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RELATIONSHIPS BETWEEN TWO 16PF INTERPRETIVE SYSTEMS

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ABSTRACT

The interrelationships between a "rational" (Krug, 1981) and an "empirical" (Burger & Kabacoff, 1982) 16PF interpretive system were explored using a variety of procedures. A method for representing the rational types in the space of the empirical system was presented, and ways in which the two systems could be used in tandem were discussed. A number of graphical procedures, including the use of star glyphs, were suggested in order to facilitate profile interpretation.

Recently two taxonomies of 16PF profiles have been developed to aid in the interpretation of protocols from that test. One system (Krug, 1981) is a "rational" system in which scores on the 16PF second order factors of Extraversion, Anxiety, Tough Poise and Independence were collapsed into the categories high, average and low. All possible combinations of the three score levels for the four second order factors were taken as prototypical definitions of the resulting eighty-one 16PF patterns. Subjects from the most recent standardization of the 16PF were then assigned to one of these eighty-one patterns, and profiles of these groups on the 16PF scales (and other scales) were presented. Each of the eighty-one profiles is identified by a four digit code, with each digit — which can vary from one to three — representing the level (low, medium, high) of the four second order factors respectively. Thus, the code 2222 would represent a pattern in which the four second order factor scores were all in the average range. To use the system, one must collapse each of the second order factor sten scores of a particular protocol into the low, medium and high scheme to obtain its four digit code. The interpretive material for the protocol can then be found in Krug (1981) under that particular code. A narrative interpretation of each of the patterns is also offered. The system is a "rational" one in that the categories were generated by an a priori schema.

By way of contrast, Burger and Kabacoff (1982) have developed an empirically based system of 16PF profile interpretation utilizing a variant of a Q-type factor analytic classification strategy (Skinner, 1979). Four bipolar types (or profiles) were isolated from an empirical analysis of 16PF profiles. These four "modal profiles" have been *tentatively* labelled Poor vs. Healthy Adjustment, Self Sufficient vs. Socially Dependent, Extraverted vs. Introverted, and Flexible-Abstract vs. Practical-Conventional. These modal profiles are the 16PF profiles of "idealized individuals", and represent the orthogonal axes of the typological model. Any subject can be located in the typological space by computing the projections (Pearsonian correlations) of that 16PF profile with the modal profiles.

Those projections (which indicate the degree of relationship between the shape of the profile and the modal profiles), along with the overall elevation and scatter of the profile, complete the description of the profile in the model. Conventionally, a correlation of ±.50 or greater of a 16PF protocol with a particular modal profile indicates a successful classification into that particular personality "type". Some individuals may resemble one type ("idealized individual"), some may resemble more than one type, and still others may not resemble any of the types. Once a set of profiles has been classified into a particular personality type, plotting their respective elevation and scatter components can provide a basis for further distinguishing among them. Thus Burger and Kabacoff (1982) found that neurotic and psychotic profiles (classified into the poor adjustment type) differed in that the neurotic profiles clustered in the high elevation — high scatter section of such a plot while the psychotic profiles clustered in the low-elevation — low scatter region of the plot. Thus, one can emphasize the dimensional aspects of the model by considering the location of a particular individual in the system (i.e., to what degree is it related to each of the ideal types) by examining the coordinates of the profile in the typological space or may underscore the type aspects by focusing upon the typal classification procedure (e.g., this profile is classified as an introvert type).

Both of these systems have much to recommend their use. The rational system developed by Krug (1981) represents an actuarial approach to 16PF interpretation, and is tied to a database containing 16PF correlates for more than 17,000 individuals. These correlates include occupational scales, career-theme scales, clinical scales and several other miscellaneous scales. Actuarial approaches to test interpretation have an extensive history and have been a particularly useful contribution to MMPI development (e.g., Gilberstadt & Ducker, 1965; Marks, Seeman & Haller, 1974; Webb & McNamara, 1979). The size and breadth of this database ensures sampling adequacy and provides the rational system with useful normative data. The empirical system developed by Burger and Kabacoff (1982) represents a psychometric, dimensional approach that is intuitively appealing. Like the rational system, it has demonstrated the ability to adequately describe a large variety of profile types, including occupational and clinical mean profiles contained in the 16PF *Handbook* (Cattell, Eber & Tatsuska, 1970) and the individual profiles contained in *A Guide to the Clinical Use of the 16PF* (Karson & O'Dell, 1976). Unlike the categorical approach of the rational system, the empirical system employs a dimensional model which is more sensitive to and appropriate for the measurement of profile change over time.

