general psychology class. Since the members of this class had already taken the Otis Self-Administering Test of Mental Ability: Higher Examination Form D, this procedure had the added advantage of providing an opportunity to correlate the contrast-response scores with this measure of intelligence.

Inasmuch as the work with the psychology class was completed first, this portion of the research will be reported in Part I of this thesis; the procedures and results of the investigation into the occupational group will be discussed in Part II.

PART I

THE RELATION OF INTELLIGENCE AND PERSONALITY TO THE CONTRAST RESPONSE

The Procedure

The first step was to select the words for the proposed free-association tests. In order to make the tests simple with few distracting influences, the selections with some exceptions were based on the following rules:

- 1) Select common words every testee might be expected to be familiar with in order to lessen the possibility of failure to respond. As a practical means of doing this the words were picked from the 3,000 most common words listed by Thorndike (5).
- 2) Omit names of places and persons, such as Adam, Eve, Albany, and Alice, as it would seem that there would be greater likelihood that some persons would have special associations with words of this type.
- 3) Omit literary terms, such as affrighted and beheld, which are not commonly used in conversation.
- 4) Avoid loading the test with purely abstract terms. Select a preponderance of concrete expressions.

5) In selecting words to which contrast responses are expected, avoid terms whose opposite or contrasting coordinate is uncommon. This principal was adopted so as to eliminate as much as possible the probability that testees wouldn't be familiar with the contrast response.

6) Avoid words, such as abhor and blood, that might have such strong unpleasant and embarrassing associations as to produce a mental set that would influence subsequent responses.

7) Avoid homographs, homonyms, and words that might sound like other common words. For this reason fair, bear, hedge, and many others were omitted.

8) Avoid articles, prepositions, interjections, and numbers. An exception to this rule was the inclusion of "from" in Form A.

Two lists (Form A and Form B) of a hundred items each were then picked from this group of selected words and administered to a few persons to discover as many contrast responses as possible. The responses selected as possible contrast responses for Form A were then judged as contrast or non-contrast associations by seven judges (six of them being college graduates). The responses which were deemed contrasts by six out of seven of the judges were accepted for scoring and the remainder were given to seven other judges (five college graduates and two college students) to

consider further. Responses selected as contrasts by four of the fourteen were discarded. In order to check the remaining terms, Webster's New International Dictionary (2) and Roget's Thesaurus of English Words and Phrases (4) were consulted. Words listed as antonyms by the dictionary or as ideas with antithetical signification by the thesaurus were accepted. Those still remaining were rejected. In order to have a further check, the accepted decisions of the fourteen judges were, wherever possible, compared with the dictionary and thesaurus. No disagreements were found.

The selected responses for Form B were first checked with the dictionary and the thesaurus. Most of them were accepted and rejected on this basis. The remainder were given to eleven judges (nine of them college graduates) for an opinion. The responses deemed contrasts by nine out of the eleven were accepted and the rest discarded.

Form A was administered to the general psychology class of the University of North Dakota by the instructor, Hermann F. Buegel, who before reading the words from the list gave the students the following instructions:

This afternoon I am going to give you a word-association test devised for the purpose of studying the responses to common words. For this reason we want your first response to each word. We don't want you to try to think of logical associations--try to seize on the first word that comes to you and write it down.

We would rather not have any response than not have your first reaction to a word.

The list consists of one-hundred common words which we all know. I shall read them to you one at a time. Immediately after I give a word, write your response down. Do not write the stimulus word--write only the first word you think of. If you have no reaction before the next word is spoken or if you think of some very personal response that you do not wish to write down, draw a line to indicate the omission. Do not in any case put down a second choice. Either put down what you first think of or draw a short line. Please remember to indicate all omissions by such a line so we know which response is the first, which the next, and so on.

Do you understand what is desired of you? If not, please raise your hand. (Pause.) Now remember to give the first word you think of.

Two weeks later Form B was administered after the class had been read the following instructions:

A study of the word-association test which you took two weeks ago indicates that the association of opposites is a common type of association but that the most common type for a given word varies with the word. In response to "husband" 50 out of 68 persons wrote the opposite "wife"; whereas, to the word "sorrow" only five persons gave an opposite. Some words were more frequently associated with similar ideas and some more frequently associated with contrasting ideas. In order to get more data on the frequencies of the various types of responses, it has been decided to give you another word list.

This list also contains one-hundred common words. I shall read them to you one at a time. Immediately after I give a word, write your response down. Do not write the stimulus word--write only the first word you think of. If you have no reaction or if you think of some personal experience that you do not wish to write down, draw a line to indicate the omission. Do not in any case put down a second choice. Either put down what you first think of or draw a short line. We would rather not have any response than not to have your first reaction.

Is there any one who is not ready to start?
(Pause.) Now remember to give the first word you think of.

