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Schizophrenic disorders – do cognitive dysfunctions relate to course characteristics and the psychopathological picture?

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SUMMARY

Aim: Cognitive dysfunctions are nowadays often considered as fundamental characteristics of schizophrenic disorders essential for pathogenesis and clinical aspects of the disease as well as social functioning of the patients. The aim of the study was to determine the associations between some chosen indicators of disordered cognitive functions and some chosen variables describing the course and the clinical picture of schizophrenic disorders.

Material and method: 69 patients satisfying both DSM-IV and ICD–10 schizophrenia criteria were examined. Two clinical tools were used for the assessment of the clinical state (scales: PANSS and KOSS), and similarly two scales for the assessment of premorbid functioning (scales: GAF and W). Neurocognitive dysfunctions were examined with the help of computer-aided tests from the Vienna Test System including the measures of: reaction time (RT), visual line pursuit (LVT), perseveration (PERSEV), and the capacity of visuospatial memory (CORSI). Simple non-parametric tests and rank correlation coefficients were used in statistical analysis.

Results: The associations between cognitive dysfunctions and: age, social functioning before hospitalisation, duration of the disease and the number of hospitalisations were discovered. The dysfunctions were less pronounced at the time of the first episode than in the relapse phase or the residual phase. The quantitative assessment of disorders' severity did not correlate with cognitive dysfunctions, but the detailed analysis of the psychopathological picture revealed correlations between some dysfunctions with the dimensions of deficit, disorganisation and dysphoria. The distortion dimension (positive) did not reveal such associations. All the indicators of cognitive dysfunctions correlated with worse results of the current episode treatment. All the significant correlations reached only a weak or moderate level.

Conclusions: Cognitive dysfunctions are associated with rather unfavourable characteristics of the disease course. The results of the psychopathological assessment correlate weakly with the neuropsychological assessment – cognitive dysfunctions are associated with deficit, disorganisation and dysphoria rather than productive symptoms of the disease in question.

schizophrenia / **cognitive dysfunctions** / **course** / **psychopathological dimensions**

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INTRODUCTION

From the time of clinical descriptions presented by Kraepelin and Bleuler, abnormalities of cognitive processes related to attention, thought association and will activity are considered to be im-

portant in the psychopathological picture and pathogenesis of schizophrenia. The dysfunctions in question are nowadays reckoned as the basic traits of schizophrenic disorders, fundamental for its pathogenesis, general functioning as well as clinical aspects of the disease (e.g. awareness of the disease, its course and prognosis) [1, 2, 3, 4]. Patients suffering from schizophrenia are characterized by a diversity of deficits of cognitive functions affecting attention, memory, (especially so called working memory), visuospatial functions, language competence, processes of memory and learning, general intelligence [5, 6, 7, 8, 9].

In spite of significant conformity of study results indicating that cognitive dysfunctions are present in a majority of patients (though to a different degree), it is not clear whether they are bound in some specific way with the structure of patients' mental state and its changes during treatment. Drawing conclusions from the available studies is hampered by significant diversity of methods evaluating dysfunctions of cognitive processes, heterogeneity of terminology and functional interpretation of the applied tests, as well as diverse definitions of other variables, including the clinical ones, correlated with the dysfunctions in question [2, 3, 4, 10].

The question whether there exists (dominates or prevails) one specific type of cognitive dysfunction in patients suffering from schizophrenia or whether the observed dysfunctions have an individual, diverse and multimodal nature has not been settled. However the majority of current study results emphasise the substantial meaning and the presence of specific cognitive disorders, which constitute primary dysfunctions (core) such as working memory and executive functions disorders [11, 12, 13, 14, 15, 16, 17], or attention disorders [5, 18, 19]. Some part of the studies indicates diversity of the profile of the disorders [20, 21] or a generalised, not specific nature of the ascertained deficits of activities [22].

