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A NEUROPSYCHOLOGICAL APPROACH TO THE RORSCHACH IN PATIENTS WITH DEMENTIA OF THE ALZHEIMER TYPE

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This paper presents two neuropsychological approaches to using the Rorschach test with patients diagnosed with Dementia of the Alzheimer Type (DAT). The first approach examined Rorschach variables from the Comprehensive System (CS) within the context of the cardinal neuropsychological deficits. The second approach illustrated a "process approach" to scoring linguistic errors and perseverations on the Rorschach test via the introduction of a new scale. DAT patients were significantly different from normal comparison participants on selected CS variables but were not significantly different on CS measures of deviant verbalization and perseverations. Significant differences between the two groups were observed for linguistic errors and perseverations when the Rorschach protocols were rescored using the new scale. Furthermore, the types of linguistic and perseveration differences observed on the Rorschach test might be specific to the characteristic deficits of DAT. The findings are interpreted within a neuropsychological framework and are offered as support for the use of the Rorschach as a neuropsychological problem-solving test.

Beginning with Rorschach's (1942) seminal work, there have been many attempts to use the Rorschach test with neurologically impaired individuals. Most of these attempts have been met with criticism, typically due to the failure to integrate the primary neuropsychological deficits of the individual within the interpretative framework. Furthermore, in the absence of guidelines on how to approach Rorschach protocols of neurologically impaired individuals, clinicians have,

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traditionally, resorted either to forcing their inferences into psychological frameworks and disregarding the neuropsychological deficits of the individuals or attempting to use the Rorschach test to determine the specific neurological diagnosis. In both cases, the outcome has been less than favorable and has resulted in a lack of guidelines for interpreting Rorschach test results with neurologically impaired individuals.

With the work of Exner (1979, 1986, 1993), there has been a rethinking of how to understand the nature of the Rorschach test. Prior to Exner's work, the Rorschach test was strictly referred to as a "projective" psychodiagnostic assessment tool. As Exner (1993) and others (Acklin, 1994; Perry & Braff, 1994) have argued, however, the Rorschach test may better be described as an abstract problem-solving test requiring the integration of numerous cognitive functions. From this problem-solving perspective, the "Rorschach task" is to organize a stimulus field that has abstract, as well as clearly defined, images and to communicate what it is that the individual perceives to the examiner. Within this frame of reference, the Rorschach test easily lends itself to a neuropsychological approach and can be used to assess information processing, scanning and visual- spatial abilities, complex concept formation, and verbal and communicative skills, among others. Still, in order for the Rorschach test to transition from a psychological assessment test to a neuropsychological instrument, a theoretical basis must be provided. Most importantly, this theoretical basis must be grounded in the neurological foundation of brain-behavior relationships (Lezak, 1995).

This article will present two neuropsychological approaches to using the Rorschach test with Dementia of the Alzheimer Type (DAT) patients. We selected DAT because, as Lezak (1995) points out, it is "By far the most common and best known of the dementias" (p. 204). The first approach will examine traditional Rorschach test variables from the Comprehensive System (CS; Exner, 1990, 1993) within the context of the cardinal neuropsychological deficits of patients with DAT. The second approach will illustrate a "process approach" (Kaplan, 1988) to scoring linguistic errors and perseverations on the Rorschach via the introduction of a new scale. It is the goal of this paper to demonstrate that a careful analysis of how DAT patients navigate the Rorschach test may provide us with rich neurological information and allow us to formulate hypotheses about the status of different cognitive functions.

Rorschach (1942) was the first to examine the responses of elderly and "organically impaired" individuals to the inkblots. He posited, "After a further period of development [that] it should be possible in almost every case to come to a definite conclusion as to whether the subject is normal, neurotic, schizophrenic, or has organic brain disease" (p.120). Oberholzer (as cited in Piotrowski, 1937), a colleague of Rorschach, examined "organic cases" in detail. Among his findings were that these patients were unable to synthesize important details into intact percepts, and that their responses were frequently marked by repetition. He concluded that eventually these patients became self-centered extroverts. Piotrowski (1937) studied a "cortical, subcortical" group of patients and introduced 10 signs that would aid in the diagnosis of organic conditions. Based upon his empirical studies, he, like Oberholzer, concluded that "the function suffering most is the ability for a well developed, active and constructive inner life" (p. 536). Piotrowski was careful to explain that the 18 cases he based his findings on had a mix of subcortical and cortical involvement. However, inspection of his patients' ages reveals that only 3 were over the age of 65 and three were under the age of 40, thus, his sample may not be relevant to understanding how DAT patients perform on the Rorschach test.

