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Discriminating Personality Disorders Using the WAIS–R: A Comparison of Three Approaches

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The purpose of this article is to determine if performance on the Wechsler Adult Intelligence Scale–Revised (WAIS–R) can be used to discriminate between the different taxonomies of personality disorder classification specified by three models: the biosocial, the interpersonal, and that described by the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev. [*DSM–III–R*]; American Psychiatric Association, 1987). Three discriminant function analyses were performed and the results indicated the usefulness of the WAIS–R in making such differentiations for all the approaches. The WAIS–R proved most effective with the biosocial model, evidencing a robust and clinically meaningful pattern of results. Implications for further research are discussed.

Nosological classification attempts to organize behaviors into a number of homogeneous categories. Diagnostic labels thus characterize behavior in terms of not only functional but also etiological similarity. However, to make such an adjudication there needs to be some criterion by which behaviors are evaluated—a medium in which the similarities and differences of individuals are manifested and that also serves as a metric for classification. The history of psychiatry is replete with nosological documents and today there are many approaches to understanding psychopathology, each applying a different criterion for evaluating behaviors (e.g., American Psychiatric Association, 1987; Kiesler, 1986; Millon, 1981). This article examines three such approaches to the classification of personality disorders and determines the utility of the WAIS–R as a metric for making such diagnostic determinations.

Rapaport, Gill, and Schafer (1968) have long argued that the Wechsler Adult Intelligence Scale (WAIS) provides a standardized, well-controlled forum for evaluating an indiviudal's state of psychological functioning; performance outcomes on the various scales are hypothesized to bear certain relationships to

various diagnostic groupings. If this theoretical link between WAIS performance and diagnostic category is correct, then the utility of any classification approach can be evaluated on this criterion. Specifically, differences in WAIS subscale scores may reflect important diagnostic differences.

Thus psychological testing can be a valuable interface between theoretical formulations of pathology and actual diagnostic classifications by providing both criteria that differentiate various nosological groups and a statement as to the type of dimension that allows such a discrimination. Piedmont, Sokolove, and Fleming (1989) provided an example of how the WAIS–R can furnish an algorithm, based on performance on a subset of the scales, that not only discriminated between psychotic and affective disorders, but also provided a clinically meaningful dimension (centered on a social insight and understanding) that separated the two nosological entities.

This article attempts to extend such an analysis to the area of personality disorders. Although there is some evidence that the WAIS can be useful in diagnosing borderline personalities (Hymowitz, Hunt, Carr, Hurt, & Spear, 1983; Widiger, 1982), there has been no systematic application of this measure to all the personality disorders stated in the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed. [*DSM–III*], American Psychiatric Association, 1980). However the area of personality classification contains difficulties not found with the Axis I diagnoses. In the newly revised *DSM–III–R* (American Psychiatric Association, 1987) there is controversy as to the number of personality disorders (a case in point is the masochistic personality which, although not yet considered a disorder, maintains an experimental status). There is also criticism because there is no uniform index for evaluating how the different diagnostic indicators contribute to making each diagnosis (Kiesler, 1986). In light of this last issue, the WAIS–R may be able to identify aspects of psychological functioning that may or may not be salient to the different disorders.

Thus, the area of personality disorder classification is less clearly defined relative to other categories. The different approaches to understanding characterological disturbances included here attempt to organize the 11 different accepted diagnoses around larger constructs of either behavioral similarity, extremeness/rigidity, or level of decompensation. These models were chosen because each represents an influential perspective in the understanding of characterological disorders. This investigation attempts to determine whether performance on the WAIS–R can be used to evaluate the utility of these three models of personality classification: the *DSM–III–R*, the circumplex, and the biosocial. A description of each follows.

The *DSM–III–R* provides an atheoretical attempt at classifying characterological disorders. Although it specifies 11 distinct entities, it organizes them into three categories based on behavioral similarities. Group 1 includes the paranoid, schizoid, and schizotypal personalities and represents odd and eccentric behaviors. Group 2 refers to emotional and erratic type individuals and

includes the histrionic, narcissistic, antisocial, and borderline personalities. Finally, Group 3 reflects anxious and fearful dispositions and includes the avoidant, dependent, compulsive, passive–aggressive, and mixed-atypical diagnoses.

