MULTIVARIATE EXPERIMENTAL CLINICAL RESEARCH

VOLUME 6 NUMBER 3 1983

A Journal for Basic Behavioral Research into Personality Dynamics and Clinical Psychology

Published Three Times a Year by the Psychology Press, from the Department of Psychology, Wichita State University
Wichita, Kansas, U.S.A.

POLICY STATEMENT

The primary aim of *Multivariate Experimental Clinical Research* is to provide a publication outlet for research in the areas covered and indicated currently by the terms personality study, clinical diagnosis and therapy, extending into the learning, social, physiological, applied and developmental aspects of these. Although due representation is given to theoretical articles which may have a methodological basis, the journal is not one of multivariate statistical methods. Although multivariate in outlook, both manipulative and non-manipulative research is accepted. In fact preference is given to dynamic, manipulative and time-sequential studies. Particular encouragement is provided for pioneer experimental attacks on what is designated personality dynamics and motivation, as well as the natural expansion thereof into structured learning theory.

Multivariate Experimental Clinical Research, Volume 6, No. 3, 1983, 101-110

BELIEF IN A DIFFICULT WORLD: THE PSYCHOLOGICAL ADJUSTMENT COMPONENT OF INTERNAL-EXTERNAL LOCUS OF CONTROL

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ABSTRACT

Factor analytic studies of Rotter's I-E Scale suggest that locus of control is multidimensional, though little has been done to advance theory by making specialized predictions based on the separate dimensions. Lefcourt noted a paradox in the observation that externals are statistically higher in anxiety and other psychopathological indicators, given their perceived inability to change their negative circumstances. It was hypothesized that this paradox could be resolved by examining the relationships of the locus of control factors to measures of psychological adjustment. More particularly, it was predicted that Belief in a Difficult World — a factor identified by Collins — would bear a significant relationship to the adjustment measures since this factor appeared to reflect a sense of alienation and fatalism. Collins' Difficult World factor and other factors were clearly identified in the present study. Adjustment measures included anxiety, depression, anomia, and self-esteem. As predicted, Belief in a Difficult World was substantially correlated with these measures, as was total score, whereas correlations of the other factors ranged from near zero to moderate in magnitude.

The locus of control construct emerged from the work of Rotter and his associates in the context of social learning theory (Rotter, 1954, 1966; Rotter, Chance, & Phares, 1972; James, 1957; Phares, 1957). As formulated by Rotter (1966) a person may be located on a bipolar dimension of internal versus external control orientation depending upon the degree to which the generalized expectancy of control reinforcement is perceived as contingent upon one's own behavior (internal orientation) as opposed to forces beyond one's control (external orientation). "Generalized expectancy" refers to the relative pervasiveness of control orientation, implying a reasonably stable characteristic in people without denying that situation-specific perceptions may often occur which are uncharacteristic of such a general tendency. Though this construct was not developed as a

measure of psychological adjustment, positive relationships have frequently been reported between externality and depression (e.g., Abromowitz, 1969), anxiety (e.g., Ray & Katahn, 1968), and self-esteem (e.g., Fleming & Watts, 1980). Lefcourt (1976) noted an apparent paradox in the fact that one who perceives little or no responsibility for one's situation — i.e., an external — should feel anxious or depressed about events beyond one's personal control. Lefcourt asked: "Indeed, why should a person experience anxiety if his world is already perceived as unpredictable and uncontrollable?" (1976, p. 86). He further stated that: "It may be concluded then that there is enough convergence of theoretical and empirical data to support the assumption of correlation between locus of control and psychopathology. What is missing are the factual details that are needed to fill in the gaps related to specific questions of how and why" (p. 95).

A plausible explanation for Lefcourt's paradox may be found in the multidimensional nature of locus of control. Levenson (1972) constructed multidimensional scales to measure three aspects of control orientation: internality (*I*), or a belief in personal control; chance (*C*), representing a belief in chance or fate; and powerful others (*P*), a belief that control lies in the hands of other people. In a psychiatric sample she found that paranoids and undifferentiated schizophrenics had higher scores than neurotics on the two external scales, *C* and *P* (Levenson, 1973). Other studies with the *I*, *C*, and *P* scales are reviewed by Levenson (1981), including results for alcoholics and prisoners.

While Levenson's work has made an important contribution to the understanding of locus of control and its relationship to psychopathology, it does not explain the relationship between psychological adjustment and the Rotter Scale as such. Rotter's (1966) I-E Scale is still the most commonly used measure of locus of control as a bipolar trait, but there is considerable evidence for its multidimensionality (e.g., Gurin, Gurin, Lao, & Beattie, 1969; Joe & Jahn, 1973; Mirels, 1970; see also reviews by Lefcourt, 1976; Phares, 1976; and Rotter, 1975, critical discussion of measurement issues). Collins (1974) argued convincingly that problems arose with the Rotter Scale because of its forced-choice format which requires respondents to pick one statement each from 23 pairs of I-E propositions; this forced-choice procedure might obscure potentially relevant factors from emerging if subjects are in fact responding to more than one stimulus construct. By converting each of 23 item pairs to 46 independent statements to be rated as Likert scale items, Collins obtained four bipolar (internal-external) factors which he identified as: Belief in a Difficult World, a Just World, a Predictable World, and a Politically Responsive World. A person endorsing Difficult World items "believes that his environment is composed of difficult, complicated, and unsolvable tasks . . . not to be equated with an unlawful world ruled by Lady Luck" (Collins, 1974, p. 385). This type of lack of control would seem to be related to such negative affective states as depression and alienation. A person who scores externally on the Difficult World factor believes that positive actions to change existing circumstances are futile and doomed to failure. Such a person may have learned not to try to attempt changing negative conditions. Seligman's (1975) learned helplessness construct or Beck's (1967, 1976) cognitive theory of depression provide potential theoretical frameworks for exploring this form of externality.

According to Collins, Belief in a Just World characterizes people who, near the internal terminus of the scale, believe in justice and equity in the world. The Predictable World factor is strongly characterized at the external pole by a belief in luck or fate, and at the internal pole by lack of such a belief. The Politically Responsive World factor contained items pertaining to the individual's ability to cope with government, change the political system, the possibility of preventing wars, and the like. The degree to which this factor and the Just and Predictable World factors should be related to mental health is less clear than is the case with the Difficult World factor. Conceivably one could view the world as unjust, unpredictable, and unresponsive in the main, yet maintain a positive outlook precisely because these things are beyond immediate control, per Lefcourt's paradox. One who scores on the external end of any of these factors might or might not feel depressed, anxious, or alienated, depending, perhaps, on more complicated factors in the individual's psychological makeup or circumstances. Since for many situations externality may represent a realistic mode of functioning, psychological well-being may not depend on a particular internal-external orientation, at least as regards the latter three factors.

Collins also considered that, though four interpretable factors were identified, there was still a "common thread" of generalized expectancy present, as indicated by loadings of most variables on the largest unrotated factor. Collins' study has been replicated by Duffy, Shiflett, & Downey (1977) for a group of Army reservists; four of their five factors resembled the Collins' factors, while a fifth appeared to measure a Friendly versus Unfriendly World.

The purpose of the present study was to relate Collins' factors of locus of control to several measures of personal adjustment. From the above considerations it was hypothesized that internality would be associated with a greater degree of psychological health on the Difficult World factor. The finding that factors other than Difficult World were unrelated, or were less strongly related, to the adjustment measures might then be interpreted as a resolution of the paradox raised by Lefcourt.

METHOD

SUBJECTS

Subjects were 148 female and 111 male participants for class credit in first-year psychology courses at California State University, Northridge. The median age was 19.0; 82% were white non-Hispanic. Each attended two sessions of one hour duration as part of a research program for examining the relationships between a number of self-administered, self-report measures of personality.

TESTS AND FORMS

Participants completed a personal data form stating sex, age, estimated grade-point average (GPA), and other kinds of background information. The Marlowe-Crowne Scale (Crowne & Marlowe, 1964) was administered to ascertain whether the locus of control factors and other measures were correlated to any extent with social desirability. Thorndike's (1942) Vocabulary Test, the McClosky-Schaar (1965) Anomy Scale, Bendig's (1956) short form of Taylor's

(1953) Manifest Anxiety Scale, Beck's (1967) Depression Inventory, the Rosenberg (1965) Self-Esteem Scale, and an extended version of Janis and Field's (1959) Feelings of Inadequacy Scale, were also administered. The latter was developed as a multidimensional measure of self-esteem by Fleming and Courtney (in press), who identified five factors as: Self-Regard (a general self-worth dimension, similar to Rosenberg's, 1965, construct), Social Confidence, School Abilities, Physical Appearance, and Physical Abilities. The non-adjustment measures were included to partially assess the discriminant validity of the factor scales. To be useful a factor should not be too highly correlated with logically distinguished constructs.

Collins' (1974) modifications to the Rotter Scale were used in the present study to measure locus of control. A six-point agreement format was used, varying the order of the items at random.

RESULTS

FACTOR ANALYSIS AND INTERPRETATION

Four factors were extracted via principal axis factor analysis with squared-multiple correlations as initial communality estimates. There were 15 eigenvalues greater than one, but the correct number of factors using Cattell's (1966) scree test was four. The 10 largest eigenvalues were: 6.04, 3.48, 2.41, 2.00, 1.69, 1.52, 1.48, 1.46, 1.36, and 1.27. The four factors were transformed by direct oblimin with the obliquity parameter set to zero. The percentage of total variance accounted for by the common factors was 30.3%, which is comparable to Collins' 29%.

Belief in a Difficult World. For interpretive purposes an item was assigned to a factor based on its largest absolute loading greater than .30. A Difficult World (*DW*) factor clearly emerged with 8 of Collins' 11 *DW* items loading on this factor. Largest loadings from this group were: "Many times I feel that I have little influence over the things that happen to me," .59; "By taking an active part in political and social affairs the people can control world events," -.54; and "Sometimes I can't understand how teachers arrive at the grades they give," .44.

Four additional items loaded on this factor which were not definers in the Collins paper. All of these had to do with school. These items were: "The idea that teachers are unfair is nonsense," -.53; "Many times exam questions tend to be so unrelated to course work that studying is really useless," .45; "In the case of the well-prepared student there is rarely if ever such a thing as an unfair test," -.42; and "Most students don't realize the extent to which their grades are influenced by accidental happenings," .34.

It does not seem surprising that such school-related items contributed to *DW* for a college sample. It is not clear, however, why these items were salient for the present group, but not for Collins' undergraduates. Perhaps the fact that most of our participants were in their first year made a difference, as the freshman year is indeed the most difficult for students.

Belief in a Just World. A Just World (*JW*) factor was identified having six definers, five of which were also salient in the Collins study. (A seventh item was

dropped to improve reliability; see below.) Five items which loaded on this factor in the Collins study did not load here, however. Items with the largest loadings were: "People are lonely because they don't try to be friendly," .53; "People who can't get others to like them don't understand how to get along with others," .44; and "Most misfortunes are the result of lack of ability, ignorance, laziness, or all three," .40.

Belief in a Predictable World. This factor (*PrW*) was defined by six of the seven items identified in the Collins study, plus two others that were identified by Collins as *JW* items. The latter two were: "What happens to me is my own doing," .44; and "In the case of the well-prepared student there is rarely, if ever, such a thing as an unfair test," .34. The content of these items seems consistent with the *PrW* as well as the *JW* construct; these items were not split between these two factors in either study, however.

Largest loadings on *PrW* were: "Becoming a success is a matter of hard work, luck has little or nothing to do with it," .71; "Getting people to do the right thing depends upon ability; luck has little or nothing to do with it," .62; and "There is really no such thing as luck," .58.

Belief in a Politically Responsive World. Collins' Politically Responsive World (*PolW*) factor was very closely identified in the present study with seven of his eight items loading on it. An additional item was also salient here ("There will always be wars, no matter how hard people try to prevent them," .33), but one item was deleted due to lack of reliability (see below). The largest loadings were: "This world is run by the few people in power, and there is not much the little guy can do about it," .70; "The average citizen can have little influence in government decision," .62; and "By taking an active part in political and social affairs the people can control world events," -.60.

Summary. The four factors identified here were interpreted as being very similar to those in the Collins study. Most of the same items loaded on *DW* as well as four school-related items, also interpreted as contributing to the Difficult World construct. There were fewer salient loadings on *JW*, with two of the Collins *JW* items loading on *PrW*. Otherwise, the pattern of *PrW* loadings was very close to that reported by Collins, as was the pattern for *PolW*.

FACTOR SCALES

Scales were formed by summation of the items saturating the appropriate factors. Three items (one each from *DW*, *JW*, and *PolW*) were eliminated due to low item-total correlations. Scale correlations and internal consistency coefficients are presented in Table 1. Except for the rather low value of coefficient alpha for the *JW* scale, reliabilities appear acceptable. With the exception of *DW* with *PolW*, scale intercorrelations were not substantial.