The purpose of this paper is to study the interrelationships between these two systems. Each system has reasons to recommend its use, and some assessors may wish to employ both systems to interpret a particular 16PF profile. For the remainder of this paper, Krug's (1981) system will be referred to as the rational system, while that of Burger and Kabacoff (1982) will be referred to as the empirical system.

METHOD

The eighty-one profiles of the rational system were correlated with the four modal profiles of the Empirical system. These correlations locate the eighty-one

profiles in the four dimensional typological space of the profiles. In addition, the elevation (overall mean of the profile) and scatter (standard deviation of the profile) parameters were calculated and each rational profile was "typed" by assigning it to one of the modal profiles (types) if it correlated ±.50 or greater with it.

RESULTS

Table 1 presents the results of the typological classification in terms of both the percentage of rational profiles classified and estimates of the classification rates in normal populations. These latter rates were obtained by summing the population incidences (in normal populations) of the rational profiles (as reported in Krug, 1981) that were classified into a particular empirical type.

TABLE 1

Classification Rates* of Rational Profiles into Empirical Personality Types

	Type	N	%	Estimated Population** Percentage
I.	Poor Adjustment	13	16	17%
	vs			
	Healthy Adjustment	11	14	10.5%
II.	Self Sufficient	6	7	10.3
	vs			
	Socially Dependent	7	9	8.8
III.	Extraverted	12	15	10.9
	vs			
	Intraverted	15	19	9.1
IV.	Flexible-Abstract	4	5	8.1
	vs			
	Practical-Conventional	5	6	6.1
	Unclassified	8	10	19.5

* N = 81

**Based upon the incidence of the rational profiles (within a particular empirical type) in normal populations (Krug, 1981).

The classification rates of the rational profiles (90%) and estimated classification rates in normal populations (80.5%) compare very favorably with those in several MMPI actuarial systems (Payne & Wiggins, 1968), and are considerably higher than those reported in the derivation of the empirical system (Burger & Kabacoff, 1982). These classification rates represent further evidence for the robustness of the empirical system. In interpreting the two percentage columns in Table 1, it is important to remember that the estimated population percentage differs from the percentage of rational system profiles classified (into a particular type) because of differences in the relative incidences of the rational profiles in normal populations. Looking first at the classification rates of the rational profiles themselves, there is an approximately equal classification rate at each pole. Type I and III occur most frequently — almost 2/3 of the time. In normal populations, the estimates indicate that the highest classification rate (17%) is for the Poor Adjustment pole of the first type. The classification rates of both poles of the remaining types evidence only a small degree of variability, averaging about 9% at each pole.

Since the correlations of the rational profiles with the modal profiles are also the projections of those profiles on the four orthogonal axes of the empirical typological space, the examination of the position of the rational profiles in the space of the modal profiles offers some interesting insights into the fit between the two systems.[1] The four modal profiles correlate significantly with the scores on the second factors of Anxiety, Tough Poise, Extraversion and Independence (r's = .83, .80. .90 and .90 respectively). About a third of those rational profiles classified into a particular type have projections exceeding [.50] on two modal profiles. Since the rational system was designed to represent every possible combination of second order factor scores (and consequently, many different 16PF profiles), it is not surprising to find some profiles occupying positions midway between two modal profiles. Thus, rational profile 3312, with projections of .10, - .11, .89 and .10 on modal profiles I through IV respectively, is an example of a relatively pure type since it has a large projection on modal profile III (the extraverted pole of the Extraverted-Introverted type) and near zero projections on the other three modal profiles. Rational profile 2112, with projections (correlations of - .57, - .61, - .06 and - .01) on the respective modal profiles, is a combination of the negative poles of modal profiles I and II.