Both tests were scored on the basis of the number of contrast responses selected by the procedure already discussed. A few unforeseen responses to scored items appeared to be contrasts. These were checked with the dictionary and the thesaurus in the same way the other terms had been. The words selected for Form A and the contrast responses counted in scoring are listed in Table I; the corresponding data for Form B, in Table II. The obtained scores of the students on these and the other tests used are recorded in Appendix A. The other tests include the Otis Self-Administering Test of Mental Ability; Higher Examination Form D and the Bernreuter Personality Inventory. The extroversion-introversion and the self-sufficiency scales of the latter were selected as they have the highest correlations with other scales and the lowest intercorrelations.

TABLE I
WORDS SELECTED FOR FREE-ASSOCIATION TEST: FORM A
AND RESPONSES SELECTED FOR SCORING

Selected Stimuli	Selected Contrast Responses
penny	
apple	
home	
book	
inside	outside
grain	
below	above, up
wish	
work	play, rest
car	
man	
month	
square	
gain	
date	
west	east
cake	
brother	sister
candle	
arm	
avenue	
high	low
king	queen
silver	
worse	better, best
pencil	
husband	wife
vacation	
hero	heroine, coward, villain
song	
dull	sharp, bright, lively, gay, smart, happy
letter	
costly	cheap, cheaply
lost	found, gain, gained, gaining
winter	summer
law	
railroad	
question	answer, reply
chief	
wrong	right, correct
tent	
front	back, rear, behind
smoke	
navy	
multiply	divide
bread	
cruel	
sign	

TABLE I--Continued

short	long, tall
beach	
arrow	
good	bad, wrong
palace	
north	south
give	take, receive, accept
sickness	health, well
chain	
head	foot, feet, tail, toes
pipe	
silk	
tame	wild
rich	poor
quarter	
club	
evening	morning, dawn
obey	
come	go
honor	
luck	
liberty	
difficult	easy
grandfather	grandmother
open	shut, close, closed
paper	
old	new, young
robin	
valley	hill, hills, mountain, mountains
big	small, little
animal	
dangerous	safe, harmless
country	city, town
dim	bright
religion	
reward	
from	to, toward
note	
echo	
enemy	friend
begin	end, stop, finish, quit, terminate
egg	
doubt	believe, know, trust, faith, sure
dollar	
sorrow	glad, happy, happiness, joy
tree	
empty	full, fill
draw	
after	before
push	pull, draw
stranger	friend, acquaintance, know, familiar
message	

TABLE II

WORDS SELECTED FOR FREE-ASSOCIATION TEST: FORM B
AND RESPONSES SELECTED FOR SCORING

Selected Stimuli	Selected Contrast Responses
box	
camp	
school	
shoe	
large	small, little
lamp	
uncle	aunt
cold	warm, hot
wheel	
hard	soft, easy
daughter	mother, son
lodge	
shallow	deep
cage	
bought	sell, sold
log	
down	up
soldier	
window	
spend	save
glove	
cry	laugh
first	
married	single, divorced
music	
most	least, less, little
sit	stand
dove	
now	then, later, never
autumn	spring
thick	thin, narrow, slim
blacksmith	
out	in
alive	dead
mouth	
hit	miss
nurse	
owl	
black	white
came	gone, went, left
borrow	
cook	
under	over, above, up
odd	even
corn	
ugly	
bitter	sweet

TABLE II--Continued

pocket	
wide	
key	
wet	dry
magic	
float	
party	
youth	
light	dark, darkness, heavy
coat	
more	less
store	
scatter	gather, collect
lion	
sad	glad, happy, joyful, cheerful, pleasant
boy	girl
ship	
fox	
smooth	rough, bumpy, irregular
fence	
day	night
walk	
hat	
dirty	clean
different	same, like, similar
oak	
ascend	descend
cat	
strong	weak, delicate, feeble
flag	
bridge	
moon	
field	
few	many, large
bottom	top
purse	
farmer	
future	
fork	
nail	
false	true, truth
job	
fail	succeed, pass, win
father	mother, son
slow	fast, swift, quick
garden	
fat	thin, slim, lean, poor, slender
honest	
follow	lead
remember	forget
lake	
early	late
nest	

Results and Interpretations

Table III summarizes the known data on the reliability of the free-association tests used in this experiment. From the split-half product-moment correlations (.947 and .957) the reliabilities of the whole tests were estimated as .973 and .978 by the Spearman-Brown prophecy formula. Since the standard errors are small, it is evident that the tests must have a high degree of consistency and accuracy in measuring something. What this something is will have to be determined by a study of its correlations with known criteria.

