The Role of Cognitive-Developmental Tests in Differential Diagnosis of Borderline and Schizophrenic Patients

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The aim of our research was to find out whether cognitive-developmental tests such as Nominal Realism Test and Vygotsky Concept Formation Test could contribute to the process of diagnosing borderline and schizophrenic patients. The specific aim of this study was to assess the diagnostic power of subtests (such as Vocabulary, Comprehension, Similarities and Picture Arrangement Test) on Wechsler Adult Intelligence Scale (VITI) in the differential diagnosis of the two groups of patients. The study included 90 subjects, 30 of whom were diagnosed with borderline personality disorder (BPD), 30 had the diagnosis of schizophrenic psychosis (SCH), while 30, who had no psychiatric diagnosis, represented the control group. The findings indicate that the patients with BPD, and particularly those diagnosed with SCH, had both quantitative and qualitative cognitive impairment.The findings show that cognitive-developmental tests represent valuable tools in the differential diagnosis of borderline personality disorder and schizophrenia.

Keywords: schizophrenic psychosis, borderline personality disorder, cognitive– developmental tests, VITI, differential diagnosis

The capacity for symbolic representation, the capacity for acquiring signs and a system of signs, largely depends on the level of personality organization. A continuously viable boundary between the subject and the object is a pre-condition which must be fulfilled in order to establish a differentiation between the signifier and the signified. A breakdown of this boundary leads to the collapse of linguistic structures. Analysis of written texts and oral discourse of schizophrenic patients indicates that their linguistic forms could be destroyed: there is no differentiation between the signifier and the signified; words are perceived as concrete things, they lose their conventional meaning and are used idiosyncratically; due to the breakdown of syntactical principles**,** verbal expressions of these patients could become dissociated, chaotic and incomprehensible (Werner & Kaplan 1963).

Previous studies demonstrated that the vocabulary of schizophrenic patients was poor (Chen, Chen, Chan, Lam, & Lieh-Mak, 2000; Morice & Ingram,

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1982; Morice, 1990; Morice & McNicol, 1985, 1986), that their discourse was incoherent (Rochester, Martin, & Thurston, 1977; Rochester, 1978) and that their ability to maintain causal relations and their verbal production were decreased (DeLisi, 2001). Concreteness of their thinking was also manifested through their inability to understand irony and metaphor (Mo, Su, Chan, & Liu, 2008).

According to Torres, Olivares, Rodriguez, Vaamonde, and Berrios (2007) only 6% of schizophrenic subjects function on the level of formal operations, while 70% function on the level of concrete operations. The corresponding figures for the control sample were 25% and 15%, respectively. These differences were statistically significant. The samples were specifically differentiable at permutation, probabilities, and pendulum tests on the Longeot Logical Thought Evaluation Scale.

As far as the problem of concreteness is concerned, Vygotsky's research of this topic, although it was done decades ago, is still relevant and potentially useful in modern clinical psychology (Vygotsky, 1934). By using his Concept Formation Test, Vygotsky put his patients into a situation which compelled them to form new, artificial concepts. The test material included three-dimensional objects, (different in size, shape and colour), marked with meaningless words. Their task was to find the criteria for grouping these objects. The results showed that schizophrenic patients were not able to single out one common characteristic of these objects and then put them into different groups accordingly. In other words, they were not able to form a concept. Instead, they formed complexes – collections of objects that relate to each other in a concrete, factual way. Due to a great number of these concrete relations, different objects could be included into complexes based on many different qualities. A typical complex of this kind is called the chain complex, in which one element is added to another one according to its similarity in colour, while the third one is added based on its similarity in shape with the second one, etc. (Vygotsky, 1934).

Kasanin and Hanfman (1938) repeated Vygotsky's research in order to check his conclusions. They used Vygotsky Concept Formation Test to assess 50 schizophrenic patients and compare their performance to the performance of a group of normal subjects of the same age and educational level. The achievement of the schizophrenic group was markedly inferior in comparison with the group of normal subjects of the same age and education.

Deficit of conceptual (categorial) thinking found in Vygotsky's research, was also identified in schizophrenic patients who did the Wisconsin Card Sorting Test, (Josman & Katz, 2006; Morice, 1990; Noguchi, Hori, & Kunugi, 2008; Owashi, Iwanami, Nakagome, Higuchi, & Kamijima, 2009).