TABLE 1

Scale Interrcorrelations and Internal Consistency Coefficients

Scales		Scales I.	II.	III.	IV.	Total
I.	Difficult World	.77				
II.	Just World	-.03	.59			
III.	Predictable World	.28	.24	.73		
IV.	Politically Responsive World	.44	.05	.14	.78	
	Total Scale (46 items)	.77	.33	.63	.63	.82

Note: Diagonal entries contain coefficient alpha.

CORRELATIONS WITH INDIVIDUAL DIFFERENCE MEASURES

The correlations of the factor scales and the individual difference variables are displayed in Table 2. In evaluating these results it should be remembered that for a moderately large sample (n = 259 here), a correlation as low as .15 is significant for a one-tailed test at alpha = .01. To be of practical significance in evaluating the hypothesis that the Difficult World is related to psychological adjustment, correlations of at least .20 and preferably .30 or greater should be obtained. From Table 2 it can be seen that this hypothesis is confirmed; the lowest (absolute) correlation between adjustment and Difficult World is .22, with the remaining coefficients ranging from .24 to .40. These are all in the predicted direction such that externality is negatively related to adjustment. Though there is a tendency for externality to mirror the same pattern on *PolW* as on *DW*, the *PolW* correlations are much lower. With the exception of a few small but significant differences, the *JW* and *PrW* scales appear to be unrelated to these adjustment variables.

Correlations of the factor scales with social desirability seem moderate and acceptable. Scale correlations with the non-adjustment variables are generally small, which should also be expected.

TABLE 2

Correlations of Locus of Control Scales with Individual Difference Variables

Variables	Scales				
	I. Difficult World	II. Just World	III. Predictable World	IV. Politically Responsive World	Total
STATUS					
Age	-.14*	-.00	-.04	-.06	-.12*
Sex[a]	-.01	-.23***	.01	-.02	-.06
Birth order	-.09	-.06	-.03	-.04	-.05
Number of sibs	-.12*	-.06	-.07	-.08	-.10
ACHIEVEMENT/ INTELLECT					
Reported GPA	-.12*	-.06	-.04	-.04	-.14*
Vocabulary	-.11*	.04	-.02	-.04	-.08
SOCIAL DESIRABILITY	-.24***	.06	-.20***	-.13*	-.24***
PSYCHOLOGICAL ADJUSTMENT					
Self-Esteem Scales[b]					
Self-Regard	-.40***	.02	-.18**	-.19***	-.34***
Social Confidence	-.34***	.01	-.17**	-.22***	-.31***
School Abilities	-.40***	-.02	.07	-.25***	-.32***
Physical Appearance	-.22***	-.08	-.10	-.21***	-.24***
Physical Abilities	-.25***	-.02	-.10	-.07	-.19***
Rosenberg Self-Esteem	-.40***	.04	-.15**	-.20***	-.34***
Anxiety	.40***	-.02	.17**	.24***	.36***
Depression	.24***	-.04	.10	.16**	.22***
Anomy	.39***	-.12*	.07	.25***	.31***

Note. Significance tests are one-tailed.

[a]Females were arbitrarily assigned the lower nominal code for the sex variable.

[b]Fleming and Courtney (in press) Self-Rating Scales.

*$p < .05$ **$p < .01$ ***$p < .001$

DISCUSSION

A number of studies have found the Rotter Scale to be multidimensional. In the present study four factors were found using Collins' (1974) expansion of this scale. These factors corresponded closely to those discussed by Collins. As predicted, the Belief in a Difficult World factor was more highly associated with the adjustment measures than were the others. Thus, the paradoxical relationship of Rotter's (1966) locus of control with such measures of personal adjustment appears to be due primarily to this component.

Although the need for multidimensional measures of locus of control seems well-established, additional research is needed to further clarify the relationships between these dimensions and measures of adjustment and psychopathology. We suggest that future efforts take place on two fronts: the refinement of measures and the study of special populations. The relationships of Levenson's *I, C,* and *P* scales (discussed earlier) to the Rotter Scale seem unclear (Hall, Joesting, & Woods, 1977; Levenson, 1972, 1981), for example. Part of the problem with these studies has been the use of the total score for the Rotter Scale, rather than the separate factors, such as Difficult World. More work on the convergent and discriminant validity of the Collins Scales is called for and a multitrait-multimethod treatment (Campbell & Fiske, 1959) would be valuable if different measures of each could be found. Assessment of group differences for the Collins Scales in clinical populations should show substantial differences in degree of externality for Belief in a Difficult World for certain groups, such as depressives and alcoholics, when compared to control or norming groups. Such group differences should not be expected on the other scales, however.

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Multivariate Experimental Clinical Research, Volume 6, No. 3, 1983, 111-118

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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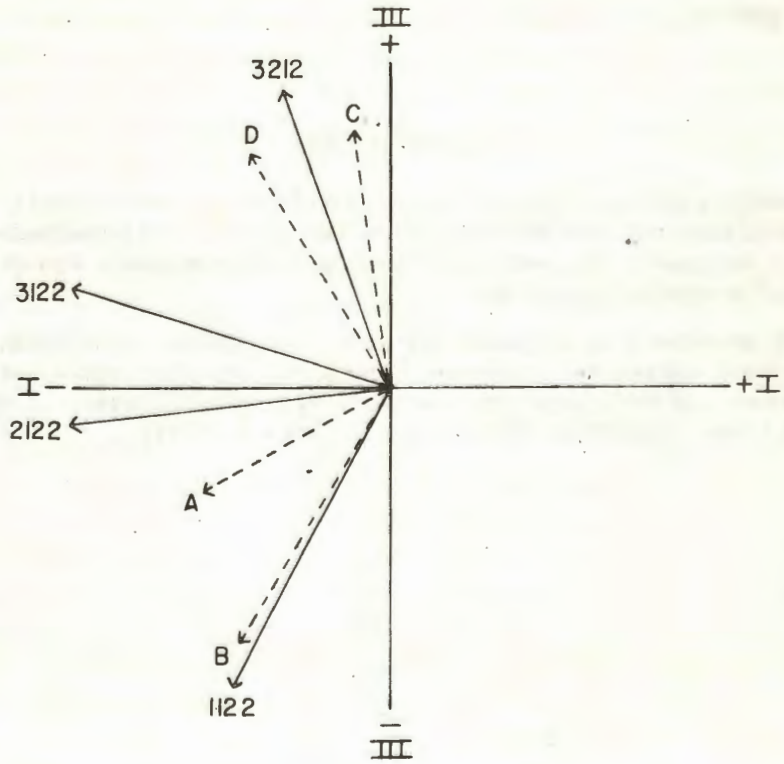

Figure 1. Plot of the vectors of selected rational types (solid lines) and two clinical profiles (dotted lines) on Modal Profiles I and III.

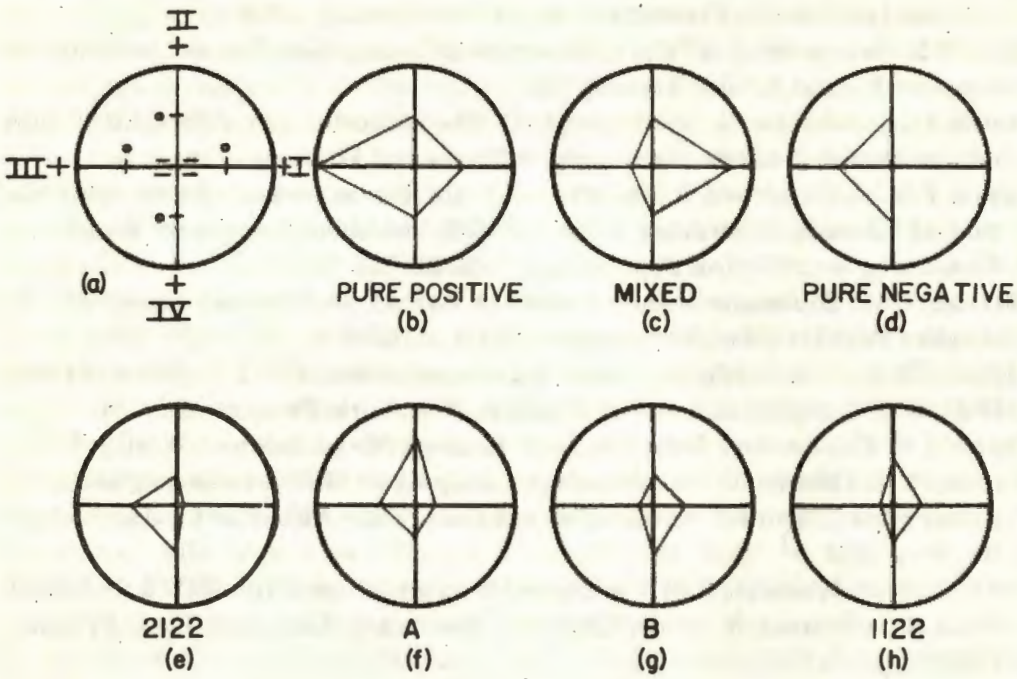

Figure 2. Glyphs of various 16PF profiles in the four dimensional space of the empirical system.

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.

Multivariate Experimental Clinical Research, Volume 6, No. 3, 1983, 119-127

HIGHER-ORDER FACTOR STRUCTURE OF CATTELL'S MAT AND 8SQ

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*The author is indebted to Professor Brian Start, and to Professor Gordon Stanley at the University of Melbourne for their kind advice on certain aspects of this research.

ABSTRACT

Previous research has failed to delineate adequately the higher-order factor structure of the Eight State Questionnaire (8SQ), and of the Motivation Analysis Test (MAT). Kline (1979, p. 185) concluded that, "... there is considerable need for further investigation . . . utilizing factorial procedures in accord with the technical demands which are listed . . . so that one can have confidence in the attainment of simple structure and the consequent psychological import of the results." In response to Kline's suggestion, the present study indicated *two* third-order 8SQ factors, and *nine* second-order MAT factors, on an Australian sample of 258 college students. Use of Cattell's Rotoplot program was shown to be a valid and useful factor analytic procedure. Findings are discussed and tentative labels are assigned to each higher-order factor.

The question as to the higher-order factor structure of Cattell's Motivation Analysis Test — MAT (Cattell, Horn, Sweney, & Radcliffe, 1964), and also the Eight State Questionnaire — 8SQ (Curran & Cattell, 1976) has remained unresolved (cf. Boyle, 1983b). Cattell and Kline (1977, p. 184) asserted that, "... much further research into the higher-order structure of ergs and sentiments combined with investigation of the factors in experimental studies needs to be done..." Kline (1979, p. 185) concluded that, "... the proper higher-order structure of dynamic traits is not known." While three third-order 8SQ factors have been reported (cf. Cattell & Kline, pp. 222-223), "Much further research is, however, demanded before these factors can be properly labelled" (Kline, 1979, p. 170).

It is pertinent to examine the higher-order factor structure of the MAT and 8SQ. The present investigation also should provide some evidence on the similarity and differences between the general emotional state, and the more specific motivational dynamic trait domains. This study additionally aims to investigate the merits of orthogonal versus oblique rotation, and as well, the efficacy of Cattell's Rotoplot program.

METHOD

SUBJECTS

The total sample comprised 258 male and female student teachers attending I.C.E., Melbourne. There were 219 females, and 39 males. The college was located in a predominantly middle-class socioeconomic area. The majority (about 80 percent) of the students was Australian born. The sample ranged in age from 18 to 47 years, with the mean age being about 22 years.

INSTRUMENTS

Two measures were used: (i) Eight State Questionnaire (8SQ); and (ii) Motivation Analysis Test (MAT). According to Curran and Cattell (1976, p. 3), the 8SQ ". . . was designed specifically for measuring eight important emotional states and moods . . . The theoretical importance of measuring emotional states lies in the fact that any prediction of how a person will act or how he will perform depends as much on his present state as on his usual trait." Form A of the 8SQ was chosen since immediate test-retest (dependability) coefficients, and stability coefficients (retest after one week) were higher than for Form B (Curran & Cattell, p. 14). Hence significant changes on Form A subscales could be regarded with greater certainty as indicative of *real* psychological alterations. Form A of the MAT was the only one available. According to Cattell et al. (1964, p. 3), the MAT ". . . presents a unique advance in psychological measurement techniques in that it uses objective devices instead of the usual self-evaluative, verbal-preference opinionaire methods." There were moreover, no other comparable, factorially based, instruments available, designed to measure simultaneously several emotional states and specific motivational dynamics respectively.

As demonstrated by Kline (1979), these measures are as reliable and valid as most measures in the personality and motivation domains (cf. Buros, 1978). Each is prefaced by standard instructions, and responses are marked on separate answer sheets. The mean time for completing the 8SQ is about 20 minutes, and for the MAT about 50-55 minutes (cf. Cattell, 1982, p. 23). Each subscale, including the integrated (I) and unintegrated (U) MAT subscales, is scored separately.