The circumplex model is based on the interpersonal approach to personality assessment advocated by Leary (1957). This orientation hypothesizes that there are eight broad categories of interpersonal action that can be used to classify individuals (e.g., aggressive-sadistic, docile-dependent). Adjectives which characterize these dimensions, when factor analyzed, produce two major factors. Plotting each of these adjectives on the two dimensions results in a circular ordering of the traits, hence a *circumplex* (see Conte & Plutchik, 1981). A circumplical model had been found when the descriptive ratings of each diagnostic category by health-care professionals were factor analyzed (Plutchik, 1967; Plutchik & Platman, 1977). Such an application has three important implications:

1. Personality disorders can be conceptualized as distinct groups of related personality traits.
2. Personality disorders may represent more extreme or exaggerated manifestations of certain underlying personality traits (Kiesler, 1986).
3. Given the interpersonal nature of these variables, diagnoses can be interpreted to represent detailed articulations of the implicit schemata health-care workers maintain in regard to each disorder.

Plutchik and Conte (1986) reported a study where 10 psychiatrists were presented all 11 *DSM–III* personality disorders plus the term *well-adjusted* and asked to rate each in terms of their perceived similarity to particular reference words. Based on the resulting correlations, the 12 terms were plotted on a circumplex. Of interest to this study are the angular placements of the 11 disorders relative to the term *well-adjusted*. Such distances can be interpreted to reflect an index of maladjustment; the greater the distance between a disorder and the anchor term (i.e., well-adjusted), the more the characterological impairment perceived by the psychiatrists.

Based on the results of their study, we were able to discern three groups of personality disorders. Group 1 included the histrionic and dependent personalities and were perceived closest to adjustment. Group 2 included the borderline, narcissistic, antisocial, and compulsive disorders and represented the more moderate cluster. Paranoid, schizoid, schizotypal, passive-aggressive, and avoidant disorders comprised Group 3, the cluster perceived as the most maladjusted. This trichotomous classification of the personality disorders is included in this study.

The third model included in this study is the biosocial approach outlined by Millon (1969, 1981). This perspective seeks to understand individuals as the

product of the interaction of both individual and social systems. Personality disorders are thus seen as "any behavior pattern that is consistently inappropriately maladaptive, or deficient in the social and familial system within which the individual operates" (Millon, 1981, p. 65).

Based on this perspective Millon (1981) created three broad categories that encompass the *DSM-III* personality disorders. The first category includes the dependent, histrionic, narcissistic, and antisocial disorders. Two qualities characterize such individuals: (a) they are able to relate to others and self in a consistent and focused manner, and (b) they are able to create and maintain social and affiliative linkages with others that provide them with emotional satisfaction. The second group, representing a more impaired level of functioning, includes the compulsive, passive-aggressive, schizoid, and avoidant disorders. These individuals are less consistent in their interpersonal relations and are more detached from any social support systems. This social isolation results in a greater incidence of autistic ruminations. The third category represents the lower levels of personality functioning and includes the schizotypal, paranoid, and borderline disorders. The salient features of this cluster are a social incompetence and a pronounced impairment of ego functioning in terms of either a diffusion of capacities or rigidity.

It is interesting to note that despite the differences in orientations, there is a substantial amount of consistency in how the personality disorders are organized. Table 1 provides a breakdown of the disorders that comprise the three taxonomies for each model. As can be seen, both the circumplex and biosocial

TABLE 1
Breakdown of Personality Disorders Comprising the Three Taxonomies of the Biosocial, Circumplex, and *DSM-III-R* Models of Characterological Impairment

	Model		
Group	*DSM-III-R*	*Circumplex*	*Biosocial*
1	Paranoid Schizoid Schizotypal	Histrionic Dependent	Histrionic Dependent Narcissistic Antisocial
2	Antisocial Borderline Histrionic Narcissistic	Antisocial Borderline Compulsive Narcissistic	Passive-aggressive Avoidant Compulsive Schizoid
3	Avoidant Dependent Compulsive Passive-aggressive Atypical-mixed	Paranoid Schizotypal Schizoid Passive-aggressive Avoidant	Paranoid Schizotypal Borderline

models perceive the histrionic and dependent personalities as being the least impaired, whereas the paranoid and schizotypal types represent more severe pathology. Even *DSM-III-R* groups these two together, though it makes no statement as to the degree of incapacity. Although such convergences may provide fruitful hypotheses, it is the differences between these models that serve as the groundwork for this report.

