

Semantics, pragmatics, and formal thought disorders in people with schizophrenia

Carlos Salavera
Miguel Puyuelo
José L Antoñanzas
Pilar Teruel

Universidad de Zaragoza,
Zaragoza, Spain

Background: The aim of this study was to analyze how formal thought disorders (FTD) affect semantics and pragmatics in patients with schizophrenia.

Methods: The sample comprised subjects with schizophrenia (n = 102) who met the criteria for the disorder according to the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition Text Revision. In the research process, the following scales were used: Positive and Negative Syndrome Scale (PANSS) for psychopathology measurements; the Scale for the Assessment of Thought, Language, and Communication (TLC) for FTD, Word Accentuation Test (WAT), System for the Behavioral Evaluation of Social Skills (SECHS), the pragmatics section of the Objective Criteria Language Battery (BLOC-SR) and the verbal sections of the Wechsler Adults Intelligence Scale (WAIS) III, for assessment of semantics and pragmatics.

Results: The results in the semantics and pragmatics sections were inferior to the average values obtained in the general population. Our data demonstrated that the more serious the FTD, the worse the performances in the Verbal-WAIS tests (particularly in its vocabulary, similarities, and comprehension sections), SECHS, and BLOC-SR, indicating that FTD affects semantics and pragmatics, although the results of the WAT indicated good premorbid language skills.

Conclusion: The principal conclusion we can draw from this study is the evidence that in schizophrenia the superior level of language structure seems to be compromised, and that this level is related to semantics and pragmatics; when there is an alteration in this level, symptoms of FTD appear, with a wide-ranging relationship between both language and FTD. The second conclusion is that the subject's language is affected by the disorder and rules out the possibility of a previous verbal impairment.

Keywords: schizophrenia, formal thought disorder, semantics, pragmatics

Introduction

Schizophrenia is a mental disorder usually beginning in adolescence or youth, and very often has a chronic disabling evolution (Singh, 2010). Due to its severity, schizophrenia represents an important health problem, involving an onerous burden both for patients and their families. The illness affects the subject's contact with reality, reducing the patient's relationships with other people, and therefore their communication skills. Some patients diagnosed as schizophrenic show a structural alteration in significant elements of their language ability. The disease affects different levels of language at different times.¹⁻³

Disturbances in oral communication have been considered since the time of Bleuler⁴ and Kraepelin⁵ to be one of the central elements in schizophrenia.⁶ They can be of two kinds, ie, a decrease in verbal production, associated with a reduction of syntactic

Correspondence: Carlos Salavera
c/San Juan Bosco 7, Zaragoza 50009,
Universidad de Zaragoza, Zaragoza, Spain
Tel +34 976 76 1000 ext 3444
Email salavera@unizar.es

complexity, and disturbances in speech comprehension and coherence, also referred to as formal thought disorders (FTD).

Patients with schizophrenia often display a wide range of abnormal types of communication behavior, and language disorders in schizophrenia are mainly a loss of voluntary control of the word generation process.⁷ This population shows a language-processing deficit, affecting speech, semantics, syntax, and phonology.⁸ However, other authors consider that pragmatics is also a field where the linguistic disorders of the language of people with schizophrenia are focused.^{9–11} This has been perfectly demonstrated in the study by Kuperberg et al¹² who center the language violations of patients with schizophrenia in the pragmatic, semantic, and syntactic sections, and leave morphologic disorders as something residual and with a low prevalence in this population.

There has been research into the possibility that schizophrenic speech could differ depending on the clinical manifestations of FTD. Studies have also been carried out on whether FTD could have an influence on the lack of recognition of linguistic stimuli in people with schizophrenia, given that these patients show a tendency to have verbal disorders in their speech and inefficient inhibition mechanisms, resulting in impairment of the activation mechanisms of verbal processes.^{13–22}

Often everyday conversations contain expressions with meanings other than the obvious ones. These disparities do not interfere with communication, provided that the speaker and the receiver (the person who speaks and the person who listens, respectively) share certain rules directing conversational interactions. The ability to communicate and understand these intentions, and the rules that regulate them, forms part of language semantics and pragmatics, and is impaired in schizophrenia.^{1,23,24} The aim of this study was to analyze how FTD affect semantics and pragmatics in patients with this disorder.