DESIGN AND PROCEDURE

To avoid the unreliability and specificity of items (cf. Cable, 1972; Cattell, 1973; Boyle, 1979), the 8SQ and MAT subscale scores for all 258 students were intercorrelated, producing a 28 × 28 matrix. While the intercorrelations among the 8SQ scales ranged from .48 to .83, those among the 20 U and I MAT subscales ranged from .01 to .29. There were few significant correlations between 8SQ and MAT subscales. As per the factor analytic methodology enunciated by Cattell (1973, pp. 282-287; 1979, p. 351), and confirmed by Kline (1979, pp. 38-41), an iterative principal factoring analysis was performed. Initial communality estimates (SMC's) were iterated until convergence occurred at well beyond the fifth decimal place (550 iterations). Hence the communality estimates were accurate, and not inflated, as occurs in the principal components method, which adds spurious common factor variance into the solution (Lee & Comrey, 1979, p. 301). A

plot of the eigenvalues indicated eight significant factors on the basis of the Kaiser — Guttman (K-G) criterion. The scree test (Cattell, 1966) indicated 11 significant factors (see Fig. 1.)

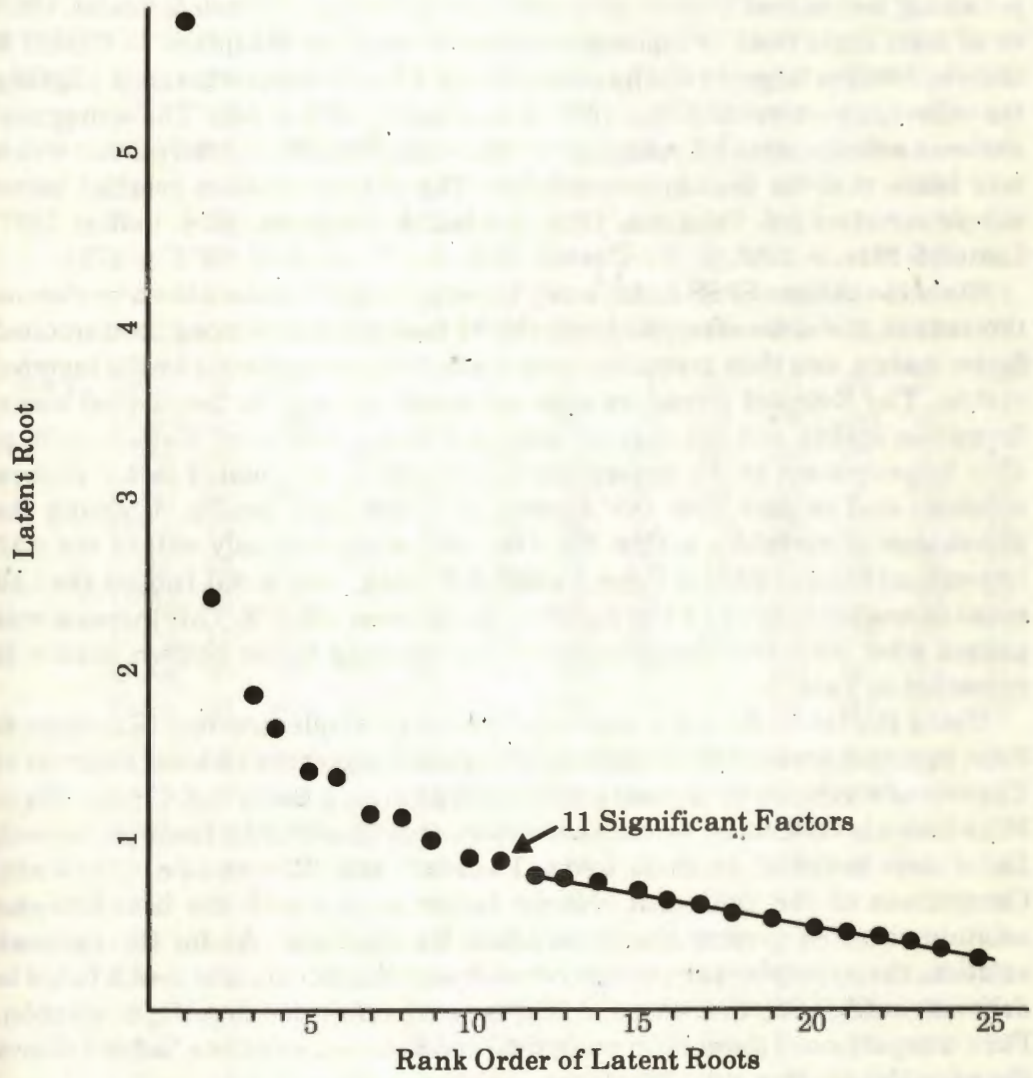

Figure 1. Scree plot of latent roots on 8SQ and MAT data (N = 258)

Using the SPSS package (Nie, Hadlai, Hull, Jenkins, Steinbrenner, & Bent, 1975), 11 factors were rotated to both the orthogonal varimax criterion, and to an oblique (direct oblimin) solution. Despite its limitations (cf. Cattell & Vogelmann, 1977; Hakstian, Rogers & Cattell, 1982), the scree test gave a more accurate indication of the correct factor number than did the K-G criterion (which seriously underestimated the number of significant factors). Eleven factors were rotated since underfactoring would have thrown useful information away (cf. Crawford, 1975).

RESULTS

The advantage of 550 iterations was that the hyperplane (±.10) count increased from 64.61% for the oblimin solution with only 28 iterations (convergence at third decimal place) to 65.91%. While this increase was small, it did allow a more accurate point of departure for the subsequent rotation and 'visual polishing' techniques. Cattell advocated use of Rotoplot (Cattell & Foster, 1963) or at least some form of topological rotation (such as Maxplane — Cattell & Muerle, 1960) to improve the hyperplane count by more appropriately aligning the reference vectors (cf. Kline, 1979, p. 41; Cattell, 1978, p. 142). The orthogonal varimax solution gave a hyperplane (±.10) count of 64.29% (550 iterations) which was below that for the oblimin solution. The oblique rotation reached better simple structure (cf. Vaughan, 1973; Burdsal & Vaughan, 1974; Bolton, 1977; Cattell & Muerle, 1960, p. 569; Cattell, 1978, p. 137; Nie et al., 1975, p. 473).

Since the oblique SPSS factor analytic output did not contain the transformation matrix, it was necessary to derive this by first pseudo-inverting the unrotated factor matrix, and then premultiplying the factor pattern matrix by the inverted matrix. The Rotoplot procedure was instigated using both the derived transformation matrix and the original unrotated factor matrix (cf. Cattell, 1978, p. 151). Improvement to the hyperplane count (and to the rotated factor pattern solution) was evident from the 'History of Hyperplane' profile, depicting the percentage of variables within the ±.05, and simultaneously within the ±.10 hyperplane bandwidths (cf. Price, Cattell, & Patrick, 1981, p. 85). Indeed, the ±.10 count increased from 65.91% to 72.08% — an increase of 6.17%. This increase was gained after only five Rotoplot runs. The resulting factor pattern matrix is presented in Table 1.

Using the tables for statistical significance of simple structure (Kameoka & Sine, in press), seven of the 11 factors were significant at the 1% level. In terms of Thurstone's criterion of "at least n zero loadings in each factor" (cf. Child, 1970, p. 56), where n is the number of common factors, only 11 zero order loadings for each factor were required. In these terms, Factors 7 and 10 were also significant. Comparison of the analytical oblimin factor pattern with the best Rotoplot solution revealed greater simple structure for the latter. As for the varimax solution, the hyperplane count was below that of the oblimin one, and it failed to delineate sufficiently the two major 8SQ factors exhibited in the oblique solution. For a comparison of the oblique analytical and Rotoplot solutions, Table 2 shows the variables loading significantly on each factor for each solution.

The Rotoplot solution was more readily interpretable with less overlap between the factors. Factors 1, 8, 9, and 11 were less complex in the Rotoplot solution. The factor pattern failed to demonstrate any overlap of the higher-order 8SQ and MAT factors, thereby providing support that the two measures tap discrete psychological variance. Factor pattern correlations ranged from -.52 to .24, however the vast majority did not reach significance at the 5% level. Interpretation of these higher-order factors is best made in terms of the variables loading significantly.

TABLE 1

Oblique Factor Solution on 8SQ and MAT Variables

Variable		Factor Number 1	2	3	4	5	6	7	8	9	10	11	h^2
8SQ	Ax	**69**	03	01	-07	01	06	-16	05	01	03	-05	92
	St	**56**	07	09	-10	-09	04	-14	05	00	12	03	64
	De	**44**	-05	-07	-09	03	01	**-38**	03	12	-14	04	87
	Rg	**44**	-06	05	10	10	00	**-29**	03	10	-14	02	73
	Fa	18	04	01	08	00	-07	**-63**	-01	-06	04	-10	78
	Gi	**66**	-15	03	15	03	-09	-02	01	06	-15	-08	81
	Ex	-17	02	14	02	-04	-09	**54**	03	01	19	-15	73
	Ar	-08	-06	09	-09	01	-03	**64**	03	-10	05	00	75
MAT	U-Ca	-01	00	-03	**-35**	10	-11	11	-01	05	-02	01	23
	U-Ho	-09	**48**	06	05	12	07	10	05	-08	**-20**	00	43
	U-Fr	03	01	04	08	**-60**	-02	06	01	05	03	-01	40
	U-Na	-06	**-30**	12	-09	-07	00	-03	16	-18	06	-08	30
	U-Se	15	19	-01	02	03	06	13	**-22**	-10	-12	07	25
	U-Ss	02	02	-09	-05	02	08	08	-19	**-35**	06	00	25
	U-Ma	-06	-10	16	**41**	**25**	06	02	03	07	11	01	37
	U-Pg	10	03	01	07	-10	**24**	02	**39**	04	00	-01	31
	U-As	03	00	-06	-06	-07	-01	02	-10	**52**	03	04	34
	U-Sw	-05	-03	-01	02	-01	02	03	-01	00	**51**	-03	32
	I-Ca	-01	-03	03	04	-07	**-45**	02	01	08	-03	02	23
	I-Ho	-02	**69**	01	-14	-01	-07	-10	05	01	07	-17	61
	I-Fr	-11	-02	**33**	-11	-17	-01	-08	02	-05	-16	18	31
	I-Na	-03	03	**20**	**-53**	13	18	-01	-05	03	07	06	42
	I-Se	-01	-10	-01	00	-03	-05	-01	05	-04	-02	**56**	43
	I-Ss	-08	-10	**32**	-02	-10	**31**	-12	**-52**	08	-05	-10	66
	I-Ma	10	-05	12	05	05	**20**	06	17	05	10	-19	22
	I-Pg	-09	-07	**-61**	01	-05	08	-09	05	05	-05	08	44
	I-As	-02	-19	-02	-05	-04	-04	-04	06	08	-03	**-23**	23
	I-Sw	08	22	12	12	07	-03	-06	-02	-12	16	12	28
Hyper-plane Count	±.10	19	21	19	21	21	22	17	22	22	17	21	
	±.05	10	12	12	9	12	12	10	16	9	11	14	

Notes. (i) Factor loadings rounded to two decimal places.
(ii) Significant loadings bold.

TABLE 2

Significant Variables for Each Factor Solution

Factor	Oblimin	Rotoplot
1	Ax, St, De, Rg, Fa, Gi *vs.* Ex	Ax, St, De, Rg, Gi
2	(U + I) Ho, I-Sw *vs.* U-Na	(U + I) Ho, I-Sw *vs.* U-Na
3	I-Fr, I-Na, I-Ss *vs.* I-Pg	I-Fr, I-Na, I-Ss *vs.* I-Pg
4	U-Ma *vs.* U-Ca, I-Na	U-Ma *vs.* U-Ca, I-Na
5	U-Ma *vs.* U-Fr	U-Ma *vs.* U-Fr
6	U-Pg, I-Ss, I-Ma *vs.* I-Ca	U-Pg, I-Ss, I-Ma *vs.* I-Ca
7	Ex, Ar *vs.* De, Rg, Fa	Ex, Ar *vs.* De, Rg, Fa
8	U-Pg *vs.* U-Se, (U + I) Ss	U-Pg *vs.* U-Se, I-Ss
9	U-As *vs.* U-Ss, U-Na	U-As *vs.* U-Ss
10	U-Sw *vs.* U-Ho	U-Sw *vs.* U-Ho
11	I-Fr, I-Se, I-Sw *vs.* I-Ma, I-As	I-Se *vs.* I-As

DISCUSSION

That extraction and rotation of 11 factors was correct was checked empirically with factor patterns resulting from extraction of 8, 9, 10, 12, and 13 factors. Below 11 factors important information was lost and factor space was inadequate. Above 11 factors, primaries began to emerge (e.g., I-Ca, I-Fr, U-Sw) with only one significant factor loading (cf. Bolton, 1977, pp. 4-5). The general superiority of the scree test over the K-G criteria has been well documented in previous studies (cf. Cattell & Vogelmann, 1977, p. 318). The correct number of factors was extracted in the present study. As Cattell (1978, p. 189) demonstrated, "... rotation offers a second 'court of appeal'." There was noticeable decline in factor variance with 12 or more factors. Examination of factor solutions with less than 11 factors, revealed wide (at least ±.20) hyperplanes. With 11 factors, the ±.10 hyperplane count was 72.08% as stated above.

