Published in final edited form as:

Psychol Assess. 2013 March ; 25(1): 253–263. doi:10.1037/a0030546.

Rorschach Measures of Cognition Relate to Everyday and Social Functioning in Schizophrenia

Raeanne C. Moore, Donald J. Viglione, Irwin S. Rosenfarb, Thomas L. Patterson, and Brent T. Mausbach

Alliant International University, San Diego University of California, San Diego

Abstract

Neurocognitive impairment and negative symptoms contribute to functional disability in people with schizophrenia. Yet, a high level of unexplained variability remains after accounting for the role of these factors. This study examined the role of thought disorder, psychological complexity, and interpersonal representations, as measured by the Rorschach, in explaining functional and social skills capacity in 72 middle-aged and older outpatients with schizophrenia (mean age = 51.2). Participants responded to the Rorschach administered using the R-Optimized administration instructions and scored using the Rorschach Performance Assessment System. Relationships with neuropsychological performance and psychopathology were also explored. Psychological complexity, which refers to a person's cognitive capacity for problem-solving and organizing their surroundings, was correlated with functional capacity ($r = .30$) and social skills capacity ($r = .34$). Healthy interpersonal representations were correlated with positive social skills (r 's = .24 to .28). In multiple regression models, psychological complexity accounted for significant variation in functional ($\beta = 0.23$, $p = 0.02$) and social skills capacity ($\beta = 0.35$, $p < 0.01$) after controlling for neurocognitive functioning and psychopathology. These data suggest that psychological complexity plays a significant role in the functional limitations seen in schizophrenia, above and beyond the contributions of neurocognitive impairment and negative symptoms. Support was also found for the impact of healthy object relations functioning with social functioning. Clinical implications include novel information for future development of cognitive remediation treatment strategies based on a patient's developmental level of psychological capacity and healthy interpersonal schemas.

Keywords

functional capacity; Rorschach Performance Assessment System; thought disorder; psychological complexity; interpersonal representations

Although the prevalence of schizophrenia is only about 0.4% (Saha, Chant, Welham, & McGrath, 2005), it is the fourteenth leading cause of disability among all diseases in the World (World Health Organization, 2008) and accounted for an estimated \$62.7 billion (U.S.) per year in total costs to society in 2005 (Wu et al., 2005). Approximately 36% of these costs are due to direct care, such as provision of medications, outpatient treatment, and hospitalization (Wu et al., 2005), with the remaining costs due primarily to the indirect costs

Correspondence concerning this article should be addressed to Raeanne C. Moore, Department of Psychiatry, University of California San Diego, 9500 Gilman Drive; La Jolla, California, 92093-0993. r6moore@ucsd.edu.

Raeanne C. Moore, California School of Professional Psychology, Alliant International University, San Diego and Department of Psychiatry, University of California, San Diego; Donald J. Viglione, California School of Professional Psychology, Alliant International University; Irwin S. Rosenfarb, California School of Professional Psychology, Alliant International University; Thomas L. Patterson, Department of Psychiatry, University of California, San Diego; Brent T. Mausbach, Department of Psychiatry, University of California, San Diego.

(disability) associated with the disease, such as unemployment, reduced productivity, and the need for ongoing supervision or care on the part of caregivers (Wu et al., 2005). Indeed, many people with schizophrenia reside in assisted living facilities such as Board and Care (B&C) and skilled nursing homes (Cohen et al., 2000; Palmer, Heaton, & Jeste, 1999), and less than 15% engage in paid or non-supported employment (Anthony & Blanch, 1987; Slade & Salkever, 2001). Even when patients' symptoms are relatively well controlled by pharmacotherapy, deficits in everyday and social functioning continue to interfere with independent and productive living. For example, Slade and Salkever (2001) reported that a 40% reduction in psychiatric symptoms is associated with only an 8% improvement in unsupported employment rates and 12% improvement in any type of employment, providing evidence that factors other than psychiatric symptoms contribute most to functional disability.

Typically, functional disability is attributed to neurocognitive impairment. Since the introduction of the idea of dementia praecox (Kraepelin, 1896), studies have documented reduced ability to remember, think, concentrate, formulate ideas, reason, and communicate in schizophrenia (Elvevåg & Goldberg, 2000; Reichenberg, 2010), and these have been linked to impairments in everyday, social, and community functioning (Bowie, Reichenberg, Patterson, Heaton, & Harvey, 2006; Green, 1996). A recent meta-analysis on the relations between neurocognition and functional outcomes reported that overall neurocognition, however, as measured by standard neuropsychological tests, explained only approximately 5% of variation in functional outcomes, suggesting that factors other than neurocognition likely contribute to functional disability in this population (Fett et al., 2011). Thus, more research is needed to identify factors contributing to social and everyday functional disability in schizophrenia.

In the current study, we chose to examine the cognitions of thought disorder, psychological complexity, and interpersonal representations in relation to functional outcomes. Cognition has been differentiated from neurocognition in terms of level of abstraction and presumed neurophysiological correlates. Following Green and Nuechterlein (1999), we associate neurocognition with basic, relatively narrowly defined abilities and neurocognitive impairments with specific neuroanatomical or neurophysiological irregularities at the basic neuronal level, including impairments in attention, memory, and executive functioning. In this model, intact neurocognition is assumed to be a prerequisite for the more abstract concept of cognition which would be represented by, for example, thoughts, social schemas, emotion perception, problem-solving and intelligence.

Thought Disorder

Impairments in thinking, such as impaired reality testing or thought disorder, and communication as demonstrated in disorganized speech, are primary symptoms associated with schizophrenia. Disorganized speech, including difficulty staying on topic, planning upcoming speech, or inhibiting the verbalization of irrelevant ideas, are the most common and accessible physical manifestation of disorganized thought processes (Kerns & Berenbaum, 2002). Research has demonstrated that thought disorder occurs independently of hallucinations and delusions and is present throughout non-psychotic periods of the illness, although it is more prevalent during active psychosis (Holzman, Shenton, & Solovay, 1986; Nuechterlein, Edell, Norris, & Dawson, 1986).

The foundation for the measurement of thought disorder in this work was laid by measures derived from the Rorschach (Johnston & Holzman, 1979; Watkins & Stauffacher, 1952), and work with these measures contributed greatly to the delineation and conceptualization of disordered thinking. As a performance-based behavioral problem-solving task, the

Rorschach has been demonstrated to be a reliable and valid measure of thought disorder in people with schizophrenia (Kleiger, 1999; Viglione, Meyer, Gacono, & Evans, 2008). This research is based largely on (a) Rorschach response distortions as measured by what is called form quality and (b) behavioral evidence of thought disorder, as evidenced by verbalizations and explanations of visual constructions that demonstrate confused reasoning and speech and scored as cognitive codes.

The Rorschach form quality variable includes sophisticated empirical systems (Exner, 2003; Meyer, Viglione, Mihura, Erard, & Erdberg, 2011a) for judging the accuracy of responses. As suggested by Dawes (1999), if a person inaccurately identifies the whole blot on Card VII as saying it looks like “a person’s head,” instead of “two people looking at each other standing on something,” the person is likely to have difficulty interpreting reality and would receive a poor form quality score (FQ-). As an example of a cognitive code demonstrating a nonsensical, thought disordered speech, a person may describe the black and red portion of Card II as “an inverse aspect ratio picture of blood inside of that person, but not with my camera.” Other Rorschach measures of thought disorder have included disturbed content and disturbed understanding of interpersonal matters (Kleiger, 1999).