Materials and methods

Subjects

The sample was composed of subjects with schizophrenia ($n = 102$) who met the diagnostic criteria for the disorder according to the DSM-IV-TR (Diagnostic and Statistical Manual of Mental Disorders, 4th Edition Text Revision).²⁵ Six people refused to take part in the study for various reasons. The average age of the trial population was 40.84 ± 11.18 (range 20–65) years. The population

which took part in the study comprised 52 men (51%) and 50 women (49%). All participants were receiving ambulatory clinical treatment in centers belonging to the public health system, and they all signed the relevant informed consent. The patients received no economic incentive for their participation in the study.

Assessment tools

The following scales were used in the research process: the Positive and Negative Syndrome Scale (PANSS) for psychopathology measurements; and the Scale for Assessment of Thought, Language, and Communication (TLC) for FTD, Word Accentuation Test (WAT), System for the Behavioral Evaluation of Social Skills (SECHS), the pragmatics section of the Objective Criteria Language Battery (BLOC-SR) and the verbal sections of the Wechsler Adults Intelligence Scale (WAIS) III for assessment of semantics and pragmatics. These scales have been widely validated and used in numerous previous studies. The PANSS, TLC, and WAIS III scales have been used previously for research in patients with schizophrenia.^{26–30} The rest of the tests (BLOC-SR, WAT, and SECHS) have a wide diffusion, and their use has also been established in people with schizophrenia.³¹

The PANSS³² is a 30-item scale that measures the psychopathology present in the patient with schizophrenia, and is widely validated for evaluation of this disorder. The WAIS III³³ is a test designed to assess global intelligence and consists of two scales, ie, verbal and performance. Each test in the WAIS-III can be used independently and has recognized validity and reliability; its validity for patients with schizophrenia has also been demonstrated. Following other studies, in our investigation only the verbal scale was used; this is a valid method with obvious benefits in its administration, and our purpose was to measure each participant's verbal capacity and use of language.^{34,35}

The WAT³⁶ is a rapid and simple test designed to estimate the patient's premorbid cultural and intellectual level, in order to infer his current cognitive situation. It is based on the recognition of Spanish words not frequently used in daily speech, written entirely in upper case letters and without accents. The hypothesis is that to read the words correctly, a subject needs to have seen them previously. Reading aloud is a verbal capability more resistant than other verbal functions, like vocabulary, and the reading test is a useful tool to estimate the prior intelligence level, taking into account that people with a higher previous cultural level are deemed to have greater lexical richness.^{37,38}

The BLOC-SR³⁹ is a language assessment battery for schoolchildren aged 5–14 years. In some cases, this battery has proven to be useful for language evaluation in disabled adults.⁴⁰ The BLOC-SR has been used in studies carried out in patients with schizophrenia, where its utility in detecting and depicting language issues in schizophrenia has been demonstrated.⁴¹ One of the differences between this scale and the rest of the language assessment tests is the fact that it does not provide information about what assessed subjects do not know, but mainly about what they actually do know, their already attained capabilities, and even the skills they could be more competent in. Given the deficiencies these subjects show early on in the disease, flexibility and the way the information is provided are very important in assessing language in schizophrenia.^{42,43} All these factors determined that the pragmatics test in BLOC-SR was the evaluation tool chosen in this study to assess these issues in people with schizophrenia.

The TLC^{44,45} is based on 5–10-minute improvised conversations between interviewers and patients. The assessment is carried out according to the definitions and criteria used in subtypes of abnormal language expression. The TLC test yields information on communication disorders using four scales, ie, flow of ideas, structure of speech, speech peculiarities, and verbal productivity.

The SECHS⁴⁶ is a system that assesses particular and specific behaviors shown by the subject during social interactions, real or simulated, with other people. It consists of three blocks, ie, nonverbal communication, paralinguistic verbal communication, and linguistic verbal communication. The subject's behaviors are assessed and scored using a five-point Likert scale.

Procedure

The sampling technique used was of an empiric or non-probabilistic type, in its intentional or unintentional modality, given that because of the characteristics of the study, various criteria were taken into consideration as follows for choosing the sample in order to make it more uniform: a diagnosis of schizophrenia, being in a period of clinical stability (ie, not in an acute phase of the disease), age 18–65 years, and either gender. Evaluation of the participants was carried out by the main researcher (a clinical psychologist). The study was performed in accordance with the ethical principles of the Declaration of Helsinki,⁴⁷ and all the participants signed an informed consent form for participation in the research. Statistical analysis of the data was carried out using the

Statistical Package for Social Sciences version 19.0 (SPSS Inc, Chicago, IL).