Whereas underfactoring produces pseudosecondaries (Eysenck & Eysenck, 1976, pp. 53-54), overfactoring produces pseudospecific factors (Crawford, 1975, p. 226). The use of the 'blind' Rotoplot finish to objectively attain greater simple structure (determined by increasing ±.10 hyperplane counts), dramatically altered the resulting factor pattern. Hence Cattell's contentions concerning topological rotation seem correct. Rotoplot provides an effective means of improving simple structure over and above that attained by oblique analytical rotation alone.

While three third-order factors had been reported previously (Kline, 1979, pp. 169-170) for the 8SQ (8SQ subscales are largely at the second-stratum level, with the exception of Stress, and Fatigue — Cattell, 1973, p. 228), only *two* third-order factors emerged in the present study. The first represented a cluster of stress related subscales (Anxiety, Stress, Depression, Regression, Guilt) rather indicative of neuroticism. The other characterized the extraversion — introversion

dimension (cf. Eysenck & Eysenck's 1969, N and E factors). This bipolar factor contrasted Extraversion, and Arousal at one pole, with Depression, Regression, and Fatigue at the other. Hence the 8SQ appears too narrow in the range of states tapped. One dimension suggested in factor analytic research (Boyle, 1979; 1983a) is state curiosity. Another is state hostility (cf. Zuckerman, 1976; 1979). Variables related to these states should be included in any resampling of the state sphere.

Nine second-order MAT factors emerged. Previously Cattell (1957) reported six secondaries. However as Kline (1979) pointed out, "This preliminary research is not particularly helpful in classifying what is obviously a highly complex field. Certainly no substantive implications can be drawn from the results" (p. 185). Burdsal (1975) reported six secondaries, which according to Kline (p. 185), ". . . bore little relation to those discussed above or to the hypotheses implicit in the nature of these ergs and sentiments." That Burdsal underfactored is almost certain, since his hyperplane count (±.10) reached only 62.7%, even though he employed Rotoplot *and* Maxplane. The present findings attained greater simple structure since the ±.10 hyperplane count was almost 10% higher than that obtained by Burdsal.

Interpretation of the nine bipolar higher-order MAT factors was less than certain, given the factor complexities as defined by the loadings in Table 1. However, the first of these MAT factors contrasted home orientation and sweetheart attachment with narcistic tendencies, suggesting therefore, the incompatibility of family life and self-indulgent gratification. This factor might be labelled *Family vs. Self-Orientation.* The second contrasted the I components of fear, narcism, and self-sentiment with pugnacity. This secondary partially resembled the largest second-order MAT factor reported by Cattell (1957) which he interpreted as ergic inhibition versus ergic expression. While having some of this flavor, it also suggested caution and self-protection as opposed to outright aggression, and destructive, hostile impulses. This factor might be labelled *Caution vs. Hostility.* The third factor contrasted mating tendencies with attitudes toward self-satisfaction through a career, suggesting therein, the incompatibility of a successful career, with unrestrained sexual behavior. Seemingly the latter would need to be well controlled if it is not to distract one, and interfere with career attainment. This secondary might be labelled *Sexual Expression vs. Career Comfort.* The fourth factor contrasted mating and fear ergs, suggesting the incompatibility of strong sex drive and heightened levels of alertness to external dangers. Such unconscious inhibition of sexual behaviors is readily apparent in the psychoanalytic case histories of neurotic individuals, for example. This factor might be labelled *Uninhibited vs. Inhibited Libido.* The fifth MAT secondary contrasted pugnacity, self-sentiment, and mating tendencies with career orientation. This factor suggested an incompatibility betweeen excessive self-concern and career. It might be labelled *Selfishness vs. Occupational Success.* The sixth factor contrasted pugnacity with superego and self-sentiment. It suggested the incompatibility of aggressive, destructive, hostile impulses with self-integrity in terms of one's social repute and moral respect. This factor might be labelled *Hostility vs. Self-Integrity.* The seventh factor was an unintegrated one contrasting assertiveness with self-sentiment. According to this factor, the level of drive to self-assertion, mastery, and achievement is

inversely related to level of self-concern. Presumably the more an individual is preoccupied with him/herself (perhaps even in the sense of neurotic self-concern), the less likely is that individual to achieve, and be self-assertive. This factor might be labelled *Assertiveness vs. Self-Sensitivity.* The eighth factor contrasted sweetheart-spouse sentiment with strength of attitudes attaching to the parental home. This factor might be labelled *Sweetheart vs. Parental Attachment.* Finally, the ninth MAT secondary contrasted superego with assertiveness, suggesting therefore, an incompatibility of the strength of the drive to achieve with the level of one's conscience development. This factor might be labelled *Conscience Development vs. Achievement Motivation.*

All the MAT secondaries make good psychological sense, although their specific interpretations remain tentative, pending cross-validational studies with differing and larger samples. The two previous investigations of higher-order structure of the MAT failed to provide substantive evidence on the MAT secondaries. Given the comments above concerning underfactoring, and the attainment of *maximum* simple structure, the present study has seemingly provided the first valid, albeit approximate evidence on this issue. These conclusions apply also to the higher-order factor structure of the 8SQ.

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Multivariate Experimental Clinical Research, Volume 6, No. 3, 1983, 129-141

DIFFERENTIAL PERFORMANCE ON ATTENTION AND MEMORY TASKS AS A FUNCTION OF PERSONALITY IN ADOLESCENT AND ADULT OUTPATIENTS: A MULTIVARIATE APPROACH

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ABSTRACT

Eysenck's "personality sphere" was examined in relation to performance measures of verbal and visual attention and memory in 200 male and female adolescent and adult outpatients. Factors, sex, age, and personality (Extraversion, Neuroticism) played a significant multivariate role in the performance of attention and memory tasks. In the second phase of this research, and following an exclusion of 90 "ambiverts," extreme scorers on Extraversion were further dichotomized about the mean score on Neuroticism. Multivariate tests suggested a significant role for sex, age, interaction between age and sex of subjects, Extraversion and Neuroticism, in the performance of attention and short-term memory tasks. The present findings for outpatients suggested that introversion and higher than average neuroticism tended to improve upon outpatients' attention efficiency and short-term memory whereas extraversion and low emotionality did not. Age and sex of subjects appeared to have interacted with personality in the differential performance of attention and memory tasks. The present findings for outpatients were related to findings of other researchers. The MMPI's clusters on emotionality (TSC PS) paralleled the Eysenckian measures of Extraversion and Neuroticism (JEPI, EPI) suggesting a possible redundancy of measures.

This study concerns the specific "personality sphere," mapped by H. Eysenck and S. Eysenck (1968; S. Eysenck, 1963) as two orthogonal (independent) dimensions of extraversion-introversion and neuroticism-stability, with respect to simple measures of attention and short-term memory. According to H. Eysenck's (1967) neurophysiological theory of personality, introverts show characteristically higher cortical arousal when compared with extraverts. The theory also postulates that cortical arousal is measured by individual differences in Extraversion whereas the autonomic activation is measured by individual differences in Neuroticism. Two personality inventories, the Junior Eysenck Personality Inventory (S. Eysenck, 1963) and the Eysenck Personality Inventory (H. Eysenck & S. Eysenck, 1968), are presumed to measure the dimensions of Extraversion and Neuroticism.

A higher level of arousal, said to be characteristic of introverts, is also automatically produced when strong emotion is experienced by an individual. In some writings (Norman, 1976; Wender, 1976) it is believed to have been shown that there might be an inverse U-shaped relationship between a person's arousal and actual performance. Studies which dealt with the presumed relationship between levels of arousal and the individual's scores obtained on the Eysenckian measures of Extraversion and Neuroticism, appear to suggest that there might be relatively significant differences between performances of emotionally stable and emotionally unstable extraverts and the performances of stable or unstable introverts on an array of performance measures of attention and short-term memory (M. Eysenck, 1976; 1977). Most studies reported in the literature (M. Eysenck, 1976) were carried out with college students or individuals of a rather restricted IQ range and possibly skewed distribution of personality characteristics. This researcher is unaware of studies attempting to replicate H. Eysenck's (1967) theoretical formulations with clinical population samples. The present study set out to fill this gap in our knowledge of the relationship between personality and performance measures of attention and memory.

Individuals are presumed to differ in their performances of attention and memory tasks at various age levels. There is also some evidence to suggest that males and females face different levels of difficulty at various age levels and that both age and sex may interact resulting in differential performances (Maccoby & Jacklin, 1974; 1980; Spence & Helmreich, 1978). Given the above, it was hypothesized as follows: (1) Age, Sex of subjects and interaction between age and sex shall bear on the differential performance of attention and memory tasks in the present research. (2) Personality variables, Extraversion and Neuroticism, shall attain over-all multivariate significance in the context of 23 dependent measures under consideration. Both hypotheses were advanced for the first, inductive phase, as well as for the second, deductive phase of this research.

For the second phase of this research, it was postulated that (3) Introverts shall be superior to extraverts in the performance of verbal memory tasks and some visual memory tasks. Also, introverts shall score higher on all measures of emotionality (MMPI); (4) Stable individuals shall score lower than emotionally unstable individuals on all measures of emotionality (MMPI). This hypothesis was to test a presumed equivalence of Eysenckian measures of Neuroticism with the seven scales of the Tryon-Stein-Chu Psychological Scales (MMPI) which, according to Stein's (1968) finding, appears to be component measures of emotionality.

All "no difference" hypotheses were tested at the .05 level of probability.

METHOD

Phase I

SUBJECTS

The data were gathered from one hundred males and an equal number of females. Consecutive referrals for psychological treatment were accepted until the 25 persons quota for each of the four age groups was achieved. The mean age of females or males within a respective age group was 13 yr., 16 yr., 21 yr., and 40 yr. All individuals met the criteria set for reading fluency.

PROCEDURES

Each examinee was individually assessed by the author in a one-to-one situation. The order of administering the 23 tasks was held at random order to avoid repeatedly confounding effects.

Auditory attention. Each person was given a task of auditory attention. The Digit Span task (WISC-R; WAIS) was deemed appropriate for this purpose.

Visual attention. Visual attention was measured by means of the Wechsler Coding tasks (WISC-R; WAIS) and the Smith (1973) Symbol Digit Modalities Test.

Visual memory. Visual memory, immediate and delayed recall, was measured through the recall of the coding symbols of the Wechsler and Smith type and following the standard administration of the Bender Test (Bender, 1946). No instruction about a pending recall of all three tasks was given. It is presumed that at least the first recall task possibly measured unintentional visual memory closely associated with visual attention efficiency.

Verbal memory. Verbal memory was measured through two sentences memory tasks and the emphasis was on memory for syntax. In order to assure comparability of administration procedures, the Babcock Story (Rappaport, Gill & Schafer, 1974) and selection "B" from the Wechsler Memory Scale, Form 1 (Wechsler & Stone, 1945) were played from a magnetic tape. Following a single listening to a story, the subject's immediate and delayed recall was recorded *verbatim* and scored for recalled unit memories. A score of one was given for each verbatim recalled unit memory. The raw score may have been any number from 0 to 21 for each story. The total raw score for immediate and also for delayed recall was obtained by adding both scores and dividing them by two. The so obtained mean raw score was entered into the data for analyses.

Personality variables. The Junior Eysenck Personality Inventory (S. Eysenck, 1963) was given to all 12 to 16 yr. olds, whereas the Eysenck Personality Inventory (H. Eysenck & S. Eysenck, 1968) was answered by all 17 to 65 yr. olds. Both inventories were scored for Extraversion (*E*), Neuroticism (*N*), and Lie (*L*).

An alternate measure of emotionality (neuroticism) was given through the administration of the Tryon-Stein-Chu Psychological Scales or Clusters (Stein, 1968). The original MMPI Cards were used. Following Stein's (1968) published work, all Cards not included in the seven clusters of emotionality, were removed from the full 550 Cards MMPI complement and only 192 Cards were retained.

It is generally believed that there might be a relationship between a person's over-all general intelligence, personality, and the performance on various tasks of attention and memory. It is for this reason that the Verbal IQ and the Performance IQ were included in the pool of data for analyses.

DESIGN AND ANALYSIS

The first phase of this study saw an inductive, fact-finding process from recorded effect to presumed cause. The main interest was in finding a significant role for personality, i.e. extraversion-introversion and neuroticism-stability, in the over-all multivariate context of the data. The 2 (Sex) by 4 (Age) factorial design was applied to a total of 23 dependent measures. The pool of subjects

numbered 200. The data for each phase of this research were analyzed by means of the Component Analysis of Variance (CANOVA) including the Multivariate Analysis of Variance (MANOVA). The Clyde Computing Service procedures were used written by David Poor. Pearson Product Moment Correlation Coefficients were computed for the Verbal IQ, the Performance IQ, and the measures of Extraversion, in relation to all significant dependent measures.

Phase II

SUBJECTS

The second phase of this research saw an elimination of 90 individuals operationally defined as "Ambiverts" from the original pool of 200 males and females. The sample now contained 55 females and an equal number of males.

PROCEDURES

The pool of data on 23 dependent measures was reduced to 21 variables. Extraversion and Neuroticism became "categorical variables" in the second phase of this research. The seven measures of emotionality (MMPI) along with measures of auditory and visual attention and memory formed the pool of dependent measures.