Psychological Complexity

The term “psychological complexity” refers to the intricacy of cognition represented in the products of and processes involved in cognition. It has been in the psychological literature since at least the 1940s and soon thereafter was applied to the Rorschach responses and interpreted as a demonstration of developmental progress and maturation (Friedman, 1953). Indeed, developmental theories associate advancing age with increasing differentiation in neurocognition, cognition, behavior, and coping (Werner, 1948). In contrast, the variable but declining course in schizophrenia (Kraepelin, 1896) along with the prominence of negative symptoms and the reduced ability to think, reason, and to communicate in the disorder (Elvevåg & Goldberg, 2000; Reichenberg, 2010), suggest that cognition and psychological processing is less complex among people with schizophrenia, and that the previous evidence of developmental advancement is lost or no longer evident. Indeed, individuals with schizophrenia have been found to produce simplistic Rorschach responses along a number of dimensions (Minassian, 2001; Viglione, 1999).

The simplest Rorschach responses are characterized by single object responses to a visually prominent subcomponent area of the blot involving only a global specification of the shape of the response (e.g., “a potato” or “that part is a dog’s head”). In contrast, complex responses specify forms, break up the entire blot into different types of objects, inter-relate them, and use multiple blot stimuli, for example, color, movement, shading, and depth (e.g., to Card III using the entire blot “twins in black tuxedos setting a table for a party, you can see the red decorations in the background”). Traditionally, these response features have been measured incompletely along single dimensions with individual variables.¹ Yet, when measured in this way, they have consistently demonstrated an association with age, cognitive capacity, cognitive motivation, and problem-solving abilities (Viglione, 1999). Overall, research on Rorschach complexity provides indirect support for the conclusion that individuals who have the capacity and motivation to encode, integrate and organize complex visual stimuli should have more positive outcomes in regard to their everyday and social functioning. Reviewing this research, Viglione (1999) laid the groundwork for a more

¹An example would be the synthesis (DQ+) variable, which is the frequency of responses which inter-relate two or more separate objects as in “fish swimming around each other.” Another is the Blend variables, which is the frequency of responses with more than one blot stimuli providing the rationale for the response. Such stimuli or “determinants” invoke movement, color, shading, dimensionality, tactile attributions and reflections but not form, which is considered the simplest of the determinants.

integrated and comprehensive approach to measuring “Rorschach response complexity” when he defined it as “the amount of productivity, precision, differentiation, and integration involved in the aggregate of all the responses” (p. 259). Taking this lead, Dean et al. (2007) constructed a more extensive and complete multi-variable measure of psychological complexity using Comprehensive Rorschach System variables (CS; Exner, 2003), which is almost identical to the variable used in this study.

Interpersonal Representations

Understanding and participating in everyday social interactions pose considerable challenges for people with schizophrenia (Hooley, Candela, Millon, Blaney, & Davis, 1999). These individuals have difficulty interpreting the non-verbal cues of other people, including body language, gestures, and facial expressions. Whereas social skills are an observable behavior, interpersonal representations and schema, which are non-observable cognitions and underlying cognitive structures, are associated with social relationships. In turn, these cognitions are related to self-concept, perceived self-other boundaries, and understanding of others. Theoretically, assessment of the interpersonal schema should relate to a person's outward expression of social behavior, such that individuals with poor and distorted interpersonal schema would produce similarly flawed representations of people on the Rorschach and should have impaired social skills, as is often the case with schizophrenia. Conversely, those with positive and healthy interpersonal schemas and mental representations of people should have intact social skills.

Traditionally, the Rorschach has demonstrated strength in measuring these social cognitive structures (Exner, 1993; Perry & Viglione, 1991; Stricker & Gold, 1999) in the form of many scores accessing dimensions of human representations in test responses, such as: accurate versus distorted form quality, benevolent versus malevolent and aggressive responses, etc. Accordingly, the interpersonal schema and mental representations contributing to the above “looking at each other” or “setting a table for a party” Rorschach responses are likely to be related to a healthy and organized understanding of self and thus a superior interpersonal schema. In contrast, (a) the response with the confused internal view of a person with “inverted aspect ratio” in a confounded relationship with a person wielding a camera, or (b) that of a head seen in an area that looks like two people would be much more likely to result from disturbed interpersonal representations.

Purpose of the Current Study

The purpose of the current study is to assess the relationships between thought disorder, psychological complexity, and interpersonal representations with daily and social functioning in people with schizophrenia. We hypothesized as follows:

1. Thought disorder would be negatively correlated with everyday and social functional ability, such that higher levels of thought disturbance would be associated with lower levels of functioning.
2. Psychological complexity would be positively correlated with everyday and social functional ability, such that higher complexity would be associated with greater functioning.
3. Healthy interpersonal representations would be positively correlated with social skills functional ability.
4. Patients with greater thought disorder in combination with low psychological complexity were expected to have the lowest functional ability.

In addition, we used components of the recently published Rorschach Performance Assessment System (R-PAS; Meyer, Viglione, Mihura, Erard, & Erdberg, 2011b). This study, accordingly, to a small degree serves as an early validation study for R-Optimized administration and R-PAS for applications to schizophrenia.

Method

Participants

Participants were 72 middle-aged and older community-dwelling individuals with schizophrenia or schizoaffective disorder. Fifty-eight of the 72 participants were enrolled in a randomized clinical trial (RCT) examining the efficacy of psychosocial skills-based interventions for improving functioning in those diagnosed with schizophrenia. The remaining 14 met the same inclusion criteria (see below), although they were not enrolled in the RCT. Participants were at least 35 years of age, had a chart DSM-IV diagnosis of schizophrenia or schizoaffective disorder, and were psychiatrically stable. The participants were older, not the most disturbed or disabled among people with schizophrenia, and were voluntarily participating in an intervention study; therefore, the sample may not be representative of the general schizophrenia population. Participants were excluded if they had (a) a diagnosis of dementia, were (b) judged to be a serious suicide risk, (c) unable to complete the assessment battery, or (d) currently participating in any other psychosocial intervention or drug research at the time of intake. The study protocol was approved by the University of California San Diego and the Alliant International University Institutional Review Boards, and all participants provided written, informed consent prior to participating.

Primary Study Measures

Performance-Based Measures of Everyday and Social Functioning—Everyday living skills were assessed using the UCSD Performance-Based Skills Assessment (UPSA) (Patterson, Goldman, McKibbin, Hughs, & Jeste, 2001b). The UPSA is a performance-based measure of functional capacity designed for use with the severely mental ill and assesses functioning through a series of role plays in five domains: planning/organization, finances, communication skills, transportation, and household chores. The UPSA uses of real-world props (e.g., a telephone, bus schedule) to maximize ecological validity and authenticity. Subtest scores range from 0 to 20, for a possible UPSA score between 0 and 100 points. In the current study, the Cronbach alpha coefficient for the UPSA was .89. The UPSA has been linked to real-world functional outcomes (Cardenas et al., 2008; Mausbach et al., 2008; Mausbach et al., 2011; Mausbach, Moore, Bowie, Cardenas, & Patterson, 2009). Several studies have found relationships between the UPSA and functioning, neuropsychological performance, and interpersonal skills (Bowie et al., 2006; Patterson et al., 2001b), and results of these studies have indicated that negative symptoms and cognitive impairment are related to UPSA performance.

Social skills capacity was assessed using the Social Skills Performance Assessment (SSPA) (Patterson, Moscona, McKibbin, Davidson, & Jeste, 2001c), a performance-based measure of social skills created for use with individuals with schizophrenia. Like the UPSA, it is a role-play enactment measure, with two scenarios lasting three minutes each. The first role-play scenario requires the participant to engage in a social interaction in which he/she is meeting a new neighbor (played by the examiner). In the second role-play scenario, the participant engages in an instrumental interaction in which he/she needs to contact his/her landlord (played by the examiner) about a previously reported problem. Role-play exercises are recorded and scored on several domains (i.e., interest, affect, fluency, focus). The SSPA had good internal consistency in the current study, with a Cronbach alpha coefficient of .90.