TABLE III
RELIABILITIES OF TWO CONTRAST-SCORED
FREE-ASSOCIATION TESTS

	Form A	Form B
Split-half correlation	.947 (S.E. .013)	.957 (S.E. .010)
Estimated reliability	.973 (S.E. .007)	.978 (S.E. .005)
Obtained intercorrelation	.71 (S.E. .06)	
Intercorrelation corrected for attenuation	.73 (S.E. .06)	

It will be noted that the obtained product-moment intercorrelation (.71) between the two tests (Form B was given two weeks after Form A) is considerably lower than the reliabilities of the test. Because of the high reliabilities of the two forms, this intercorrelation is not substantially changed when corrected for attenuation by Spearman's formula.

Assuming that the two tests are equivalent, the comparatively low intercorrelation between forms is probably due to differences in mind sets of the subjects as a result in part of unknown factors and in part to the differences in the instructions preceding the tests. Instructions for Form B were changed in order to determine whether more opposites would be given by the students when they were aware that contrasts were common responses. The mean increase was 4.1 (S.E. 1.25) and the median increase 2.8 (S.E. 1.32). This indicates that there is an increase in the number of contrast responses but it cannot be considered significant even tho the mean increase is more than three times its standard error, because it is not known that the two tests are exactly equivalent.

Table IV summarizes the product-moment correlations calculated between the free-association test and the other tests administered to the psychology class. None of the correlations are large enough to be of significance. In fact they are so small that there is extremely little likelihood that there is any important relationship. Hence, it may be assumed with a high degree of confidence that there are no major factors common to the contrast response and intelligence as measured by the Otis test, to the contrast response and self-sufficiency as measured by the Bernreuter Personality

TABLE IV
CORRELATIONS OF CONTRAST-SCORED FREE-ASSOCIATION
TESTS WITH INTELLIGENCE AND PERSONALITY TESTS

Mental Ability (Otis)	-.04 (S.E. .13)	-.17 (S.E. .13)
Introversion-Extroversion (Bernreuter)	-.12 (S.E. .13)	-.09 (S.E. .13)
Self-Sufficiency (Bernreuter)	-.07 (S.E. .13)	-.06 (S.E. .13)

Inventory, and to the contrast response and introversion-extroversion as measured by the same inventory.

As a further check for information to explain the meaning of the contrast response, the Bernreuter personality inventories for the fourteen high- and fourteen low-contrast scorers on Form A were selected. Individual items were checked for significant differences in the frequencies of "yes" and "no" answers of the two groups. The same procedure was also followed for Form B. For Form A, 12 differences were found that would occur by chance--disregarding the "?" answers of which there were comparatively few--only five or less times in 100; for Form B, 14 were found. Since there are 125 items, the probable number of such cases is 12.5 (5% at each extreme). Hence, the differences noted cannot be considered significant.

Summary

O'Connor (3) found that the contrast responses do not correlate with structural visualization, vocabulary, clerical aptitude, and tonal memory. It may now be added with reasonable assurance that they do not correlate with intelligence, self-sufficiency, and introversion-extroversion. Hence, whatever the contrast-scored free-association test measures, it doesn't include any major factor that is common to any of these abilities and aptitudes.

PART II

THE RELATION OF OCCUPATION AND WORK PREFERENCES TO THE CONTRAST RESPONSE

The Procedure

For the work with the occupational group Free-Association Test: Form A was used but with two changes. Responses to "gain" indicated that about one-third of the students thought that they had heard "game"; likewise, responses to "high" indicated that about one-sixth of the testees thought that the stimulus word was "pie". The first of these words was changed to "table"; the second to "profit". In order to keep the number of scored items the same, "loss" was counted as a contrast response to "profit" in the revised form.

The test was administered orally, the writer recording the responses, to one worker at a time but with considerable variation in testing conditions. Whenever possible it was given in a private room, but in a few cases it was given in an office full of workers, in others in a car, and in still other cases outside while sitting on some convenient object.

The introduction and instructions preceding each administration was in substance as follows:

I want to get your help on some research I am doing for my Master's thesis at the University of North Dakota. I am trying to find out whether persons in different occupations give different responses to my list of words. Hence, I am giving it to bookkeepers, teachers, salesmen, etc. The purpose of this research is to attempt to develop a test that might be of value in helping young people decide on what occupation to enter. All I want you to do is to tell me the first thing that you think of when I read a word from my list. For example, the first word is "penny". What do you think of when I say "penny"? The next word is "apple"

After the list was completed, the testee was asked the following questions:

If wages and hours and opportunities were the same, what type of work would you prefer to do? If you had to choose between selling and bookkeeping, which would you select? If your choice were between selling and research, which would you take? If between teaching and bookkeeping? If between teaching and research? If between supervisory work and bookkeeping? If between supervisory and research?

The tests were scored on the same items as when given to the psychology students with the exception noted at the beginning of this section. The papers were then separated into groups as follows:

1) Group 1, containing all workers tested, including thirty not in the classifications studied in this thesis but tested as opportunity presented itself in order to have a

more general even tho not a representative sampling of the population.