Our purpose is threefold: first, to determine if performance variability on the WAIS-R can be reliably related to the taxonomies proposed by the three models; if so, to then ascertain if changes in performance are consistent with the levels of impairment outlined by the model; and finally, to determine what scales are necessary for making the discriminations and, using the hypotheses of Rapaport et al. (1968), to ascertain the clinical significance performance on them holds.

METHOD

Subjects

Subjects consisted of 48 psychiatric patients (25 men, 23 women) from the Massachusetts Mental Health Center and Boston University Medical Center. They ranged in age from 19 to 67 years ($M = 32.8$ years, $SD = 11$ years) and had received an average of 12.8 years of education ($SD = 2.6$ years). These individuals represent all patients who received the WAIS-R as part of their psychological evaluations at these two institutions. The mean Verbal Intelligence Quotient (VIQ) was 97.69 ($SD = 14.9$) and the mean Performance Intelligence Quotient (PIQ) was 93.55 ($SD = 13.5$). Seventy-five percent were White, 23% were Black, and the remaining 2% were Hispanic. Thirteen percent were on medication at the time of testing; 36% were inpatients and 60% were outpatients at the time of testing. The status of the remaining 4% was unknown.

Only 35 of these subjects (19 men, 16 women) were included in the analyses for the biosocial and circumplex models. This was due to the noninclusion of the mixed-atypical diagnostic category because it is not specified by these models. These 13 individuals were included in those analyses with the *DSM-III-R* taxonomies.

Diagnosis

During the course of their psychiatric treatment, all subjects received a *DSM-III* diagnosis either from their supervising clinician or from a psychologist evaluating their test data. These impressions were formed either after treatment was well underway or as discharge diagnoses. Where no explicit *DSM-III* diagnosis was present, the subject was retained in our sample only if sufficient background

information was present in their files to make such a determination. The breakdown of diagnoses were as follows: 1 each for compulsive, dependent, narcissistic, and avoidant; 2 each for paranoid and antisocial; 4 each for schizotypal and histrionic; 5 schizoid; 14 borderline; and 13 mixed-atypical. None of these individuals had a concurrent Axis 1 diagnosis.

It should be pointed out that clinical diagnoses tend to be unreliable and are thus a fallible criterion for the purpose of determining the validity of the WAIS–R scales in making diagnostic discriminations (Morey, Blashfield, Webb, & Jewell, 1988). However, there are no infallible criteria. Given that the original diagnoses were formed after some period of evaluation, these clinical formulations may have been enhanced. Further, Cronbach and Meehl (1955) argued that a scale can be validated against an imperfect criterion and still eventually attain greater construct validity. The diagnoses used here represent a first step in a continuing validation process. It is hoped that eventually the derived equations may prove more valid than the original criterion (Morey et al., 1988).

RESULTS

Discriminant function analyses were performed for each of the three classification approaches using their respective diagnostic groupings as the criterion and the scales scores on each of the WAIS–R subtests as the predictors. Table 2 presents means and significance tests for performance of the diagnostic groups on each of the WAIS–R scales. As can be seen, there are few significant differences between the various groups on the 11 scales. Ability is, therefore, not a salient dimension for discriminating between the groups. Discriminant analyses were performed separately for each classification model and are discussed in turn.

Biosocial Model

The discriminant analysis of these scales produced a canonical correlation coefficient of .741, Wilks's lambda = .349, $\chi^2(22) = 28.43$, $p < .16$. The results of this analysis are presented in Table 3. Although the analysis was nonsignificant, there are three points suggesting that further analysis should be done. First, a very strong effect size was found, as evidenced by both the canonical correlation and lambda. Secondly, this effect size is not merely an artifact of a small sample size, but actually translates into a high degree of predictive efficacy. With the prior probability of group membership set equal to .33 (thus each case has an equal chance of being assigned to any group), this analysis correctly classified 77.14% of the sample, a 44% increase over chance, $\chi^2(4) = 34.36$, $p < .001$. Finally, given a relatively small sample size ($n = 35$) and a large number of predictors (11), there may be a subset of variables that make no useful contri-

