AN ALTERNATIVE METHOD FOR EVALUATING SUBJECTIVELY INTERPRETED TEST DATA

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Introduction

Many standardized tests in use today involve subjective interpretation of results. In clinical settings or when decisions are to be made about a patient, individual interpretation of results is necessary. On some occasions, however, subjective interpretation of findings may be inefficient. A method of test interpretation which utilizes statistical procedures rather than subjective clinical judgement would be useful in dealing with large numbers of subjects and in studies in which the researchers are interested in groups of people rather than in individuals.

Sources of Data

The sample consisted of 500 subjects, students enrolled in graduate and undergraduate programs of several colleges in a university in the southeastern United States. These people were asked to respond on a voluntary basis to the Personal Orientation Inventory (POI), an instrument designed by Everett L. Shostrom to measure characteristics of self-actualization. The POI consists of 150 items which yield 12 scores purported to reflect various dimensions of self-actualization.

The POI was selected as the instrument for this study because of the manner in which results are interpreted. Test results are scored objectively in that totals are obtained for items in each scale. Profiles are interpreted by comparing them to sample profiles described in the POI manual. A number of profiles are presented including those for college students, Peace Corp Volunteers, psychopathic felons, hospitalized persons, and others. These profiles show typical scores obtained by poorly functioning, normally adjusted, and self-actualized persons. The clinician compares the subject's profile with those in the manual and makes a subjective judgement as to the person's adjustment.

Methodology

Test results were scored using a computer program written by Dr. Harry Barker of the University of Alabama. This program obtained totals of items for each of the twelve scales of the POI. Other computer programs used were also written by Dr. Barker (1973). Ward's Hierarchical Grouping Technique was applied to test score variables. As described by Ward and Hook (1961), this technique is used to group test profiles so as "to maximize the homogeneity of profiles within the same clusters, taking into account of all profile variables and all clusters at the same time" (p. iii). Ward's Hierarchical Grouping Technique is used appropriately with measures of profile similarity and does not require prior formation of nucleus groups.

The computer program (CORR23) used has a subject limitation of 350 subjects. Due to the fact that the total number of subjects in the present study exceeded this number, two applications of Ward's Hierarchical Grouping Technique were required. Two groups were formed by combining results of these applications.

To test the appropriateness of each subject's placement within the designated groups, a discriminant analysis program (CORR06) was used to classify subjects. CORR06 reports a probability term associated with the largest discriminant function. The higher this term, the more likely the subject belongs to the designated group. Application of this type of discriminant analysis was required as a check on subject placement since groups were formed on the basis of combining results of two different applications of Ward's Hierarchical Grouping Technique. Finally, a second discriminant analysis program (CORR20) was used to test the discriminating power of the variables (scale scores) between the two groups.

Two POI scores, Time Competence and Inner-Other Support, are reported in terms of ratios. Shostrom believes that response on these dimensions is best represented as position on a continuum. The other ten scores represent totals of items within each of the ten profile scores. In this study the two Ratio scales were treated as totals, rather than ratios. Results of discriminant analysis with the ratio scales as variables are reported separately from discriminant analysis for which the ten scale scores were variables.

Results

Results of applications of this technique to data of 350 subjects resulted in two groups composed of 173 and 177 subjects, respectively, accumulated error = 96.0099. Ward's Hierarchical Grouping Technique applied to the remaining data of 150 subjects resulted in two groups of 69 and 81 subjects, accumulated error = 46.5457. Results of the discriminant analysis run to test appropriateness of each subject's group placement indicated a very small percentage (10%) had been grouped inappropriately by Ward's.

Results of the conventional discriminant analysis indicate that groups formed on the basis of Ward's Hierarchical Grouping Technique were significantly separated by the profile score variables. F test on Wilks Lambda was found to be significant at the .01 level of confidence.

Insert Table 1 about here

Results of the univariate F tests indicate that each of the variables differentiated (P .01) between the groups.

Insert Table 2 about here

Visual examination of data for the two groups indicates that average scores of individuals within the two groups are roughly comparable to scores obtained by poorly functioning and normally functioning subjects as described

by Shostrom. The POI manual states, "self-actualized groups are significantly higher on all scales and nonself-actualized groups tend to be lower on all scales. Normal groups tend to score in between" (Shostrom, 1972, p. 21).

Insert Table 3 about here

Discussion

Application of the procedures described in this paper provides an alternative method for interpretation of test data. Applications of this technique are not limited to POI data and could be made to similar types of tests when scores are not to be interpreted on an individual basis. This efficient procedure would be most useful in dealing with large numbers of subjects in which groups are defined in liberal terms, rather than in cases in which each member of a group must be precisely described. It is recognized that in many cases application of these procedures would be inappropriate and, in such cases, individual clinical judgement of the psychologist would be the appropriate method used to evaluate test data.

Results of discriminant analysis in classifying subjects indicate impressive accuracy (90%) of subject placement in groups by Wards, while results of the second discriminant analysis which examines relationships between variables in groups indicate that the procedures applied result in groups significantly separated by profile variables. Since profile scores were used as grouping variables, it is not surprising that discriminant analysis reveals that groups were significantly separated when scores from the POI are used as independent variables. However, when results of conventional discriminant analysis are treated as a statistical test of the success with which Wards and classifacatory discriminant analysis form groups, this statistic is found to contribute in an important way to data analysis.