2) Group 2, containing all workers from group 1 who spend most of their time influencing other people. This group includes salesmen, supervisors, and teachers who have been working in their respective occupations for at least two years.

3) Group 3, containing all workers from group 1 who spend little, if any, of their time influencing people. This group includes research workers, janitors, bookkeepers, and clerical workers who have been working at their respective occupations for at least two years.

4) Group 4, containing all workers from group 2 who prefer their own occupations to any occupation mentioned in paragraph 3.

5) Group 5, containing workers from group 3 who prefer their own occupations to any occupation mentioned in paragraph 2.

6) Group 6, containing workers from group 2 who prefer any occupation mentioned in paragraph 2 to any occupation mentioned in paragraph 3.

7) Group 7, containing workers from group 3 who prefer any occupation mentioned in paragraph 3 to any occupation mentioned in paragraph 2.

The frequencies of the contrast responses for each of these groups are recorded in Table V. The medians and their

standard errors have been added to the same table. Since the frequencies do not appear to form a normal curve, the general formula (S.E. Mdn = $\frac{1.7}{\sqrt{N}}$) which does not assume normality was used for calculating the standard error of the median.

Casual Observations

In administering the tests the writer observed that those who respond most quickly and with least evidence of introspection give the most contrasts. Evidences of introspection noted are: (1) Questions by testee as to whether he is giving correct answers, (2) comments as to the irrationality of responses, (3) explanations of associations, (4) admissions of the inhibition of contrasts because they do not seem to be logical responses, (5) changing responses, and (6) longer deliberation on some words, especially on those having common opposites and no common synonyms. Without exception those who showed much evidence of introspection responded with few contrasts and with but few exceptions those of reacted quickly with no evidence of introspection responded with many coordinates and opposites. It was also observed that opposites were seldom given after a period of hesitation.

It seemed a common tendency to consider opposites as illogical associations. Some persons who responded with few

contrasts laughed disconcertedly when they gave their first opposite. On a few occasions persons who responded with many contrasts expressed surprise at finding themselves giving opposites. In two or three cases such persons quit giving opposites. There were at least two or three persons who gave many contrasts but who were unaware that they had given any. Except in a few instances the responses were not discussed with the testees. Hence, the proportion who were not aware of giving opposites is not known.

While it was quite obvious that some persons suppressed opposites, it seems equally certain that there were some individuals to whom the contrast response never occurred. They were slightly slower than the many-contrast responders but often seem to be reacting just as spontaneously. Another point of interest and possibly of significance is that these zero-contrast scorers think more often of personal experiences. A few of them, indeed, seemed unable to find any association in their consciousness for words that did not remind them of a personal experience. In this connection it is perhaps pertinent to note that 29 of the 157 persons tested gave no contrast responses whatever.

In several cases persons gave no contrasts for the first thirty items or so and then began giving many contrasts. In these cases it seemed that the subject responded more quickly

and easily after the change than before. In fact the change was so striking in a few cases that it seemed almost as tho a weight had been lifted from the subject's mind. This and other observations noted above seems to indicate that the opposites and coordinates are easier to give but that they are often inhibited in order to give responses that are considered logical.

Some workers who were contacted in their place of business and who had no acquaintanceship with the author seemed to be somewhat suspicious of the author's intentions. While no actual fears were expressed, a few of them seemed to be afraid that the results of the test would be used against them in some way. These persons scored low.

As expected, the choices between occupations were not based solely on the individual's preference for influencing as opposed to non-influencing positions. Remarks by some workers indicated that they gave considerable weight to the matter of variety of experiences. Remarks by other persons indicated that considerable weight was placed on the extent of freedom of movement; for example, some persons preferred selling to bookkeeping because in the former one could move about more.

Results and Interpretations

In Table V even-numbered groups represent an attempt at progressive purifications of the population with respect to sales aptitude; the odd-numbered groups represent an attempt at progressive purification with respect to the absence of the same aptitude. Since the degree of purity is not known for

TABLE V
FREQUENCIES OF CONTRAST-RESPONSE SCORES
BY OCCUPATIONAL GROUPS

Score	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
0-2	49	16	24	11	23	4	19
3-5	12	3	5	3	5	1	4
6-8	4	2	0	1	0	1	0
9-11	8	3	4	3	3	1	3
12-14	8	5	1	4	1	4	0
15-17	6	3	3	3	3	1	3
18-20	5	2	2	0	1	0	0
21-23	6	3	2	1	2	1	2
24-26	10	6	2	5	2	2	2
27-29	6	3	1	2	1	1	1
30-32	6	5	0	4	0	4	0
33-35	12	5	4	5	2	4	1
36-38	14	7	5	7	1	5	1
39-41	4	4	0	4	0	2	0
42-44	7	4	3	4	3	2	1
N	157	71	56	57	47	33	37
Mdn	13.6	22.0	4.9	25.0	2.8	29.9	2.4
S.E. Mdn	2.4	4.2	2.2	2.3	2.1	2.2	0.5

any of these groups, it cannot be proved that any one of them is purer than another. However, it seems logical that the likes and dislikes of the workers would be directly related in part at least

to their sales aptitude. Hence, the greater the preponderance of preferences for the influencing-other-people jobs--or vice versa--the greater the purity of the population in this respect. Hence, the writer feels it is safe to assume that the larger-numbered groups are actually purer than the lower-numbered ones.