TABLE 2
Mean Performance Scores on the WAIS-R Scales for the Three Taxonomies

Classification Model	WAIS-R Scale										
	Digit Span	*Vocabulary*	*Arithmetic*	*Comprehension*	*Similarities*	*Picture Completion*	*Picture Arrangement*	*Block Design*	*Object Assembly*	*Digit Symbol*	*Information*
Biosocial											
Group 1	9.12	10.5	8.88	10.5	11.1	9.4	9.3	9.0	8.8	10.8	10.5
Group 2	10.0	9.4	8.4	9.6	8.7	8.6	8.9	9.6	8.3	8.3	10.1
Group 3	9.6	10.6	8.8	9.8	9.3	7.7	9.2	8.6	8.6	6.9	10.0
F	0.3	0.29	0.05	0.14	1.9	0.96	0.03	0.43	0.05	6.35	0.06
p	–	–	–	–	–	–	–	–	–	.005	–
DSM-III-R											
Group 1	10.3	10.5	9.0	10.0	8.6	7.2	8.4	9.2	7.6	6.9	10.5
Group 2	9.3	10.5	8.6	9.9	10.2	8.3	9.3	8.5	8.9	8.3	10.0
Group 3	9.8	9.7	8.8	8.9	9.3	9.5	9.9	9.8	8.9	8.3	9.1
F	0.48	0.29	0.08	0.53	1.3	1.5	0.86	1.4	0.96	1.1	0.61
p	–	–	–	–	–	–	–	–	–	–	–
Circumplex											
Group 1	9.6	11.6	10.4	10.8	12.0	9.6	10.4	9.0	9.0	11.6	11.2
Group 2	9.5	10.4	8.5	10.1	9.7	8.3	9.4	8.8	9.1	7.4	9.9
Group 3	9.6	9.6	8.4	9.1	8.4	7.6	8.1	9.0	7.5	7.6	10.0
F	0.02	0.64	1.04	0.47	3.76	0.83	1.04	0.03	1.2	5.2	0.26
p	–	–	–	–	.03	–	–	–	–	.01	–

Note. See Table 1 for the personality disorders that comprise each group for the three models.

TABLE 3
Within-Groups Correlations Between Discriminating Variables and Discriminating Function and Standardized Canonical Discriminant Function Coefficients

	WAIS–R Scale										
Classification Model	*Digit Span*	*Vocabulary*	*Arithmetic*	*Comprehension*	*Similarities*	*Picture Completion*	*Picture Arrangement*	*Block Design*	*Object Assembly*	*Digit Symbol*	*Information*
Biosocial											
Standardized coefficient	−.03	−.35	.22	.05	.79	.26	−.59	.37	−1.2	1.3	−.34
Correlation to function	−.06	−.02	.01	.07	.25	.22	.00	.07	.02	.57	.05
DSM–III–R											
Standardized coefficient	.08	.80	−.39	−.39	.55	−.47	.43	−1.8	1.3	.65	−.31
Correlation to function	−.17	.06	−.07	.06	.29	−.03	.06	−.23	.18	.20	.01
Circumplex											
Standardized coefficient	−.09	.94	.49	−.47	.66	−.12	.37	−1.4	−.16	1.49	−.77
Correlation to function	−.05	.11	.14	.09	.33	.16	.16	−.02	.10	.44	.07

bution to the discrimination but their presence unnecessarily spends degrees of freedom.

An examination of the standardized discriminant function coefficients in Table 3 supports this contention. Three groups of variables emerge. The first are the four WAIS–R subscales with moderately negative weights (Vocabulary, Picture Arrangement, Object Assembly, and Information). Relatively high scores are associated with the more severe end of the personality pathology spectrum. The second group of subscales has moderately positive weights (Similarities, Block Design, and Digit Symbol). Relatively high scores are associated with less severe symptomatology. The remaining cluster of four subscales all have weights close to zero.

A second discriminant analysis was performed using only the seven subscales with nonzero loadings. A resulting canonical correlation of .732, Wilks's lambda = .372, $\chi^2(14) = 28.71$, $p < .01$, was obtained. The pattern of correlations between the remaining subscales and the canonical function remained consistent with the previous analysis (the clinical significance of performance on these scales is discussed later). Based on this reduced equation, 74.3% of the sample was accurately classified, $\chi^2(4) = 20.1$, $p < .001$. Clearly, removing the four subscales with the near-zero loadings yielded a more accurate discrimination between the three nosological groups without sacrificing either effect size or predictive accuracy.