The attempts to find specific associations between indicators of different cognitive dysfunctions assessed with neuropsychological tests and psychopathological dimensions of schizophrenia that are considered to be fundamental (deficitary, disorganised, productive) do not bring unequivocal results. In spite of the fact that the majority of studies affirm some specific associations between them [e.g. 23, 24, 25, 26, 27], others argue that neuropsychological dysfunctions exert rather a general, non-specific and weak influence on psychopathological manifestations evaluated in clinical examination [28, 29, 30, 31, 32]. Many studies conducted in recent years revealed important associations between negative symptoms and cognitive disorders whereas such associations with positive symptoms have not been reported. It has been found that people suffering from schizophrenia with dominating negative symptoms present much more serious cognitive disorders in comparison with those who have a predominance of positive symptoms [33, 34, 35]. What is more, people with more pronounced negative symptoms and cognitive dysfunctions present a poorer social adjustment in comparison with those with a lower level of the symptoms in question [36]. Associations between cognitive dysfunctions, premorbid functioning of the subjects and the course of the treatment have also been assessed and they do not always turn out to be unequivocal [37, 38, 39]. The results of other studies reveal associations between pronounced cognitive deficits and difficulties in social functioning [40, 41], coping with the disease [42] or even worse quality of life [43].

In the circumstances taking up research, that might contribute to clarifying this heterogeneity seemed to be justifiable.

THE AIM OF THE STUDY

The objective of the presented study was to evaluate associations between chosen indicators of disordered cognitive functions (especially attention and working memory) and chosen variables describing the course (familial predispositions, premorbid personality, age at the onset of the disease, duration of the disease, the number of hospitalisations) and the clinical picture of schizophrenic disorders (intensity of disorders, intensity of psychosocial dysfunctions, the level of improvement after current treatment).

MATERIAL AND METHODS

Subjects

Essential information was collected from 69 people diagnosed with schizophrenic disorders, fulfilling DSM-IV and ICD–10 diagnostic criteria at the same time. All of them were patients hospitalised in different wards of the Psychiatric Department at the time of the study. Basic socio-demographic and clinical characteristics of the group are presented in Table 1.

Methods

Apart from the questionnaire prepared specially for the purpose of the study, enabling registration of socio-demographic and clinical data, some standardised tools for the assessment of mental state and psychosocial functioning were used.

Table 1. The socio-demographic and clinical profile of the studied group of patients.

Analyzed variable		Value	
Sex	women	frequency (%)	39
	men		61
Age	years	mean ± sd (range)	33.8±11 (19–62)
Education	primary	frequency (%)	30
	secondary		55
	higher		15
Place of residence	village, small town	frequency (%)	19
	large city		81
Premorbid personality	not disturbed	frequency (%)	25
	*schizo+		19
	other		56
Family history of the disease	none	frequency (%)	66
	present		34
Age at the onset of the disease	years	mean ± sd (range)	23.5±7 (13–45)
Duration of the disease	years	mean ± sd (range)	10±10 (0–43)
Number of hospitalisations		mean ± sd (range)	8±10 (1–42)
Functioning (according to GAF)	best in the previous year	mean ± sd (range)	58.9±17.9 (0–100)
Functioning according to W scale	best in the previous year	mean ± sd (range))	1.7±0.8 (0–3)
Syndrome	paranoid	frequency (%)	82
	delusional		4
	catatonic		6
	depressive		7
Disorder severity according to KOSS-C	at admission	mean ± sd (range)	2.2±0.7 (0–3)
	at discharge	mean ± sd (range)	0.8±0.7 (0–2)
Disorder severity according to PANSS	at admission	mean ± sd (range)	81.5±25 (32–141)
Disorder severity according to KOSS-S	at admission	mean ± sd (range)	29.5±13 (2–61)
Clinical improvement assessment	at discharge	mean ± sd (range)	1.7±0.6 (0–3)

* schizo+ – (schizoid or schizotypal); sd – standard deviation

Mental state assessment

PANSS – *Positive and Negative Syndrome Scale* [46] is a popular tool for the assessment of schizophrenic syndromes, encompassing 30 items, divided by the authors into groups: 7 positive symptoms, 7 negative symptoms and 16 symptoms belonging to the so-called general psychopathology. According to factor analysis in a large group of patients [proper unpublished study] they might be contributed to 6 dimensions, interpreted as: negative, positive, hostility, cognitive, depression and anxiety dimensions. Mean absolute value sum profile belonging to proper factors and weighted sums in relation to the number of items constituting a given dimension are presented in Fig.1. Such a relative profile illustrates the balance of syndrome dimensions with some domination of negative and positive symptoms over cognitive symptoms and the symptoms associated with hostility/impulsivity, and above all, with the symptoms associated with depression and anxiety.