All SSPAs were rated by the examiner and a blind rater, and interrater reliability was good at $\alpha = 0.87$. Poor performance on the SSPA has been found to be significantly correlated with greater negative symptoms of psychosis and worse overall cognitive functioning (Patterson et al., 2001c; Pratt et al., 2007; Sitzler, Twamley, Patterson, & Jeste, 2008).

Rorschach Measurement of Cognitions—Outpatients with schizophrenia responded to the Rorschach administered using the R-Optimized administration instructions and scored using the Rorschach Performance Assessment System as found in a draft version of the R-PAS Manual which was ultimately published in 2011 (Meyer et al., 2011b). The Rorschach is a behavioral problem-solving task in which respondents must use reasoning and problem-solving skills to make sense of perceptual regularities and irregularities found in the blots. It also requires the clear communication of how one sees the blot to another person. In creating a response to the ambiguous complex and contradictory stimuli, respondents need to utilize their internal cognitions and underlying schema, which makes it a good method of assessing thought disorder, psychological complexity when problem-solving, and interpersonal understanding of human representations (Perry, Viglione, & Braff, 1992). R-PAS is recently published as an improved Rorschach system with a strong evidence base, administrative changes to maximize reliability and scoring consistency, and more accurate normative comparisons, although it sustains a great deal of the procedures and characteristics found in previous Rorschach literature. We selected variables with good validity support, as demonstrated by the validity review in R-PAS resulting in their ultimate inclusion in the system (Meyer et al., 2011b). Most distinctive is our use of the newly adopted R-PAS method to optimize the number of responses in the form of prompting for a second response to a card and discontinuing after four responses. Known as R-Optimized administration, this administration nearly eliminates less useful Rorschach records with an insufficient number of responses (Dean et al., 2007). Of note, our study retains the CS Form Quality (FQ) system, as, at the time of data collection, the R-PAS FQ system was still under development. Also, the final R-PAS version for the Ego Impairment Index (EII-3) and Complexity were not finalized at the time we conducted the study, so that slightly different versions of the two were included as noted below. It should be pointed out that there is considerable overlap between the R-PAS and CS variables used in this study, except that MOA is not included in the CS.

Thought Disorder/Severity of Disturbance: The Ego Impairment Index-2 (EII-2) is a composite measure of thought disturbance and psychological impairment with good interrater reliability ($ICC = .93$ to $.98$) derived from Rorschach responses on the R-PAS (Perry & Viglione, 1991). Because of its strong research support, the EII-2 (Meyer et al., 2011a; Perry & Braff, 1994; Viglione, Perry, Giromini, & Meyer, 2011) and included in the R-PAS as the EII-3. Research indicates that the EII-2 is associated with schizophrenic spectrum disorders, poor response to treatment, thought disorder, and cognitive dysfunction (Viglione, Perry, & Meyer, 2003c).

There are five subcomponents of the EII-2: (1) inaccurate responses in which the object does not match the blot area (distorted form quality (FQ-) measured by the CS system), (2) a sum of the cognitive codes weighted to measure severity (WSumCog), (3) disturbing and problematic imagery and ideational themes involving, for example, aggression, morbidity, blood, sex, and anatomy (Critical Contents), (4) distorted perceptions of human movement and experiences (M-), (5) and the Human Representational Variable (HRV), which in the realm of thought disorder has to do with disturbed cognitions about people. Combined, these components detect the following aspects of thought disorder: impaired reality testing, thought disorganization, and extreme or poorly controlled thought content. Its construction also controls for the number of responses. High scores are associated with a more severe thought disorder.

Psychological Complexity: The rationale for Complexity as a measure of psychological complexity is described in the introduction to this paper. Its validity and response process is summarized in the R-PAS manual (Meyer et al., 2011b), where it is established as having a sufficient research foundation to be included in the R-PAS. This variable provides the clinician with information regarding a person's cognitive capacity for problem-solving and organizing their surroundings. The formula for Complexity is included in the CS (Dean et al., 2007) and the R-PAS version is almost identical. It is a summary score that uses variables in the following R-PAS categories to calculate the overall Complexity score: Location, Synthesis, and Vagueness considered together, determinants, and contents, and the complete formula used in this study is presented in Appendix A. More differentiated and integrated use of the locations, more determinants, and more contents results in higher Complexity. In this study, an early version of the R-PAS Complexity score was used, which is nearly identical to the version ultimately adopted in R-PAS. This study's version only differs from the ultimate R-PAS version by the inclusion of food content, whereas food was ultimately dropped as one of the contents in R-PAS. The possible Complexity points attributable to food in a record equals its mean, which is very small (food content $M = 0.33$; Meyer, Erdberg, & Shaffer, 2007) relative to the Complexity mean (Complexity $M = 68$), so the two versions of Complexity are nearly identical.

Interpersonal Representations: Based on summaries of the available research (Meyer et al., 2011a), the variables chosen to assess interpersonal representations in this study are the Human Representational Variable (HRV; Viglione, Perry, Jansak, Meyer, & Exner, 2003a), Human Content Variable ($H:Hd+(H)+(Hd)$; Exner, 1993), and Mutuality of Autonomy Scale (MOA; Urist, 1977).

These three variables have been developed out of theories based on early object relations research, and have been found to provide reliable and valid representations of interpersonal schema in people with schizophrenia, so are included in this study and the R-PAS. The HRV has been found to be related to interpersonal functioning, interpersonal perception, and psychological health (Viglione, Perry, Jansak, Meyer, & Exner, 2003b). The HRV is generated by subtracting Poor Human Representations (PHR) from Good Human Representations (GHR). Respondents must conceptualize, visualize, and describe people, human intentions, and human experience based on their schema of the self, others, and interpersonal relationships (Viglione et al., 2003a). High HRV scores are associated with a healthy understanding of others and positive interpersonal relationships, while low scores are associated with the opposite. Strong empirical grounding exists for the HRV as a summary variable measuring understanding of people and relationships based on schemas of the self, others and interpersonal relationships (Exner, 1993; Perry & Viglione, 1991; Viglione, 1999; Viglione et al., 2003b).

Rorschach Human Content compares whole human response images to part and imaginary human images. Developed by Exner (1993) as a measure of the conceptualization of self and others, human content responses provide an indication as to whether perceptions of the self and others are based on realistic and more complete conceptualizations of others versus imaginary or incomplete conceptualizations of others. Unrealistic whole human responses and realistic and unrealistic part human responses ($(H)+Hd+(Hd)$) are divided by the total number of human responses ($H+Hd+(H)+(Hd)$), with lower values indicating more mature and straightforward understanding of self and others. Because of some research supporting this score (Blatt, Brenneis, Schimek, & Glick, 1976; Lerner & St. Peter, 1984), it is included in the R-PAS and this study.

The Mutuality of Autonomy (MOA) scale was developed by Urist (1977) as a measure of object relational developmental maturity. The MOA is useful in the assessment of the

patient's perceived self-other boundaries, which can provide insight into disturbed social functioning. Healthy responses on the MOA describe figures engaging in activities that convey a sense of mutuality, and reciprocal acknowledgment of respective individuality is observed (Bombel, Mihura, & Meyer, 2009). Unhealthy responses describe figures engaging in relationships with severe imbalances of mutuality (Bombel et al., 2009). The MOA is scored on a seven point scale with low scores being most healthy and high scores being associated with disturbed object relations or interpersonal representations. Following R-PAS research reviews and recommendations, its simplified scoring is used (Meyer et al., 2011a). Mutuality of Autonomy Health (MAH) is scored for Level 1, Mutuality of Autonomy Pathology (MAP) is scored for Levels 5, 6 and 7, and the remaining levels are not scored. The overall MOA score, called MAP/MAHP in R-PAS, is calculated by dividing the MAP responses by the sum of MAH and MAP responses.