While results of applying statistical procedures to POI data appear to be impressive, these findings would be meaningless if the groups formed based on these applications bore little resemblence in terms of average subject scores to Shostrom's profile descriptions of similar groups. For this reason examination of Table 3 is particularly relevant. The higher scoring group bears remarkable resemblance to Shostrom's descriptions of typical college students while the scores for the lower group appear similar to those of less self-actualized persons, represented by POI profiles for entering college freshmen and alcoholic males. The POI profile for alcoholic males was selected to represent those of poorly functioning persons as was that for POI entering college freshmen (male and female). These profiles are very similar to the lower scoring group's profile with this study data. According to self-actualization theory younger people as a group are less fully functioning that are mature adults. Therefore, scores obtained by older college students which bear resemblance to those of entering freshmen indicate that these older people appear to be relatively poorly adjusted.

In conclusion, examination of results of this study indicate that statistical procedures can be used as an alternative to subjective interpretation of test data in certain circumstances. Groups were formed on the basis of applying statistical procedures to test data rather than by relying on clinical judgement to form groups. Scores obtained by subjects in the two groups appear to be similar to scores described by the POI manual as being typical of poorly adjusted and normally adjusted people.

References

Barker, H. R. Behavioral sciences statistics program library. University Al.: University of Alabama Reproduction Services, 1973.

Shostrom, E. L. Manual for the Personal Orientation Inventory. San Diego: Educational and Industrial Testing Service, 1972.

Ward, J. H., & Hook, M. E. A hierarchical grouping procedure applied to a problem of grouping profiles (ASD-TN-61-55). Lackland Air Force Base, Tex.: Personnel Laboratory, Aeronautical Systems Division Air Force Systems Command, October 1961.

Table 1

Results of Conventional Discriminant Analysis
for Two Groups on POI Data

Variables	Wilks Lambda	DF-B	DF-W	F*	X^2	DF
Two Ratio Scales----	.430	2	0	.000	419.771	2
Ten Profile Scales--	.537	10	489	42.195	307.328	10

*For 2 groups and 2 variables the F ratio is not correct. Chi square for the discriminant root is interpreted.

Table 2

Univariate Analysis of POI Variables
$df_b = 1$, $df_w = 498$

Variable	MS-B	MS-W	F
Time Competence (Tc)	2169.5166	5.0584	428.8937
Inner-Other Support (I)	28884.7812	74.4766	387.8370
Self-Actualizing Value (SAV)	1145.7891	8.4041	136.3377
Existentiality (Ex)	2602.4941	13.5842	191.5828
Feeling Reactivity (Fr)	874.4678	7.9401	110.1332
Spontaneity (S)	922.5137	5.3047	173.9036
Self Regard (Sr)	860.5361	4.5992	187.1070
Self Acceptance (Sa)	828.1611	7.6614	108.0959
Nature of Man (Nc)	262.3179	4.3450	60.6519
Synergy (Sy)	148.1802	1.7141	86.4479
Acceptance of Aggression (A)	976.9150	8.0493	121.3665
Capacity for Intimate Contact (C)	2099.8223	10.3878	202.1427

Table 3

Comparison of Average Scores and Standard Deviation
for Study Data and for POI Manual Data

POI Scales:	Tc	I	SAV	Ex	Fr	S	Sr	Sa	Nc	Sy	A	C
Average Scores for Study Sample, Poorly Functioning People												
Mean:	13.1	73.0	17.1	16.6	14.0	10.2	10.3	13.0	10.5	6.4	14.4	15.2
S.D.:	2.6	9.0	3.3	3.5	3.0	2.4	2.4	2.9	2.4	1.5	3.1	3.4
Average Scores for Study Sample, Normally Adjusted People												
Mean:	17.3	88.3	20.4	21.2	16.7	13.0	12.9	15.6	11.9	7.5	17.1	19.3
S.D.:	1.9	8.2	2.5	3.9	2.6	2.2	1.8	2.6	1.7	1.1	2.5	3.0
Average Scores for College Sample, POI Manual, Males												
Mean:	15.1	75.6	18.8	16.7	13.8	9.7	11.5	13.7	11.6	6.3	15.1	15.6
S.D.:	2.9	8.9	2.6	4.4	2.9	2.2	2.2	3.1	2.0	1.4	3.0	3.4
Average Scores for College Sample, POI Manual, Females												
Mean:	16.2	76.0	19.1	17.2	13.7	9.6	11.5	14.3	11.9	6.6	15.0	15.6
S.D.:	2.7	9.7	3.4	4.2	2.8	2.4	2.3	2.8	1.9	1.3	2.9	3.3
Entering College Freshmen (Male and Female), POI Data												
Mean:	15.1	75.6	18.8	16.7	13.8	9.7	11.5	13.7	11.6	6.3	15.1	15.6
S.D.:	2.9	8.9	2.6	4.4	2.9	2.2	2.2	3.1	2.0	1.4	3.0	3.4
Alcoholic Males, POI Data												
Mean:	13.0	73.6	18.4	16.6	14.2	8.7	9.9	13.8	11.2	5.6	13.8	15.6
S.D.:	3.2	9.9	2.4	4.1	2.2	2.4	2.7	2.5	2.0	1.7	2.5	4.2