KOSS – *Clinical evaluation of schizophrenic syndromes* [47] is a tool created and used in the Psychiatric Department. Two versions of the scale were used: KOSS-C – for the global assessment of syndrome severity by the means of one general ordinal scale (from 0 to 3) as well as KOSS-S – for the detailed assessment of symptoms by the means of 31 scales. Parallel presentation (as in Fig. 1) of the profiles of 8 dimensions KOSS is presented in Fig. 2.

Assessment of social functioning

Two tools were used.

Global Assessment of Functioning scale (GAF) – simple ordinal scale (0–100) enabling the global assessment of health, interpersonal and occupational aspects of functioning. It defines 10 compartments that can be divided in a more detailed manner by the rater. It belongs to the supplementary tools for the DSM-IV system [44, 48]. *W Scale* – is a more sophisticated tool [48] used in our Psychiatry Department, only a part of the scale – global life adjustment assessment scale was used in the present analysis (0 – not adjusted; 1 – poorly adjusted, 2 – relatively adjusted, 3 – well adjusted).

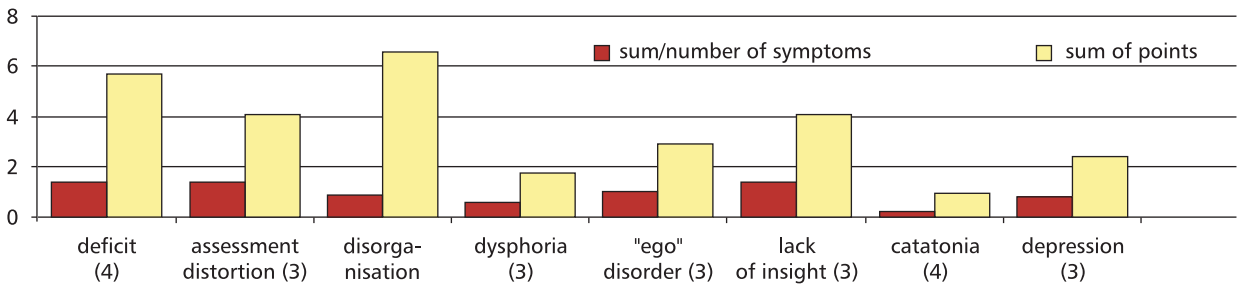

Fig. 1. The absolute and weighted profiles of schizophrenic syndrome dimensions described according to the PANSS scale. The number of symptoms creating a specific dimension in parenthesis.

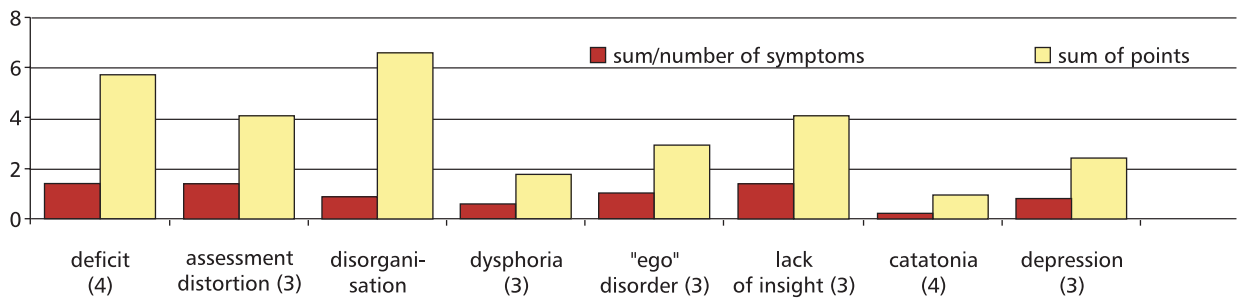

Fig. 2. The absolute and weighted profiles of schizophrenic syndrome dimensions described according to KOSS. The number of symptoms creating a specific dimension in parenthesis.

The assessment of cognitive dysfunction

For the assessment of cognitive dysfunctions we applied some chosen tests from the computerised battery of psychological tests of the *Wiener Testsystem* [49]. The tests displayed on a monitor screen were completed by means of a light pen and a special keyboard. Visual and auditory stimuli displayed on a monitor screen were used in subtests.