R-PAS Inter-Rater Reliability—The R-PAS was administered by a member of our research team. To estimate scoring reliability, 12 of the R-PAS protocols were re-scored by a graduate student who had considerable scoring training and experience and had no affiliation with the research study. Interrater reliability for the EII-2, Complexity, HRV, and MOA variables were calculated using two-way random effect intraclass correlation coefficients (Shrout & Fleiss, 1979). Results suggest that the two raters were highly consistent, with ICC's ranging from 0.83 to 0.97 (ICC's for individual variables: EII-2, $\alpha = 0.92$; Complexity, $\alpha = 0.97$; HRV, $\alpha = 0.89$; MAP/MAHP, $\alpha = 0.83$), which is above the excellent range cut-off score of .74 suggested by Fleiss (1981).

Secondary Study Measures

Global Cognitive Ability—Global cognitive ability was assessed using the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) (Randolf, 1998). The RBANS is a screening measure that assesses neuropsychological functioning in the following areas: Overall neurocognitive performance, immediate memory, delayed memory, attention, visuospatial/constructional abilities, and language. Index and overall scores range from severely impaired to above average. In this study, the RBANS demonstrated good internal consistency, with a Cronbach alpha coefficient of .79.

Positive and Negative Symptoms—The PANSS was developed to assess positive and negative symptoms in people with schizophrenia, and demonstrated good internal consistency in this study (PANSS Total Score $\alpha = .84$, PANSS Positive $\alpha = .73$, PANSS Negative $\alpha = .63$). The PANSS is a 30-item structured interview measure, with higher scores indicating greater severity of symptoms. For each item, the interviewer rates the participant's levels of psychopathology on a seven-point scale from '1' = absent to '7' = extreme. The PANSS Total Score, in addition to the seven-item Positive Symptom Scale and the seven-item Negative Symptom Scale were used in this study.

Depressive Symptoms—The Calgary Depression Scale for Schizophrenia (CDSS; Addington & Addington, 1990) was used to assess depressive symptoms. The CDSS is a nine-item structured interview measure, in which participants' symptoms are rated from '0' = absent to '3' = severe. Scores are summed (range = 0-27), with higher scores indicating greater depressive symptoms. In this study, the CDSS had good internal consistency ($\alpha = .83$).

Procedure

For all 72 participants, a DSM-IV diagnosis of schizophrenia or schizoaffective disorder was determined through chart diagnosis, as diagnosed by the patient's psychiatrist. The 58 participants who were enrolled in the RCT completed demographic and clinical

questionnaires, as well as the UPSA, PANSS, RBANS, and CDSS in a predetermined order as part of the baseline assessment for the trial. Approximately 1-2 weeks after this initial assessment participants were administered the Rorschach Performance Assessment System (R-PAS) and the Social Skills Performance Assessment (SSPA). In all cases, both assessments were conducted within a two week time period and prior to the initiation of treatment. The 14 remaining participants completed the assessment battery during a single visit. All data were collected at board and care (B&C) facilities, clubhouses, participant's homes (if living independently) and mental health clinics in San Diego County.

Data Analysis

All variables were examined for skewness using the adjusted Fisher-Pearson standardized third moment coefficient (Tabachnik and Fidel, 2001), with values >1.25 considered significantly skewed. Seven variables had skew above 1.25 ($p < .001$). These variables were transformed using log transformations, and the transformed variables had skews less than 1.25. To transform variables with values of zero or negative values we added a constant to move the minimum value of the distribution to 1.00. For variables with skew values pre- and post-transformation are as follows: EII-2 (1.44; .06), FQ-(2.21; -.47), WSum6 (1.61; -.39), M-(1.27; .65), PHR (1.41; -.29), MAP (1.68; .75).

Initially, Pearson correlations were conducted to analyze the bivariate relations between study variables, with emphasis on the correlations between EII-2, Complexity, HRV, Human Content, and MAP/MAPH with UPSA and SSPA performance. When Pearson correlations were significant, we proceeded to conduct multiple regression analyses to determine if results persisted while controlling for RBANS, PANSS and CDSS scores. To test hypothesis 4, we conducted regression analyses to examine the main effects of both EII-2 and Complexity, together, in predicting UPSA and SSPA scores. These analyses also included the clinical covariates listed above as well as the interaction term.

Results

Sample Characteristics

Demographic and clinical characteristics are presented in Table 1. Mean age of the racially/ethnically diverse participants was 51 years old. Two-thirds of the participants lived in B&C or other supervised living environment, while the remainder resided in private living. As a group, functional capacity was below the proposed cutoff for independent living (cutoff > 75) and cognitive functioning was in the cognitively impaired range.

Primary Analyses

Table 2 shows Pearson bivariate correlations between primary R-PAS variables, functional outcomes, and clinical variables. Correlation between the EII-2 and functioning were not significant (Hypothesis 1, UPSA: $r = -.10$, $p = 0.40$; SSPA: $r = -.00$, $p = 0.97$). However, there were positive correlations between Complexity and the UPSA (Hypothesis 2; $r = 0.30$, $p < 0.01$) and the SSPA ($r = 0.34$, $p < 0.01$). Interestingly, PANSS Positive and PANSS Total were positively related to the EII-2, whereas PANSS Negative was negatively associated with Complexity. For Hypothesis 3, the SSPA was not significantly associated with the HRV ($r = 0.16$, $p = 0.17$), Human Content ($r = -0.18$, $p = 0.12$), or the MAP/MAHP ($r = 0.07$, $p = 0.63$).

Regression Analyses

Hypothesis 4 predicted that the combination of high thought disorder (EII-2) and low psychological complexity would be associated with the greatest impairments in functional and social skills capacity, as measured by the UPSA and the SSPA. In a multiple regression

model with UPSA as the dependent variable, a main effect was found for the EII-2 ($\beta = -0.30$, $t = -2.32$, $p = 0.02$) and Complexity ($\beta = 0.43$, $t = 3.48$, $p < 0.01$). With SSPA as the dependent variable, a main effect was found for Complexity ($\beta = 0.39$, $t = 3.17$, $p < 0.01$), but not the EII-2 ($\beta = -0.12$, $t = -1.22$, $p = 0.23$). In the aforementioned analyses, additive effects of EII-2 and Complexity were observed in the prediction of UPSA scores. In the multivariate model, the beta coefficients for each variable increased in the hypothesized direction (EII-2 = -0.30 ; Complexity = $.43$) over the univariate model (EII-2 = -0.08 ; Complexity = $.30$). A similar, albeit less robust, trend was observed for prediction of SSPA scores, in which the beta coefficient for the EII-2 increased from -0.05 in the univariate model to -0.12 in the multivariate model, and the beta coefficient for Complexity increased from $.28$ to $.39$. As predicted, assessing both cognitive factors together was associated with a greater amount of variance in functional and social skills capacity than assessing either variable in isolation. The main effects were not complicated by the fact that the interaction of EII-2 and Complexity in both multivariate analyses was not significant (UPSA: $\beta = 0.07$, $t = 0.65$, $p = 0.52$; SSPA: $\beta = -0.18$, $t = -1.61$, $p = 0.11$).