DESIGN AND ANALYSIS

The original factors, Sex and Age, were joined by factors Extraversion (Extraverts vs. Introverts) and Neuroticism (Emotionally Stable vs. Emotionally Unstable). The so modified design read 2 (Sex) by 4 (Age) by 2 (Extraverts vs. Introverts) by 2 (Stable vs. Unstable). The dichotomy of Extraversion scorers into extreme high 27% and extreme low 27% followed a procedure suggested by Kelley (1939). This procedure allowed to form a category of Extraverts (score of 18 or more) and a group of Introverts (score of 8 or less), resulting in 110 individuals being selected for further study. However, the dichotomy of Neuroticism scores about the mean score resulted in unequal numbers of observations per group, two groups being represented by one single person. This fact rendered comparisons among 32 groups meaningless with regard to the means of significant variables. However, since none of the advanced hypotheses postulated such comparisons, the study was allowed to proceed as planned.

The CANOVA and MANOVA analyses were repeated for the modified set of data.

RESULTS

Phase I

The results of the first round of statistical analyses suggested that factors, sex, age, interaction of age with sex, and personality (Extraversion, Neuroticism) played a significant multivariate role in the performance of attention and memory tasks.

The first "no difference" hypothesis regarding the role of age, sex, and interaction of age with sex, was disproved with a probability exceeding .001 alpha. Table 1 summarizes the multivariate and univariate analyses of variance for the Age factor in relation to said 23 measures. Univariate analyses emphasized the role of four variables with significant contribution to "between age-groups" variance: the immediate and the delayed recall of the Smith Coding Symbols, Extraversion and Neuroticism of the Eysenckian personality scales, attained over-all significance within the multivariate context. The sex of subject factor was also significant at the .05 level of confidence. Univariate analyses of variance drew attention to two variables, Verbal Attention and Neuroticism. Both measures significantly differentiated between the performances of males and females.

TABLE 1

Summary Multivariate and Univariate Analyses of Variance of Factors, Age, Sex, and Interaction of Age with Sex (Test of Hypothesis #1; $N = 200$)

Variable	*df*	*F*	*P*
Multivariate Significance of Age	3,192	2.30	.001
Univariate Analyses:			
Smith Coding Symbols, Immediate Recall		3.83	.011
Smith Coding Symbols, Delayed Recall		2.86	.038
Extraversion		2.85	.039
Neuroticism		3.70	.013
Multivariate Significance of Sex	1,192	2.01	.007
Univariate Analyses:			
Verbal Attention		3.98	.047
Neuroticism		5.95	.016
Multivariate Significance of Age by Sex	3,192	1.79	.001
Univariate Analyses:			
Verbal Attention		2.68	.048
Wechsler Coding Symbols, Delayed Recall		3.04	.030
Neuroticism		3.22	.024

The interaction between age and sex of subjects in the performance of 23 verbal and visual tasks reached statistical significance ($p < .001$). Univariate analyses of variance emphasized the role of Verbal Attention ($p < .048$), the Delayed Recall of the Wechsler Coding Symbols, and the role of Neuroticism.

The first "no difference" hypothesis was disproved. The research hypothesis was supported by the present data. The finding for a significant role of Extraversion and Neuroticism i.e. the Eysenckian "personality sphere" was

supported by the present data. The finding for a significant role of Extraversion (arousal) and Neuroticism (emotionality amplifying individual arousal levels) provided the rationale for the second phase of this research.

Table 2 (see pages 135-136) presents the mean scores and standard deviations of 23 dependent measures arranged by sex of subjects and by age.

Phase II

The dichotomized data were subjected to CANOVA and MANOVA analyses. Hypothesis 1 for the second phase of this study was disproved for Age, $F(3, 78) = 1.69, p < .004$; Sex of subjects, $F(1, 78) = 1.99, p < .020$; and interaction of age with sex, $F(3, 78) = 1.45, p < .032$. Significant multivariate F's were followed up by univariate analyses of variance. Within the context of age, the MMPI's Social Introversion was found with acceptable significance, $F(3, 78) = 3.77, p < .014$. The procedure for sex of subjects drew attention to Verbal Attention, $F(1, 78) = 5.28, p < .024$. Finally, Verbal Memory, Immediate Recall, attained significance through interaction of age with sex, $F(3, 78) = 2.71, p < .05$. The first, alternative hypothesis was supported by the dichotomized data. Table 3 presents the findings for Hypothesis 1.

TABLE 3

Summary Multivariate and Univariate Analyses of Variance of Factors, Age, Sex, and Interaction of Age with Sex (Study Phase #2; Hypothesis #1; $N = 110$)

Variable	*df*	*F*	*P*
Multivariate Significance of Age	3, 78	1.69	.004
Univariate Analyses:			
Social Introversion (MMPI)		3.77	.014
Multivariate Significance of Sex	1, 78	1.99	.020
Univariate Analyses:			
Verbal Attention		5.28	.024
Multivariate Significance of Age by Sex	3, 78	1.45	.032
Univariate Analyses:			
Verbal Memory, Immediate Recall		2.71	.050

Hypothesis 2 assumed a significant role for the dichotomized Extraversion and Neuroticism categories in relation to 21 dependent measures. The results of the multivariate and univariate analyses of variance in support of the second hypothesis are presented in Table 4.

TABLE 2

Means and Standard Deviations of 23 Dependent Measures by Sex (N = 100) and Age (n = 25)

Variable	Sex	Males			
	Mean Age	13	16	21	40
Auditory Attention	Mean	9.88	10.28	10.92	12.32
	SD	1.96	3.93	3.57	3.40
Verbal Memory, Immediate Recall	Mean	12.60	11.16	12.88	12.44
	SD	4.53	6.97	6.47	6.66
Verbal Memory, Delayed Recall	Mean	11.40	9.72	11.80	11.68
	SD	4.68	6.46	6.37	6.34
Verbal IQ (WISC-R; WAIS)	Mean	100.60	96.08	99.60	99.32
	SD	11.65	18.78	22.35	20.12
Performance IQ	Mean	103.20	102.00	105.76	105.84
	SD	10.00	18.92	18.13	18.92
Visual Attention (Coding)	Mean	43.12	49.48	51.80	42.48
	SD	10.96	20.76	17.05	24.17
Coding, Immed. Recall	Mean	5.56	6.36	6.04	6.08
	SD	2.24	2.78	1.95	2.46
Coding, Delayed Recall	Mean	4.56	5.92	5.72	5.56
	SD	2.33	2.87	2.07	2.58
Bender, Immed. Recall	Mean	6.12	6.00	6.16	5.68
	SD	1.83	2.55	1.75	2.84
Bender, Delayed Recall	Mean	5.84	5.52	5.72	5.28
	SD	2.23	2.90	2.13	3.19
Smith' Coding	Mean	41.12	45.16	48.16	46.48
	SD	12.72	20.93	20.42	20.83
Smith' Coding, Im. Recall	Mean	4.96	6.56	5.56	5.48
	SD	2.39	2.43	2.29	2.34
Smith' Coding, Delayed Rec.	Mean	4.52	5.84	4.76	4.80
	SD	2.60	2.69	2.42	2.22
Personality (JEPI; EPI): Extraversion	Mean	14.16	13.00	13.80	12.20
	SD	5.02	3.67	4.42	4.64
Neuroticism	Mean	14.60	12.28	13.84	9.56
	SD	4.68	4.14	5.81	6.68
Lie Scale	Mean	2.64	2.36	3.16	3.00
	SD	1.32	1.73	2.21	2.58
Personality (MMPI): Soc. Introversion	Mean	12.20	10.32	10.84	9.72
	SD	5.46	3.69	5.53	5.46
Body Symptoms	Mean	9.80	6.68	9.56	8.32
	SD	6.46	3.24	6.68	5.91
Trust-Distrust	Mean	11.44	10.24	10.00	8.80
	SD	6.87	5.08	4.92	6.28
Depression	Mean	12.76	11.32	9.84	8.40
	SD	7.42	5.15	6.26	6.94
Resentment & Aggression	Mean	10.56	10.16	9.52	7.40
	SD	5.21	5.81	4.52	5.39
Autism & Disrupt. Thought	Mean	8.68	8.60	7.16	6.44
	SD	5.44	4.00	4.39	4.23
Tension; Worry & Fears	Mean	11.32	9.32	8.52	10.64
	SD	5.91	4.69	6.08	6.96

TABLE 2

Means and Standard Deviations of 23 Dependent Measures by Sex (N = 100) and Age (n = 25)

Variable	Sex	Females			
	Mean Age	13	16	21	40
Auditory Attention	Mean	11.24	12.28	12.32	11.08
	SD	3.03	3.30	2.79	2.71
Verbal Memory, Immediate Recall	Mean	13.08	11.88	9.32	9.56
	SD	5.27	5.98	5.94	4.59
Verbal Memory, Delayed Recall	Mean	12.00	10.56	8.60	8.48
	SD	4.85	6.09	5.79	4.76
Verbal IQ (WISC-R; WAIS)	Mean	95.60	98.92	104.24	100.68
	SD	18.50	17.44	16.58	16.84
Performance IQ	Mean	102.56	109.28	105.00	100.52
	SD	16.65	14.61	13.84	11.24
Visual Attention (Coding)	Mean	47.88	42.24	48.72	44.68
	SD	14.32	14.26	17.79	19.01
Coding, Immed. Recall	Mean	6.40	5.48	5.16	5.12
	SD	2.12	2.22	2.13	2.03
Coding, Delayed Recall	Mean	6.00	5.32	4.96	4.32
	SD	2.41	2.43	2.09	2.34
Bender, Immed. Recall	Mean	6.28	5.52	5.16	4.20
	SD	2.13	2.53	1.97	2.00
Bender, Delayed Recall	Mean	5.92	5.52	5.04	4.84
	SD	2.06	2.86	2.01	2.13
Smith' Coding	Mean	46.60	41.40	41.96	43.56
	SD	14.99	15.30	12.83	15.02
Smith' Coding, Im. Recall	Mean	5.84	6.08	5.16	4.12
	SD	2.05	2.40	2.09	2.05
Smith' Coding, Delayed Rec.	Mean	5.52	5.40	4.80	3.56
	SD	2.31	3.00	2.20	2.38
Personality (JEPI; EPI): Extraversion	Mean	12.48	14.64	13.24	10.60
	SD	2.80	4.63	5.20	5.73
Neuroticism	Mean	13.80	16.64	13.72	13.24
	SD	5.82	3.66	5.17	4.64
Lie Scale	Mean	2.84	3.68	3.36	2.76
	SD	1.82	2.64	2.23	2.15
Personality (MMPI): Soc. Introversion	Mean	12.44	9.80	12.44	13.72
	SD	4.22	4.38	4.09	6.62
Body Symptoms	Mean	8.24	9.00	8.68	9.32
	SD	4.75	5.76	5.09	6.19
Trust-Distrust	Mean	8.56	10.96	12.20	11.40
	SD	4.46	5.90	5.17	5.73
Depression	Mean	10.64	11.88	11.24	12.84
	SD	6.47	7.30	5.02	6.54
Resentment & Aggression	Mean	9.72	9.36	9.92	9.32
	SD	5.45	5.40	4.29	4.96
Autism & Disrupt. Thought	Mean	7.76	9.64	9.40	8.76
	SD	4.37	6.07	4.44	4.57
Tension; Worry & Fears	Mean	8.96	10.36	10.12	12.04
	SD	5.71	6.32	6.06	6.77

TABLE 4
Summary Multivariate and Univariate Analyses of Variance of Factors, Extraversion and Neuroticism
(Study Phase #2; Test of Hypothesis # 2; $N = 110$)

Variable	$df = 1 / 78$	Extraversion		Neuroticism	
		F	*P*	*F*	*P*
Mulivariate Significance of Extraversion		3.71	.001		
Multivariate Significance of Neuroticism				2.49	.003
Univariate Analyses:					
Verbal Memory, Immediate Recall		12.63	.001		
Verbal Memory, Delayed Recall		10.24	.002		
Verbal IQ (WISC-R; WAIS)		4.15	.045		
Wechsler Coding Symbols, Immediate Recall		6.69	.012		
Social Introversion (MMPI)		18.40	.001	5.88	.018
Body Symptoms (MMPI)		10.34	.002	13.70	.001
Trust-Distrust (MMPI)		15.56	.001	9.14	.003
Depression (MMPI)		26.60	.001	9.48	.003
Resentment & Aggression (MMPI)		5.54	.021	10.50	.002
Autistic & Distruptive Thought (MMPI)		6.47	.013	10.30	.002
Tension, Worry & Fears (MMPI)		9.07	.003	28.76	.001

The multivariate test of high and low scorers on Extraversion was significant, $F(1,78) = 3.71, p < .001$. The dichotomy of Neuroticism scorers about the mean also attained statistical significance, $F(1,78) = 2.49, p < .003$. Subsequent univariate analyses of variance supported the role of Verbal Memory, Verbal IQ, and the Wechsler Coding Symbols, in the over-all multivariate context of Extraversion and Neuroticism. As would be expected, both Extraversion and Neuroticism, showed a strong association with seven scales of emotionality of the MMPI-derived Tryon-Stein-Chu Psychological Scales.