Reaction Time test [RT] is used for measuring reaction time for simple stimuli dependent on efficient attention. Examined subjects were to react (by pressing the proper button) in response to a particular stimulus (visual or auditory) as soon as possible. From the available versions of the test the following were chosen: (1) version S9 – measure of reaction time in response to a simple visual stimulus (yellow light) and (2) version S10 measure of reaction time in response to a simple auditory stimulus (sound), (3) more complex version S3 – measure of reaction time with the choice of a yellow light or a sound as well as (4) the most complex version S5 – measure of reaction time expected after noticing the yellow light accompanied by the sound or the yellow light accompanied by the red light. It has been assumed that reaction time is associated with the ability to focus attention on the performed task. Correct completion of sophisticated versions of the test (3 and 5) requires that the combination of stimuli is kept for a short period of time in two-modal memory (vision, audition) so that it can be compared to a previously remembered pattern and the ability of shifting from one set of stimuli to the other. Medians of reaction time (msec.) were used in the analyses as the basic test result.

Visual Pursuit Test (LVT) – used for directing and focusing attention during the task engaging visual perception. The test encompasses 40 pictures presented successively. Each of them shows 9 long lines crossing each other on the bright background. The subject is to follow the line marked with an upper arrow with his eyes and to mark the number that the line leads to on the keyboard. Correctness and the time spent on following the line is crucial. Test index (the number of correct responses in a period of time) was used as the fundamental result value in the analysis.

Perseveration Test (PERSEV) examines the tendency to perseveration. There are nine circles arranged asymmetrically on the monitor screen, and the subject is to press them in a random manner to the extent possible. The computer calculates the frequency of pressing different circles. Redundancy index is calculated on that basis and it represents the probability of non-random choice (repeating, favouring) certain circles. The higher the redundancy index, the greater tendency to perseveration. The redundancy index of the second degree is considered to be the measure of inflexibility and it reflects the frequency of repeating the choice of different combinations of pairs of circles.

Corsi Test (CORSI) – tests the direct visuo-spatial memory capacity. A few cubes (from 3 to 8) appear on the monitor screen for a while. After the exposition the subject is to point the cubes that appeared on the screen in the right order. The basic value that is being measured is the mean number of cubes that are held in memory (and pointed appropriately), which according to the authors, is associated with the skills of visuo-spatial aspects of working memory.

Statistical analysis

The methods available in the statistical package SPSS PC (version 12 PL) have been used, especially simple measures of statistical description, checking hypotheses by means of non-parametric tests and correlation analysis (Pearson's correlation coefficients, Spearman's correlation coefficients).

RESULTS

The extent of dysfunction

As the Table 2. shows and as it has been expected, the more sophisticated reaction is required by the task, the longer time was needed for it's completion, from 309 msec. for acoustic stimuli (S10) to 622 msec for the alternative choice of combination of double modality stimuli (S5). The average tendency to perseverate came to about 54%. During the time required the patients managed to trace properly the course of about 25 lines and kept in memory the position of 5 cubes approximately. The value of the mean standard error fit in the confidence interval.

Table 2. The statistical description of indicators of the examined cognitive processes dysfunctions.

Indicators of the examined dysfunctions	Range	Mean value	standard error	Standard deviation	Boundaries 95% CI* lower	higher
RT s10 median reaction time (msec)	163–1098	309.03	21.598	176.824	265.48	351.70
RT s9 median reaction time (msec)	178–803	295.49	14.503	119.536	264.86	322.76
RT s3 median reaction time (msec)	269–1237	500.04	23.571	193.092	453.92	548.02
RT s5 median reaction time (msec)	381–1187	622.26	20.590	168.610	580.55	662.74
PERSEV redundancy indicator of the 2-nd degree	14.2–100.0	53.6900	2.81903	23.106	47.92	59.17
LVT general result	0–38	24.80	1.289	10.549	22.21	27.35
CORSI visual memory capacity	3–8	5.12	0.128	1.058	4.86	5.37

* CI confidence interval

Cognitive dysfunctions and variables describing the course of the disease

Non-parametric analysis of associations between the examined cognitive dysfunctions and analysed nominal variables (Table 3) revealed only single associations reaching the degree of statistical significance. Only the result of measurement of reaction time for the stimulus of the most complex pattern was dependent on education (the higher level of education, the more efficient reaction). Similar association occurred between the time of a simple visual reaction (S9) and the time of the most complex bimodal reaction (S5) on the one hand, on the other hand – the phase of the development of the disease (the most efficient reaction after the first episode of psychosis and distinctly less efficient after the relapse and in the residual phase). Neither of cognitive dysfunction indicators showed significant associations with family history nor with premorbid personality of the patients.