Plots of various 16PF profiles in the space of the modal profiles can provide a basis for comparing different 16PF protocols. While there are difficulties in portraying all four dimensions simultaneously (more will be said of this later), pairs of major dimensions can easily be represented. Figure 1 presents several profiles plotted in the space of Modal Profiles I and III respectively. The four solid lines plot the positions of four of the rational types (3212, 3122, 2122, and 1122). The dotted lines are plots of profiles selected from *A Guide to the Clinical Use of the 16PF* (Karson & O'Dell, 1976). The projections of all these profiles were generated by correlating them with the four modal profiles found in Burger and Kabacoff (1982). Profiles A and B (cases I and II in Karson & O'Dell) are the profiles of "a man with psychosomatic symptoms" and "a case of reactive depression," while profiles C and D (case XIV in Karson & O'Dell) are the profiles of an individual who was tested twice and labelled "a situational reaction". The

plots illustrate a number of uses of both the rational and empirical systems. Looking first at the lower left hand quadrant of Figure 1, profiles A and B would both be classified as type 2122 in the rational system (on the basis of their second order factor scores). However, while A is somewhat proximate to the profile of that rational type, B is some distance away, and actually is quite a bit closer to the 1122 rational type. Rather than relying solely upon the second order factor scores, it might be better to use proximity in the space of the modal profiles as a method to assign a particular individual profile to a particular rational type. This could be done by determining the correlations of a particular profile to be interpreted with the modal profiles. Correlations between the rational types and the modal profiles[1] could then be consulted, and the proximity of a profile to the rational types could be determined by inspection or, perhaps, via a plot such as Figure 1. Looking next at the upper left hand quadrant of Figure 1, the profile C is classified (on the basis of the second order factor scores) as rational type 3212, while D (the second testing of the same individual), is classified as a 3122 type. The plot clearly indicates that D is closer to rational type 3212 than type 3122, although the change between the two testings is clearly towards 3122. The plotting of profiles C and D is useful because it indicates the direction of movement of the profile (over the two testings) — a highly useful feature in interpreting profile change. Care should be taken in interpreting such changes as it is possible they reflect the effects of unreliability. The plot also again highlights the problem of using the second order factor scores as a basis for classification in the rational system.

It is possible to represent all four axes of the empirical system on a two dimensional surface by means a *glyph* (Anderson, 1960). Figure 2 gives several examples of star glyphs constructed from the projections of a particular 16PF protocol on the four modal profiles. The center of each glyph is the negative pole of all four axes, which radiate from the center to the edge of the circle at the four compass points. The zero point for each axis is located at the point halfway between the center and the edge of the circle. The positive pole is located at the point where each axis touches the edge of the circle. The location of these points is illustrated in Figure 2(a). By connecting the points on each of the four axes a polygon is generated. The shape of the polygon is unique to that particular set of projections in the four dimensional space of the modal profiles. One can compare different profiles by comparing the shapes of their respective glyphs. The glyph (b) represents a profile which has zero projections on axes I, II and IV, and has a +1.00 projection on axis III. This is an example of a pure "Extravert" (Modal Profile III — positive pole) type. Glyph (c) illustrates a "mixed" type — zero projections on II and IV, +.50 on I and -.50 on III. Glyph (d) portrays a pure "Introvert" (Modal Profile III — negative pole) type. Glyphs (e) and (h) portray two of the rational types plotted in Figure 1, while glyphs (f) and (g) describe the two clinical profiles from Figure 1. Note that again, as was indicated in Figure 1, profile B is more similar to rational type 1122 than type 2122 (as measured by the similarity between their respective glyphs).