Hypothesis 3 concerned the presumed superiority of introverts over extraverts in the performance of verbal memory tasks and some visual memory tasks. It was also expected that introverts would attain higher mean scores on measures of emotionality. The results of pairwise comparisons of the respective means and standard deviations are shown in Table 5. Introverts were found superior to extraverts on verbal memory, both immediate and delayed recall, and on all measures of emotionality. The third research hypothesis was supported at varying levels of probability.

TABLE 5

t test for Significance of Difference between Means (Standard Deviations) for Extraverts and Introverts on Eleven Significant Measures (Study Phase #2; Test of Hypothesis #3; $N = 110$)

Variable	Extraverts ($n = 56$)		Introverts ($n = 54$)		t	P
Verbal Memory, Immediate Recall	7.64	(4.78)	10.74	(5.12)	3.26	.01
Verbal Memory, Delayed Recall	6.73	(4.71)	9.59	(4.92)	3.11	.01
Verbal IQ (WISC-R; WAIS)	98.05	(18.31)	92.94	(13.35)	1.66	
Wechsler Coding Symbols, Immediate Recall	4.43	(2.16)	5.54	(2.06)	2.77	.01
Social Introversion (MMPI)	9.18	(5.24)	13.48	(5.09)	4.34	.001
Body Symptoms (MMPI)	7.07	(4.99)	10.50	(6.05)	3.20	.01
Trust-Distrust (MMPI)	8.77	(5.33)	12.37	(5.41)	3.49	.001
Depression (MMPI)	8.29	(5.79)	13.61	(5.97)	4.71	.001
Resentment & Aggression (MMPI)	8.36	(4.89)	10.42	(4.99)	2.17	.05
Autism & Disruptive Thought (MMPI)	7.16	(4.43)	9.07	(4.94)	2.09	.05
Tension, Worry & Fears (MMPI)	8.75	(5.05)	12.20	(6.01)	3.22	.01

The fourth hypothesis compared emotionally stable and emotionally unstable individuals. The findings of *t* test comparisons of appropriate means are given in Table 6. The present data denied any role for Neuroticism in the performance of verbal memory, verbal IQ, and the Wechsler Coding Symbols. The respective *t* values were smaller than unity suggesting no significant difference between emotionally stable or unstable persons in the performance of given tasks.

However, significant differences were found on all seven measures of emotionality. The fourth research hypothesis was supported at varying levels of statistical significance.

TABLE 6

Significant Differences between Low-Neuroticism (Emotionally Stable) and High-Neuroticism (Emotionally Unstable) Outpatients on Significant Dependent Measures (Study Phase #2; Test of Hypothesis #4; $N = 110$)

Variable	Outpatients					
	Stable ($n = 61$)		Unstable ($n = 49$)			
	M	*SD*	*M*	*SD*	*t*	*P*
Verbal Memory, Immediate Recall	9.26	(5.24)	9.04	(5.13)	0.22	
Verbal Memory, Delayed Recall	8.23	(5.29)	8.02	(4.66)	0.22	
Verbal IQ (WISC-R; WAIS)	94.36	(16.72)	97.02	(15.57)	0.85	
Wechsler Coding Symbols, Immediate Recall	5.02	(2.40)	4.92	(1.88)	0.24	
TSC Psychological Scales (MMPI):						
Social Introversion	10.16	(5.12)	12.69	(5.86)	2.36	.05
Body Symptoms	6.95	(4.43)	11.00	(6.47)	3.71	.001
Trust-Distrust	8.98	(4.86)	12.47	(5.99)	2.33	.01
Depression	9.21	(5.20)	13.37	(7.23)	3.35	.01
Resentment & Aggression	7.87	(4.87)	11.24	(4.62)	3.70	.001
Autistic & Disruptive Thought	6.67	(3.46)	9.88	(5.54)	3.50	.001
Tension, Worry & Fears	8.16	(4.23)	13.28	(6.70)	4.62	.001

DISCUSSION

This study was conducted in two phases of statistical analysis. The purpose of the first phase was to find a statistically significant role for personality within a multivariate context involving measures of visual and verbal attention and memory, and additional measures of emotionality. This expectation was supported by a pool of data for 200 individuals. The finding for a significant role of Extraversion and Neuroticism suggested that Eysenck's (1967) two-factor theory of personality may be applicable to a restricted sample of clinical outpatients. Bianchi and Fergusson (1977) have shown that Extraversion scores remain stable with clinical population samples. Gomez and Dally (1980) have shown that recovery from neurotic disorders is followed by increased scores on measures of Extraversion.

The significant role of Extraversion in attention and memory processes was expected on the basis of earlier research findings (M. Eysenck, 1976; 1977). Recent work with children (Gabrys, 1979), adolescents and adults (Gabrys, 1980) appears

to have shown that there might be a relationship between arousal and recall of prose, the measure of cortical arousal being the junior or senior Extraversion scales of the Eysenckian personality inventories. The present finding for a multivariate role of Extraversion in relation to performance measures of attention and memory provided further support for the construct validity of Extraversion.

There was also a significant role for Neuroticism. However, subsequent univariate analyses of variance suggested that the role of Neuroticism in the performance of attention and memory tasks was not as clear as the role of Extraversion. Eysenck admitted that Neuroticism influences Extraversion like an amplifying valve with the result that emotionally unstable introverts show higher cortical arousal than emotionally stable introverts. It is also assumed that emotionally unstable extraverts may be closer to optimal arousal levels than emotionally stable extraverts. The effect for Neuroticism may change when the *N* scale is dichotomized in a way to reflect extreme scorers only (the present dichotomy was about the mean score). The fact that Neuroticism facilitates performance for high ability level individuals and worsens performance for low ability subjects has been shown by Katahn (1966). Furthermore, there might be an interaction of task difficulty with ability of subjects and their anxiety level (Katahn, 1966). These aspects were not examined in the present study.

The second, deductive phase of this study, proceeded from theory-based expectations to actual effects. Multivariate analyses of variance registered significantly higher probability levels for Extraversion (from $p < .039$ to $p < .001$) and Neuroticism (from $p < .038$ to $p < .003$) in relation to some of the dependent measures. The present study into the *E* and *N* components of personality also supported earlier research by Stein (1968). It would appear that the Eysencks' Neuroticism measures bear a close relationship to seven clusters of emotionality, the Tryon-Stein-Chu Psychological Scales, which according to Stein (1968) are a distillation of the total MMPI. The apparent similarity of content between the Eysenckian scales as broad measures of emotionality, and the MMPI-derived TSC. PS scales as component measures of emotionality may be of interest to clinicians who want to economize on assessment procedures. Stein (1968) offered practical suggestions about differences between Extraverts and Introverts, emotionally stable or unstable, in relation to counselling for vocational choices.

The present research sustained interest in personality research and its presumed role in processes of attention and short-term memory. The present findings supported the view that the cortical arousal features are perhaps more important in understanding memory processes than autonomic responsivity.

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Multivariate Experimental Clinical Research, Volume 6, No. 3, 1983, 143-159

ASSESSMENT OF ASSERTIVENESS IN THE INTELLECTUALLY HANDICAPPED

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ABSTRACT

Earlier work in the structural analysis of self-reported difficulty in assertiveness had indicated that individuals differed in terms of a two-facet model — response type (positive vs. negative assertiveness) by referents (close vs. distant interpersonal encounters). This study replicated the individual differences structure for an intellectually handicapped sample, thus extending the generalizability of that model. However, although the dimensions were found in three different methods of assessment, self-report, behavioral rating, and role play, little agreement was found between the methods in accounting for individual profiles. Additionally, there were hints that the four interaction dimensions of assertiveness might actually reflect different difficulty positions on a non-linear unidimensional scale of assertiveness. Using a Rasch model to derive the single scale, role play and self-report were significantly correlated in their assessments, but the correlation was not very great. It was hypothesized that method differences might reflect legitimately different perspectives of close-distant referent raters.

Assertiveness assessment has received considerable attention in the psychological literature, but its implied benefits have been sought more for general and clinical populations rather than the intellectually handicapped. Since non-institutionalized intellectually handicapped people are frequently subject to unrealistic demands which can lead to failure, low aspiration levels, and uncritical compliance and acquiescence (Cf. Rosen, et al., 1974), all of which exacerbate the initial handicap, more attention to their potential difficulties in assertiveness is warranted. This study extends earlier findings in the structural analysis of assertiveness difficulties (Firth & Snyder, 1979; Leah, et al., 1979) as applicable to the intellectually handicapped.

Following general disenchantment with assessments based on global clinical impressions (Eysenck, 1965), research and clinical practice in the area of assertiveness have employed three basic assessment methodologies: self-report, behavior ratings, and role play. These three approaches to data collection vary as to their strengths and weaknesses.

The most frequently used method has been the paper and pencil self-report inventory (e.g., Galassi, et al., 1974; Goldsmith & McFall, 1975; Lazarus, 1971; McFall & Lillesand, 1971; Rathus, 1973; Wolpe & Lazarus, 1966). Unfortunately, many of the available instruments have reliability, validity, or item specification problems (see Rich & Schroeder, 1976). By their very nature, self-report assessments are open to confounding response sets (Anastasi, 1979), and the extent of such response sets is related to the needs of the individual for protection, avoidance or criticism, sympathy, and help (Crowne & Marlowe, 1960). Intellectually handicapped individuals may well be particularly vulnerable to such needs and hence to response sets. Furthermore, individuals with restricted behavioral repertoires are less able to imagine what response they would make to the imaginary situation presented in the inventory (Miller, 1972). The routine, protected life of most intellectually handicapped people makes this a very real assessment problem. Nevertheless, self-report methodology has generally been shown to be as reliable and valid as any other (Hersen & Bellack, 1976; Scott & Johnson, 1972), and it is often able to tap information not detected in the standard laboratory/clinical assessment (Mischel, 1972). As such, its use would seem appropriate to an exploratory study with the intellectually handicapped.

An assessment methodology suited to the reading, writing, and verbal deficiencies of the intellectually handicapped is the behavior rating, which enables behavior to be recorded by some relevant observer in the natural setting. The majority of social skills inventories designed for use with the intellectually handicapped are of a behavior rating type (Gunzberg, 1967). These inventories have their problems as well. Mischel (1968) proposes that a significant source of variance in behavior ratings lies in the role of the rater, and that reported consistencies in behavior may result from constructs of the observer rather than from the performance of the observed. Similarly, Klimoski and London (1974) suggest that the rater interprets or classifies overt behaviors according to a personal conceptual schema, leading to biased recording. There is a need to investigate the extent to which behavior ratings agree with the results from other assessment methodologies.

Role play methodology has also had widespread use in the assertion field, particularly with the introduction and revision of inventories based on standardized interpersonal situations (Eisler, et al., 1973; Eisler, et al., 1975). Studies attempting to establish role play as a valid assessment tool have produced inconsistent findings (Greenberg, 1967), and it has been suggested that the results can often be re-interpreted in terms of experimenter demand characteristics (Orne, 1962). Problems can, however, be minimized if the experimenter fulfills certain requirements. The individual should role play his/her own behavior rather than that of another person (Geller, 1978), should be aware of all the circumstances relevant to each imagined scene (Darroch & Steiner, 1970), and should not be tested with situations far removed from his/her past experience

(Miller, 1972). The use of role play in the assessment of assertiveness has yet to be tested with the intellectually handicapped.

The varied strengths and weaknesses of the three assessment strategies (self-report, behavior ratings, and role play) suggest that each could make a contribution to the investigation of assertiveness in the intellectually handicapped. The application of all three strategies in the same sample permits each method to act as a validatory check on the others, as well as possibly revealing the unique capabilities of any one method in any one area of assertive behavior.

This study sought to evaluate the method influence in the assessment of assertiveness difficulties for an intellectually handicapped sample. Item selection was based on the findings of Leah et al. (1979). After earlier work had challenged the conceptual validity of a popular, global-index, assertiveness inventory (Law, et al., 1979), Leah et al. attempted to take account of types of responses and types of situations which characterize assertive behavior in university students. They extended the two-facet model developed by Gay, et al. (1975) — referents or interpersonal partners (e.g., friends, parents, strangers) x response classes or types of assertive behavior (e.g., asking favors, refusing requests, expressing disagreement). The results indicated that interpersonal partners could be reliably subclassified into distant and close referents, and that response types could also be grouped into two subclasses of positive and negative responses. They proposed that difficulty in assertiveness in a student population can be conceptualized by means of an interactionist model of two response classes x two referent groups. This conceptualization is supported by studies showing the importance of familiarity with the interpersonal partner (Bander, et al., 1975; Goldsmith & McFall, 1975; Warren & Gilner, 1978), and by clinical and research reports acknowledging the need to train both positive and negative expressions of feelings (Hersen & Bellack, 1976; Hersen & Eisler, 1976; Hersen, et al., 1973; Lazarus, 1971; 1973). Firth and Snyder (1979) also found that this structural pattern held equally well for a general population (hospital worker) sample.