Poor premorbid functioning affects cognitive functioning during hospitalization though to a moderate extent. The dependence is only visible with reference to reaction times (poorer premorbid adjustment, slower reaction), with the tendency to their prolongation together with the degree of stimulus complexity. Moreover, it becomes more evident, when developed GAF scale (100 compartments) is applied for the assessment of functioning than when a simpler scale W (4 compartments) is applied.

The duration of the disease and the number of hospitalizations correlated with all the analysed dysfunctions – while the duration of the disease was longer and the number of hospitalisations was higher, the reaction time was longer, the tendency to perseveration increased, the ability to follow the lines and the number of remembered cubes decreased. Similar associations between cognitive dysfunctions and the age of the patients were found, but for the tendency toward perseveration which didn't show any association with age. The above-mentioned independent variables (age, duration of the disease, the number of hospitalisations) were strongly intercorrelated, the strongest correlations were found for the age and the duration of the disease ($r=0.82$), strong correlations were found for the duration of the disease and the number of hospitalisations ($r=0.84$), moderate correlations were found for the age and the number of hospitalisations ($r=0.62$). There were no significant correlations between the extent of cognitive dysfunctions and the age at the onset of the disease.

Cognitive dysfunctions and variables describing the clinical picture

Table 5 shows correlations between cognitive dysfunctions and quantitative characteristics of the variables describing patients' clinical state – from the evaluation of the severity of the disorders at the beginning and at the end of hospitalisation, to the indicator of improvement achieved after treatment.

The severity of disorders assessed as a whole (KOSS-C) doesn't reveal any associations with

Table 3. The associations between the examined dysfunctions of cognitive processes and chosen, nominal socio-demographic features and the features of the disease course – rank comparison.

Cognitive dysfunction indicator	Qualitative socio-demographic variables and clinical variables			
	Education	Disease phase	Family history of the disease	Premorbid personality
	K-W test (p)	K-W test (p)	M-W test (p)	K-W test (p)
RT s10 median reaction time (msec)	ns	Ns	ns	ns
RT s9 median reaction time (msec)	ns	0.042[b]	ns	ns
RT s3 median reaction time (msec)	ns	Ns	ns	ns
RT s5 median reaction time (msec)	0.045[a]	0.022[c]	ns	ns
PERSEV redundancy indicator of the 2-nd degree	ns	Ns	ns	ns
LVT general result	ns	Ns	ns	ns
CORSI visual memory capacity	ns	Ns	ns	ns

M-W test (Mann-Whitney); K-W test (Kruskal-Wallis)

a primary – 221msek.; secondary – 127msek; higher – 113 msek

b first episode – 228 msek; relapse – 308 msek; residuum – 306 msek.

c first episode – 500 msek; relapse – 638 – msek; residuum – 635 msek.

Table 4. The associations between the examined dysfunctions of cognitive processes and chosen qualitative variables describing the course of the disease – correlations (Pearson's r).

Cognitive dysfunction indicator	Correlations (Pearson's r) and course indicators					
	Age	GAF before the onset of the disease	W scale before the onset of the disease	age at the onset of the disease	duration of the disease	number of hospitalisations
RT s10 median reaction time (msec)	0.42**	–0.27*	(–0.20)	ns	0.39**	0.28*
RT s9 median reaction time (msec)	0.41**	–0.30*	ns	ns	0.44**	0.54**
RT s3 median reaction time (msec)	0.38**	–0.34**	–0.32**	ns	0.44**	0.34**
RT s5 median reaction time (msec)	0.54*	–0.34**	–0. 35**	ns	0.58**	0.47**
PERSEV redundancy indicator of the 2-nd degree	Ns	ns	ns	ns	0.31*	0.29**
LVT general result	–0.43**	ns	ns	ns	–0.54**	–0.31**
CORSI visual memory capacity	–0.39**	ns	ns	ns	–0.46**	–0.52**

Pearson's Correlation (two sided test); **$p<0.01$; *$p<0.05$ in parenthesis $0.05<p<0.1$

the severity of cognitive dysfunction, with the exception of the status at discharge, when a significant negative weak relationship with the visuospatial memory capacity appears (more dysfunctions, less remembered cubes).