Dorken and Kral (1951) examined the Rorschach protocols of carefully diagnosed patients with senile dementia according to the then available criteria. The authors found that 5 of the 35 patients could not respond to the test, and that the others gave a reduced number of responses. The investigators reported that their patients exhibited very poor form quality, which was related to their level of deterioration. The authors also found that these patients offered a lack of variety in response determinants and specifically

offered few movement, color, and shading determinants. According to Piotrowski's (1937) signs, however, only half of their patients were correctly identified as "organic." The authors concluded that "the finer nuances that lend individuality to the personality, tend to become lost or obliterated" (Dorken & Kral, 1951, p. 158).

Insua and Loza (1986) studied Rorschach responses of two groups of elderly respondents, one normal and the other in the early stages of "suspected dementia." The investigators found that the lack of percepts involving human movement best differentiated the elderly demented group from the normal comparison group. They concluded that the lack of seeing humans in movement on the Rorschach indicated a weak energy level and was a promising sign that could help make the diagnosis of dementia.

In each of the above studies, there were numerous methodological and diagnostic problems that were unaddressed. Most importantly, in these cases, the authors neglected the neuropsychological profiles of their sample and, instead, based upon their impoverished Rorschach test protocols, developed inferences about the personality of these "organic" individuals. Furthermore, it was the contention of all of these authors that the Rorschach test could be used as a diagnostic instrument in this population, although, to our knowledge, in no case had this been empirically supported.

In the present study, we will introduce a strategy for interpreting the Rorschach test variables of patients with DAT. We propose that differences between DAT patients and normal comparison participants on Rorschach test variables from the CS can be mapped according to the cardinal neuropsychological signs of DAT. These signs include apraxia, agnosia, aphasia, amnesia, and loss of abstraction (see Cummings & Benson, 1992). Furthermore, we will introduce a new scale for the assessment of linguistic, and executive functioning and perseveration errors (see Appendix A). This scale was adapted from Barr, Bilder, Goldberg, Kaplan and Mukherjee's (1989) classification scale of phonemic, semantic, syntactic, and perseverative errors on the Boston Naming Test (Kaplan, Goodglass, & Weintraub, 1983). In the adaptation of the scale for the Rorschach test, additional categories were created or borrowed from existing scales. For example, several linguistic categories that reflect severe forms of linguistic errors often observed in patients with thought disorder were selected from the work of Johnston and Holzman (1979; Solovay et al., 1986). Likewise, modifications of the executive functioning and perseveration error categories were made to parallel a taxonomy proposed by Sandson and Albert (1984). The latter taxonomy of perseverations consists of three categories that are distinct at the levels of cognitive process and neuroanatomy. These categories consist of "recurrent perseveration," the unintentional repetition of a previous response, which is most common in aphasic patients and DAT patients; "stuck-in-set perseveration," the inappropriate maintenance of a framework, which is most common in frontal lobe pathology; and, "continuous perseveration," which is caused by a disturbance in motor output, and is most common in patients with subcortical involvement (Sandson & Albert, 1984, p. 728).

In an attempt to integrate both the taxonomy of Sandson and Albert (1984) and the scoring system from Barr et al. (1989), we developed three new perseveration categories (i.e., stuck-in-set, thematic, and phonemic), and we also retained two existing perseveration categories from the CS (i.e., content and mechanical perseveration; Exner, 1986).

Sandson and Albert (1984) defined the term perseveration as "any continuation or recurrence of experience or activity without the appropriate stimulus" (p. 715). Goldberg and Tucker (1979) suggested that all perseverations reflected a "pathological inertia of cognitive processes and an impaired ability to completely terminate the previous activity" (Goldberg, 1986, p. 716). Although this form of abnormal behavior is, typically, observed in respondents with some form of cerebral impairment, perseverations can occur in normal subjects during states of fatigue, heightened anxiety, or guardedness (Freeman & Gathercole, 1966). Therefore, for the purpose of scoring perseveration on the Rorschach, we broadened the

definition to capture any reduction in the behavioral variability and, thus, score each sample of repetition independent of whether the stimulus demands pulled for that response. In this fashion, we could determine the degree of perseverations that occurred beyond what was expected in normal comparison subjects.

In the present study, we introduced the use of this new scale for scoring linguistic errors and executive functioning and perseveration errors. We hypothesized that DAT patients would commit more linguistic errors than normal comparison, and that these errors would be of the type noted to occur in DAT patients (i.e., word-finding circumlocution and paraphasias; Cummings & Benson, 1992). In contrast, we hypothesized that DAT patients would not commit a significantly greater number of linguistic errors, such as neologisms and confused and fluid speech, which might be more representative of a thought versus linguistic disorder. In respect to perseverations, we hypothesized that DAT patients would exhibit a significantly greater number of perseverations than normal comparison participants. Furthermore, we postulated that DAT patients would display a greater tendency for thematic perseverations that corresponded the closest to the "recurrent perseveration" category of Sandson and Albert (1984), and which they suggested is representative of DAT.