Results

Sociodemographic variables

The sample (Table 1) comprised nearly equal numbers of men and women. The participants' average age was 40.84 (range 20–65) years. Nearly half of the subjects had not continued their education beyond compulsory schooling (48.86%), while 18 of them had a university degree (17.64%).

Semantics and pragmatics

The scores obtained by participants on the Verbal-WAIS (Table 2) in the sections testing arithmetic ($x = 7.51$), digit span ($x = 8.35$), and similarities ($x = 9.24$) were lower, whereas in the sections concerning vocabulary, information, and comprehension they were quite stable. In the WAT, the results indicated good premorbid language skills, with a mean of 23.96 ± 3.40 from a maximum of 30 points. This indicates that language is affected by the disorder and rules out the possibility of a previous verbal impairment. For the pragmatics section in the BLOC-SR scale, there was a lack of data for the population with schizophrenia, but this study showed that the parameters in this section were significantly affected ($x = 63.57 \pm 21.26$).

The results for the PANSS, which identifies psychopathology, showed a mean of 57.94 ± 13.97 , and were consistent with those obtained in previous studies of patients with schizophrenia. The scale for TLC showed that the flow of ideas factor was more present ($x = 13.88 \pm 7.57$), and far above speech structure, speech peculiarities, or verbal productivity.

Table 1 Sociodemographic features (n = 102)

Age, years			
Mean \pm SD			40.84 \pm 11.18
Range			20–65
Gender			
	n		%
Men	52		51
Women	50		49
Education			
Never attended school	1		0.83
School certificate	19		18.62
Compulsory primary/ secondary education	30		29.41
Vocational education and training	17		16.66
High school	15		14.7
Higher education	18		17.64

Abbreviation: SD, standard deviation.

Table 2 Results obtained in the tests administered

	Minimum	Maximum	Mean	SD
Verbal-WAIS				
Vocabulary	3	16	9.71	2.602
Similarities	5	18	9.24	2.739
Arithmetic	4	12	7.51	2.194
Digit span	5	14	8.35	2.305
Information	4	17	9.76	3.444
Comprehension	4	17	9.75	2.862
Total verbal-WAIS	67	119	92.14	12.951
SECHS				
Nonverbal	9	42	19.37	6.753
Paralinguistic	8	33	15.90	5.460
Verbal	5	25	10.75	4.778
Total SECHS	22	100	46.02	16.181
WAT	16	30	23.96	3.400
BLOC-SR				
Pragmatics	13	100	63.57	21.267
TLC				
Flow of ideas	1	28	13.88	7.573
Speech structure	3	26	8.88	5.952
Speech peculiarities	0	21	6.25	5.249
Verbal productivity	3	18	9.69	3.860
Total TLC	12	88	38.71	20.433

Abbreviations: TLC, Scale for the Assessment of Thought, Language, and Communication; WAT, Word Accentuation Test; SECHS, System for the Behavioral Evaluation of Social Skills; BLOC-SR, pragmatics section of the Objective Criteria Language Battery; Verbal-WAIS, verbal sections of the Wechsler Adults Intelligence Scale; SD, standard deviation.

On the SECHS, used in this study to evaluate pragmatics, the score obtained was 46.02 ± 16.181 .

Formal thought disorders

The results for FTD in the participants (Table 3) suggest that even if FTD are not limited to schizophrenia and often present in other pathologies, such as mania and depression, schizophrenic speech may differ according to the clinical manifestations of FTD in such a way that it may even be possible to diagnose schizophrenia from the patient's speech.

Relationship between FTD, semantics, and pragmatics

Finally, the relationship between FTD and language semantics and pragmatics was analyzed (Table 4). In this section, the results showed a correspondence between tests assessing semantics and pragmatics and the subject's language disorders affecting communication. Thus, positive correlations were found among tests measuring semantics and pragmatics (Verbal-WAIS, WAT, BLOC-SR, and SECHS).

However, FTD measured using the TLC scale showed a negative correlation with these scales; this means that the

more FTD exist, the worse the results are for semantics and pragmatics. Attention should also be drawn to the fact that the WAT scale does not show a relationship with FTD, which means that these disorders do not affect the premorbid verbal level of the person with schizophrenia.

