

7 Multimethod replication of the AB5C model of personality traits

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The lexical approach to personality measurement (John, Angleitner, & Ostendorf, 1988) employs single trait terms (adjectives, nouns) as its primary unit of measurement. Factor analyses of large sets of trait rating data by lexical researchers have suggested that the universe of trait-descriptive terms can be represented by five broad factors. Today the Five-Factor Model (FFM; John, 1990) enjoys wide acceptance in personality psychology.

Nonetheless, researchers who use personality inventories—even those who advocate the FFM—sometimes feel that the lexical tradition is more concerned with the structure of *language* than the structure of *personality* (R. Hogan, personal communication, March 3, 1991; R.R. McCrae, personal communication, May 23, 1991). For example, Lanning (1991, p. 14) says, ‘. . . personality structures exist within the person rated, and personality constructs exist outside of the person rated Analysis of the properties of trait words . . . keeps us within the domain of cartogra-phy. The insight gained into the person by this approach can be no more profound than the anthropological speculation of the armchair theorist.’

To allay the doubts of researchers who use personality inventories, the present study demonstrates how lexically-based personality research can be relevant and useful to their concerns.

METHOD

Subjects and materials

Subject group 1 (68 male, 86 female American students) completed the California Psychological Inventory (CPI; Gough, 1975); subject group 2 (30 male, 45 female American students) took the CPI and the Hogan Personality Inventory (HPI; Hogan, 1986); and subject group 3 (31 male, 58 female German students) took the authorized German translation of the CPI. All subjects were rated by acquaintances on 49 bipolar adjective rating scales (BARS; Johnson, 1991a; Johnson & Ostendorf, 1993) designed specifically to assess the five-factor model (FFM; John, 1990).

Procedure

Analyses began with a purely lexical approach called the Abridged Big Five-Dimensional Circumplex (AB5C) model (Hofstee, De Raad, & Goldberg, 1992). The acquaintance trait ratings from the American samples were subjected to a principle components factor analysis to obtain a five-factor, varimax-rotated solution. Next, all trait terms were plotted within ten circumplex planes, where the dimensions of each circumplex were defined by two of the five factors. The angular locations of trait terms within each circumplex were computed by $\Theta = \tan^{-1}(y/x)$, where x represents the trait's correlation with the factor oriented horizontally and y represents the trait's correlation with the factor oriented vertically. For example, 'liberal' showed a strong negative correlation with Factor III (Conscientiousness) and a strong positive correlation with Factor V (Intellect); it was therefore located at 110° within the circumplex whose x-axis was defined by Factor III and y-axis by Factor V (see Figure 1).

The AB5C analyses described above are purely lexical because they involve regressions of trait-term data onto FFM dimensions defined by the trait terms themselves. The next set of analyses constituted a multimethod extension of the purely internal lexical analysis. Instead of plotting acquaintance ratings onto dimensions defined by the same ratings, the next analyses plotted acquaintance ratings onto FFM dimensions defined by scales of self-report personality inventories.

The American and German CPI responses were scored by a method (Johnson, 1991b) that yields five scores corresponding to the FFM. HPI scale scores for Sociability, Likeability, Prudence, Adjustment, and Intellectance

were used to represent FFM Factors I through V. Scores were standardized according to gender norms. Ten circumplexes analogous to the lexical circumplexes were generated by regressing acquaintance ratings on all possible pairings of FFM scores from the American CPI. Two additional sets of ten circumplexes were constructed from the HPI and German CPI FFM scores.

The similarity of the ten lexically-based circumplexes to their corresponding American CPI-, HPI-, and German CPI-based circumplexes was determined by correlating the angular locations of the traits across analogous circumplexes. If corresponding circumplexes generated from different methods are essentially rotated versions of each other, the ordering of traits around the circumplexes should be similar and the sets of angular locations should correlate highly ($> .9$) with each other. Furthermore, examination of the regression equation, $y=bx+a$ should yield a slope b close to unity and also indicate with the intercept constant a how many degrees the second circumplex must be rotated to correspond to the first. Circumplexes were plotted and superimposed upon each other, and then the second circumplex was manually rotated by the amount a . This provided a visual representation of goodness-of-fit between corresponding circumplexes.

RESULTS AND DISCUSSION

A high degree of correspondence of the ordering of adjectives between the purely lexical and inventory-based circumplexes was found, with Pearson correlations generally in the .9 range (see Table 1). This indicates that the lexical and inventory-based circumplexes are simply rotational variants of each other. The degree of correspondence is quite astonishing, given the number of factors that should destabilize the results: relatively small sample sizes, differences in methods for assessing the five factors, and language differences. The striking similarities across lexical and inventory-based circumplexes is exemplified in Figure 1, which shows the correspondence between the lexical and HPI-based circumplexes defined by Factors III and V, both before and after rotation.