Method

Participants

Of the 41 participants in this study, 22 of the participants (17 men and 5 women) were diagnosed as having probable DAT, based on a detailed evaluation conducted by a board-certified neurologist. Diagnosis for probable DAT was established according to the National Institutes of Neurologic Communicative Disorders and Stroke-Alzheimer's Disease Related Disorders Association criteria (NINCDS-ADRDA; McKahnn et al., 1984). The NINCDS-ADRDA guidelines for the diagnosis of definite Alzheimer's disease are explicit and identify definite, probable, and possible diagnoses of DAT. The diagnosis of definite DAT can be established only on autopsy. In contrast, probable Alzheimer's disease is a clinical diagnosis that is made in patients who have cognitive deficits in two or more areas that are established by neuropsychological testing, insidious onset and progression of the disease, and a normal level of consciousness.

Ten of the DAT participants were recruited from an ongoing study at the Veterans Affairs Medical Center (VAMC); the remainder of the participants were recruited from an outpatient clinic. Nineteen participants (2 men, 17 women) were used as a normal comparison group. Fourteen of these participants were the spouses of the DAT patients. In cases where the spouse was unavailable, an age-matched control participant was recruited. Although caretakers of DAT patients are often under abnormal amounts of stress and, therefore, may not represent a "true" normal population, they are often used as controls because they are well matched on critical variables such as socioeconomic status.

All of the normal comparison participants were reported to be in good health and did not complain of, or show evidence of, cognitive disturbance. Both the DAT and control groups had participants who were being treated with medications. The class of medication was variable; however, no DAT participant was being treated with a cholinergic agonist (i.e., often prescribed to enhance memory in DAT patients).

As a means of characterizing the cognitive state of both the DAT and normal comparison participants, the Mini-Mental State Exam (MMSE; Folstein, Folstein, & McHugh, 1975) and the Dementia Rating Scale (DRS; Mattis, 1988) were administered. The mean scores (and *SD*s) for the MMSE, the DRS total and subscale scores, as well as demographic data and significance of group differences, are presented in Table 1.

Measures

The Rorschach test was administered and scored, according to the CS, by a trained clinician and scored by a team of three trained scorers (see Exner, 1993, for definitions of the variables listed in Table 2). In five of the DAT participants, the inquiry phase immediately followed the free

Table 1
Means, Standard Deviations, and Demographic Characteristics for DAT and Normal Comparison Participants

	Groups					
	DAT[a]		Normal[b]			
Variable	*M*	*SD*	*M*	*SD*	t^c	*p*
Age (in years)	75.7	5.6	73.3	5.7	–	
Education (in years)	13.3	2.9	13.9	2.6	–	
MMSE	20.0	5.7	29.6	0.7	7.17	.001
DRS total score	102.1	30.3	141.5	3.0	5.63	.001
DRS attention	30.0	9.0	36.8	0.5	3.24	.01
DRS initiation/perseveration	23.4	8.4	36.7	1.1	6.82	.001
DRS construction	4.4	2.0	6.0	0	3.48	.001
DRS conceptualization	29.5	8.9	37.7	1.8	3.90	.001
DRS memory	14.7	6.1	24.3	1.1	6.66	.001

Note. MMSE = Mini-Mental State Exam; DRS = Dementia Rating Scale; DAT = Dementia of the Alzheimer Type.
[a]$n = 22$. [b]$n = 19$. [c]$df = 39$.

association phase of the test, because it was determined, a priori, that those participants might not be able to recall their original responses. From the CS, Kappa-corrected coefficients were obtained for the scoring of Rorschach test variables and ranged from .74 to .82 for the three scorers.

In this study, the assignment of Rorschach variables to one of the five cardinal neuropsychological signs of DAT was theoretically derived and was intended to demonstrate how Rorschach responses can be interpreted from a neuropsychological perspective. In addition to scoring variables from the CS, linguistic errors and executive functioning and perseveration errors were scored in the following manner, Rorschach protocols were recorded on tape and transcribed verbatim. All verbalizations elicited during the test were noted. Linguistic errors and executive perseveration errors were scored according to the criteria outlined in Appendix A. There was a tendency for respondents to exhibit halted speech and produce incomplete sentences when they were responding to a question that the examiner asked; in those cases, the linguistic error was not scored. In some cases, a single response qualified for several linguistic or executive functioning and perseveration errors; for example, Card I, "it's a bat, because of the wings," and Card II, "it's a bat, because of the wings." In this example these two responses qualify for thematic and stuck-in-set perseveration; however, only one category was assigned, and that category was selected on the basis of which one best fits with the type of error. In cases where the response clearly addressed two different types of errors, both were assigned; for example, Card I, "it's a bat, because of the wings," and Card II, "it's a battling bat, because of the wings," In this example, both stuck-in-set and phonemic perseveration should be assigned. The Kappa-corrected coefficients for the linguistic errors and executive functioning and perseveration errors ranged from .66 to .84.