In applying this conceptual scheme to the intellectually handicapped, data were collected across similar items representing the distant-close referent and positive-negative response categories of assertion for three assessment methods on a sheltered workshop sample. Tucker's exploratory three-mode common factor analysis (Snyder & Law, 1979; Tucker, 1966) was applied to the individual x assessment method x type of assertiveness difficulty data matrix to extract the structure of individual differences for the cross-method evaluation.

METHOD

SAMPLE

From the employees of the five Activity Therapy Centres in Brisbane, Queensland, sixty volunteer individuals were selected from the borderline to mildly retarded measured-intelligence range. Males and females were equally represented in the sample with an average male age of 19.4 years and an average female age of 21.1 years.

ASSESSMENT INSTRUMENTS

The assessments domain was represented by 16 items with each item appearing in a self-report, behavior rating, and role play rating inventory respectively. Items were derived from a two-facet model of assertiveness difficulty delimited by the interaction of assertiveness response classes and referents (Leah, et al., 1979). Response classes were categorized as positive or negative. The expression of warmth and the initiation of conversations represented positive assertiveness in this study; and the expression of negative feelings and the refusal of requests represented negative assertiveness. Referents were categorized as close or distant. Friends and parents represented close referents; and strangers and authority figures represented distant referents. Each item thus involved one assertive response, either positive or negative, with one referent, either distant or close. Actual phrasing of the item was based on practical circumstances typical of the situations that these individuals may encounter in their daily lives.

For all three assessments, the suspected degree of difficulty the individual would experience was rated. Gambrill and Richey (1975) suggested that the individual's degree of discomfort and anxiety in assertive situations may be a better predictor of clinical disability than measures of response probability or frequency. A 1 to 4 rating scale was considered most suited to the intellectual capacity of the sample. One corresponded to 'very difficult', two 'difficult', three 'easy', and four 'very easy'.

PROCEDURE

In order to avoid reading difficulties, each item of the self-report inventory was read aloud to each individual and where necessary, the meaning explained and clarified. The responses were recorded by the experimenter.

The behavior ratings were completed by one workshop supervisor in each Activity Therapy Centre. Four of the items, however, concerned the individual's behavior at home and it was therefore necessary to contact the parents for their ratings in those situations. Where such contact was impossible, elder siblings, hostel mistresses and housemothers completed the ratings.

The role plays were conducted individually in a private office at each center. Ratings, carried out by an Honors clinical psychology student, used the same four point scale and were based on (a) content of response, (b) duration of response, (c) latency of response, and (d) eye contact. An independent (clinical psychology student) rater assessed 60% of the role plays with an inter-rater reliability coefficient of 0.92. The role plays were conducted approximately two weeks after the self-report inventories were administered.

THREE-MODE COMMON FACTOR ANALYSIS

The data matrix, X(ijk), is arranged into three observational (raw data) modes: (I) persons × (J) assessment methods × (K) assertiveness difficulty items. The strung-out data matrix of individuals by combination variables, X (I × JK), intercorrelates to yield R (JK × JK). Factoring the combination variable correlation matrix leads to F (JK × M, where M < JK), the matrix of generalized individual differences factor loadings associated with the method-item variables.

Tucker's three-mode common factor analysis (Snyder & Law, 1979; Tucker, 1966, pp. 301-311) exploits the inherently three-mode data design more fully and decomposes these individual differences into their separate method, item, and interactional influences.

For each observation, Tucker's three-mode common factor analysis model is given as:

$$[1] \quad x_{ijk} = \sum_m \sum_p \sum_q a_{im} b_{jp} c_{kq} g_{mpq} + u_{ijk},$$

where x(ijk) is a difficulty rating for individual i by assessment method j on assertiveness item k; a(im) reflects the influence of the individual differences factor m on individual i; b(jp) reflects the influence of the method factor p on method j; c(kq) reflects the influence of the assertiveness difficulty factor q on assertiveness item k; and u(ijk) is the uniqueness associated with that rating. Each g(mpq) is an entry in a reduced three-way core matrix classified by the derivational (factor) modes, M, P, and Q; its value specifies the interrelationship among these three different domain factors.

Standardizing the ratings across i for each jk combination and calculating the correlations, the Tucker model becomes, in matrix form:

$$[2] \quad R \text{ (with communalities)} = (B * C)\, G\, A'\, A\, G'\, (B' * C'),$$

where * denotes the direct or Kronecker product (see Tucker, 1966, or below); A (I × M), B (J × P), and C (K × Q) are the basic derivational (factor) modes associated with the individuals, assessment methods, and assertiveness items observational (raw data) modes; and G (PQ × M) is the interactional, three-mode core matrix. In this case, the factor coefficients for individuals in matrix A are not determinate and A'A = I is assumed. The dimensionality of A and its interactional impact are contained in the core.

Although the matrix operation of the direct product will not be familiar to most psychologists, it is an important operation for the three-mode factor analytic model, in that it enables us to combine matrices of different orders. Applied to this case,

$$(B * C) = \begin{bmatrix} b_{11}C & \cdots & b_{1P}C \\ \vdots & & \vdots \\ b_{J1}C & \cdots & b_{JP}C \end{bmatrix}$$

where the direct product supermatrix has JK combination rows and PQ combination columns. Thus, a new row is formed by multiplying each entry in the B matrix by the entire C matrix row; a new column is similarly constructed by the

combination of each element of B with the entire C matrix column. Since the core matrix, G (in Equation 2), will have PQ combination rows, the direct product matrix and the core matrix can be multiplied in the usual way. In effect, the three-mode model indicates that the original correlation matrix (with communalities on the diagonal) is reduced to a three-mode core, but can be recovered by scaling the core by the direct product of the variable mode solutions.

The derivational modes, B and C, and the core, G, are related to a traditional factor analysis of the combination R matrix as follows:

[3] $F = (B * C)\, G$,

where B and C are column-wise sections of orthonormal matrices and because of the use of correlations, describe deviations from average ratings; and F is the factor pattern of the combination variables. Core, thus, weights each pq combination value in order to reproduce the individual differences factor loading associated with the particular combination variable. The larger the influence of the separate mode idealized dimensions in the combination variable individual differences factor, the higher the weight given in the core. These interactional weights in core are calculated by:

[4] $G = (B' * C')\, F$,

because $B'B = I$ and $C'C = I$.

Transformations (rotations) can be applied to each of the B and C modes and the core. Since the core is frequently interpreted in terms of the B and C dimensions, which form its rows, it must be transformed in the same way as those solutions. The inverse transformations from the B and C solutions produce what is called the "counter-rotated core." Further, in order to simplify the core (column) individual differences factors interpretation, the core can be transformed (rotated) itself. Calculation details are given in Snyder and Law (1979) and Snyder, et al. (1979).

In the present case, the following procedural steps were taken:

(1) The data were organized into a persons by combination methods-items matrix and standardized across persons in the usual manner during the calculation of correlations among the methods-items variables.

(2) The methods-items combination correlation matrix was factored to yield the F factor matrix (Equation 3).

(3) From the methods-items combination correlation matrix, the separate methods and items averaged correlation matrices were calculated.

(4) Both the methods and items correlation matrices were factored to yield the B and C matrices (Equation 3).

(5) All the factor matrices were rotated to an appropriately interpretable solution. Retention of roots was decided on the basis of Scree Tests and final interpretability.

(6) The core matrix was calculated (Equation 4); counterrotated to match the B and C solutions; and rotated to correspond to the F solution.

(7) Interpretation focuses on the core matrix, which in turn depends upon the B and C solutions.

RESULTS

The three-mode common factor analysis results are presented in terms of the assessment method component matrix, the assertiveness difficulty item factor matrix, and the three-way core matrix. Individual differences are implicated in the core interpretation.

Inspection of the assessment method component matrix (Table 1) indicates minimal cross-method agreement; that is, the variable vectors, when plotted in accordance with their weights on the component reference axes, are nearly perpendicular to one another (the highest correlation is 0.22 between self-report and role play methods). The apparent cross-method agreement in the first component is artifactual, attributable to component model constraints on variance accountability.

TABLE 1

Unrotated Component Loadings for the Assessment Methods (Unrotated B Matrix)

Method	Component		
	1	2	3
Self Report	.67	-.49	.55
Behavior Rating	.60	.78	.19
Role Play	.72	-.18	-.66

Note: Traditionally salient loadings (.30 and above) are not printed in bold face because the vector plots show the methods to be independent.

Since the method correlation matrix is calculated across the item relationships in the three-mode combination correlation matrix, the low correlations between the methods imply that the methods display little agreement across any item combinations. Difficulties expressed in any one data collection perspective may or may not be similarly detected in another approach. Since each method therefore presents a somewhat different view of the individual difficulties

experienced in these situations, a dimensional reduction based on common variance alone may be misleading and certainly less useful than retaining the full method variance.

Component axes were rotated through each of the method variables to ascertain counterrotational values for the calculation of the core. The methods retained their identification in the derivational mode: the first factor was the *Behavior Rating Factor* (B1); the second factor was the *Self-Report Factor* (B2); and the third factor was the *Role Play Factor* (B3).

TABLE 2

Varimax Rotated Factor Loadings for 16 Items
(Rotated C Matrix)

Item	Factor			
	1	2	3	4
Initiate interaction/Stranger	.04	**.41**	**.46**	.02
Express positive feelings/Authority	-.05	**.58**	.22	.15
Express displeasure/Friend	**.41**	.20	.24	.06
Refuse unreasonable request/Parents	.18	-.10	.24	**.48**
Express positive feelings/Stranger	-.05	.22	**.58**	.10
Initiate interaction/Authority	.01	**.72**	.19	.06
Refuse unreasonable request/Friend	**.53**	.00	-.13	.06
Express displeasure/Parents	**.32**	.18	.19	**.40**
Refuse unreasonable request/Authority	**.62**	-.17	-.05	-.02
Express displeasure/Stranger	**.56**	.08	.27	-.03
Initiate interaction/Friend	.04	.25	**.42**	**.38**
Initiate interaction/Parents	-.03	.20	.01	**.49**
Refuse unreasonable request/Stranger	**.42**	.14	-.23	.22
Express displeasure/Authority	**.50**	-.12	.00	.17
Express positive feelings/Friend	-.03	.16	**.38**	**.30**
Express positive feelings/Parents	.09	.00	.02	**.48**

Note: Salient loadings (.30 and above) are printed in bold face.

Common factor analysis of the assertiveness items resulted in four factors accounting for 50.8% of the total variance (see Table 2). The retention of four factors was consistent with the Scree Test of the eigenvalues (which were 3.26, 2.35, 1.40, 1.11, 0.97, 0.90, 0.80, 0.79, etc.) and the predicted number of dimensions based on previous research with this form of questionnaire. The first factor was marked by difficulties with negative assertiveness responses in general and was

interpreted as the *Negative Assertiveness Factor* (C1). The second was marked by difficulties with the initiation of interactions with authority and stranger referents and the expression of positive feelings to authority referents; this factor was interpreted as the *Distant Referent Factor* (C2). The third was marked by difficulties with positive assertiveness responses to strangers and friends and was interpreted as the *Positive Assertiveness Factor* (C3). The fourth was marked by difficulties with parents and in positive assertiveness, with friends. This factor was interpreted as the *Close Referent Factor* (C4). These results are consistent with the facet structure implicit in the item selection and further substantiate the generality of that structure across samples.

The remaining questions pertain to the generality of the assertiveness difficulty structure across the assessment methods and the similarity of the individual rankings within that structure. The pattern of core values indicates the way in which the three derived methods agree and disagree on the structure identified for the assertiveness items. Since these values for the individual differences factors (columns in Tables 3 and 4) display a similar differentiation across methods of positive and negative assertion and to a lesser extent, close and distant referents, these categories appear to reliably characterize the item structure regardless of the method of assessment.

TABLE 3
Rotated Core Matrix (G)

Method/Item	Individual Differences Factor					
Factor	F1	F2	F3	F4	F5	F6
B1 C1	0.08	1.44	0.00	0.03	0.00	0.21
B1 C2	-0.07	-0.04	-0.04	1.01	0.02	-0.13
B1 C3	0.35	-0.20	-0.10	1.18	-0.29	0.03
B1 C4	0.19	0.09	0.50	0.25	0.61	0.16
B2 C1	-0.29	0.29	0.05	0.22	-0.08	1.10
B2 C2	0.73	0.09	0.30	0.04	-0.59	0.19
B2 C3	0.49	0.32	0.27	0.23	0.02	0.02
B2 C4	0.32	-0.07	0.88	-0.18	0.11	0.73
B3 C1	0.39	0.01	-0.80	0.19	0.70	0.43
B3 C2	1.11	-0.17	0.18	-0.09	-0.07	0.20
B3 C3	0.97	0.08	0.05	0.26	0.36	-0.15
B3 C4	0.57	-0.06	0.40	-0.07	0.97	-0.10

Note (1). Entries indicate the extent to which a particular Kronecker value from (B*C) contributes to the individual differences factor.

Note (2). B1: Behavioral Rating; B2: Self-Report; B3: Role Play; C1: Negative; C2: Distant (Positive); C3: Positive; and C4: Close.