DISCUSSION

This paper has outlined the major relationships between two 16PF interpretive systems and suggested that they can be profitably used in tandem. To utilize both

systems in the interpretation of a particular 16PF protocol, one would first correlate (this can be easily accomplished on a pocket calculator) that profile with the four modal profiles (Burger & Kabacoff, 1982) in order to determine the projections of the profile on the four axes of the empirical system. That profile, and relevant rational patterns, could then be plotted (using either the conventional Cartesian coordinate system or glyphs) to represent the position of the individual profile with respect to both the rational patterns and the modal profiles.[2] A number of individuals (Tukey, 1977; Wainer & Thissen, 1981) have emphasized the utility of such graphical displays in interpreting data. The similarity of the profile to rational patterns and modal profiles could be used, along with other data to make the profile interpretation. It is further suggested that the proximity of a particular profile to relevant rational patterns (in the space of the modal profiles) may be a better index of similarity to the rational patterns than the second order factor schema proposed by Krug (1981). Thus, by using the procedures described above, one can determine which of the rational types a given profile is most similar to, and consult the interpretive material associated with that type. Glyphs, in particular, may be useful for such comparisons. Each rational pattern, when plotted as a glyph in the space of the empirical system, generates a polygon whose shape is unique to that pattern. If the glyphs of all the rational patterns are drawn, then the glyph of any particular profile can be visually compared to the rational glyphs.

The empirical system (four bi-polar types) is more general than the rational system (81 types), and the choice between the systems could be made in terms of preference for a more specific or more general approach. However, the systems may be used in tandem (as described in this paper), and such use may add to the utility of each. The empirical system is ideally suited for graphical representation of profiles, and is particularly useful for depicting and measuring change in profiles over several testings. Further, the personality types of the system appear to have some clinical appeal and make theoretical sense. The rational system brings with it a rather large database, profile correlates and profile interpretations. The richness of that database, when used for individual profile interpretation via the dimensions of the empirical system, offers a powerful new approach to the interpretation of 16PF protocols. Similar quantitative approaches have had at least some utility when applied to the MMPI (e.g., Skinner, 1977b). As research identifies more correlates of the types in either system, this information can be integrated into the other via the procedures suggested in this paper. Finally, the two systems combined may offer a convenient framework which can be utilized to describe 16PF profiles in addition to a simple presentation of scale scores.

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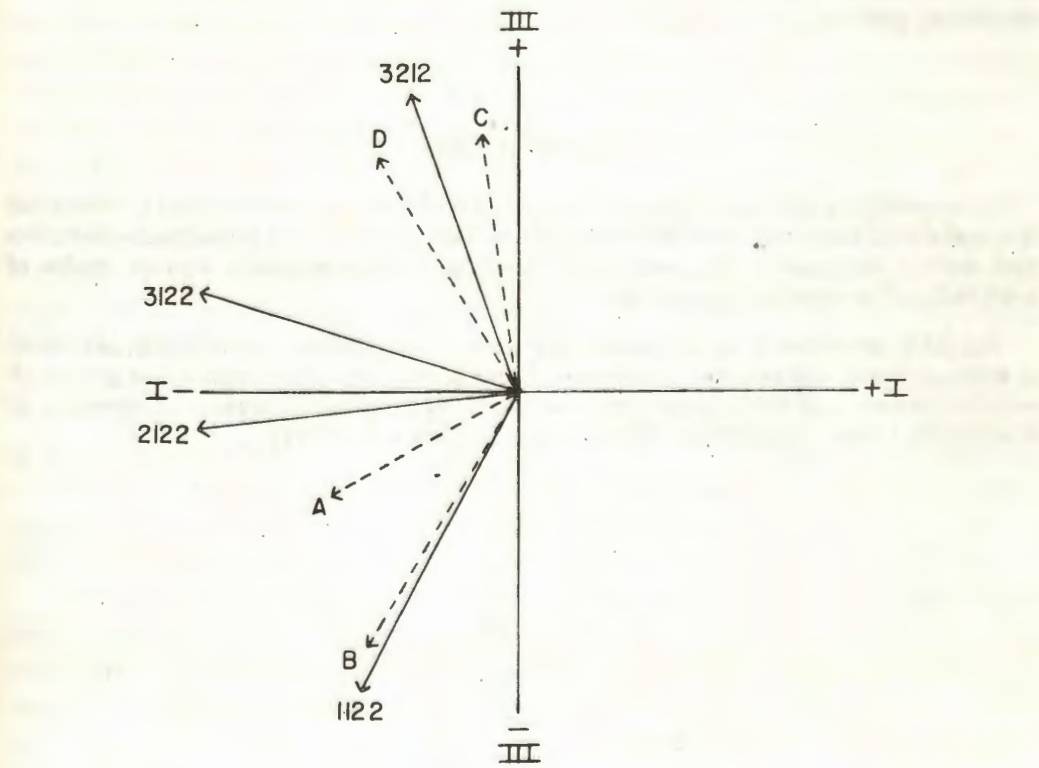