Analyses

Inspection of the distribution of the Rorschach dependent variables revealed that, in most cases, these variables were not normally distributed. Therefore, we followed the guidelines presented by Exner (1993) and conservatively analyzed the data with either a parametric (i.e., Student's t tests) or a nonparametric analyses (i.e., Mann-Whitney U test or Kruskal-Wallis test), depending upon the nature and distribution of the data. Because the multiple Rorschach test variables are closely related, and to correct for an inflated risk of Type I error, the alpha criterion was set at .01. Considering the relatively small sample size,

Table 2
Assignment of Rorschach Variables to the Cardinal Neuropsychological Deficits of DAT

Deficit	Rorschach variable
Aphasia	a decrement in verbal abilities resulting in an elevated *Lambda*
	poor verbal output leading to few *Blends*
	paraphasic errors resulting in deviant verbalizations (*DV*s)
	low number of responses (*R*)
Amnesia	an increase in perseverative responses (*PSV*)
	a decrease in popular responses (*POP*)
Agnosia	low percentage of conventional responses (*X*+%)
	high number of card rejections (*REJ*)
Apraxia	high percentage of distorted responses (*X*−%)
	low organization activity (*Zfreq & Z Sum scores*)
	high developmental quality ordinary responses (*DQo*%)
	low developmental quality synthesized (*DQ*+%)
Abstraction difficulties	low number of movement responses (*M, FM, m*)
	an elevation in Level 1 cognitive special scores (*W SUM 6*)

setting the alpha level criterion conservatively at .01 was selected over using a Bonferroni approach to safeguard from committing a Type II error.

To examine which of the linguistic variables and executive functioning and perseveration variables best discriminated the DAT patients from the normal comparison participants, a discriminant function and classification analysis was conducted. With only 41 participants, the participants to variables ratio (i.e., 41:11) was barely satisfactory in yielding reliable discriminant function coefficients, and because the sample was not large enough to permit independent sample cross-validation, we subjected the data to a jackknife procedure. In the jackknife procedure, each participant is classified on the basis of the discriminant function equation derived from the remaining participants. All statistical analyses were performed with the BMDP 3S, 3D and 7M programs (Dixon, 1992).

Results

To address our hypothesis that DAT patients would perform differently than normal comparison participants on selected Rorschach test variables from the CS, we subjected the data to either *t* test or a Mann Whitney U test (i.e., U statistic), depending on the distribution of the data. The means for each of the variables and a summary of the analyses discussed earlier are presented in Table 3.

Differences between DAT patients and normal comparison subjects on the linguistic scale were examined using the Kruskal-Wallis test. Because significant differences were found for the number of Rorschach test responses (*R*) given by DAT patients and normal comparisons, each of the following variables was divided by the number of responses, resulting in a percentage score. The percentage scores for each of the variables and a summary of the analyses are presented in Table 4.

Table 3
Means and Standard Deviations for DAT and Normal Comparison Participants on Rorschach Test Variables

Variable	DAT[a]		Normal[b]		Statistic	*p*
	M	*SD*	*M*	*SD*		
Aphasia						
Lambda	4.6	4.0	0.4	0.2	23.00[c]	.001
Blends	0.4	0.9	2.5	1.6	356.00[c]	.001
Deviant verbalization	0.4	0.5	0.3	0.7	-1.29[d]	*ns*
Number of responses (*R*)	12.0	2.0	14.9	3.8	4.95[d]	.001
Amnesia						
Perseveration (*PSV*)	0	0	0.2	0.4	114.00[c]	*ns*
Populars	3.0	1.8	5.9	1.9	364.00[c]	.001
Agnosia						
Form quality (*X*+%)	49.5	13.7	76.3	15.7	6.55[d]	.001
Card rejections	0.8	1.1	0		114.00[c]	.001
Apraxia						
Form quality (*X*-%)	30.2	13.4	9.4	12.7	-3.35[d]	.01
Z score frequency	4.7	1.8	9.2	3.0	5.28[d]	.001
Z score sum	11.6	5.9	27.4	11.0	5.34[d]	.001
Developmental quality (*DQo*%)	80.3	19.2	61.7	3.5	0.58[d]	*ns*
Developmental quality (*DQ*+%)	9.7	8.8	30.6	12.1	6.06[d]	.001
Abstraction difficulties						
Human movement (*M*)	0.7	1.0	2.5	1.8	366.50[c]	.001
Animal movement (*FM*)	1.2	0.7	3.0	1.7	336.50[c]	.001
Inanimate movement (*m*)	0.2	0.6	1.8	1.4	33.50[c]	.001
Special scores (*W SUM 6*)	7.3	8.8	6.8	6.0	-0.26[d]	*ns*

Note. DAT = Dementia of the Alzheimer Type.
[a]n = 22. [b]n = 19. [c]Mann-Whitney U. [d]t (39).