Lastly, we examined the contribution of Complexity to UPSA and SSPA performance above and beyond the already known contributions of overall cognitive functioning and psychiatric symptoms. In separate hierarchical regressions for UPSA and SSPA, the first step included the PANSS Total Score, RBANS Total Score, and CDSS Scores, and the second step included Complexity. Complexity ($\beta = 0.23$, $t = 2.37$, $df = 53$, $p = 0.02$) was significantly related to UPSA scores, accounting for an additional 4.9% of the variance beyond that accounted for by RBANS ($\beta = 0.58$, $t = 5.60$, $df = 54$, $p < 0.001$), PANSS Total Scores ($\beta = 0.43$, $t = -2.35$, $df = 54$, $p = 0.02$), and depressive symptoms ($\beta = 0.11$, $t = 1.10$, $df = 54$, $p = 0.28$).

For the regression predicting SSPA scores, Complexity ($\beta = 0.35$, $t = 2.98$, $df = 53$, $p < 0.01$) was significant, accounting for an addition 11.8% of variance beyond that accounted for by RBANS Scores ($\beta = 0.17$, $t = 1.43$, $df = 54$, $p = 0.16$), PANSS Total Scores ($\beta = -0.29$, $t = -2.40$, $df = 53$, $p = 0.02$), and depressive symptoms ($\beta = 0.24$, $t = 1.97$, $df = 54$, $p = 0.05$).

Secondary Analyses

Table 3 contains secondary (exploratory) correlation analyses between the subcomponents of our primary Rorschach variables and measures of symptoms of psychopathology and functioning. Significant bivariate correlations were found between both GHR and PHR and PANSS Positive, and GHR and RBANS Total Score.

As has been noted, the MAP/MAHP can be separated into two subcomponents: the Mutuality of Autonomy Health (MAH) Index and the Mutuality of Autonomy Pathology (MAP) Index. Interestingly, SSPA Scenario 1, which measures the participant's ability to meet a new neighbor and engage in a friendly and appropriate conversation, was related to the MAH and other positive interpersonal representation variables (MAH: $r = 0.32$, $p < 0.01$; HRV: $r = 0.27$, $p = 0.03$; GHR: $r = 0.24$, $p < 0.05$; and [(H)+Hd+(Hd)]/[H+(H)+Hd+(Hd)]: $r = -0.28$, $p = .02$), but not related to variables oriented toward negative interpersonal representations (MAP: $r = 0.18$, $p = 0.14$; PHR: $r = -0.07$, $p = 0.59$).

Discussion

This study was the first to examine variables of the newly developed R-PAS in sample of relatively healthy, psychiatrically stable middle-aged and older adults with schizophrenia. The EII-2 was not related to everyday functioning, social functioning or negative symptoms. Psychological complexity, measured by the R-PAS Complexity score, which quantifies the

intricacy of cognition represented in the processes involved in cognition, was positively related to both everyday and social functioning. Specifically, having both high thought disorder and low complexity was associated with lower functional and social skills capacity compared to having only high thought disorder or low complexity in isolation. Although it is surprising that there was no main effect of EII-2, Complexity by itself and in combination with EII-2 is known to be more closely related to everyday functional skills and exerts effects that suggest a unique role in the capacity for functional and social skills.

Our findings indicated that the EII-2 is positively associated with both overall and positive psychiatric symptoms and negatively related to overall cognitive functioning. There is a neurobiological basis of attention and information processing dysfunctions in schizophrenia, in that patients have problems focusing their attention on salient cues and overcoming the disrupting effects of distracting stimuli (Braff, 1993; Perry, Minassian, Cadenhead, Sprock, & Braff, 2003). The EII-2 provides an observable, behavioral sample of disturbed thinking that is a result of perceptual inaccuracy, dysfunctions in attention and dysfunctions in the flow of associations, with the end result being a lack of linear progression of speech. The EII-2 was developed as a measure of cognitive disorganization and perceptual disturbances (Perry, 2001; Perry & Braff, 1994; Perry, Moore, & Braff, 1995) and the significant relationships between greater impairment on the EII-2, worse overall cognitive functioning and more positive symptoms contribute to this literature.

Support was also found for a negative relationship between psychological complexity and negative symptoms. While negative symptoms were independently related to both everyday and social functioning, psychological complexity accounted for a significant amount of variance above and beyond general cognitive functioning and overall psychiatric symptoms in the prediction of functional and social skills capacity. The interpersonal communication of problem-solving with complex visual stimuli that is involved in producing complex Rorschach responses apparently provides a sample of how a person often needs to resolve visual material in real life, including visual problem solving of daily tasks (e.g., reading a letter from a doctor, navigating a bus route) and visual recognition of social cues. Consistent with prior theory, such results suggest that Complexity involves a tendency to use more cognitive activity, intelligence, energy, and motivation, and thus cope better with life's challenges.

In regard to interpersonal representations, the R-PAS Human Content and Mutuality of Autonomy Health (MAH) were significantly associated with the SSPA. Additionally, we found relationships between the SSPA Scenario 1 and the Rorschach Human Content, Good Human Representations (GHR), and MAH. The current findings indicate that a relationship does indeed exist between positive mental representations or schemas of social relationships and perceived self-other boundaries with the actual performance of positive, socially engaged, interpersonal behaviors among people with schizophrenia. From a theoretical perspective it makes sense that HRV, MAH and GHR would be related to the first SSPA Scenario but not Scenario 2 or the SSPA as a whole, as Scenario 2 of the SSPA is confrontational in nature and inconsistent with the implicit properties of GHR and MAH. Additionally, among people with schizophrenia who tend to have a greater proportion of negative, malevolent, and confused human representations, having at least some benevolent, organized, and healthy representations allows them to more successfully conduct positive interpersonal interactions so as to procure support from others.

There are some limitations to the current study that should be acknowledged. First, the data are cross-sectional in nature, so inferences of causality cannot be made. Further research and/or clinical trials may benefit from using longitudinal designs to measure how changes in interpersonal representations and psychological complexity predict changes in social and

functional capacity over time. Another limitation worth highlighting is the question of whether the results will generalize to younger and/or more symptomatic and disturbed patients with schizophrenia and other patients with chronic mental illness, and further research may benefit from exploring the relationships between capacity and psychological complexity with other patient populations. Historical clinical diagnoses by the participant's psychiatrists were used in this study, which is a limitation as they can be unreliable. The use of a structured clinical interview would ensure reliability and consistency of participant's diagnoses. Differences in outcomes based on diagnosis were not examined in this study due to the small proportion of participants with schizoaffective disorder. However, based on the demographics of the participants and results of previous studies diagnostic differences are unlikely (Mueser et al., 2010; Patterson, Goldman, McKibbin, Hughs, & Jeste, 2001a; Patterson et al., 2001c). A final limitation is functional ability as reported by others was not measured. The SSPA and UPSA are proxy measures for social skills and everyday functioning performance, and are not actual measures of how the participants are functioning in the real-world. Report by others such as the Subjective Level of Functioning (SLOF) scales are often used to assess functioning. The UPSA has been found to be highly predictive of SLOF ratings, as well as mediating the relationship between neuropsychological performance and functional performance (Bowie et al., 2008; Bowie et al., 2006), so we did not find it necessary to obtain a report by others in the present study.

These results support the view of the Rorschach (Meyer et al., 2011a) as a multi-dimensional performance or behavioral problem-solving test which can provide valuable information regarding a patient's intellectual capacity, cognitive motivation and problem-solving ability. Data obtained from the Rorschach can provide meaningful contributions to clinicians in helping to identify how individuals make meaning out of their external world and the world of other people (Meyer et al., 2011a; Viglione, 1999). These results also provide critical initial support for R-Optimized Administration for assessing thought disorder, psychological complexity and human representations in patients with schizophrenia. Given that this research did not use R-PAS in its final form, it provides only a limited test of this new system. Most importantly, one would want to recode these responses with R-PAS FQ and the new Complexity scores, to determine whether the results for HRV, GHR, EII-2, and Complexity would hold up, which would be expected given the results of a recent study which found critical CS and R-PAS FQ scores to be correlated at 0.75 (Su, 2012).