One of the important findings of Vygotsky's research (1934) was that cognitive deficit in schizophrenic patients could be identified even before the first symptoms of their illness occur. In some of the patients who developed schizophrenia later in their life, disturbances in thinking could not have

been detected otherwise, but in a test situation. Contemporary researches on schizophrenic children produced similar results. The children who were tested by WISC before the onset of the illness showed more dysfunction in speech and thinking in comparison with the healthy control group. The results demonstrated that the subjects from the experimental group had significantly lower scores on Comprehension and Similarities. (Torres et al., 2007; Nicolson et al., 2000).

According to clinical and theoretical studies, destruction of linguistic forms is not found in patients with borderline personality disorder (Kernberg, 1975). Generally speaking, these patients had syntactically better organized discourse than schizophrenic patients. However, their inability of semiotisization of their internal states lead to a certain intrusion of pre-linguistic and paralinguistic elements in their speech (Kristeva, 1980). It is the absence of symbolization of internal states that leads to impulsive, destructive and auto-destructive behaviour, highly characteristic of these patients. According to Fonagy et al. affect symbolization is the basic precondition for affect control (Fonagy, Gergely, Jurist, & Target, 2002). Primitive defense mechanisms which belong to the psychotic parts of the personality, splitting and projective identification, lead to a cognitive deficit and a dichotomized, black and white perception of the world in patients with borderline personality disorder (Veen & Arntz, 2000).

There is a lack of research addressing cognitive functioning of patients with borderline personality organization. The existing literature does not provide uniform conclusions. For instance, one study suggests that the IQ of patients with borderline personality organization is significantly lower compared to the control group (average IQ 79.60) (Mandes & Kellin, 1993), while another one found this difference to be rather small (average verbal IQ 97.60, non-verbal 93.55) (Piedmont, Sokolove, & Fleming, 1989). Others showed no statistically significant differences in IQ scores of borderline patients in comparison to normal subjects (Rossini, Schwartz, & Braun, 1998; Jamilian, 2009; Harris, 1993; Skelton, Boik, & Madero, 1995).

Haaland, Esperaas, & Landro (2009) tested BPD patients by using an extensive neuropsychological batter. Borderline patients were found to have reduced executive functioning compared to healthy controls. With regard to the other neuropsychological domains (working memory, attention, long-term verbal memory, and long-term non-verbal memory) no differences were found between the two groups.

The aim of this study *w*as to explore the diagnostic power of two cognitive – developmental tests (Nominal Realism Test and Vygotsky Concept Formation Test) and four subtests from Wechsler Adult Intelligence Scale in the differential diagnosis of borderline personality disorder and schizophrenic psychosis. Our second goal was to *find out* if there is any incremental diagnostic value of developmental cognitive test in comparison with VITI subtests..

Method

Sample. The sample consisted of 3 groups of subjects: a) 30 subjects without diagnosis, b) 30 subjects diagnosed with SCH, and c) 30 patients diagnosed with BPD.

The schizophrenic group included 14 subjects who suffered from paranoid schizophrenia, 1 subject who suffered from hebephrenic schizophrenia, and 15 subjects who suffered from schizophrenia simplex.

A team of psychiatrists reached a consensus on the diagnosis of each and every patient who was selected for the sample. All these patients were assessed and followed for a minimum period of 3 years prior to the beginning of our study. ICD 10 classification criteria were used to make the diagnosis. The patients with co-morbidity were excluded from either study group.

All the patients who took the battery of tests specially chosen for this research were hospitalized at "Dr Laza Lazarevic", Psychiatric Hospital in Padinska Skela, and Psychiatric Hospital of the Clinical Centre of Serbia, Belgrade.

Average age of the patients from Control group was 30.70, from Borderline group 35.06 and from Schizophrenic group 36.8. The total average age of subjects was 34.19 with standard deviation 8.383 years.

All subjects had completed secondary education, i.e. 12 years of formal education, since it was the minimum requirement for participation in the study.

Instruments. The following subtests from Wechsler Adult Intelligence Scale (VITI) were used in our study:

Vocabulary. Kaufman and Lichtenberger (2002) suggest that scores at Vocabulary subtest are closely related to capacity for symbolic representation. Unique abilities measured by this subtest are language development and word knowledge.