Table 4
Percentage of Linguistic Errors on the Rorschach and Statistical Analyses of Groups

Variable	DAT[a]	Normal[b]	*H*[c]	*p*
Semantic paraphasia	6.2	2.0	4.76	.01
Phonemic paraphasia	3.3	0.9	1.38	*ns*
Unrelated paraphasia	0.7	0	1.77	*ns*
Neologistic paraphasia	0.3	0	0.86	
Word-finding circumlocution	6.1	1.2	7.35	.001
Superordinate category	9.5	1.8	10.81	.001
Inappropriate or stilted speech	6.3	2.5	2.03	*ns*
Confused and fluid speech	2.0	0	3.72	*ns*
Linguistic error total	34.5	7.8	22.74	.001

Note. DAT = Dementia of the Alzheimer Type.
[a]n = 22. [b]n = 19. [c]Kruskal-Wallis.

Differences between DAT patients and normal comparisons on the executive functioning and perseveration scale were also examined using the Kruskal-Wallis test. Once again, each of the variables was divided by the number of responses resulting in a percentage score. The percentage scores for each of the variables and a summary of the analyses are presented in Table 5.

Finally, a discriminant function with jackknifed classification analysis was conducted to determine which variables among the linguistic errors and executive functioning and perseveration errors best separated DAT patients from normal comparison participants. The linguistic error total and the executive functioning and perseveration total error scores were not included in this analysis. A summary of the analyses is presented in Table 6 and Table 7. The four-variable equation was significant, Wilks's Lambda (Λ) = 0.29, the equivalent $F(4, 36) = 21.56$, $p < .001$, and demonstrated excellent sensitivity, 90.4%, and specificity, 100%.

Discussion

The findings of our study provide the first descriptive statistics for CS Rorschach test variables in carefully diagnosed DAT patients. Our results are consistent with previous studies that have demonstrated that participants with neurological disorders perform differently than normal comparison subjects on the Rorschach test (Dorken & Kral, 1951; Insua & Loza, 1986;

Table 5
Percentage of Executive Perseveration Errors on the Rorschach and Statistical Analyses of Groups

	Groups			
Scale	DAT[a]	Normal[b]	U[c]	p
Mechanical perseveration	2.2	0	2.72	*ns*
Content perseveration	0.3	0	0.86	*ns*
Phonemic perseveration	2.6	0	4.77	.01
Stuck-in-set perseveration	7.9	1.3	4.11	.05
Thematic Perseveration	20.7	5.2	15.39	.001
Executive perseveration total	33.9	5.6	21.17	.001

Note. DAT = Dementia of the Alzheimer Type.
[a]$n = 22$. [b]$n = 19$. [c]Kruskal-Wallis.

Table 6
Discriminant Function Analysis With DAT Patients and Normal Comparison Participants

Variable	Coefficient[a]
Thematic perseveration	–.86
Unrelated paraphasia	–.70
Stuck-in-set perseveration	–.62
Word-finding circumlocution	–.60
Constant	2.26
Canonical correlation	.84

Note. $n = 22$. DAT = Dementia of the Alzheimer Type.
[a]Standardized coefficients for the canonical variables.

Table 7
Classification Analysis With DAT and Normal Comparison Participants

		No. of cases classified	
Group	% correct	DAT	Normal
DAT	90.4	19	2
Normal	100.0	0	19
Total	95.0	19	21

Note. DAT = Dementia of the Alzheimer Type.

Klopfer & Kelley, 1946; Piotrowski, 1937). Instead of explaining these differences in terms of psychological constructs, however, we provided a strategy for interpreting the Rorschach test results within a neuropsychological framework. The decision to include particular variables within this framework, although theoretically determined, connects the inference process to the characteristic cognitive deficits of DAT. This strategy can serve as a guideline for others who are assessing neurologically impaired individuals, as well as others suspected of experiencing cognitive impairment.