Of particular interest is the mean score for each of the three groups on the discriminant dimension. Because cases were assigned to the criterion groups on the basis of a hypothesized increase in personality disorganization, it is now necessary to determine whether changes in scores on the discriminant equation are associated with changes in the severity of pathology. The group centroids for Groups 1 to 3 are 1.79, 0.12, and −0.756, respectively. Thus high positive scores are associated with slight pathology, discriminant scores near zero with moderate impairment, and high negative scores with severe deterioration. The performance of these groups on the discriminant function is consistent with the predictions of the model.

To evaluate the predictive utility of these equations, a "jackknife" cross-validation procedure was employed. One subject was selected from the sample and a discriminant analysis was performed on the remaining cases. The resulting discriminant equation was then used to classify the unused case. This procedure was repeated 35 times, systematically removing each case. The unincluded case was accurately classified in 63% of the analyses. Assuming equal prior probabilities of group assignment, these analyses provide a 30% increase in predictive efficacy over chance.

Finally, based on these 35 analyses, average unstandardized weights were calculated for each subscale and this equation was used to classify the entire sample. This resulted in 71% of the subjects being accurately classified. The

following equation, based on the aggregated values, is recommended for use in classification because it represents a more stable estimate of the parameters:

$$\begin{aligned} DX = {} & (.302 \times \text{Similarities}) - (.058 \times \text{Vocabulary}) \\ & - (.162 \times \text{Picture Arrangement}) \\ & - (.083 \times \text{Information}) + (.122 \times \text{Block Design}) \\ & - (.343 \times \text{Object Assembly}) \\ & + (.537 \times \text{Digit Symbol}) - 2.49. \end{aligned} \quad (1)$$

A derived value greater than 0.97 results in a determination of *slight* impairment, a value below −0.32 in an adjudication of *severe* impairment. A value in between results in a *moderate* classification (the centroids for Groups 1 to 3 are, respectively, 1.81, 0.13, and −0.77).

DSM-III-R

The discriminant analysis of the scales produced a canonical correlation coefficient of .636, Wilks's lambda = .46, $\chi^2(22) = 31.05$, $p < .095$. The results of this analysis are presented in Table 3.

Again, given the relatively large effect size and the fact that the resulting equation was able to classify accurately 66.7% of the cases, $\chi^2(4) = 23.48$, $p < .001$, a second analysis was performed omitting the one subscale (Digit Span) that had a near-zero loading. The resulting canonical coefficient was .635, Wilks's lambda = .464, $\chi^2(20) = 31.14$, $p < .053$, and produced a classification rate of 66.7%. Removing this one subscale improved the discriminative ability of the equation, although it remained marginally significant.

The centroids for Groups 1 to 3 were −1.04, 0.86, and −.42, respectively. Although *DSM-III-R* does not postulate any theoretical relationships between the three groups, this analysis is able to quantitatively differentiate among the groups. Group 2 stands out from the others and evidences better performance overall. Although Groups 1 and 3 have different centroids, they appear more related to one another than to Group 2.

Cross-validation analyses were performed on these data using the same procedure as already described. The unincluded case was accurately classified in 46% of the analyses—a 13% improvement over that expected by chance. Average unstandardized weights were again calculated for each scale based on these 48 analyses and this equation was then used to classify the entire sample. A classification rate of 65% was obtained. The values used in that equation were:

$$\begin{aligned} DX = {} & (.23 \times \text{Vocabulary}) - (.12 \times \text{Arithmetic}) \\ & - (.12 \times \text{Comprehension}) + (.2 \times \text{Similarities}) \\ & - (.16 \times \text{Picture Completion}) \end{aligned}$$

$$+ (.14 \times \text{Picture Arrangement})$$
$$- (.74 - \text{Block Design}) + (.47 \times \text{Object Assembly})$$
$$+ (.23 \times \text{Digit Symbol})$$
$$- (.093 \times \text{Information}) - .296. \quad (2)$$

An obtained value greater than 0.222 is classified in Group 2, a score less than −0.734 results in a Group 1 assignment, and values in between are associated with Group 3 (the centroids for Groups 1 to 3 are, respectively, − 1.04, 0.872, and 0.428).