In comparing the groups the median was used because the distributions contained relatively large numbers of extreme measures which would affect the mean disproportionately. This application of the general rule was checked by dividing the standard error of the median by the standard error of the mean for groups 1 and 2. In each case the ratio was greater than one, indicating that the median was the more reliable measure of the two. (The standard error of the mean is 1.2 for group 1 and 1.7 for group 2.)

The medians for groups 1, 2, 4, and 6 become progressively larger, indicating that there may be a positive relationship between the purity of the influencing-other-people group and the number of contrast responses. The ratio of the difference between the medians of groups 1 and 7 to the standard error of the difference is 5.0, indicating that there are better than 999 chances in 1,000 that there is a true difference.

On the other hand, the medians for the odd-numbered groups become progressively smaller indicating a possible negative correlation between the purity of the non-influencing group and the contrast scores. In group 7 the calculated standard error is probably incorrect because of the relatively large frequency of the step containing the median. Hence, to be conservative, it was re-calculated using a step frequency of five, which is the average frequency for the lower six steps. This gives a standard error of 1.8. Using this estimate instead of the one in the table, the ratio of the difference between the medians of groups 1 and 7 to the standard error of the difference is 3.0, which gives an assurance of 999 in 1,000 that there is a significant difference between the two groups.

The corresponding ratio for groups 6 and 7 is 9.7, indicating an even higher degree of assurance that there is a true difference between the influencers and non-influencers. The coefficient of contingency, C , for the same groups divided into three step-intervals (0-2, 3-26, and 27-44) is .46, the highest possible coefficient being .707. For a C of zero, the probable error, P.E., for a group of this size equals .081. The $C/P.E.$ ratio is 5.7, indicating that there are only 6 chances in a 100,000 that the correlation of .46 is due to chance. The chi-square test, likewise, indicates great odds

in favor of a relationship, the exact probability being far greater than 99 in 100.

One possible source of error is that a large percentage of those in the influencing-other-people division were among the author's acquaintances and that practically all of those in the other group were strangers. The median of the 41 acquaintances is 26 (S.E. 1.9). Since this is higher than the median of group 2, it appeared that some process of selection must have taken place or that acquaintanceship, per se, must in some way have influenced results. Since casual observations indicated that spontaneity might be a factor in determining the number of contrasts, it was considered possible that acquaintances, perhaps being more spontaneous in the testing situation because they knew the test administrator, responded with more opposites simply as a result of acquaintanceship. If this were true, it would produce a spurious correlation under the conditions noted at the beginning of this paragraph. Hence, the purifications were repeated, rejecting the 41 acquaintances. For results, see Table VI.

All the medians in Table VI are lower than the medians in Table V but the trend in the non-influencing groups is still essentially the same. However, the trend of the medians of the influencing-other-people groups has been leveled off at the second group, indicating that exclusion of acquaintances has eliminated a corresponding larger part of those selected

TABLE VI

FREQUENCIES OF CONTRAST-RESPONSE SCORES BY OCCUPATIONAL
GROUPS EXCLUDING ACQUAINTANCES

Score	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
0-2	42	14	21	10	21	4	17
3-5	10	2	5	2	5	1	4
6-8	4	3	0	2	0	1	0
9-11	7	3	3	3	2	1	2
12-14	6	4	1	4	1	4	0
15-17	5	2	3	2	3	1	3
18-20	3	2	1	0	1	0	0
21-23	4	3	1	1	1	1	1
24-26	5	3	1	3	1	0	1
27-29	4	3	1	2	1	1	1
30-32	5	4	0	3	0	3	0
33-35	6	3	3	3	2	3	1
36-38	9	4	5	4	1	3	1
39-41	1	1	0	1	0	1	0
42-44	5	2	3	2	3	0	1
N	116	53	48	42	42	24	32
Mdn	9.4	15.2	4.3	14.5	2.5	19.0	2.3
S.E.Mdn	2.3	5.5	4.2	2.4	1.9	7.3	1.7

for groups 4 and 6 by the first process of purification. This might be due to the effect of acquaintanceship, as hypothesized in the previous paragraph, but it could also be due to a natural process of selection which will be discussed later after disposing of the possibility that acquaintanceship might invalidate the trends noted and differences found in the first purification.

