

A FACTOR ANALYSIS OF
MENTAL ABILITIES AND PERSONALITY TRAITS*

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The relationship between measures of verbal fluency and certain personality traits is examined by factor techniques. From a matrix of eight factor scores derived from mental tests plus five personality scores, six factors were obtained. An oblique solution lends limited support to the hypothesized relationship between the two domains.

In factorial studies of abilities, it has become general practice to include two or three "anchor" tests to measure each of the primary mental abilities that might be related to the experimental variables. In this way, one or more new factors may be isolated and interpreted with each successive well-planned study. The "anchor" tests which will probably best measure each of the several "established" factors can be identified fairly well.

This is not yet the case, however, for the area of temperament and personality, where there is much less agreement upon "anchor" variables. Using several different approaches, Cattell (1) has rather consistently found ten to twelve factors. Guilford has developed three inventories, STDCR, GAMIN, and I, which represent end products of his efforts to measure temperament factors. Although no serious effort has been made to compare the works of these authors, it seems that some of their factors may be quite similar while others apparently do not appear in both sets.

Few studies have straddled mental abilities and personality traits, even though the nature of any relationships found would be of considerable theoretical and practical importance. Thornton (9) found practically no overlap between tests of mental abilities and four questionnaire-type variables which measured a single factor called "Feeling of Adequacy." Other studies

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likewise find little relationship (2). There is supporting evidence, however, for the hypothesis that fluent persons tend to be independent, extraverted, and unstable (7).

The present study is an effort to help define the relationships between mental abilities and personality traits, the latter being measured by a questionnaire. The major hypothesis was that there would be some relationship between measures of verbal fluency and extraversion or rathymia. Studies by Cattell and other British investigators (6) would tend to support this hypothesis. The relationship among the mental ability scores was also of interest since this involved, in a sense, a second-order factor study of eight cognitive factors. The personality score intercorrelations, which are admittedly distorted by experimental-dependence conditions in scoring (3), were of minor interest.

The Variables

Data on twenty-eight mental ability tests and on a personality inventory were collected by Taylor, the mental ability tests furnishing the basis for his study of fluency (8). For the present study, the fifteen tests were selected which best measured Taylor's eight primary abilities. Scores on two tests measuring the same factor were combined with equal weights to obtain a single index. (In the case of the Perceptual Speed factor, only one test was used.) These eight factor indices were included with five scores from a personality inventory for this study.

The eight factor indices, for which the tests are described by Taylor, were as follows:

1. *Memory* (First Names, Word-Number)
2. *Perceptual Speed* (Identical Numbers)
3. *Reasoning* (Letter Series, Letter Grouping)
4. *Number* (Addition, Multiplication)
5. *Verbal Comprehension* (Same or Opposite, Completion)
6. *Word Fluency* (First and Last Letters, Suffixes)
7. *Verbal Versatility* (Similes, Letter Star)
8. *Ideational Fluency* (Topics, Theme)

The remaining five personality variables from Guilford's "Inventory of the Factors STDCR" were:

9. *Social Introversion*
10. *Thinking Introversion*
11. *Depression*
12. *Cycloid Tendency*
13. *Rathymia*

Procedures and Results

The data were obtained on 170 high-school seniors in Washington, D.C.

The score distributions on the eight factor scores were normalized. The matrix of correlation coefficients for the 13 variables was analyzed by Thurstone's group centroid method. Six factors were extracted and an oblique rotational solution obtained.

TABLE 1

Intercorrelations (above diagonal) and Residuals (below diagonal)

Var.	1	2	3	4	5	6	7	8	9	10	11	12	13
1		04	35	21	22	19	14	17	-07	10	-10	-08	-04
2	-05		34	34	24	23	26	27	-20	07	01	05	22
3	01	06		33	51	36	40	33	-12	-12	-19	-10	14
4	02	02	-03		18	30	21	22	-16	-10	-11	-07	22
5	00	03	05	-03		36	40	38	07	01	-18	-18	-05
6	-01	-04	-02	03	02		32	32	-07	05	-01	07	07
7	00	-02	01	03	-01	-02		52	-16	11	07	16	27
8	02	-01	-01	03	-04	-01	-03		-17	16	-05	-01	10
9	-01	-03	-01	03	02	-01	-01	-01		06	45	23	-58
10	03	02	-01	-02	05	-01	-02	00	-01		53	48	-12
11	-01	-01	00	01	-03	-02	02	01	00	03		90	-08
12	00	-02	-01	00	00	03	-02	01	03	04	01		22
13	00	-01	-01	02	02	-04	02	-01	-08	-04	-02	-03	