Our findings are encouraging as they provide novel information regarding the specific cognitive deficits underlying the functional impairments in schizophrenia, which in turn can help guide experimental neuroscience researchers in clarifying the specific brain systems associated with functioning. In addition, results can help aid clinicians in test selection, case conceptualization, and subsequent identification of individual therapeutic treatments targeted at identifying and improving a patient's primary symptoms (e.g., psychological complexity, poor interpersonal representations) to help improve everyday and social functioning in this population.

For example, if a patient has low psychological complexity and high thought disorder he/she may benefit from cognitive remediation focused on problem-solving, cognitive motivation, and visual training, as improvements in basic visual processing have been found to improve visual memory in schizophrenia (Surti, Corbera, Bell, & Wexler, 2011). Or, if a patient has poor interpersonal representations he/she may benefit from Luborsky's brief psychodynamic therapy (Luborsky, 2000) focused on challenging and correcting maladaptive patterns of communication, which in turn could lead to improvements in social functioning.

Acknowledgments

This research was supported in part by grant R01 MH084967 from the National Institute of Mental Health.

Appendix A

Complexity Composite Score Formula (Dean et al., 2007)

Each response is assigned complexity points for three sets of codes: Location/Developmental Quality (DQ), Determinants, and Contents. Each response is assigned Complexity points for the three sets of codes (Sum of Location/DQ + Determinants + Contents), and then these quantities are summed across all responses to produce the overall Complexity score. Points are assigned as follows:

Component	Point Value (Assign Max)
(1) Location/Developmental Quality	
For all locations: DQv DQv/+ or DQo	0 1
For D or Dd locations: DQ+	2
For W, WS, DS, or DDs locations: DQ+	3
(2) Determinants	
Pure F Determinant	0
Single Non-F Determinant	1
Two Determinant Blend	2
Three Determinant Blend	3
(3) Contents	
Single A, Ad, (A), or (Ad) code	0
Multiple Content codes	Total # of Contents (including all A contents)

References

- Addington D, Addington J. A depression rating scale for schizophrenics. *Schizophrenia Research*. 1990; 3:247–251. [PubMed: 2278986]
- Anthony WA, Blanch A. Supported employment for persons who are psychiatrically disabled: An historical and conceptual perspective. *Psychosocial Rehabilitation Journal*. 1987; 11(2):5–23.
- Blatt SJ, Brenneis CB, Schimek J, Glick M. Normal development and psychopathological impairment of the concept of the object on the Rorschach. *Journal of Abnormal Psychology*. 1976; 85(4):364–373. [PubMed: 956503]
- Bombel G, Mihura JL, Meyer GJ. An examination of the construct validity of the Rorschach Mutuality of Autonomy (MOA) Scale. *Journal of Personality Assessment*. 2009; 91(3):227–237. [PubMed: 19365763]
- Bowie CR, Leung WW, Reichenberg A, McClure MM, Patterson TL, Heaton RK, Harvey PD. Predicting schizophrenia patients' real-world behavior with specific neuropsychological and functional capacity measures. *Biological Psychiatry*. 2008; 63(5):505–511. [PubMed: 17662256]
- Bowie CR, Reichenberg A, Patterson TL, Heaton RK, Harvey PD. Determinants of Real-World Functional Performance in Schizophrenia Subjects: Correlations With Cognition, Functional

- Capacity, and Symptoms. *American Journal of Psychiatry*. 2006; 163(3):418–425. [PubMed: 16513862]
- Braff DL. Information Processing and Attention Dysfunctions in Schizophrenia. *Schizophrenia Bulletin*. 1993; 19(2):233–259. [PubMed: 8322034]
- Cardenas V, Mausbach BT, Barrio C, Bucardo J, Jeste D, Patterson T. The relationship between functional capacity and community responsibilities in middle-aged and older Latinos of Mexican origin with chronic psychosis. *Schizophrenia Research*. 2008; 98(1):209–216. [PubMed: 17936585]
- Cohen CI, Cohen GD, Blank K, Gaitz C, Katz IR, Leuchter A, Shamoian C. Schizophrenia and older adults: An overview: Directions for research and policy. *American Journal of Geriatric Psychiatry*. 2000; 8(1):19–28. [PubMed: 10648291]
- Dawes RM. Two methods for studying the incremental validity of a Rorschach variable. *Psychological Assessment*. 1999; 11(3):297–302.
- Dean KL, Viglione DJ, Perry W, Meyer GJ. A method to optimize the response range while maintaining Rorschach comprehensive system validity. *Journal of Personality Assessment*. 2007; 89(2):149–161. [PubMed: 17764392]
- Elvevåg B, Goldberg TE. Cognitive impairment in schizophrenia is the core of the disorder. *Critical Reviews in Neurobiology*. 2000; 14(1):1–21. [PubMed: 11253953]
- Exner. *The Rorschach: A comprehensive system, Vol. 1: Basic foundations*. 3rd ed.. John Wiley & Sons; Oxford England: 1993.
- Exner. *The Rorschach: A comprehensive system, Vol. 1: Basic foundations*. 4th ed.. John Wiley & Sons; Oxford England: 2003.
- Fett AK, Viechtbauer W, Dominguez MD, Penn DL, van Os J, Krabbendam L. The relationship between neurocognition and social cognition with functional outcomes in schizophrenia: A meta-analysis. *Neuroscience and Biobehavioral Reviews*. 2011 doi: S0149-7634(10)00114-4 [pii] 10.1016/j.neubiorev.2010.07.001.
- Fleiss, JL. *Statistical methods for rates and proportions*. 2nd ed.. John Wiley & Sons; New York, NY: 1981.
- Friedman H. Perceptual regression in schizophrenia. An hypothesis suggested by the use of the Rorschach test. *Journal of Projective Techniques*. 1953; 17:171–185. [PubMed: 13062259]
- Green MF. What are the functional consequences of neurocognitive deficits in schizophrenia? *American Journal of Psychiatry*. 1996; 153(3):321–330. [PubMed: 8610818]
- Green MF, Nuechterlein KH. Should Schizophrenia be Treated as a Neurocognitive Disorder? *Schizophrenia Bulletin*. 1999; 25(2):309–318. [PubMed: 10416733]
- Holzman PS, Shenton ME, Solovay MR. Quality of thought disorder in differential diagnosis. *Schizophrenia Bulletin*. 1986; 12(3):360–372. [PubMed: 3764357]
- Hooley, JM.; Candela, SF.; Millon, T.; Blaney, PH.; Davis, RD. *Interpersonal functioning in schizophrenia Oxford textbook of psychopathology*. Oxford University Press; New York, NY US: 1999. p. 311-338.
- Johnston, MH.; Holzman, PS. *Assessing schizophrenic thinking: A clinical and research instrument for measuring thought disorder*. Jossey-Bass; San Francisco: 1979.
- Kerns JG, Berenbaum H. Cognitive impairments associated with formal thought disorder in people with schizophrenia. *Journal of Abnormal Psychology*. 2002; 111(2):211–224. [PubMed: 12003444]
- Kleiger. *Disordered Thinking and the Rorschach*. The Analytic Press, Inc; Hillsdale: 1999.
- Kraepelin. *Dementia Praecox and Paraphrenia*. Chicago Medical Books; Chicago: 1896.
- Lerner HD, St. Peter S. The Rorschach H response and object relations. *Journal of Personality Assessment*. 1984; 48(4):345–350. [PubMed: 6481599]
- Luborsky, L. *Principles Of Psychoanalytic Psychotherapy: A Manual For Supportive-expressive Treatment*. United States; Basic Books: 2000.
- Mausbach BT, Bowie CR, Harvey PD, Twamley EW, Goldman SR, Jeste DV, Patterson TL. Usefulness of the UCSD Performance-based Skills Assessment (UPSA) for predicting residential independence in patients with chronic schizophrenia. *Journal of Psychiatric Research*. 2008; 42:320–327. [PubMed: 17303168]