The association between cognitive dysfunction and the level of clinical improvement is the most distinct and the most consequent – the faster the reaction, the lesser tendency towards perseveration, the higher efficiency in line tracking and the higher number of remembered cubes, the more pronounced improvement of mental state. The associations with the most simple, uni-modal reaction types turned out to be weak and insignificant (S9, S10).

Table 5. The associations between the examined dysfunctions of cognitive processes and factor structure of schizophrenic syndrome – correlations (Spearman's δ) with premorbid functioning, disorder severity and the level of improvement after treatment.

Cognitive dysfunction indicator	Correlations (Spearman's δ) with symptoms' severity		
	KOSS-C at admission	KOSS-C at discharge	clinical improvement[a] (0–3)
RT s10 median reaction time (msec)	ns	Ns	(0.24)
RT s9 median reaction time (msec)	ns	Ns	ns
RT s3 median reaction time (msec)	ns	Ns	–0.36**
RT s5 median reaction time (msec)	ns	Ns	–0.38**
PERSEV redundancy indicator of the 2-nd degree	ns	Ns	–0.26**
LVT general result	ns	Ns	0.34**
CORSI visual memory capacity	ns	–0,26*	0.25*

Spearman's rank correlation (two sided test); **p<0.01; *p<0.05; in parenthesis 0.05<p<0.1

[a] 0 – none, 1- slight, 2 – moderate, 3 – distinct

The following tables show the results of a more precise analysis of correlation associations between cognitive dysfunction indicators and the psychopathologic picture of the schizophrenic syndrome. The analysis making use of factor dimensions of the syndrome according to PANSS (Table 6) shows that the tendency to perseveration was the cognitive dysfunction with the highest number of associations with syndrome dimensions (negative, cognitive and depressive). What is more, only the association of the negative syndrome with the reaction time using the most demanding stimulus (S5) was found. Associations on the level of statistical tendency were found between some sparse dysfunction indicators and anxiety dimension as well as cognitive dimension. The strength of the association between the tendency to perseverate and the deficit dimension was relatively higher in comparison with other associations (p=0.37).

Using KOSS scale in a parallel analysis (Table 7) leads to the conclusion that there are significant associations between cognitive dysfunctions and dimensions of disorganisation, deficit and dysphoria. The disorganisation dimension turned out to be the one with the most significant level

Table 6. The associations between the examined dysfunctions of cognitive processes and factor structure of schizophrenic syndrome – correlations (Spearman's δ) with psychopathological dimensions of the disorder picture according to PANSS.

Cognitive dysfunction indicator	Correlations (Spearman's δ) with PANSS dimensions					
	negative	positive	positive	hostility/ impulsivity	depression	anxiety
RT s10 median reaction time (msec)	ns	Ns	ns	Ns	ns	Ns
RT s9 median reaction time (msec)	ns	ns	ns	Ns	ns	Ns
RT s3 median reaction time (msec)	ns	ns	ns	(0.21)	ns	Ns
RT s5 median reaction time (msec)	0.26*	ns	ns	(0.24)	ns	Ns
PERSEV redundancy indicator of the 2-nd degree	0.37**	ns	0.28*	(0.21)	0.27*	Ns
LVT general result	ns	ns	(–0.24)	Ns	ns	Ns
CORSI visual memory capacity	ns	ns	ns	Ns	ns	Ns

Spearman's rank correlation (two sided test); **p<0.01; *p<0.05; in parenthesis 0.05<p<0.1

of correlation with cognitive dysfunctions (two complex reaction time tests, perseveration and line tracking). Other dimensions reveal only single associations on the level of statistical tendency. The complex reaction time for an alternative bimodal stimulus (S3) was the dysfunction showing the highest number of associations with the dimensions (deficit, disorganisation, dysphoria and on the level of statistical tendency – lack of insight). A relatively high level of correlations between perseverative tendencies and deficit dimension is remarkable.

DISCUSSION

The results achieved by the examined schizophrenia patients were significantly worse from the results achieved by healthy people composing the control group, which were shown in previously published papers [51, 52]. Schizophrenia patients sample examined in the study was chosen from the same population. The results of the control group were not described here because the fundamental aim of the study was to compare groups of patients differing by clinical characteristics i.e. basic features of the disorder course and a clinical picture of the disorder. It should be stressed however, that the results achieved by the examined patients were significantly worse than the results of healthy subjects, thus confirming the presence of cognitive dysfunctions in schizophrenia patients.