Although differences between DAT patients and normal comparison participants were observed for most of the Rorschach test variables, there were several important exceptions. We had anticipated that perseverations, as defined by the CS and considered to be a clear indicator of "severe neurological impairment" (Exner, 1986, p. 362), would be elevated in our DAT sample. Among our DAT patients, however, there were no perseverations of any type. Likewise, we anticipated that the DAT patients would commit a greater number of deviant verbalizations (*DV*s), considering that word intrusions and paraphasic errors are commonly encountered in this population (Fuld, Katzman, Davies & Terry, 1982); however, our patients were not significantly different on this cognitive special score nor did they obtain a higher total score for cognitive errors (*W SUM 6*). The lack of differences on these Rorschach test measures from the CS may be due to the insensitivity of the scoring criteria in certain cases, particularly for perseverations. This limitation speaks to the need for the introduction of new, more sensitive measures, as was confirmed when we examined the results from the linguistic errors and executive functioning and perseveration scales. Using this scale, we confirmed our hypothesis that the DAT patients commit a greater amount of linguistic errors than do normal comparisons. Most importantly though, through the use of this novel approach we can extend our analysis beyond the overall performance decrement to delineate the types of errors observed. Thus, the results revealed that the type of errors committed by DAT patients (i.e., semantic paraphasias, word finding circumlocution, and the use of superordinate categories) was characteristic of their dementia (Cummings & Benson, 1992). Similarly, we observed that although DAT patients committed a larger number of perseverations of all types, the largest numbers of perseveration errors observed were of the phonemic and thematic types, thus, confirming our hypothesis. It has been suggested that all forms of perseveration involve impaired frontal cortex mediated executive-functioning, resulting in an increase in the number of perseverations across every domain of behavior and cognition (Bilder & Goldberg, 1987). The tendency for DAT patients to commit thematic perseverations appeared, however, to be characteristic of aphasic patients and patients with left-hemisphere lesions as well as DAT patients (Sandson & Albert, 1984). Several authors (Sandson & Albert, 1984; Yamadori, 1981) have suggested that the thematic or recurrent type, of perseveration involves an abnormal recall of "postfacilitated items from a short-term memory buffer" (Sandson & Albert, 1984, p. 727). Further support for scoring linguistic and executive functioning and perseveration errors was illustrated via the discriminant function analysis. Using a conservative jackknife classification procedure still resulted in very high sensitivity and specificity, thus, providing support for the construct validity of this scale. However, given the instability of classification coefficients derived from small samples, future studies will be needed to determine the stability of the discriminant function analysis.

Based upon the current findings, this study presents evidence that Rorschach test protocols can be interpreted using a neuropsychological approach. As a neuropsychological problem- solving task, the Rorschach test may offer several unique advantages over other neuropsychological tests. For example, the Rorschach test can be used with all individuals (i.e., normal as well as pathological), is not limited by level of intelligence, and provides us with ranges of scores as well as categorical indicators of impairment. Furthermore, substantial cognitive resources must be mobilized in the service of generating novel responses to the Rorschach stimuli. These cognitive resources

require the organization of numerous cognitive operations that are revealed when the respondent attempts to solve the Rorschach test problem of "what might this (the inkblots) be." Although there are numerous ways that an individual can approach the Rorschach test problem, the range of possibilities is reduced in cognitively impaired individuals, which makes the test suitable for detecting impaired cognitive processes. In fact, Freeman and Gathercole (1966) found, that out of 16 tests, the Rorschach test elicited the most perseverative responses among schizophrenia patients. Finally, unlike traditional neuropsychological tests such as the Wisconsin Card Sorting Test (WCST; Heaton; Chelune, Talley, Kay, & Curtiss, 1993), in which the individual is presented with a forced choice, with the Rorschach test we can apply a qualitative "process" analysis to an individual's responses.

Unquestionably, the current findings are a first step in the use of the Rorschach test in evaluating neurologically impaired individuals. One obvious problem with our sample is that because a majority of our DAT participants were recruited from the VAMC, we have an unbalanced representation of male DAT participants and female control subjects. Although this limits the generalizability of the potential findings, there are no reports of differences in the frequency of Rorschach test determinants in nonpatients based upon gender (Exner, 1990; Mattlar, Knuts, & Virtanen, 1985). Second, in this study, most of the DAT participants had a mild-to-moderate degree of cognitive impairment and, thus, it is unclear if the present results are representative of DAT participants across the spectrum of cognitive impairment. It is important to note, however, that the DAT participants ranged in performance on the MMSE, from a score of 5 (*severe impairment*) to a score of 27 (*mild impairment*), and that even the most cognitively impaired DAT participant was testable on the Rorschach. Finally, depression was not assessed in our study. The incidence of depression in DAT is controversial, although major depressive episodes appear to be rare (Cummings, Miller, Hill & Neshkes, 1987). Still, future studies should consider the role of depression in DAT.

Additional studies are clearly needed comparing the Rorschach test to more traditional neuropsychological assessment tests in participants representing various types and degrees of organic impairment. Nonetheless, by incorporating principles from neuropsychology to the Rorschach test, we believe that we have broadened the use of the test and, in turn, have helped to bridge the gap between the fields of neuropsychology and personality assessment.