Discussion

The results in the semantics and pragmatics sections were inferior to the average values obtained in the general population.^{27,28,51} These outcomes suggest that the most significantly affected sections are those where attention, concentration, and formation of concepts are required, thus showing the effect of FTD on the semantic and pragmatic aspects of language in schizophrenia.

This would correlate with the idea that abnormalities in associative connections between words and concepts have been considered a central element in schizophrenia. More specifically, the question is whether when patients with schizophrenia speak abnormally, the problem underlying their verbal disorders goes deeper than their speech and may be considered a product of thinking itself.⁵² If alterations in schizophrenic speech are the product of abnormal and disorganized thinking, then we may expect that these strange ideas may influence other aspects of their behavior, and that in other situations, these subjects could also display abnormal nonverbal behaviors and nonrealistic ideas.¹⁸

Comparing the results obtained on the TLC scale with those in other studies, the values were similar. Values are slightly higher for some of the attributes, specifically poverty of speech, pressure of speech, distractible speech, and blocking, where scores are double that of earlier ones; for the remaining attributes, the results are very similar to those obtained in previous studies.^{48,53}

Furthermore, the data obtained concerning existing correlations between FTD and verbal disorders suggest that patients with schizophrenia also show a tendency to display interferences in their personal ideas in inappropriate contexts, apart from delusory ideas. Our results showing a high correspondence between the semantics and pragmatic sections and the TLC scale support the opinion that speech disorders in schizophrenia are generally due to the presence of psychopathology, given the positive correlation between the two. The more serious the psychopathology, the greater the presence of thought disorders. Our results suggest that verbal disorders in patients with schizophrenia should be considered as part of a disorder in thinking, and should be differentiated from disorders affecting only speech, in line with the suggestions of Harrow et al.⁵⁴ In general, the disorganized speech,

Table 3 Comparison among various studies carried out using the TLC scale

	Present study (n = 102)	Andreasen ⁴⁵ (n = 45)	Bazin et al ⁴⁸ (n = 107)	Peralta et al ⁴⁹ (n = 115)	Harvey et al ^{50,*} (n = 142)
Poverty of speech	2.09	0.47	1.35	1.00	0.94
Poverty of speech content	10.81	0.76	10.91	10.41	1.29
Pressure of speech	10.46	0.36	0.77	0.32	0.47
Distractible speech	10.63	0.02	0.92	0.77	
Tangentiality	10.90	0.55	10.79	10.09	1.83
Derailment	10.52	10.22	10.62	10.09	1.64
Incoherence	10.11	0.33	0.59	0.89	0.74
Illogicality	10.40	0.42	10.38	10.54	
Clanging	0.62	0.00	0.26	0.13	
Neologisms	0.34	0.02	0.36	0.07	
Word approximations	0.88	0.00	0.75	0.30	
Circumstantiality	0.72	0.04	0.88	0.69	1.14
Loss of goal	0.85	0.71	10.63	10.03	1.32
Perseveration	0.63	0.13	0.98	0.98	
Echolalia	0.11	0.07	0.16	0.12	
Blocking	10.03	0.06	0.50	0.57	
Stilted speech	0.50	0.02	0.32	0.17	
Self-reference	0.74	0.16	0.94	0.16	
Total	190.36	120.33	170.11	50.34	

Note: *Only eight attributes were considered in this study.

abnormal ideas, and behavior observed in schizophrenia belong to a constellation of symptoms, a wide range of which are positive, and this helps give us a better understanding of the relationship between disorganized speech and thought disorders.^{30,55}

The present study shows the relationship between the Verbal-WAIS and the scales for FTD assessment, and found correlations between the Verbal-WAIS and the TLC scales. The data obtained demonstrated that the more serious the FTD, the worse the performances in Verbal-WAIS tests (particularly in its vocabulary, similarities, and comprehension sections) which allows us to conclude that FTD affect semantics and pragmatics. Our results support the main hypothesis concerning a relationship between FTD and semantic memory, which has been reported in some^{15,26} but not all⁵⁶ studies carried out. Our study confirms this view, finding a link between FTD and semantic system impairment.