Figure 1. Plot of the vectors of selected rational types (solid lines) and two clinical profiles (dotted lines) on Modal Profiles I and III.

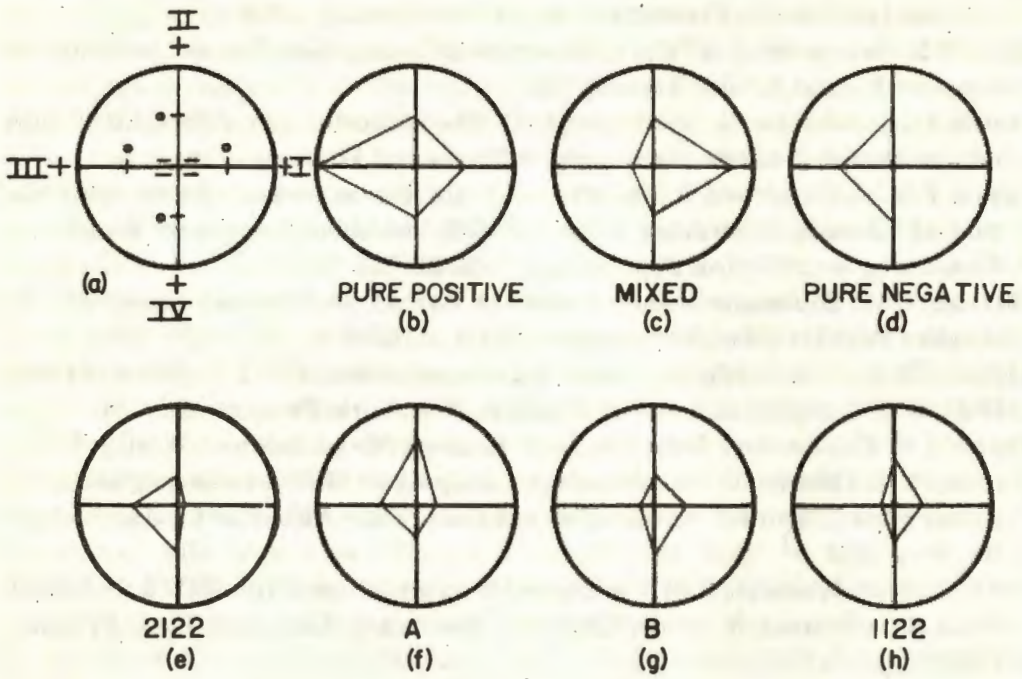

Figure 2. Glyphs of various 16PF profiles in the four dimensional space of the empirical system.

FOOTNOTES

[1]An appendix containing the correlations of each of the eighty-one rational profiles with the modal profiles is available from the authors. The appendix also contains the elevation and scatter parameters for these profiles, along with suggestions and examples of applications for personality assessment.

[2]An SAS computer program which calculates the projections of a particular 16PF protocol on the modal profiles, determines the rational type, and generates star glyphs of both the protocol and the rational type is available from Robert I. Kabacoff, University of Missouri-St. Louis, Department of Psychology, St. Louis, MO 63121.