In group 6, Table VI, the population is too small to give a reliable median. Hence, it was necessary to compare the medians of groups 4 and 5 in this purification instead of

groups 6 and 7 used in the previous comparison. The ratio of the difference between the medians to the standard error of the difference is 3.9, which indicates that there are better than 999 chances in 1,000 that the difference is significant. The coefficient of contingency was calculated for groups 6 and 7 as before. In this purification C was found to be .47. Since the probable error of a zero coefficient for this group would be .090, there would be only 27 chances in 100,000 that the correlation could have been obtained by chance. Hence, while the probabilities of a relationship are now found to be less than before, it is still reasonably certain that a relationship exists.

Assuming that acquaintanceship was not responsible for raising the contrast scores and assuming that the contrast score correlates with sales aptitude, the differences between the medians and trends in Table V and Table VI could be explained as a process of natural selection. An individual's acquaintances are more likely to have a greater percentage of persons possessing sales aptitude than exists in the entire population for the reason that persons possessing sales aptitude probably mix more with other people and hence are more often met. Since both the acquaintances and strangers tested are members of the author's environment, the elimination of the acquaintances would be expected to lower the obtained medians somewhat in the manner already observed whereas

exclusion of the strangers would be expected to raise the medians. That this latter also would occur is indicated by the fact that the median of all the acquaintances was 26 as compared to a median of 13.6 for the entire population.

The truth may be that both factors mentioned have some influence on the differences noted between the results of the two purifications. The best explanation of the correlations found seems to be that there is some relationship between sales aptitude and the contrast response. Hence, as it is desired to eliminate persons with sales aptitude from the non-influencers, group 7 of the second purification might be the most nearly pure in this respect. Since it is desired to include persons with sales aptitude, it would seem that the acquaintances, who are most likely to have this aptitude, would be a more logical population for inclusion than exclusion. Inclusion of them alone does not yield a large enough population for group 6. Hence, the next best choice would seem to be group 6 of the first purification, in which these individuals have been included. Correlating these two selected groups gives a C of .46 (P.E. when C is zero equals .084), which is essentially the same as the other two coefficients.

The best explanation of the correlation with speed as noted by Wells and observed casually by the writer seems to

be that the number of contrasts is affected somewhat by spontaneity, which is probably the absence of introspection. This may be due to the fact that introspection, when it is resorted to, takes time and that persons who thus stop to weigh their responses usually reject opposites because they seem to be irrational. However, since spontaneity is probably one factor in making for a successful influencer, the higher scores resulting from this cause would help to differentiate between the better and the poorer influencers.

The present writer's casual observations support Well's inference that there are two opposite mechanisms involved in the responses to the free-association test. Since one of them makes for egocentric responses, it will be called the egocentric factor in the discussion that follows; since the other makes for contrast responses, it will be referred to as the contrast factor.

The contrast factor may be a mechanism for balancing and coordinating ideas, one idea being set in perspective with other similar ideas of the same class. The result of such a juxtaposition of coordinate but mutually exclusive ideas would be the association of words which, in effect, are contrasts to each other. A person who has this characteristic would be more apt to influence other people successfully because in dealing with them it would be natural for him to think of

opposing points of view. If these things are true, this factor would help to account for the correlation of contrasts with sales aptitude and would, indeed, probably be the main factor in accounting for the correlation, spontaneity being only a minor factor. Another observation of interest in this connection is that the only type of stimuli the high contrast scorers had difficulty responding to were words that had no common opposite, coordinate, or synonym. Wish, song, and sign were, incidentally, the only items omitted more than once by workers who scored over thirty.

The egocentric factor, on the other hand, may be a mechanism for measuring values in terms of personal experiences. The egocentric individual might measure the value of any idea by the part it has played in his personal experiences--and therefore associate it with the experiences of which it is a part. In this connection it is of interest to note that no-contrast scorers were frequently unable to respond when the word had no common synonym and no recalled experience connotation. Words the no-contrast scorers found especially difficult were "from," and "worse". Other words omitted more than twice were "luck" and "give".

Another point to be considered is that the same response may be the result of different mechanisms in different persons. An egocentric responder, for example, might associate "wife" with "husband" because "husband and wife" go together so often.

Some of the low-contrast scorers have, in fact, put the word "and" before "wife" in their response, indicating the possibility that the association was made because the two are often experienced together. Brother and sister, avenue and street, king and queen, question and answer, and many other such pairs of contrasts might also be occasionally associated for the same reason. Special experiences might in a few rare instances account for other spurious-contrast responses; for example, one low-scoring individual explained that he associated "play" with "work" because his job was play to him. A contrast responder, on the other hand, may give an egocentric response not because he measures values in terms of his personal experiences but because he has a guilty feeling about something which the word reminded him of. As mentioned previously, he might also avoid opposites with more or less consistency because of more or less fluctuating periods of introspection.