- Mausbach BT, Depp CA, Bowie CR, Harvey PD, McGrath JA, Thronquist MH, Patterson TL. Sensitivity and specificity of the UCSD Performance-based Skills Assessment (UPSA-B) for identifying functional milestones in schizophrenia. *Schizophrenia Research*. 2011; 132:165–170. doi: 10.1016/j.schres.2011.07.022. [PubMed: 21843926]
- Mausbach BT, Moore R, Bowie C, Cardenas V, Patterson TL. A review of instruments for measuring functional recovery in those diagnosed with psychosis. *Schizophrenia Bulletin*. 2009; 35(2):307–318. [PubMed: 19023122]
- Meyer; Viglione, DJ.; Mihura, JL.; Erard, RE.; Erdberg, P. Introducing Key Features of the Rorschach Performance Assessment System; Symposium presented at the annual meeting of the Society for Personality Assessment; San Jose, CA. March 26; 2011a.
- Meyer GJ, Erdberg P, Shaffer TW. Toward international normative reference data for the comprehensive system. *Journal of Personality Assessment*. 2007; 89(Suppl 1):S201–216. [PubMed: 18039164]
- Meyer, GJ.; Viglione, DJ.; Mihura, JL.; Erard, RE.; Erdberg, P. Rorschach Performance Assessment System: Administration, Coding Interpretation, and Technical Manual. Rorschach Performance Assessment System, LLC; Toledo, OH: 2011b.
- Minassian, A. Information processing, thought disturbance and schizophrenia: The relationship between pupil dilation, eye movements, and Rorschach responses. 62, ProQuest Information & Learning, US; 2001. Retrieved from <http://0-search.ebscohost.com.library.alliant.edu/login.aspx?direct=true&db=psyh&AN=2001-95018-027&site=ehost-live&scope=site>
- Mueser KT, Pratt SI, Bartels SJ, Forester B, Wolfe R, Cather C. Neurocognition and social skill in older persons with schizophrenia and major mood disorders: An analysis of gender and diagnosis effects. *Journal of Neurolinguistics*. 2010; 23(3):297–317. [PubMed: 21113403]
- Nuechterlein KH, Edell WS, Norris M, Dawson ME. Attentional vulnerability indicators, thought disorder, and negative symptoms. *Schizophrenia Bulletin*. 1986; 12(3):408–426. [PubMed: 3764359]
- Palmer BW, Heaton SC, Jeste DV. Older patients with schizophrenia: Challenges in the coming decades. *Psychiatric Services*. 1999; 50(9):1178–1183. [PubMed: 10478904]
- Patterson TL, Goldman S, McKibbin CL, Hughs T, Jeste DV. UCSD performance-based skills assessment: Development of a new measure of everyday functioning for severely mentally ill adults. *Schizophrenia Bulletin*. 2001a; 27(2):235–245. [PubMed: 11354591]
- Patterson TL, Goldman S, McKibbin CL, Hughs T, Jeste DV. USCD performance-based skills assessment: Development of a new measure of everyday functioning for severely mentally ill adults. *Schizophrenia Bulletin*. 2001b; 27(2):235–245. [PubMed: 11354591]
- Patterson TL, Moscona S, McKibbin CL, Davidson K, Jeste DV. Social skills performance assessment among older patients with schizophrenia. *Schizophrenia Research*. 2001c; 48(2):351–360. [PubMed: 11295387]
- Perry W. Incremental validity of the Ego Impairment Index: A re-examination of Dawes (1999). *Psychological Assessment*. 2001; 13(3):403–407. [PubMed: 11556278]
- Perry W, Braff DL. Information-processing deficits and thought disorder in schizophrenia. *American Journal of Psychiatry*. 1994; 151(3):363–367. [PubMed: 8109644]
- Perry W, Minassian A, Cadenhead K, Sprock J, Braff D. The use of the Ego Impairment Index across the schizophrenia spectrum. *Journal of Personality Assessment*. 2003; 80(1):50–57. [PubMed: 12584067]
- Perry W, Moore D, Braff D. Gender differences on thought disturbance measures among schizophrenic patients. *American Journal of Psychiatry*. 1995; 152(9):1298–1301. [PubMed: 7653684]
- Perry W, Viglione D, Braff D. The Ego Impairment Index and schizophrenia: A validation study. *Journal of Personality Assessment*. 1992; 59(1):165–175. [PubMed: 1512674]
- Perry W, Viglione DJ. The Ego Impairment Index as a predictor of outcome in melancholic depressed patients treated with tricyclic antidepressants. *Journal of Personality Assessment*. 1991; 56(3):487–501. [PubMed: 1865307]

- Pratt SI, Kelly SM, Mueser KT, Patterson TL, Goldman S, Bishop-Horton S. Reliability and validity of a performance-based measure of skills for communicating with doctors for older people with serious mental illness. *Journal of Mental Health*. 2007; 16(5):569–579.
- Randolf, C. Repeatable Battery for the Assessment of Neuropsychological Status. Psychological Corp; San Antonio: 1998.
- Reichenberg A. The assessment of neuropsychological functioning in schizophrenia. *Dialogues of Clinical Neuroscience*. 2010; 12(3):383–392.
- Saha S, Chant D, Welham J, McGrath J. A Systematic Review of the Prevalence of Schizophrenia. *PLoS Medicine*. 2005; 2(5):e141. [PubMed: 15916472]
- Shrout PE, Fleiss JL. Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin*. 1979; 86:420–428. [PubMed: 18839484]
- Sitzer DI, Twamley EW, Patterson TL, Jeste DV. Multivariate predictors of social skills performance in middle-aged and older out-patients with schizophrenia spectrum disorders. *Psychological Medicine*. 2008; 38(5):755–763. [PubMed: 17803830]
- Slade E, Salkever D. Symptom effects on employment in a structural model of mental illness and treatment: Analysis of patients with schizophrenia. *The Journal of Mental Health Policy and Economics*. 2001; 4(1):25–34. [PubMed: 11967463]
- Stricker G, Gold J. The Rorschach: Toward a nomothetically based, idiographically applicable configurational model. *Psychological Assessment*. 1999; 11(3):240–250.
- Su, WS. Cultural and linguistic adaptability of the Rorschach Performance Assessment System as a measure of schizophrenia spectrum symptomatology and severity of mental disturbance. Alliant International University, ProQuest Dissertations and Theses Database; 2012.
- Surti T, Corbera S, Bell M, Wexler B. Successful computer-based visual training specifically predicts visual memory enhancement over verbal memory improvement in schizophrenia. *Schizophrenia Research*. 2011; 132(2-3):131–134. [PubMed: 21795025]
- Tabachnick, BG.; Fidel, LS. Using Multivariate Statistics. 4th ed.. Allyn & Bacon; Needham Heights, MA: 2001.
- Urist J. The Rorschach Test and the assessment of object relations. *Journal of Personality Assessment*. 1977; 41(1):3–9. [PubMed: 845776]
- Viglione, Perry W, Jansak D, Meyer G, Exner JE Jr. Modifying the Rorschach human experience variable to create the human representational variable. *Journal of Personality Assessment*. 2003a; 81(1):64–73. [PubMed: 12842803]
- Viglione D. A review of recent research addressing the utility of the Rorschach. *Psychological Assessment*. 1999; 11(3):251–265.
- Viglione, D.; Meyer, GJ.; Gacono, CB.; Evans, FB. An overview of Rorschach psychometrics for forensic practice *The handbook of forensic Rorschach assessment*. Routledge/Taylor & Francis Group; New York, NY US: 2008. p. 21-53.
- Viglione D, Perry W, Jansak D, Meyer G, Exner JE Jr. Modifying the Rorschach human experience variable to create the human representational variable. *Journal of Personality Assessment*. 2003b; 81(1):64–73. [PubMed: 12842803]
- Viglione D, Perry W, Meyer G. Refinements in the Rorschach Ego Impairment Index incorporating the Human Representational variable. *Journal of Personality Assessment*. 2003c; 81(2):149–156. [PubMed: 12946921]
- Viglione DJ, Perry W, Giromini L, Meyer GJ. Revising the Ego Impairment Index to accommodate recent recommendations about improving Rorschach validity. *International Journal of Testing*. 2011; 11:349–364.
- Watkins JG, Stauffacher JC. An index of pathological thinking in the Rorschach. *Journal of Projective Techniques*. 1952; 16:276–286. [PubMed: 14946752]
- Werner, H. Comparative Psychology of Mental Development. Follett; New York: 1948.
- World Health Organization. The global burden of disease: 2004 update. 2008. Retrieved March 25, 2009, from <http://www.who.int/evidence/bod>