Picture Arrangement. The subtest belongs to the group of non-verbal subtests. It was included in the battery based on its requirements. Every subject, in order to succeed at this subtest, has to understand the sequence of events and establish a sequential, temporal order, the same way it is done in spoken language (Kaufman & Lichtenberger, 2002).

Similarities. According to Kaufman and Lichtenberger (2002), this test measured unique abilities or traits such as logical, abstract / categorial thinking. Therefore, this subtest was included in the battery.

Comprehension. Unique abilities or traits measured by Comprehension test are a demonstration of practical information, evaluation and the use of past experiences, generalization (proverbs items), knowledge about conventional standards of behavior, social maturity and judgment. Successful performance at this subtest depends on a person's capacity for symbolic representation. High scores on Comprehension (as well as on Vocabulary and Similarities tests) require capacity for verbal expression, verbal conceptualization and verbal reasoning (Kaufman & Lichtenberger, 2002).

The answers were scored according to the criteria established by Wechsler Individual Achievement Test (Berger, Marković, & Mitić, 1995)

Nominal Realism Test (Piaget, 1929). This test was not initially designed to be done in a clinical setting; quite the contrary, it was designed to test children's nominal realism. It was included in the battery since the achievement at this test depends on a subject's ability to differentiate a signifier from the signified.

Nominal Realism Test consists of 4 questions:
  – How do you know that the Sun is called the Sun?
  – Who gave the name to the Sun?

    – Can we change the name of the Sun? Can we call it a flower, for example?

    – Can we give the name 'cat' to a dog and 'dog' to a cat?

Responses of a schizophrenic patient (23 years of age)

    How do you know that the Sun is called the Sun?

    – I learned it at school, when I was a child.

    Who gave the name to the Sun?

    – An explorer of the Sun and other planets, those who studied them in ancient times, I don't know when...

    Can we change the name of the Sun? Can we call it a flower, for example?

    – No, we cannot. Because the Sun is the source of light, and its name is like the light. A flower does not mean light, but something else.

    Can we give the name cat to a dog and dog to a cat?

    – We cannot, because they are two completely different animals.

The total score of each participant was measured and calculated according to the following criteria:

    – *First question – How do you know that the Sun is called the Sun?*

    1 point **–** for every answer which implies that the subject learned the name from their parents or caretakers in early childhood.

    0 points – for every answer that implies that the subject learned the name at school, from textbooks ("Teacher said"," It was said in a book").

    – *Second question – Who gave the name to the Sun?*

    2 points – for all answers which imply that the name was given after making an agreement among people.

    1 point – for all answers that imply existence of an agreement. However, this agreement is confined only to people of similar ethnic origin (Serbs, Slavs, South Slavs)

    0 points – for all answers which ascribe name creation to God and geniuses (Einstein, Aristotle, Newton)

    – *Third question – Can we change the name of the Sun?* Can we call it a flower, for example**?**

    2 points – Answer: "It is possible", pointing out the arbitrary nature of linguistic signs. Nevertheless, they could not be changed at random ("It is possible, it is only a name... but, everybody would have to agree on it, otherwise it would create a chaos").

    1point – Answer; **"**It is not possible", and mentioning the chaos it would create as the only reason.

    0 points – Answer: "It is not possible", with an explanation suggesting nominal realism, such as:" It is not possible; the Sun and a flower are far too different. The Sun is the Sun, and a flower is a flower. The Sun shines, while a flower smells nice".

    – *Forth question – Can we give the name cat to a dog and dog to a cat?*

    2 points – Answer: "It is possible, but everybody has to agree with it", i.e. an explanation that suggested understanding of the arbitrary nature of a linguistic sign, but with an awareness that it could not be changed at random.

    1 point – Answer: "It is not possible", with an explanation that it would produce a chaos in communication.

    0 points – Answer: "It is not possible", if the answer suggests presence of nominal realism. "No, that would be too sick, wouldn't'? A dog, which is called a cat, is a sick dog. This is a sick combination. A dog-cat animal does not exist."

Picture 1. *Vygotsky Concept Formation Test*

The final score for each subject was marked and calculated according to the following criteria:

A) Concepts were given 2 points
B) Complexes 1 point, and
C) Sincrets (disorderly, disorganized groups without any structure in which it is difficult to perceive the criteria used to classify the objects) were scored by 0 points.