TABLE 2

The Unrotated Factor Matrix

	I	II	III	IV	V	VI	h^2
1	38	-02	-10	03	38	-22	35
2	46	07	15	-05	-26	-15	34
3	70	-14	-01	-20	20	-01	59
4	48	-09	11	-18	-13	-33	41
5	63	-12	-27	00	01	22	53
6	55	07	-02	-04	-02	-01	31
7	62	16	15	09	-02	33	56
8	62	06	-01	28	-13	20	52
-9	20	-29	66	34	02	-16	70
10	06	63	-08	39	04	-10	57
11	-13	94	-11	-21	-07	03	96
12	-04	92	27	-26	05	12	100
13	21	02	76	-11	-07	05	65

This factor approaches a general (to this battery) measure of personality, each of the variables except Rhathymia having projections on it. It may be tentatively interpreted as Depression. Items dealing with "moodiness," "feelings easily hurt," "lost in thought," and "self-conscious" are typical of the depressive-type item contained in common in the *S*, *T*, *C*, and *D* scoring keys. Items such as these can account for much of the variance in this factor. The negative loading of variable 9, which was reflected prior to factoring, means that the unreflected variable, Social Introversion, is positively related to this factor. Factor *D* corresponds closely to Lovell's (4) factor which was called "Emotionality," or the opposite pole of Thurstone's (10) "Emotional Stability" factor.

Factor E

13. Rhathymia	.71
-9. Social <i>Extraversion</i>	.51
12. Cycloid Tendency	.42
7. Verbal Versatility	.29

Surgency is probably the best interpretation that can be given to this factor, in spite of the leading variable. Cattell has pointed out the similarity between Surgency and Rhathymia. This interpretation is supported by the positive loading of Social Extraversion and by the fact that it fits Studman's definition of a fluent person. In many ways it corresponds to the "Drive" factor found by Lovell. The loading of Verbal Versatility lends limited support to the original hypothesis. The correlation of .27 between Rhathymia and Verbal Versatility was larger than any other correlation cutting across the cognitive and personality domains. The other two types of fluency, Ideational Fluency and Word Fluency, showed no relationship with this "Surgency" factor.

Factor F

10. Thinking Introversion	.54
-9. Social <i>Extraversion</i>	.39
8. Ideational Fluency	.28

This rather ambiguous factor is not strongly determined and is difficult to interpret. Abstracting from Guilford's original definitions, this factor may represent "meditative thinking, philosophizing, and analyzing one's self" in addition to "entering into social contact, not shy" plus "fluent expression of ideas." Such a trait configuration seems somewhat unlikely. With present crude insights, it is difficult to sense what might be in common among these personality and mental ability scores. Again, it was a fluency score involving the meaning of words which showed a slight sign of bridging the gap into the personality domain.

Discussion

Since the mental ability variables analyzed here are all composites except one, the factor analysis results are similar in one sense to the second-order analysis reported by Rimoldi (5). Relationships in such studies generally seem magnified. This provides another reason for considering the interpretations of the factors as tentative.

The hypothesis that there is a relationship between fluency scores and certain personality characteristics is supported to a limited degree. The evidence relevant to this hypothesis is as follows: the fluency measure, Verbal Versatility, had a projection of .29 on the Surgency factor (*E*) and correlated .27 with Rhathymia. Ideational Fluency had a projection of .28 on an ambiguous personality factor (*F*); Word Fluency had zero loadings on the three personality factors, and all personality scores had zero loadings on the three mental ability factors. The results for the remaining mental ability variables are consistent with those of other investigations, in which many zero and a few low relationships between the mental ability and personality areas are reported. Improvement in test construction in both domains and further analyses may lead to higher correlations and also to greater insight into the bases of any relationships that appear.

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