Wu EQ, Birnbaum HG, Shi L, Ball DE, Kessler RC, Moulis M, Aggarwal J. The Economic Burden of Schizophrenia in the United States in 2002. [138]. *Journal of Clinical Psychiatry*. 2005; 66(9): 1122–1129. [PubMed: 16187769]

Table 1
Demographic and Clinical Characteristics

	N=72		
	Mean (SD)		
Demographics			
Age (Years)	51.2(6.5)		
Gender (% Female)	48.6%		
Race (% Caucasian)	43.1%		
Diagnosis (%)			
Schizophrenia	84.7%		
Schizoaffective	15.3%		
Age of Diagnosis Onset (Years)	25.6(11.4)		
Education (Years)	12.4(2.5)		
Current Living Situation (% Board and Care or Other Supervised Living)	62.6%		
Clinical Characteristics: Functioning and Symptoms	Mean (SD)	Clinical Characteristics: Rorschach Variables	Mean (SD)
UPSA Total Score	67.7(16.1)	EII-2	1.0 (1.9)
SSPA Total Score	3.7(0.6)	Complexity	65.6(20.6)
RBANS Total Score	64.4(13.0)	HRV	-0.6(4.2)
PANSS Total Score ^a	60.4(15.7)	Human Content	0.6(0.3)
PANSS Positive ^a	13.9(5.6)	MAP/MAHP ^b	0.4(0.4)
PANSS Negative ^a	15.1(4.7)		
CDSS	4.5(4.6)		

note For the EII-2, MAP/MAPH, PANSS, and CDSS, higher scores are indicative of greater impairment or symptoms. For all other scales, higher scores are indicative of better performance. UPSA = UCSD Performance-Based Skills Assessment; SSPA = Social Skills Performance Assessment; RBANS = Repeatable Battery for the Assessment of Neuropsychological Status; PANSS = Positive and Negative Syndrome Scale; CDSS = Calgary Depression Scale for Schizophrenia; EII-2 = Ego Impairment Index-2; HRV = Human Representational Variable; MAP/MAHP = Mutuality of Autonomy Total Score;

^a n=58

^b n=56

* p <.05;

** p <.01;

Table 2
Bivariate Correlations with R-PAS Variables, UPSA, SSPA, RBANS, PANSS and CDSS Total Scores (N=72)

	1	2	3	4	5	6	7	8	9	10	11
1. EII-2	--										
2. Overall Complexity	.43**	--									
3. HRV	.74**	-.08	--								
4. Human Content	.19	.05	.41**	--							
5. MAP/MAHP ^a	.53**	.33*	-.29*	.26	--						
6. UPSA Total	-.10	.30**	.22	-.09	.08	--					
7. SSPA Total	-.00	.34**	.16	-.18	.07	.49**	--				
8. PANSS Total ^b	.31*	-.02	-.23	.17	.25	-.29*	-.27*	--			
9. PANSS Positive	.32*	.08	-.25	.24	.34*	-.09	-.21	.80**	--		
10. PANSS Negative	.01	-.31*	-.09	.20	.00	-.40*	-.30*	.62**	.26	--	
11. RBANS Total	-.33*	.13	.35**	-.09	.05	.65**	.33**	-.14	-.10	.16	--
12. CDSS Total	.03	-.02	.03	.05	.18	.04	.04	.23	.05	.10	.04

Note. For the EII-2, MAP/MAHP, PANSS, and CDSS, higher scores are indicative of greater impairment or symptoms. For all other scales, higher scores are indicative of better performance. R-PAS = Rorschach Performance Assessment System; UPSA = UCSD Performance-Based Skills Assessment; SSPA = Social Skills Performance Assessment; PANSS = Positive and Negative Syndrome Scale; RBANS = Repeatable Battery for the Assessment of Neuropsychological Status; CDSS = Calgary Depression Scale for Schizophrenia; EII-2 = Ego Impairment Index-2; HRV = Human Representational Variable; MAP/MAHP = Mutuality of Autonomy Total Score;

^a n = 56.

^b n = 58.

* p < .05;

** p < .01;

Table 3
Bivariate Correlations with R-PAS Subcomponent Variables, UPSA, SSPA, RBANS, PANSS and CDSS Total Scores

	UPSA Total	SSPA Total	PANSS Positive ^a	PANSS Negative ^a	PANSS Total ^a	RBANS	CDSS
FQ-	-.13	-.10	-.11	-.05	-.03	-.13	-.10
WSUM6	.05	.12	.17	-.15	.13	-.21	.14
CC	.20	.25*	.19	-.11	.11	.06	.20
M-	-.17	.06	.15	.12	.18	-.13	.00
HRV	.22	.16	-.25	.09	-.23	.35**	.03
PHR	-.10	-.08	.27*	.08	.21	-.19	-.05
GHR	.15	.09	-.12	-.09	-.18	.28*	-.03
DQ Comp	.19	.23*	-.04	-.29*	-.08	.10	-.10
Det Comp	.40**	.36**	.08	-.35**	-.04	.15	-.00
Cont Comp	.23	.29*	.17	-.19	.06	.10	.05
MAH	.14	.26*	-.10	-.06	-.05	.03	-.04
MAP	.07	.22	.27*	-.07	.20	-.02	.15

Note. For FQ-, WSUM6, CC, M-, PHR, MAP, PANSS, and CDSS, higher scores are indicative of greater impairment or symptoms. For all other scales, higher scores are indicative of better performance. UPSA = UCSD Performance-Based Skills Assessment; SSPA = Social Skills Performance Assessment; FQ- = Form Quality Minus; WSUM6 = Sum of Cognitive Special Scores; CC = Critical Content; M- = Human Movement Minus; HRV = Human Representational Variable; PHR = Poor Human Representations; GHR = Good Human Representations; DQ Comp = Developmental Quality Complexity; Det Comp = Determinant Complexity; Cont Comp = Content Complexity; MAH = Mutuality of Autonomy Health; MAP = Mutuality of Autonomy Pathology; RBANS = Repeatable Battery for the Assessment of Neuropsychological Status; PANSS = Positive and Negative Syndrome Scale; CDSS = Calgary Depression Scale for Schizophrenia.

^a
 $n = 58$.

*
 $p < .05$;

**
 $p < .01$.