Results

Some of the raw data we collected were variable, and as such they failed to meet ANOVA conditions. Therefore, the first step in this statistical analysis was the normalization of raw scores. Standardization and normalization were achieved by using the z scores corresponding to the estimated cumulative proportion of the normal distribution for each row score according to Bloom Proportion Estimation Formula.

In order to include Vygotsky Concept Formation Test in ANOVA, its scores were transformed into a dummy variable i.e. presence/absence of concept (Table 1). The answers classified as Complexes and Sincrets were referred to as the absence of concept.

The results of one-way ANOVA are shown in Table 1.

The results of Bonferroni post-hoc test showed that all individual differences between the groups were significant at the alpha level of .01. All correlations coefficients (eta) were in the medium to high range of values. Comprehension Subtest showed the highest discriminative power, followed by Vygotsky Concept Formation Test as the second-best discriminative.

Table 1. *Means (M), Standard Deviations (SD), Minimum (Min),*
Maximum (Max) of Control, Borderline and SCH groups
and difference between groups (F-test and ETA)

	1.00 Control				2.00 Borderline				3.00 SCH				eta	F (2.87)
	M	SD	Min.	Max.	M	SD	Min.	Max.	M	SD	Min.	Max.		
Vocabulary	12.3	2.322	9	17	9.32	2.341	6	13	8.5	1.74	6	13	0.59	20.851**
Picture Arrangement Test	12.53	3.298	8	19	9.71	3.054	5	16	7.1	0.62	5	8	0.75	34.165**
Comprehension	13.3	1.607	9	18	9.84	2.642	6	16	6.9	1.02	5	9	0.82	56.367**
Similarities	12.83	1.702	10	16	10.3	2.933	3	17	8.2	2.46	4	13	0.62	25.504**
Nominal Realism	4.43	2.013	0	7	1.74	1.611	0	5	0.33	0.343	0	5	0.63	26.086**
Vygotsky CF Test, formed concept	.897	.3099	0	1	.484	.508	0	1	.033	.183	0	1	0.70	41.987**

**– p<.001

Discriminative power of the Vygotsky Concept Formation Test was even higher. Based on Vygotsky Concept Formation Test, the subjects were classified into three categories, depending on their ability to form concepts, complexes or sincrets. The results in Table 2 show discrimination based on these three categories.

Table 2. *Frequencies of different levels of concept formation at Vygotsky Concept Formation Test*

	Control	BPD	SCH	Total
Sincret	0	0	9	9
Complex	3	15	20	38
Concept	27	15	1	43
T O T A L	30	30	30	90

X2(4)=51,929 Cramer's V=.760 P<,001

Table 2 shows the achievements of the subjects at Vygotsky Concept Formation Test. The results clearly indicate statistically significant differences between the groups: normal subjects form concepts, half of borderline patients were not able to form concepts (they formed complexes),while schizophrenic patients predominantly formed complexes, about a third of them formed sincrets, while only one subject was able to form a concept. This finding pointed to the conclusion that the formation of sincrets could be considered as a reliable, convincing sign of SCH in the population of adult patients.

Multinomial logistic regression was used to compare differential diagnostic power of the VITI subtests with the diagnostic power of the two cognitive-development tests. Since the inter-correlations between the predictors partially influenced the value of some of the predictors, the correlations between the predictors were calculated first.

Table 3. *The correlations between the variables*

	Vocabulary.	Picture Arrangement Test	Compre.	Similar.	Nominal Realism	Vygotsky–Formed Concept
Vocabulary	1					
Picture Arrangement Test	.590	1				
Comprention.	.721	.612	1	.		
Similarities	.682	.596	.688	1		
Nominal Realism Test	.573	.457	.591	.572	1	
Vygotsky Concept Formation Test – Formed Concept	.602	.583	.618	.612	.543	1

Table 3 demonstrates high and statistically significant correlations between the subtests at the level p<0.001. If an accurate interpretation of the results of multinomial regression is made, it is advisable to take into consideration the fact

that the groups were relatively homogenous, but different one from other. These correlations should not be used to make an estimation of the correlations among normal population.

In order to examine the total predictive power of the VITI subtests used in this study, multinomial logistic regression was applied. By including the predictor variables and maximizing the log likelihood of the outcomes, this model's predictive power was improved in comparison with "Constant Only" model. ($\chi^2_{(8s)}$=89.645 p <.001). The total predictive power was assessed by the Nagelkerke's pseudo R^2 is .706. Therefore, it was possible to successfully classify 70% of the cases by using this model (Table 4). Absence of misclassified cases among the SCH patients and the control group, proved this model to be highly appropriate for the purpose of this study.