Circumplex Model

The discriminant analysis using the WAIS–R scales to predict group membership as determined by this model resulted in a canonical correlation coefficient of .80, Wilks's lambda = .23, $\chi^2(22) = 40.1$, $p < .01$, and a classification rate of 85.7%, $\chi^2(4) = 32.25$, $p < .001$. The results are presented in Table 3.

An examination of the standardized discriminant coefficients in Table 3 indicates that three subscales make a minimal contribution to the analysis (Digit Span, Picture Completion, and Object Assembly). A second analysis was performed omitting these subscales, and a canonical correlation of .799, Wilks's lambda = .32, $\chi^2(16) = 32.8$, $p < .008$, was obtained as well as a classification rate of 69%, $\chi^2(4) = 28.59$, $p < .001$. As with the earlier analyses, not all WAIS–R scales are necessary for making discriminations between the criterion groups. In some instances, these excess scales may add unwanted variability.

Similar to the biosocial approach, the Circumplex model implies an increasing level of psychological deterioration as membership changes from Group 1 to Group 3. An examination of the group centroids would indicate if such an increasing impairment is reflected in each group's scores on the discriminant function. The centroids for Groups 1 to 3 are 2.86, −0.04, and −1.14, respectively. Clearly, the hypothesized increase in pathological severity is reflected in a decrease on the discriminant equation. The clinical significance of performance on each scale is discussed later.

Cross-validation analyses were performed in a manner consistent with those for the other models. Over the 35 analyses performed, the unincluded case was accurately classified 14 times or (40%). Average unstandardized weights, aggregated over the 35 analyses, were calculated for each scale and the resulting equation was used to classify the entire sample. A classification rate of 66% was obtained. The composite equation was:

$$DX = (.294 \times \text{Vocabulary}) + (.135\ \text{Arithmetic})$$
$$- (.144 \times \text{Comprehension}) + (.245 \times \text{Similarities})$$
$$- (.61 \times \text{Block Design}) + (.114 \times \text{Picture Arrangement})$$

$$+ (.556 \times \text{Digit Symbol}) - (.224 \times \text{Information}) - 2.804. \quad (3)$$

A derived value greater than 1.42 is assigned to Group 1, a value less than −0.59 is classified in Group 3, and any intermediate value receives a Group 2 adjudication (the centroids for Groups 1 to 3 are, respectively, 2.89, −0.042, and −1.14).

Discriminant scores on the three equations were calculated for all subjects. The resulting descriptive statistics and intercorrelations are presented in Table 4. As can be seen, the various equations are highly intercorrelated. The circumplex correlates significantly with the *DSM–III–R* and biosocial models, but the biosocial model is independent of the *DSM–III–R* model. Thus there appears to be some consistency among these three approaches.

DISCUSSION

Each of the three models evaluated evidenced varying degrees of empirical viability. Overall, the biosocial approach maintains the strongest support. It is clear that the WAIS–R is capable of providing an index of characterological impairment. However, there still remains a need to attach some clinical significance to these derived equations to determine the psychological qualities reflected in the scores; such information adds an important qualitative dimension to these equations that facilitates their application and interpretation. Although the data presented here provide no direct statements as to these

TABLE 4
Descriptive Statistics and Intercorrelations for All Three Discriminant Functions

	Model	
	DSM–III–R	*Circumplex*
DSM–III–R M = 0.09 *SD* = 1.26	–	
Circumplex M = 0.07 *SD* = 1.55	.69*	–
Biosocial M = 0.09 *SD* = 1.42	.23	.68*

Note. $N = 48$.
*$p < .001$, two-tailed.

equations' nomological qualities, evaluating them in light of the hypotheses generated by Rapaport et al. (1968) may provide a first step in this direction. Of course these hypotheses are relevant to the performance outcomes associated with clinical populations.