Since there is a grouping of more than one-fourth of the total population tested in the "0-2" interval and since the scores are well scattered thru the rest of the distribution, it seems likely that the critical point of division between the two mechanisms would be near or in this step-interval. Assuming that the presence of one of these mechanisms means absence of the other, the true location of this point would be between the true zero scores and the lowest true score

made by a contrast responder. Assuming that a negligible number of the no-contrast responder group scored above two and assuming that the number of contrast responders in the "0-2" step-interval is the same as the average frequency of the other step-intervals, the correct number of no-contrast scorers would be 41. Examination of the "0-2" group reveals that 29 of the 49 gave no contrast responses whatever.

Assuming that half of the twenty in this group who scored above zero, actually should have received a zero and assuming that the number of true-contrast responders who scored zero is negligible, the corrected zero frequency would be .39.

The number of one-contrast scores is 15. Assuming that these are really no-contrast responders, they, with the zero-contrast responders, would give us 44. In all three estimates, the no-contrast frequency is roughly one-quarter of the total. O'Connor's (3) quartile norms for a contrast-scored free-association test of thirty items also shows a similar grouping at the zero end of the scale. One-fourth of a population of 600 responded with only one or less contrasts.

Taking this suggested dichotomy as the basis for classifying the subjects instead of the divisions arbitrarily selected, the coefficients of contingency for groups 6 and 7 were recalculated using simply the intervals "0-1" and "2-44". The result was .42 for both purifications and .44 for the purifications consisting of group 6, Table V, and group 7, Table VI. These correlations indicate that this dichotomy into some and

none is almost as discriminating as the three divisions previously used. If there is a real difference and if the explanations hypothesized are correct, then the reason for the lower correlations might be that the effect of the spontaneity factor has been largely obscured by this new grouping. If, as it seems, spontaneity affects the number of contrasts given by the true contrast responders but, in itself, causes only a negligible number of no-contrast scores, then the effect of this some-and-none dichotomy would be to eliminate this factor from the correlation. If the lowering of the correlation is due to the elimination of the spontaneity factor, it would suggest that the higher medians of the acquaintances was not primarily due to this factor since the new correlations are the same for both purifications but to the process of selection mentioned previously. The larger correlation for the special purification consisting of group 6, Table V, and group 7, Table VI, suggests--if it is actually larger--that this may be the most successful purification.

Summary

The differences in medians and the correlations found indicate that the influencing-other-people workers have a decided tendency to give more contrasts to a free-association test than do the lone workers. The best explanation of these

statistics and other data available seems to be that there is a contrast-association factor present in some individuals but not in others.

The negative correlation between egocentric and contrast responses found by Murphy, indicates, as stated by Wells, two opposite mental mechanisms. The casual observations of the writer and the nature of the contrast-score frequency distribution seem to support Wells' inference..

The insignificant correlations of the contrast response with extroversion-introversion, self-sufficiency, intelligence, vocabulary, clerical aptitude, and tonal memory indicate that there is no major factor common to the contrast-association factor and to any one of these measures of abilities and aptitudes.

SUGGESTIONS FOR FURTHER RESEARCH

In repeating the experiment it would be well to do the testing in a strange community where the results wouldn't be complicated by acquaintanceship. A more nearly perfect purification than this writer obtained could no doubt be secured by repeating the investigation in a few large business concerns where comparable ratings of each worker's success could be secured from the management and where scores on general intelligence and achievement tests were available. If the contrast-score frequencies of the satisfied workers who were deemed successful by their superiors were tabulated for each range of general intelligence and for each range of achievement, a more adequate concept of the occupational significance of the contrast response would be secured.

A better picture of each worker's preferences for influencing-other-people jobs might be drawn if the worker were given more pairs of occupations to choose from and if, when he finished, he were asked to explain his selections and to make a choice between the two general types of work.

A study of the personality and thought habits of fifty no-contrast responders and of fifty many-contrast responders

might prove enlightening. If, in addition, these persons were administered equivalent forms of the free-association test at intervals of six months for three or four years, much interesting and perhaps valuable data on individual variations would be obtained. Among other things, this would indicate whether the one-fourth who score zero are consistent in not giving any contrast responses. Doubtful associations might be determined by discussing them with the subject.

The obtained three-to-one dichotomy of the population into contrast and no-contrast responders suggests the possibility that the two mechanisms are inherited thru a single pair of genes, the contrast factor being dominant and the egocentric factor recessive. This hypothesis may be checked experimentally by administering a free-association test to all members of a large number of families and determining whether the two factors are inherited in accordance with Mendel's laws.