Table 4. *Number of correctly classified subjects by VITI subtests*

	Predicted category			
Category	Control	BPD	SCH	Correctly classified
Control	25	5	0	83,3%
BPD	9	14	7	46,7%
SCH	0	6	24	80,0%
Overall percent.	37,8%	27,8%	34,4%	70,0%
Nagelkerke pseudo R2=.706.				
Cox and Snell pseudo R2=.631				

Estimated multinomial logistic regression coefficients (B), odds ratios and 95% confidence interval of odds ratios' boundaries are shown in Table 5. The variables were standardised, so the meaning of B is the same as Beta in the ordinary linear regression where log-odds ratio is the prediction criterion in the diagnosis.

Table 5. *Predictive power of VITI subtests*

	Category[a]	B	Exp. (B) Odds ratio	95% Confidence Interval for Exp. (B)	
				Lower Bound	Upper Bound
	Intercept	.597			
	Vocabulary	-.566	.568	.174	1.854
BPD	Picture Arrangement Test	-.785	.456	.168	1.242
	Comprehension	*-1.436	.238	.060	.935
	Similarities	-.032	.968	.383	2.449
	Intercept	-1.294			
	Vocabulary	.838	2.311	.447	11.955
SCH	Picture Arrangement Test	**-1.835	.160	.039	.648
	Comprehension	**-4.058	.017	.002	.142
	Similarities	-.462	.630	.158	2.510

a. The reference category is: Control *– p <.05 **– p <.01

Table 5 shows that the most important predictor among VITI tests was Comprehension subtest. Other predictors/variables in the model were held

constant. Therefore, every one standard deviation increase in the Comprehension score decreased the odds ratio by more than four times for a person to be diagnosed with BPD, and by approximately 59 times in the case of schizophrenic patients. Second important predictor was Picture Arrangement Test. Every standard deviation increase in this score reduced the chances of diagnosis of schizophrenic psychoses by approximately 7 times.

Identical procedures were repeated for Vygotsky Concept Formation Test and Nominal Realism Tests. The results show that Vygotsky Concept Formation Test model and Nominal Realism test model differ significantly from "Constant only" model ($\chi^2_{(8)}$=69.661 p <.001). Total discriminative power of the model based on Nagelkerk's pseudo R square is 0.611. Correct classification of 68.5% of the cases/subjects was possible to achieve through the use of these variables. None of the subjects diagnosed as schizophrenics were classified as normal. However, 3 subjects from the "normal" group were classified as schizophrenic. Only 26.7% of the subjects with BPD were properly classified. Half of them were classified as schizophrenic patients (see Table 6).

Table 6. *Number of correctly classified subjects by cognitive-developmental tests*

	Predicted category			
Category	Control	BPD	SCH	Correctly classified
Control	24	2	3	82,8%
BPD	7	8	15	26,7%
SCH	0	1	29	96,7%
Overall Percentage	34,8%	12,4%	52,8%	68,5%
Nagelkerke pseudo R²=.611				
Cox and Snell pseudo R²=.543				

Our next step was to assess Vygotsky Concept Formation Test and Nominal Realism Test as diagnostic predictors. The results are given in table 7.

Table 7. *Predictive power of cognitive-developmental tests*

	Category[a]	B	Exp. (B)	95% Confidence Interval for Exp. (B)	
				Lower Bound	Upper Bound
BPD	Intercept	1.030			
	Nominal Realism	-1.024	.359	.072	1.788
	Vygotsky Concept Formation Test	**-1.688	.185	.069	.496
SCH	Intercept	1.953			
	Nominal Realism	**-4.645	.010	.001	.105
	Vygotsky Concept Formation Test	*-1.297	.273	.088	.852

a. The reference category is: Control *– p <.05 **– p <.01

Vygotsky Concept Formation Test was able to successfully differentiate between the control group and the group of BPD patients. A one standard deviation increase reduced odds ratio of the diagnosis of borderline personality disorder by more than 5 times, provided all other predictors in the model were held constant. Diagnostic validity of both tests in the diagnosis of SCH was satisfactory. If a person cannot form a concept, their chances of being diagnosed as SCH increase by 100 times. A one standard deviation increase at the Nominal Realism test reduced the chances of being diagnosed with SCH by approximately 4 times.