Comparing the means on each subscale within groupings and across models (Table 2) suggests that Digit Symbol performance shows the greatest variability. Rapaport et al. and others have suggested that performance on this scale in clinical populations may represent energy levels available to the patient, and such scores are often associated with the low energy levels that accompany vegetative depressive states. Thus it is noteworthy that for both the biosocial and circumplex models, variations of Digit Symbol performance are statistically significant. This may suggest that for these two models, affective states may be a significant clinical variable that distinguishes one grouping from another. The apparent lack of variation in the means of other subscales (with the exception of the Similarities subscale in the circumplex model) may suggest that many of the cognitive, social, and affective skills that are thought to mediate specific subscale performance are not, by themselves, potent discriminators between groupings.

With regard to the biosocial model, high scores on the Similarities, Digit Symbol, and Block Design subscales were associated with the more adjusted end of the continuum. Higher scores on the Vocabulary, Information, Picture Arrangement, and Object Assembly subscales were associated with more disturbed functioning. A tentative interpretation of this discriminant function may suggest that it is capturing both certain affective variables (Digit Symbol) and specific cognitive variables (Similarities and Block Design vs. Information and Vocabulary) in its discrimination strategy. Rapaport et al. suggested that the Vocabulary and Information subscales mediate the storage and retrieval of knowledge whereas Similarities and Block Design reflect analytic thinking and abstract reasoning. Thus scores toward the more adjusted end of the continuum may reflect less depression and a better ability to utilize cognitive reasoning skills, whereas lower scores reflect better performance on simple storage and retrieval items. Because the biosocial model specifically organizes its personality-disorder groupings according to the perceived capacity of individuals to initiate and maintain social relationships, it is interesting to speculate how these specific affective and cognitive variables influence social competence. Whatever the outcome of such speculation, what can be suggested from this data is that the pattern of our results offers some empirical support and validation of the biosocial perspective. This model provides an orientation to understanding psychopathology that can be captured in a performance measure.

The patterns of subscale scores derived from the discriminant functions for both the circumplex and *DSM–III–R* models do not provide as clear a psychological framework as that for the biosocial model. In the circumplex model, Similarities, Digit Symbol, Picture Arrangement, Vocabulary, and Arithmetic all loaded positively whereas Information, Block Design, and Comprehension

loaded negatively. For the *DSM–III–R* model, Digit Symbol, Similarities, Picture Arrangement, Vocabulary, and Object Assembly all loaded positively whereas Information, Comprehension, Arithmetic, Picture Completion, and Block Design loaded negatively. We draw two conclusions from these analyses. First, we find it difficult to infer psychological interpretations from the pattern of results found with these two models. In many instances higher scores on subscales thought to reflect more adaptive functioning actually defined the impaired pole of the continuum (e.g., the negative loadings for Comprehension). Thus for this data set, the biosocial model appears to be the more robust taxonomy in that:

1. The WAIS–R subscales were able to discriminate among the three groups.
2. Performance scores on the discriminant function conformed to what the model predicted.
3. The results of the analyses held up very well under cross-validation.
4. The manner in which the different scales contributed to the discriminant function easily lent itself to a clinical interpretation consistent with the biosocial approach.

This is not to suggest that the other models are not useful, but rather that the WAIS–R provides a medium for capturing a salient biosocial dimension to personality functioning and classification.

Second, across all models, Similarities and Digit Symbol performance were associated with more adaptive psychological functioning whereas Information performance always predicted more impaired functioning. The consistency of this pattern of results may hold important implications for understanding some of the psychological variables that differentiate personality-disorder groupings. As these results suggest, certain affective (e.g., depression) and cognitive (e.g., abstract reasoning vs. information storage) variables may be important discriminators among personality disorders.

Despite the differences in theoretical outlook and the empirical findings, these results offer some useful generalizations. As noted earlier, there is great similarity in the construction of the taxonomies for each model. That two of these models imply (and the results support) a sense of severity to their classifications suggests that such an index may be a relevant dimension in diagnosis formation. The equations offered here can provide an empirical basis for such an index.

Finally, the WAIS–R continues to be found a useful criterion for making diagnostic discriminations. Future research is needed to extend the validity of these equations to new samples. This should be done both in terms of assessing the diagnostic efficacy of these algorithms in new samples and in determining personality correlates to high and low scores in an attempt to further highlight the personological qualities associated with these dimensions. It would also be of interest to determine if these equations, which provide a sense of severity of

characterological impairment, can be generalized to nonclinical populations as an index of overall adaptive functioning. In any event, the analyses presented here offer a new perspective, and resource, to diagnosis formation.

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