Cognitive dysfunctions and variables describing the disease course

The most essential statement coming from the obtained results seems to be the one that says that the duration of the disease and the number of hospitalisations correlates with nearly all the cognitive dysfunctions studied. It suggests a progressive character of cognitive dysfunctions, at least in that part of schizophrenic patients which can be met in a hospital more often. A similar association binds cognitive dysfunctions and the age of the examined subjects. High mutual correlations between these three variables (age, duration of the disease and the number of hospitalisations) suggest that their influence on the level of cognitive disorders is complex. The effects of factors dependent on the disease and natural factors may overlap together with increasing age. The number of subjects within the examined group doesn't allow for making an analysis which could separate these effects and tell them apart. Summing up the obtained results, the greatest difference of cognitive abilities takes place between the first episode and following phases of the disease (recurrent or residual), which proves that at the time of the first epi-

Table 7. The associations between the examined dysfunctions of cognitive processes and factor structure of schizophrenic syndrome – correlations (Spearman's δ) with psychopathological dimensions of the disorder picture according to KOSS scale.

Cognitive dysfunction indicator	Correlations (Spearman's δ) with KOSS-S dimensions							
	deficit	assessment distortion	disorganisation	dysphoria	"ego" disorder	lack of insight	catatonia	depression
RT s10 median reaction time (msec)	ns	(0.22)	ns	ns	ns	ns	ns	ns
RT s9 median reaction time (msec)	ns	(0.21)	ns	ns	ns	ns	(–0.23)	ns
RT s3 median reaction time (msec)	(0.22)	ns	0.27*	0.37**	(0.21)	ns	ns	ns
RT s5 median reaction time (msec)	0.24*	ns	0.25*	0.31**	ns	(0.23)	ns	ns
PERSEV redundancy indicator of the 2-nd degree	0.44**	ns	0.29*	ns	ns	ns	ns	ns
LVT general result	ns	ns	0.28*	ns	ns	ns	(–0.23)	ns
CORSI visual memory capacity	ns	ns	ns	ns	ns	ns	ns	ns

Spearman's rank correlation (two sided test); **$p<0.01$; *$p<0.05$; in parenthesis $0.05<p<0.1$

sode mean resources of that ability are relatively the highest. The idea of increasing cognitive dysfunction since the onset of the disease is often represented in literature [e.g. 2, 3]. Current research data emphasise that cognitive dysfunctions are the least pronounced in patients with the first episode of schizophrenia in comparison with patients suffering from psychosis for many years. [52, 53, 54, 55]. Moderate or weak power of correlations found in the study suggests that the above-mentioned tendency remains relative and may apply to some patients, e.g. those with a more recurrent or residual course of the disorder. That is the way that Weickert and Golberg interpreted study results [13], pointing out the heterogeneity of predispositions and the heterogeneity of dynamics of cognitive dysfunctions in patients suffering from schizophrenia. The obtained results suggest that family history of the disease and premorbid personality are not the factors that differentiate cognitive resources of subjects vulnerable to schizophrenia. Moreover, worse social functioning during the year directly preceding the onset of the disease reveals a weak but significant relationship with cognitive dysfunctions discovered later, which may suggest that they had appeared earlier, contributing to life difficulties of the affected subjects. Many studies point to similar associations [e.g. 13, 39, 44]. However, weakness and character of these correlations show at the same time, that the influence of that sort is not common. The results obtained in here, point out that the dysfunctions preceding the onset of the disease relate to the activity of attention (longer reaction time) rather than activities dependent on efficient memory and executive functioning (tendencies to perseveration, capacity of visuospatial memory).