Binary logistic regression was employed to compare the diagnostic efficiency of the two approaches in differentiating patients with SCH and BPD, The results show that the predictive model which includes VITI subtests (Table 9.) significantly differs from the "Intercept Only" model ($X^2_{(4)}$= 29,015<.001). Estimated total discriminative power of the model is .511 (Nagelkerke pseudo R^2). This model provided a successful classification of 76.7% of the cases, (with 7 patients from each group being misclassified),

Table 8. *Number of correctly classified subjects by VITI subtest*

	Predicted group classification		
GROUP	BPD	SCH	Classified correctly
BPD	23	7	76,7
SCH	7	23	76,7
Pseudo R 2=.511			

Table 9 shows that Comprehension subtest has the highest discriminative power, followed by Picture Arrangement Test.

Table 9. *Predictive power of VITI subtests*
for the differentiation of BPD and SCH patients

	B	Exp(B)	95% C.I. for EXP(B)	
			Lower	Upper
Vocabulary	1.207	3.343	.986	11.335
Picture Arrangement Test	-1.097*	.334	.116	.964
Comprehension	-2.557**	.078	.014	.420
Similarities	-.252	.778	.269	2.248
Constant	-2.001*	.135		

a. The reference category is: Borderline personality disorder *– p <.05 **– p <.01

The same analysis was applied on Vygotsky Concept Formation Test and Nominal Realism Test.

Similarly to the previous analysis the predictive model, which included the above mentioned tests, turned to be significantly different from "Constant only"

model ($X^2_{(2)}$= 19,329 p<.001). Estimation of a total discriminative power of this model is .367 (Nagelkerke). This model provided a successful classification of approximately 73.3% of the cases. Incorrect classification of schizophrenic patients occurred only in one case, while 50% of the patients with BPD were incorrectly classified.

Table 10. *Number of correctly classified subjects by development tests*

	BPD	SCH	Total
BPD	15	15	50,0
SCH	1	29	96,7
Overall Percentage			73,3
Pseudo R 2=.367			

An additional analysis showed that the patients with BPD, who were unable to form concepts, were classified according to this model as a group of schizophrenic patients. If a person is capable of forming concepts, they have about 30 times fewer chances of being diagnosed as schizophrenic than borderline patients.

Table 11. *Predictive power of developmental tests*

	B	Exp. (B)	95% C.I. for Exp. (B)	
			Lower	Upper
Nominal Realism	.408	1.504	.629	3.594
Vygotsky Concept Formation Tests, concept formed	-3.438**	.032	.004	.257
Constant	3.991	54.130		

The results strongly indicate that the applied tests, which were based on two different theoretical concepts, have significant predictive power in the differential diagnosis of schizophrenic and borderline patients. In order to investigate whether the tests designed by developmental psychologists could have an incremental contribution in the diagnostics in comparison to VITI subtests, binary hierarchical logistic regression was performed.

VITI subtests were used as predictors in the first step. Vygotsky Concept Formation Test and Nominal Realism Test were added in the second step. The results of the first step were identical with the results shown in Tables 8 and 9. The results of the second step showed that Nagelkerke pseudo R square increased from .51 to .70, and classification success from 77% to 88%. As it could be seen in Table 12, only 7 cases were misclassified.

Table 12. *Number of correctly classified subjects based on the results of all tests*

	BPD	SCH	Total
BPD	28	3	90.3
SCH	4	26	86.7
Overall Percentage			88.5

Table 13. *The predictive power of the tests*

	B	S.E.	Sig.	Exp(B)	95% C.I.for EXP(B)	
					Lower	Upper
Vocabulary	1.377	.770	.073	3.965	.877	17.918
-Picture Arrangement Test	-.816	.588	.165	.442	.140	1.400
Comprehension	-4.177	1.342	.002	.015	.001	.213
Similarities	.198	.730	.786	1.219	.292	5.096
Nominal realism	1.398	.784	.075	4.047	.870	18.815
Vygotsky Concept Formation Test, concept formed	-4.336	1.474	.003	.013	.001	.235
Constant	-1.034	.824	.209	.356		

It is evident from Table 13 that Comprehension subtest and Vygotsky Concept Formation Test are significant predictors. An increase of one standard deviation in the score at Comprehension test, (provided the other predictors in the model are held constant), reduces the chances of being diagnosed as a schizophrenic by over 6 times. At the same time, if a person is able to form a concept in the classification task, their chances of being diagnosed as a schizophrenic are lowered by almost 8 times. The results suggest that Vocabulary subtest and Nominal Realism Test could be perceived as suppressors. In view of the results from Table 3, it seems justifiable to explain this effect as a statistical artefact, which is a result of a high correlation between the predictors.