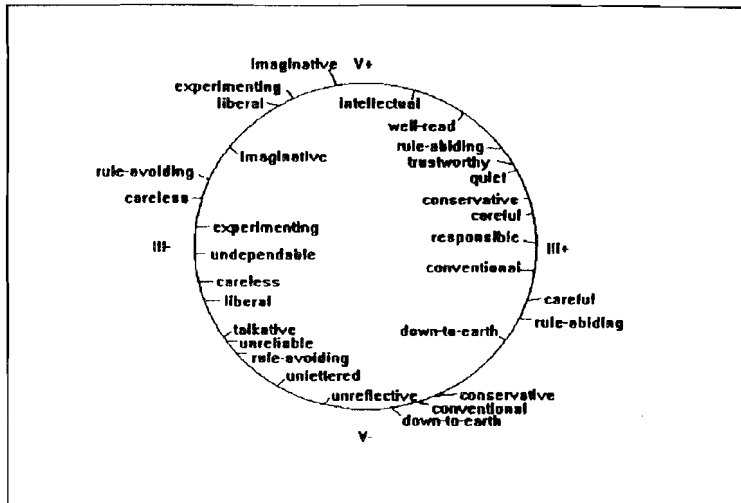
Table 1: Correspondence between lexical circumplexes and inventory-based circumplexes

Circumplex	American CPI		American HPI		German CPI			r	b	a
	r	b	a	r	b	a				
I x II (Extraversion x Agreeableness)	.99	1.00	-21.3	.97	.97	25.5	.88	.93	-3.7	
I x III (Extraversion x Conscientiousness)	.95	1.00	-20.6	.97	1.02	-23.0	.92	.95	7.9	
I x IV (Extraversion x Stability)	.97	.94	38.4	.88	.91	49.8	.95	.91	42.6	
I x V (Extraversion x Intellect)	.98	1.05	7.5	.99	1.08	-18.9	.98	.97	5.8	
II x III (Agreeableness x Conscientiousness)	.99	1.02	-9.7	.96	.98	15.3	.88	.88	17.3	
II x IV (Agreeableness x Stability)	.96	.95	42.1	.96	.91	31.8	.83	.90	12.9	
II x V (Agreeableness x Intellect)	.97	.98	19.2	.97	.98	33.7	.88	.90	16.9	
III x IV (Conscientiousness x Stability)	.94	.95	21.8	.97	1.00	35.3	.93	.90	43.9	
III x V (Conscientiousness x Intellect)	.99	.96	36.8	.99	.98	59.5	.97	.94	38.2	
IV x V (Stability x Intellect)	.98	.98	20.9	.95	.97	19.8	.87	.77	31.1	

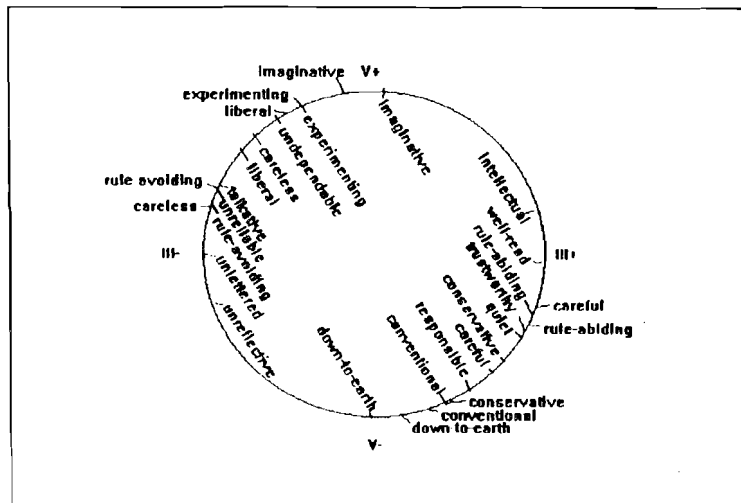
Note. r is the correlation of angular location of trait terms across circumplexes; b is the slope of the regression line, and a is the intercept value in the regression equation, $y = bx + a$.

The correspondence between lexical and inventory circumplexes indicate that the findings of purely lexical research may indeed apply to personality inventories. One of the great strengths of the lexical tradition is the vast, practically exhaustive cataloging of trait words. To tap into this lexical information, inventory users need only determine the rotational differences between lexical circumplexes and inventory-generated circumplexes. The present study, which uses only 98 trait words from the BARS, is only suggestive of the way in which a much larger lexical data base could assist in the configural interpretation of inventory scales.

Configural interpretation of personality scale scores involves describing someone who scores high/high, low/low, or high/low on a pair of scales (Gough, 1991). The AB5C model provides an empirically-based, systematic way of interpreting all such configurations of FFM scales. For example, after determining the proper rotation between Hofstee *et al.*'s Factor 1 x 2 circumplex and the HPI's Sociability x Likeability circumplex, all of Hofstee *et al.*'s terms falling closer to the bisectrix of Factors 1 and 2 would be applicable to an individual scoring high on these two HPI scales. If these terms were *cheerful*, *warm*, *confident*, and *relaxed*, then one is justified in describing a high scorer on these two HPI scales with a statement such as 'People perceive you as a cheerful, warm, confident, relaxed person'. Elsewhere (Johnson, 1993), I have suggested how these kinds of analyses might form a useful framework for computer-generated personality narrative reports.



Lexical (outside) and HPI (inside) circumplexes, unrotated



Lexical (outside) and HPI (inside) circumplexes, rotated 60°

Figure 1: Lexical and HPI circumplexes, unrotated and rotated

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