References

Acklin, M. W. (1994). Some contributions of cognitive science to the Rorschach test. *Rorschachiana, 19*, 129-145.

Barr, W. B., Bilder, R. M., Goldberg, E., Kaplan, E., & Mukherjee, S. (1989). The neuropsychology of schizophrenic speech. *Journal of Communication Disorders, 22*, 327-349.

Bilder, R., & Goldberg, E. (1987). Motor perseverations in schizophrenia. *Archives of Clinical Neuropsychology, 2*, 195-214.

Cummings, J. L., & Benson, F. D. (1992). *Dementia. A clinical approach* (2nd ed.). Boston: Butterworth-Heinmann.

Cummings, J. L., Miller, B., Hill, M. A., & Neshkes, R. (1987). Neuropsychiatric aspects of multi-infarct dementia and dementia of the Alzheimer type. *Archives of Neurology, 44*, 389-393.

Dixon, W. (1992). BMDP statistical software [Computer software]. Berkeley: University of California Press.

Dorken, H., & Kral, V. A. (1951). Psychological investigation of senile dementia. *Geriatrics, 6*(3), 151-163.

Exner, J. E. (1979). *The Rorschach: A comprehensive system: Volume 1* (1st ed.). New York: Wiley.

Exner, J. E. (1986). *The Rorschach: A comprehensive system: Volume 1. Basic foundations* (2nd ed.). New York: Wiley.

Exner, J. E. (1990). *A Rorschach workbook for the comprehensive system* (3rd ed.). Asheville, NC: Rorschach Workshops.

Exner, J. E. (1993). *The Rorschach: A comprehensive system: Volume 1. Basic foundations* (3rd ed.). New York: Wiley.

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). Mini-Mental State Exam. *Journal of Psychiatric Research, 12*, 189-198.

Freeman, T., & Gathercole, C. E. (1966). Perseveration: The clinical symptoms in chronic schizophrenia and organic dementia. *British Journal of Psychiatry, 112*, 27-32.

Fuld, P. A., Katzman, R., Davies, P., & Terry, R. D. (1982). Intrusions as a sign of Alzheimer's dementia: Chemical and pathological verification. *Annals of Neurology, 11*, 155-159.

Goldberg, E. (1986). Varieties of perseveration: A comparison of two taxonomies. *Journal of Clinical and Experimental Neuropsychology, 8*, 710-726.

Goldberg, E., & Tucker, D. (1979). Motor perseveration and long-term memory for visual forms. *Journal of Clinical Neuropsychology, 1*, 273-288.

Heaton, R. K., Chelune, G. J., Talley, J. L., Kay, G. C., & Curtiss, G. (1993). *Wisconsin Card Sorting Test manual: Revised and expanded.* Odessa, FL: Psychological Assessment Resources.

Insua, A. M., & Loza, S. M. (1986). Psychometric patterns on the Rorschach of healthy elderly persons and patients with suspected dementia. *Perceptual and Motor Skills, 63*, 931-936.

Johnston, H., & Holzman, P. S. (1979). *Assessing schizophrenic thinking*. San Francisco: Jossey-Bass.

Kaplan, E. (1988) A process approach to neuropsychological assessment. In T. Boll & B. K. Bryant (Eds.), *Clinical neuropsychology and brain function: Research, measurement, and practice*. Washington, DC: American Psychological Association.

Kaplan, E. F., Goodglass, H., & Weintraub, S. (1983). *The Boston Naming Test* (2nd ed.). Philadelphia: Lea & Febiger.

Klopfer, B., & Kelly, D. M. (1946). *The Rorschach technique*. New York: World Book.

Lezak, M. D. (1995). *Neuropsychological Assessment* (3rd ed.). New York: Oxford University Press.

Mattis, S. (1988). *Dementia Rating Scale (DRS)*. Odessa, FL: Psychological Assessment Resources.

Mattlar, C. E., Knuts, L., & Virtanen, E. (1985). Personality structure on the Rorschach for a group of healthy 71-year-old females and males. *Projective Psychology, 30*(1), 3-8.

McKahnn, G., Drachman, D., Folstein, M., Katzman, R., Price, D., & Stadlan, E. M. (1984). Clinical diagnosis of Alzheimer's disease: Report of the NINCDS-ADRDA work group under the auspices task force on Alzheimer's disease. *Neurology, 34*, 939-944.

Perry W., & Braff, D.L. (1994). Information-processing deficits and thought disorder in schizophrenia. *American Journal of Psychiatry, 151*, 363-367.

Piotrowski, Z. (1937). The Rorschach inkblot method in organic disturbances of the central nervous system. *Journal of Nervous and Mental Disease, 86*, 525-537.