DISCUSSION

Our research showed that there was a statistically significant difference in the cognitive functioning of the investigated groups. The performance of schizophrenic patients was significantly lower in comparison with the other two groups. This result is in accordance with the findings of other empirical studies, (Nicolson et al., 2000; Torres et al., 2007; Mandes & Kellin, 1993; Piedmont et al., 1990), which show that schizophrenic patients have significantly lower achievement at WAIS subtests than healthy controls.

In addition, the results confirm an inability of schizophrenic patients to function at the level of formal operations (Torres at al., 2007). Results support earlier findings that any disruption in concept formation could be detected in a test situation (Vygotsky, 1934). The results at Vygotsky Concept Formation Test suggest that an inability to form concepts could be considered one of the important indicators of SCH. This could also explain the difficulties of schizophrenic patients at Wisconsin Card Sorting Test, which is a measure of implicit classifications, very similar to those of Vygotsky Concept Formation Test (Josman & Katz, 2006; Morice, 1990; Noguchi, Hori, & Kunugi, 2008; Owashi at al., 2009).

Previous studies addressing the cognitive functioning of patients with BPD failed to reach conclusive results. Our findings are comparable with those of Mandes and Kellin (1993), Piedmont, Sokolove, and Fleming (1990) which showed that the IQ scores of patients with borderline personality organization were significantly lower, compared to those of normal subjects from the control group. Our results are discordant with the findings of the authors who found the differences in IQ scores of patients with BPD and normal controls to be small, or even undetectable (Harris, 1993; Skelton, Boik, & Madero, 1995).

Our results showed that half of the patients with BPD did not form concepts, but complexes. These findings support those clinical observations which indicate that borderline patients have a disturbed ability of semiotizatition (Kristeva, 1980; Kernberg, 1975). One of the distinguishing features of these patients is their primitive cognitive functioning, i.e. rudimentary, binary forms of classifications that result in black and white perception of the world (Veen & Arntz, 2000).

CONCLUSION

Our results revealed cognitive deficit in both diagnostic groups. This deficit could be detected either by standard IQ tests, (e.g. most commonly used WAIS III), or cognitive-developmental tests.

Our analysis shows that cognitive-developmental tests are valuable instruments in differential diagnostics of schizophrenic and borderline patients. Unlike standard tests, these tests represent a marked improvement in the diagnostic process. For example, sincrets at Concept Formation Test could be a reliable sign of SCH.

Nevertheless, the results of our research could be disputed. Despite the fact that samples of this size are common in the field (Blyler, Gold, Iannone, & Buchanan, 2000)[1], the essential limitation of our research is a small number of subjects per group for the regression coefficient estimation. Respondents in subsamples were not matched 1:1. The diagnoses were based on psychiatric observations. Neither Composite International Diagnostic Interview (CIDI) nor the SCID – the golden standard for diagnosing mental illnesses, was used to diagnose the subjects in our sample. VITI results were, (in some cases), a part of a diagnostic procedure which overestimated their diagnostic power. Estimation of parameters and prediction of group composition were based on the same sample. One should bear in mind that the estimated parameters are very unstable and that their cross-validation should be done.

In order to include cognitive-developmental tests into clinical practice, it is necessary to do a research on a bigger sample, as well as a comprehensive qualitative analysis of the answers. A general overview of the results of our research reveals that different groups of subjects provided quite different answers

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1 WAIS III Technical manual show us that the WAIS profile of SCH patients is based on sample of 40 subjects.

with regard to their quality. For example, although nominal realism was detected among some of the normal, as well as among borderline subjects, their answers were not as chaotic and bizarre as those given by the schizophrenic patients.

To summarize, despite all the limitations of our research, we believe that developmental tests have a significant differential and diagnostic potential in the diagnosis of borderline and schizophrenic patients. Considering the fact that both tests have discriminative power regarding the level of cognitive deficit in subjects, they could considerably facilitate quick clinical assessment of ambiguous cases.

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