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Murray and others (1938) proposed 40 needs of which Edwards (1954) chose to develop 15 into a measure of personality, the Edwards Personal Preference Schedule (EPPS). To control for social desirability, Edwards arranged the items of the inventory into pairs matched in terms of their social desirability ratings. The results are ipsative, i.e., the 15 needs scores sum to a certain fixed constant. This format has produced different opinions as to how factor analysis should be applied (Horst & Wright, 1959; Tatsuoka, 1971). Sherman and Poe (1959) used a normative EPPS based on 135 distinct items rated on a nine-point Likert-type scale. Others (Dixon & Ahern, 1973; Heilizer, 1963; Levonian, et al, 1959) have been content to factor only the scale scores.

The 225 items in the test actually represent 450 separate statement choices. This large a set of items or variables has posed a problem for factor analysis because of computer limitations. Normally, 80 to 100 variables are all that can be factor analyzed. Barker and Barker (1977) developed a computer program (CORR99) based on a mathematical model by Horst (1965) that will factor very large numbers of variables. This program has been revised and tested over a number of years (Barker & Barker, 1975). The indirect method has been used for theory testing and has proved to be quite useful (Barker & Barker, 1976(a) and (b); Hamlett, 1976). Recent refinement of the indirect factor method makes possible use of the method without the need of a priori theory.

This paper proposes to analyze subject preference on the 225-item EPPS by means of the indirect factor method. The items will be treated as though the subject either agreed with or did not agree with a fixed alternative.

METHODOLOGY

The 225-item EPPS was administered to two groups. One group consisted of randomly selected female teachers in Alabama who responded to a mailed questionnaire. The other half of the 315 subjects were graduate level students taking a course in statistics.

Responses to the 450 test items were punched onto computer cards. If a subject chose an A or a B alternative, it was represented by a l. If the corresponding A or B were not chosen, or if neither alternative were chosen, it was represented by a zero. A Univac 1110 computer was used for all analyses.

The first step in factor analysis by the indirect method (CORR99) required the items to be grouped for totaling. The more homogeneous the items in factor structure, the better. To identify clusters for totaling, an obverse factor analysis (CORR98) was applied to the data for 20 randomly selected individuals. A SCREE test (Cattell, 1966) was used to determine the number of factors to retain. The items were then pooled according to the results of the varimax rotation and these items were used to begin the iterative indirect factor analysis. A criterion of +.3 or greater on only one factor was used to identify items with factors.

RESULTS

The indirect factor analysis program (CORR99) was begun with eight totals. After the 14th iteration, one total was dropped due to a lack of any items loading \pm .3 or greater on the eighth factor. Of the seven factors remaining, one had too few items for interpretation (2). Table 1 shows the item numbers associated with the factors.

The factor analysis required 14 minutes using 128K core storage for a total cost of \$72.69. Twenty-five iterations were performed, and the measure of association D increased at each iteration. The D measure was used to determine the degree of agreement between the items contained in totals and the items which loaded \pm .3 or greater on a particular factor. The D measure for the 25th iteration was .70.

Factor I contained 43 items which seemed to represent an interpersonal orientation. Twenty of the items came from the Need for Heterosexuality subscale and others came from the Succorance, Dominance, and Affiliation subscales.

Factor II contains twenty items which appear to be measuring assertive aggressiveness. Items relating to aggression, autonomy, exhibitionism and dominance were included on this factor.

Factor III appears to measure an anti-social attitude (six items). It is the smallest interpretable factor. Items relating to telling others how to do their jobs and avoiding responsibilities and obligations define this dimension.

Factor IV, with items such as, "I like to do new and different things.",

appears to measure the need for change with 16 items.

Factor V contains only two items (10, 44) and was not interpreted. Nine items loaded on Factor VI. These items suggest submissiveness based on items relating to feeling inferior and needing encouragement.

On Factor VII, twenty-one items from the subscales of achievement, endurance, and order appear to represent a need for personal responsibility. Of the total of 225 items, approximately half (107) of the items did not appear on any factor.

DISCUSSION

Edwards designed the PPS to measure 15 different needs. Factor analysis of the test failed to support the theorized structure. Instead, six factors appear to measure personality traits suggested by items from different Edwards subscales.

Sherman and Poe (1969) factor analyzed items in a normative version of the EPPS and found four main factors. Three of these factors were replicated by factoring the need scale scores.

Factors I and II appear to be virtually identical to factors labeled Interpersonal Orientation and Assertive Aggressiveness by Sherman and Poe. One of our factors, although resembling their Persistence-Dependence factor, also contained many achievement-oriented items. We suggest that a better name for this factor might be **Personal** Responsibility.

A factor measuring preference for change and one measuring submissiveness were identified. The last factor, considered minor because it contained only six items, appears to be measuring an antisocial attitude.

Horst and Wright (1959) found no essential difference in using forcedchoice over a rating scale type of instrument. Tatsuoka (1971) suggests an initial factorization of ipsative instruments and subsequent use of factor scores. In comparing the results of the factoring of the 225-item ipsative version of the EPPS with the 135-item normative version, support was found for Horst and Wright's stand.

Levonian and associates (1959) evaluated the EPPS items (by scales) statistically and found "...an unexpectedly large discrepancy between what the PPS is designed to measure and the actual item factorial content." They objected to the repetitive nature of the forced-choice format. Because factoring subscales scores or items within single subsets cannot estimate complete factor structure, past factor analyses of the EPPS have been inconclusive. This study, which utilized all items of the test, clearly reveals a factorial structure different from what was intended by the test maker.

SUMMARY

A factor analysis of the 225 items of the EPPS identified six factors. These factors appear to be measuring: (1) Interpersonal Orientation, (2) Assertive Aggressiveness, (3) Personal Responsibility, (4) Change, (5) Submissiveness, and (6) Antisocial Attitude.

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I		II	III	IV	v	VI	VII
I 3 9N 18 27 28 38 43 66 67 68 69 70 73 84N 89N	142 143 153 154N 159N 164N 168 173 184N 186 193 197N 199N 204N 209N	II 72 75 91 93 96 97 98 106 116 146 147 166 167 171 180N	III 25 44 74 119 175 195	IV 51 56 57 58 59 60 132 133 134 135 158 183 201 203 206	V 10 77	VI 36 47 50 52 114 125 177 188	VII 1 4 29 53N 76 81 83 86 87 88 136 137 138 140 151
112 113 115 117 130	214N 216 217 218 219 220	190N 191 192 223 225		207			156 161 196 211 215

Table 1 Items loading $\pm .3$ on only one factor.