Cognitive dysfunctions and variables describing the clinical picture of the disease

Basically, the general clinical and psychopathological assessment of disorders' severity at the stage of developed disorders as well as at the stage of receding disorders does not show correlations with the severity of cognitive functions according to test neuropsychological assessment. It suggests the existence of separate rules that determine recognition and assessment of information associated with patients' mental state. This fact is known and emphasised by many researchers [e.g. 20, 21, 29]. It should be stressed that even psychopathological expression of the cognitive factor (dimension) in PANSS, bringing together clinical assessment items in principle associated directly with cognitive processes, correlates weakly with standardised measures that are used in the evaluation of cognitive processes in neuropsychological assessment [30, 31, 37]. According to Vadhan et al. [32], the assessment of attention by means of negative symptoms scale devised by Andreasen (SANS, *Scale for the Assessment of Negative Symptoms*) proves to be better in this respect, the scale demonstrates satisfactory diagnostic convergence with psychological measures. Yet SANS does not define other cognitive dysfunctions.

However there is a definitely more distinct association of cognitive dysfunctions with a degree of clinical improvement achieved during hospital treatment, that is with dynamics of psychopathological symptoms. Their remission is more visible when there are less cognitive dysfunctions – in principle it applies to all the examined indicators of these dysfunctions. Apparently some sort of a potential postponing or reducing the effects of treatment of schizophrenic disorders might be attributed to cognitive dysfunctions. In this respect there are no controversies in the literature [2, 3, 4, 7, 11, 12, 13, 18, 22]. On the other hand it must be stressed that the discovered associations are relatively weak, which shows that the potential is not absolute and requires caution about making predictions.

Deeper and more precise (because referring to factorial dimensions of schizophrenic disorders) analysis of associations between the psychopathological picture and the picture of cognitive dysfunctions reveals sparse and not too strong associations. Irrespective of diagnostic tools used for describing the psychopathological picture (PANSS, KOSS), only the negative (deficit) dimension and the disorganisation dimension showed significant correlations with cognitive dysfunctions – in both cases, perseveration tendency and the most complex way of measuring reaction time (S5) were present, in the case of perseveration the relationship is distinctly stronger. Both tests require efficiency in the field of working memory, executive function-

ing and attention. In the case of KOSS, the dimension of dysphoria also showed significant, moderately strong associations with more complex versions of measuring reaction time (S3, S5). Analogous associations, on the level of statistical tendency, revealed the dimension of hostility/impulsivity according to PANSS, corresponding to dysphoria presented in KOSS. The majority of studies touching the subject of correlations between neurocognitive dysfunctions and the psychopathological picture limits its interest to two (positive, negative) or three (positive, negative, disorganisation) clinical dimensions or their equivalents called otherwise. The studies [16, 17, 18, 19, 20, 21, 22] state, just as the results obtained in here, that the negative dimension and the disorganisation dimension are the ones that enter into some associations with cognitive functioning. The positive dimension (productive, distortion of assessment) does not reveal associations of that sort. The hostility/impulsivity (dysphoria) dimension was not studied from this point of view in the studies available to us by means of the literature. Some of its symptoms might be considered to be behavioural (e.g. excitement, impulsivity) as well as emotional (dysphoric mood, irritability) disorganisation manifestations. It might constitute an explanation for the results obtained in the present study indicating associations with cognitive dysfunctions similar to disorganisation.

It is more difficult to explain the association of perseveration with the depression dimension (according to PANSS but not according to KOSS). It might result from an inaccuracy of psychopathological differentiation between depressed mood symptoms and a reduction of utterances, emotion or behaviour (negative dimension), which is easier in the case of PANSS (only one symptom relates to depression) than in the case of KOSS (three symptoms). Similar doubts concerning differentiation of depression from other components of schizophrenia picture are pointed out by Holthausen et al. [56].

CONCLUSIONS

1. The traditional psychopathological picture of schizophrenic disorders and the description of cognitive dysfunctions stemming from the application of neuropsychological tests are rather difficult to match:
   – the overall assessment of severity of schizophrenic disorders does not correlate with measures of cognitive dysfunctions
   – significant associations of moderate power bind only some of the examined cognitive dysfunctions (especially the more demanding attention tests and perseveration tests) with some psychopathological dimensions (deficit, disorganisation and dysphoria),
   – The dimension of distortion of reality assessment (positive, productive) as well as others isolated dimensions do not show significant associations with cognitive dysfunctions revealed by neuropsychological tests.
2. The occurrence of cognitive dysfunctions correlates moderately with the indicators of a less favourable disease course:
   – worse social functioning before the disease,
   – longer duration of the disease, higher number of hospitalisations and worse results of treatment of the present episode,
   – a significant difference between cognitive dysfunction dimension at the time of the first episode and its dimension in recurrent and residual phase.

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