Rorschach, H. (1942). *Psychodiagnostics: A diagnostic test based on perception* (4th ed.). New York: Grune & Stratton. (Original work published in 1921.)

Sandson, J., & Albert, M. L. (1984). Varieties of perseveration. *Neuropsychologia, 22*, 715-732.

Solovay, M. R., Shenton, M. E., Gasperetti, C., Coleman, M., Kestnbaum, E., Carpenter, T., & Holzman, P. S. (1986). Scoring manual for the thought disorder index. *Schizophrenia Bulletin, 12*, 483-492.

Yamadori, A. (1981). Verbal perseveration in aphasia. *Neuropsychologia, 19*, 591-594.

Appendix A

Linguistic errors

1. *Semantic Paraphasia:* Word substitution based upon the semantic properties of the intended word. The meaning of the word is clearly conveyed. For example, tentacles for antennae, or "Here is a bat and it is hanging on a tree by its *hooks*."
2. *Phonemic Paraphasia:* Word substitution based upon the phonetic relations to the intended word. It is clear what the meaning of the word conveys. For example, "That is a lung *conflicted* with cancer," or "That is a horse with a horn, a *Capricorn*."
3. *Unrelated Paraphasia:* A real word is used that is completely unrelated to the subject. In the case of a unrelated paraphasia, the meaning of the word is unclear. For example, "Its a bat and that's its *architecture*."
4. *Neologistic Distortion:* A made-up and distorted nonword. For example, "This is a crab and this is his *phrengle*."
5. *Word-Finding Circumlocution:* Extended phrase used to describe a word, without mentioning the word itself (as if the respondent is having difficulty finding the word). For example, "The thing that Eskimos' live in and its made of ice" or "A thing that you wear on Halloween and it has holes for your eyes."
6. *Superordinate Category:* A phrase that meets either of the two following conditions: (a) identifies parts without integrating into a whole, (b) correctly describes the target word in terms of its superordinate class without elaboration. This is similar to circumlocution, but in this case there is no attempt to produce the specific target word. For example, "Two ears and a nose," "Its a claw thing," "An animal with big teeth that takes down trees," or "An animal that has wings and flies."
7. *Inappropriate or Stilted Speech:* Responses that are awkwardly phrased and stilted sounding. Unlike the paraphasic errors, changing one single word does not clarify the meaning of the sentence. For example, "My attention was being put on the center line," "A twin pair of lips," "An ear looking forward" (Solovay, et al., 1986).
8. *Confused and Fluid Speech:* A string of words that appear unrelated and fragmented and convey a lack of focus. For example, "A bunch of horses, tails, and fire up in heaven, and all people are filled in heaven and earth."

Executive Perseveration Errors

1. *Mechanical Perseveration:* The respondent reports the same object over and over again without any elaboration, and their response does not appear related to the stimuli. The responses that follow the initial response are scored. For example, "Card I is a bat, Card II is a bat, Card III is a bat," and so forth (Exner, 1993).
2. *Content Perseveration:* The respondent reports that the object observed is the same identical one as seen previously during this test session. For example, "There is that bat again, but now its flying" (Exner, 1993).
3. *Phonemic Perseveration:* A repetition of phonemic or morphemic qualities of a prior response or a clang association (i.e., rhyming or alliteration). For example, "Card I is a gas station attendant, Card II is a gas mask," or "Card VI is a cattle prodder, and Card VII is two women prodding each other," or "Card I, this is a misty appearance, and Card II these are two mystical characters and Card III, this is a mystery to me."

4. *Stuck in Set Perseveration:* The compulsive use of a framework or strategy (i.e., language or content) from a previous response. Stuck-in-set perseveration implies cognitive inflexibility in the process of generating a response. Stuck-in-set perseverations are often continuous, but can occur sporadically throughout the protocol. For example, Card I "It's a bat, I can see it's thorax and ribs," Card II is , "Two bears, I can see their thorax," Card III is, "They look like two men because of their thoracic outline."

5. *Thematic Perseveration:* The reappearance of a content or theme *without elaboration*, independent of whether or not it fits the blot, or if the response is elaborated on, it does not significantly change the perseverated theme (i.e., making it a unique response). For example, "Card IV is a football player, Card VII is two football players with helmets on." The theme can be introduced earlier and reappear several responses later. Thematic perseveration is scored for responses that follow the original theme and can be found in protocols of nonpatients. Thematic perseveration differs from mechanical perseveration in that the respondent is attempting to respond to the features of the blot, and it differs from stuck-in-set perseveration because the emphasis is on content versus the process of reaching the content. For example, Card I is a bat, Card II is two people, Card III is two people, Card IV is a person, Card V is bat, Card VI is a bat, Card VII is two people. Perseverations would be scored for the responses to cards III, IV, V, VI, and VII.