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APPENDIX A

TEST SCORES OF GENERAL PSYCHOLOGY STUDENTS

No.	Otis	Form A	Form B	I-E	S-S
1	55	2	4	-26	97
2	50	34	44	-23	33
3	46	9	5	26	-11
4	48	38	38	-22	11
5	55	a	3	-1	-65
6	47	42	40	86	7
7	60	41	44	-84	26
8	47	0	5	-44	19
9	37	0	1	a	a
10	56	29	37	-128	43
11	61	8	22	-99	5
12	38	32	29	-81	-24
13	41	2	5	-11	10
14	50	6	3	-49	-5
15	51	32	39	-96	35
16	39	30	30	-52	29
17	39	39	37	-60	82
18	33	34	35	-12	-29
19	32	18	22	18	-59
20	66	27	1	-54	28
21	54	11	17	a	a
22	59	a	22	113	-62
23	37	16	6	34	48
24	47	0	0	-14	33
25	49	a	13	12	-59
26	57	4	3	-69	37
27	41	15	17	60	-117
28	40	13	22	-61	-2
29	33	37	43	-78	46
30	45	28	27	-85	60
31	35	2	a	9	58
32	29	21	35	31	-55
33	56	3	5	-77	-5
34	56	36	30	-122	59
35	36	20	40	-29	5
36	46	32	a	a	a
37	53	32	32	32	-24
38	a	22	15	-28	-34
39	a	12	34	-87	62
40	34	15	a	-13	-45

APPENDIX A--Continued

No.	Otis	Form A	Form B	I-E	S-S
41	a	2	1	- 8	97
42	49	39	44	- 8	-63
43	45	21	18	11	-68
44	34	28	35	-32	25
45	59	18	15	- 1	94
46	64	1	15	21	147
47	44	30	34	-79	-67
48	43	4	27	- 7	41
49	43	5	10	-31	7
50	50	37	34	-53	52
51	38	21	31	14	-10
52	47	34	45	- 6	16
53	37	0	0	-71	38
54	48	17	a	a	a
55	44	16	35	-24	32
56	41	41	45	a	a
57	48	30	35	-103	153
58	39	40	38	2	21
59	a	19	28	-62	160
60	48	4	31	a	a
61	32	16	8	11	33
62	50	12	12	15	-55
63	a	17	0	-73	4
64	36	23	a	51	-32
65	42	a	40	a	a
66	43	6	43	-56	20
67	56	34	35	13	-103
68	62	11	18	5	16
69	39	2	24	7	-24
70	43	34	45	-32	8
71	34	30	14	-109	78
72	51	27	36	-38	-67

Key

Otis	Otis Self-Administering Test of Mental Ability: Higher Examination, Form D
Form A	Free-Association Test Form A
Form B	Free-Association Test Form B
I-E	Introversion-Extroversion Scale, Bernreuter Personality Inventory
S-S	Self-Sufficiency Scale, Bernreuter Personality Inventory
a	denotes that student was absent at time test was given

APPENDIX B

DISCRIMINATION INDICES FOR FREE-ASSOCIATION TEST: FORM A

Note: While the free-association test had a high enough reliability to make purification unnecessary for the purpose of this research, the writer, as an additional check, calculated two contrast-response frequency ratios for each item of Form A selected for scoring. The $H_{1/2}/L_{1/2}$ discrimination index for each stimulus was obtained by dividing the frequency of contrast responses for the high one-half of the population by the corresponding frequency for the low one-half. The high one-half, in this instance, means the half of the population responding with the greatest number of contrasts; the low one-half, the portion reacting with the fewest. The $H_{1/4}/L_{1/4}$ index was obtained in a similar way for the high one-quarter and low one-quarter of the same population. The population used in this analysis was the 68 psychology students.

Stimuli	$H_{1/2}/L_{1/2}$	$H_{1/4}/L_{1/4}$	Stimuli	$H_{1/2}/L_{1/2}$	$H_{1/4}/L_{1/4}$
inside	2.9	7.0	head	4.6	14/0
below	2.3	15.0	tase	7.3	12.0
work	2.9	13.0	rich	2.7	17.0
west	3.3	16.0	evening	12/0	6/0
brother	3.6	8.0	come	2.3	8.0
high	4.2	10/0	difficult	11/0	8/0
king	2.6	16.0	grandfather	3.6	15.0
worse	3.9	15/0	open	2.7	8.5
husband	3.3	16.0	old	7.8	17/0
hero	17.0	11/0	valley	3.5	11.0
dull	2.9	13/0	big	8.7	15/0
costly	14.0	10/0	dangerous	5/0	4/0
lost	2.5	17/0	country	16/0	12/0
winter	3.6	13/0	dim	8.5	11/0
question	2.2	3.2	from	2.4	11.0
wrong	1.9	4.2	enemy	8.7	17.0
front	2.7	8.5	begin	8.0	9/0
multiply	3.3	6.0	doubt	4.0	5.0
short	2.9	8.5	sorrow	2.0	2/0
good	3.2	17.0	empty	5.4	17/0
north	3.9	16.0	after	4.0	8.0
give	2.6	17.0	push	5.5	12/0
sickness	10.0	10.0	stranger	10.0	14/0