TABLE 4

Percent Variance of Rotated Core Matrix (G) Entries

Method/Item	Individual Differences Factor					
Factor	F1	F2	F3	F4	F5	F6
B1 C1		13%				
B1 C2				7%		
B1 C3				9%		
B1 C4			2%		2%	
B2 C1						8%
B2 C2	3%				2%	
B2 C3	2%					
B2 C4			5%			
B3 C1			4%		3%	
B3 C2	8%					
B3 C3	6%					
B3 C4	2%				6%	
Individual Differences (F) Slabs	25%	15%	13%	18%	15%	14%
Methods (B) Slabs	36%	28%	36%			
Items (C) Slabs	33%	22%	21%	24%		

The six columns in the core correspond to the individual differences factors (as per Equations 3 and 4) and the twelve rows correspond to the 3-methods-by-4-items factors derived from the B and C solutions. Retention of six individual differences factors is based on interpretability of the patterns of core weights (after rotation), before "factor splitting" occurs with greater dimensionality. Interpretation of the core rests on the interactional individual differences entries marking the method-item factors. Because the three-mode core is a kind of factor loading matrix, it can be rescaled so that each entry represents the proportion of variance accounted for by a particular interaction (see Table 4).

Convergent validity implies a similarity of structure across methods and agreement within the structure on individual status. As demonstrated by the assessment method analysis and confirmed in the core analysis, there is no *overall* convergence of any assertive dimension. However, the core specifies the derivational combinations which converge to some extent across pairs of methods. Salient interactional values for the *Self-Report* and *Role Play Factors*

across the *Distant (marked only by positive items)* and *Positive Factors* respectively reflect very slight validity for the identification of difficulties with positive assertive responses. Interestingly, although some of the positive-distant items involved the supervisor as the referent, supervisors apparently rated a different set of individuals as having these difficulties (*Individual Differences Factor 4*). The supervisors' perspective of the social interactions in the sheltered workshops may not accurately reflect the feelings and anxieties experienced by the worker in the initiation of social interactions and the expression of positive feelings to new people (strangers) and the supervisors themselves.

Different combinations of negative assertiveness and close referent interactions underlie the remaining four individual differences factors. Slight agreement across methods was found for the *Close Referents Factor,* split across two individual differences factors (Nos. 3 and 5). In role play assessment, negative assertiveness loads negatively on *Individual Differences Factor 3* and positively on *Individual Differences Factor 5,* both of which characterize parental relationships in the *Close Referents Factor.*

The *Negative Assertiveness Factor* showed no convergence across methods, resulting in four individual differences factors (Nos. 2, 3, 5, and 6). For *Individual Differences Factor 2,* negative assertiveness stood out as an independent marker, but in *Individual Differences Factors 3, 5, and 6,* it linked with the *Close Referents Factor* in different assessment methods. The association with the *Close Referents Factor* in these cases derived from the associated difficulty to refuse an unreasonable request from parents (Item 4). It is perhaps not surprising that marked individual differences would be reflected in parental relationships, an area deserving particular attention for intellectually handicapped adolescents.

DISCUSSION

Application of the Tucker three-mode common factor analysis technique to multi-method assertiveness difficulty rating data reveals six generalized individual difference factors, accounting for 45.5% of the total variance. Three assessment method factors and four assertiveness difficulty response factors are found to underlie the individual differences functions. Salient interactions are identified which imply variations in the influence of the assertiveness item structure within and across the different assessment methods, but no general claim for convergent validity can be presented.

DERIVATIONAL MODES

The categories of positive and negative assertiveness responses and to some extent, close and distant referents reliably characterize the item structure. Despite the special sample characteristics, these results confirm those found in student (Leah et al., 1979) and hospital worker (Firth & Snyder, 1979) samples.

The independence of the assessment methods indicates little cross-method convergence when assertiveness difficulties are considered without regard for their particular type and referent. By implication these results underline the complexity of the assertiveness construct.

CORE

The outstanding feature of the core is the differentiation of positive and negative assertiveness within each of the assessment methods. Referent designations are present but subordinate to the response category in the interactional pattern. This further underlines the differences between assertiveness categories regardless of the particular perspective (self, situational other, or objective observer).

Negative assertiveness shows no convergence across methods in the core although it accounts for 33% of the item common variance (slab C1) and marks about 28% of the core variance (B1C1F1 = 13%; B2C1F6 = 8%; and B3C1F3 = 4% plus B3C1F5 = 3%) in separate individual differences factors. Interacting with Close Referents (in F3, F5 and F6), negative assertiveness accounts for 33% of the core variance (11% in each individual differences factor). Thus, despite the clear distinction between positive and negative assertiveness, the structural interactions of response classes with referent types are ambiguous and the convergent validities are slight and unconvincing. Positive assertiveness shows some convergence across the self-respect and role play methods but separates for behavioral ratings. Interacting with Distant Referents, positive assertiveness accounts for 19% of the core variance with the self-respect and role play methods and 16% with the behavioral ratings method.

Although the procedural operationalization of this study purposefully fractionates the general construct of assertiveness, the utility and conceptual tidiness of construct unidimensionality luringly leads us to the reevaluation of the multidimensional hypothesis particularly when confronted with such weak confirmation of the more complex configuration.

SPECULATIVE COMMENTS

Table 5, in which the assertiveness items are rank ordered by their overall rating-means, reveals a possible explanation for the stability of the factor structure and the dominance of the positive/negative assertiveness dimension. Positive assertiveness with close, then distant, referents proved to be the easiest response category and negative assertiveness with authority, then close, then stranger, referents proved to be the most difficult for this intellectually handicapped sample. The rank orders for positive assertiveness items across methods were reasonably consistent and the demarcation with negative assertiveness items, was clear. This raises the spectre of a confound between individual differences variance and among-item variance; the factor structure (the C mode) may reflect the ordered difficulty of the items. That is, the factor structure may be determined by a grouping together of items of similar difficulty. Factor analysis operates on the implicit assumption that all items are approximately equivalent with respect to their extremeness. When the marginal distributions of two items are disparate, the correlation coefficient no longer has a maximum absolute value of 1.00. Further, when both marginal distributions are extreme but similar in shape, the lower absolute value of the coefficient is no longer zero. Thus, wherever a set of items varies in the extremeness, this variation influences the patterning of correlations and consequently, the factor structure.

TABLE 5

Mean Ratings for Assertiveness Items

Item No.	Facet Specifications	Self Report Means	Behavioral Rating Means	Role Play Means	Overall Means
11	Positive/Close (Friend)	3.45	3.48	3.40	3.44
16	Positive/Close (Parents)	3.43	3.37	3.45	3.42
15	Positive/Close (Friend)	3.28	3.37	3.15	3.27
12	Positive/Close (Parents)	3.15	3.22	3.40	3.26
2	Positive/Distant (Auth.)	3.10	3.27	3.30	3.22
6	Positive/Distant (Auth.)	3.03	3.13	3.08	3.08
1	Positive/Distant (Stranger)	2.80	3.02	2.97	2.93
5	Positive/Distant (Stranger)	2.75	2.98	2.91	2.88
13	Negative/Distant (Stranger)	2.78	2.68	2.72	2.73
10	Negative/Distant (Stranger)	2.72	2.87	2.53	2.71
3	Negative/Close (Friend)	2.53	2.87	2.63	2.68
8	Negative/Close (Parents)	2.57	2.73	2.53	2.61
7	Negative/Close (Friend)	2.53	2.65	2.60	2.59
4	Negative/Close (Parents)	2.53	2.70	2.50	2.58
14	Negative/Distant (Auth.)	2.37	2.80	2.57	2.58
9	Negative/Distant (Auth.)	2.33	2.57	2.58	2.49

Note. Scale ranges from 1 (very hard) to 4 (very easy).

TABLE 6

Individual Item Fit for the Three Assessment Methods from Recovery Data by the Rasch Multiplicative Binomial Model

Item No.	Self Report Probability	Behavior Rating Probability	Role Play Probability
1	.67	.17	.33
2	.18	.88	.44
3	.14	.12	.78
4	.40	.10	.51
5	.09	.56	.23
6	.21	.08	.52
7	.65	.06	.49
8	.24	.31	.32
9	.21	.01*	.84
10	.03	.06	.11
11	.41	.60	.75
12	.86	.32	.19
13	.94	.64	.94
14	.56	.21	.01*
15	.28	.78	.84
16	.78	.78	.27

Note: * indicates lack of fit as $p \leq .01$

In this case, negative assertiveness may be inherently more difficult than positive assertiveness, particularly for intellectually handicapped individuals. Given the interpretability of the rank-ordered items as a single dimensional construct of assertiveness, ranging in difficulty from positive to negative assertiveness, the item sets for each of the three methods were individually analyzed by the Rasch Multiplicative Binomial Model as a test of unidimensionality (Andrich, 1978). This procedure determines whether a set of items can be represented on a single latent variable by taking into account the variation in item difficulty. An item's distributional characteristics are handled by modeling the probability of a given response to an item as a logistic function of the item difficulty and the individual's overall assertiveness. The difficulty and assertiveness parameters are estimated by maximum likelihood procedures. By attempting to recover the individual subject data from these parameters and then testing the difference between the obtained and the recovered data with a Chi-square test, it is possible to see how well the unidimensional Rasch Multiplicative Binomial Model fits a particular set of data.

All three method item sets fit the unidimensional model (Table 6), with only minor perturbations. The small sample size precludes a conclusive demonstration of fit, but the unidimensional hypothesis is buttressed by the structural agreement across three separate methods of assessment. An important implication of this finding is that the summary status of any individual is now assessed by a total score of scaled items, which effectively results in a collapsed item mode. Taking into account these new scaled total scores, only the self-report and role play assessment methods were significantly correlated ($r = 0.37$; $p < .01$), indicating some convergent validity under the unidimensional hypothesis.

CONCLUDING REMARKS

Several hypotheses emerge from this study:

(1) The robust positive-negative/close-distant assertiveness structure may actually reflect a unidimensional scale of assertiveness. Difficulties with global scales in the past may have resulted from imprecise item sampling strategies.

(2) Role play and self-report methods show some agreement under the unidimensional hypothesis, but each method obviously offers a rather different perspective of an individual's status. Since these methods differ in terms of the rater's association with the rated individual (that is, self, stranger, and authority figures), the unique perspectives may validly reflect these differing relationships.

(3) While there may be quantitative differences in assertiveness difficulties across intellectual levels, the structure of individual differences appears to be highly similar for those groups studied (students, hospital workers, and sheltered workshop workers). This qualitative similarity highlights the generalizability of the structure of assertiveness, although the precise reasons for this generalizability require further examination.

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Multivariate Experimental Clinical Research, Volume 6, No. 3, 1983, 161-162

BOOK REVIEW BY
James J. Snyder

A SOCIAL LEARNING APPROACH: VOLUME 3 COERCIVE FAMILY PROCESS

Gerald R. Patterson
Eugene Oregon:
Castilia Publishing Company, 1982

In the preface, Patterson suggests that his book has two purposes. The first purpose is to summarize the research methods used and the data collected by Patterson and his colleagues in working with aggressive, antisocial children and their families. The second purpose is to relate these data to clinical experience and practice.

The first purpose is fulfilled extremely well. The major portion of the book is spent in describing the rationale, the means, and the results of an extremely large (over 100 by the Oregon Social Learning Center group alone) number of studies of the interaction of normal families and of families with aggressive children. These data focus on a molecular analysis of interactional sequences and patterns that characterize the families of aggressive children and which differentiate them from normal families. These data are rich, detailed and fascinating. However, the reader needs to be prepared for very complex data and to take time to understand bewildering analyses based on conditional probabilities, time lagged correlations and time series analyses. It simply takes time and patience, and needs to be digested in small pieces in order to be understood. The effort, however, is extremely worthwhile. Patterson also does a very nice job relating his research to other diverse areas of psychology, including developmental research on children and families, the literature on high risk children, learning theory, systems theory, and other types of child psychopathology. This contextual frame of reference provides the reader with a perspective and serves to enhance the impact of his data on the related areas in psychology.

Equally rich, intriguing, complex and rewarding is the discussion of methodological issues which are woven throughout the data presentation. This promotes an appreciation of the strengths and weaknesses of the observational methods used, and of the importance of other data collection modalities that provide converging and clarifying evidence.

The degree to which Patterson achieves his second goal is less clear. It depends upon the reader's set or expectation prior to starting. For those clinicians who have a true appreciation for the complexity of interaction within a family system, the book serves as a rich source of ways to conceptualize and intervene with troubled families. However, the clinical implications of the research are explicitly discussed in only a few chapters, and are difficult to appreciate without

reading the whole book. If readers are looking for a molar description of interaction in troubled families, or a cookbook of treatment strategies or implications, they will be quickly discouraged.

The book is also extremely useful at a third level (one at which Patterson hints in the preface). It details a fascinating journey, made by a group of talented individuals, as they plan and effect programmatic research on a pressing social problem. The book describes the conceptions and creativity, the preconceived notions which needed to be dropped, the dead ends and accomplishments, and the choices that are required in such an endeavor. At this level, it provides a "feel" for what's involved in programmatic research, and an exemplary model of a scientist-practitioner at work.

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