Table 4 Relationship between formal thought disorders and tests assessing semantics and pragmatics

	Verbal-WAIS	WAT	BLOC-SR	SECHS
WAT	0.329*			
BLOC-SR	0.323*	0.258*		
SECHS	0.384*	0.378*	0.727*	
TLC	-0.435*	0.246	-0.659*	-0.702*

Abbreviations: TLC, Scale for the Assessment of Thought, Language, and Communication; WAT, Word Accentuation Test; SECHS, System for the Behavioral Evaluation of Social Skills; BLOC-SR, pragmatics section of the Objective Criteria Language Battery; Verbal-WAIS, verbal sections of the Wechsler Adults Intelligence Scale.

To be precise, the more phonological and semantic fluency is observed, the greater the severity of FTD.⁵⁷ This could lead us to interpret internal language as being incompatible with context and therefore with the external language generated by others. It is not difficult to imagine that if the patient's external language shows anomalies in semantic structure, then her/his internal language may also be affected by semantic failure. The results of this investigation are consistent with those obtained by Kerns et al,⁵⁸ who found that delusive patients produced more semantic associations than the norm in a verbal fluency task.

Our data correspond with the view that, from a clinical perspective, communication with schizophrenic patients can be improved by structuring speech interactions, bearing in mind that low verbal ability is associated with a deficiency in the generation of a speech plan, and is related to disorders of negative thinking in schizophrenia.⁵⁹

The results obtained from our research would seem to coincide with the hypothesis that poverty of language in schizophrenia is due to difficulty in finding words.^{60,61} This may be verified, given that the results obtained in the vocabulary section of the Verbal-WAIS seem to validate this hypothesis. These results are in contrast with those reported by Berenbaum et al,⁶ who found no consistent results on this point in their study, and indicated that performance in finding words could not be associated with verbal ability, although it may be significantly related to the coherence of perturbed speech.

Conclusion

The main conclusion we can draw from this study is that even though both speaker and listener know the different meanings of words, which is a necessary condition for sharing a message and a conversation, a breakdown seems to occur in this communicative competence in patients with schizophrenia, mainly affecting pragmatics. In our assessment of pragmatics, some difficulties were observed in capturing the interlocutor's communicative intention, and in being able to interpret the message according to each interlocutor and communicative situation.² Patients with schizophrenia show greater difficulties in their communication skills when different pieces of information are included in the conversation, when some adaptation to social conventions is required, when they have no direct instructions, and especially when some indirect action requirements are included in the conversation. What in one way or another seems to be evident is that in schizophrenia the superior level of the language structure seems to be compromised, and it is this level that is related to semantics and pragmatics; when there is an alteration in this level, symptoms of FTD appear, with a wide-ranging relationship between both language and FTD.^{26,53,61-63}

The data obtained in this study concur with observations from an analysis of schizophrenic speech by Champagne-Lavau and Stip¹ who concluded that schizophrenia by definition implies the presentation of FTD, producing language distortions. Our data also support the idea that the focus of the dysfunction in schizophrenia may be in thought processes. Language deterioration forms part of a dysfunction in thinking, because pragmatics and speech analysis are the most significant features of language disorders in people with schizophrenia.

Acknowledgments

This article has been possible thanks to the research funds provided by the Department of Science and Technology of the Government of Aragón (Spain), and the European Social Fund.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Champagne-Lavau M, Stip E. Pragmatic and executive dysfunction in schizophrenia. *J Neurolinguistics*. 2010;23:285-296.
2. Covington M, He C, Brown C, et al. Schizophrenia and the structure of language: the linguist's view. *Schizophr Res*. 2005;77:85-98.
3. Leroy F, Beaune D. Language in schizophrenia: intention revisited. *Annales Médico Psychologiques*. 2008;166:612-619.

4. Bleuler E. *Dementia Praecox or the Group of Schizophrenias*. New York, NY: International Universities Press; 1911.
5. Kraepelin E. *Dementia Praecox and Paraphrenia*. Edinburgh: E & S Livingstone; 1919.
6. Berenbaum H, Kerns JG, Vernon LL, Gómez JJ. Cognitive correlates of schizophrenia signs and symptoms: I. Verbal communication disturbances. *Psychiatry Res*. 2008;159:147-156.
7. Chaika E, Lambe RA. Cohesion in schizophrenic narratives, revisited. *J Commun Disord*. 1989;22:407-421.
8. Marvel C. Schizophrenia and language. In: Brown K, editor. *Encyclopedia of Language and Linguistics*, 2nd ed. Oxford, UK: Elsevier; 2006.
9. Austin JL. *How to do Things with Words*. Oxford, UK: Oxford University Press; 1962.
10. Baskak B, Tugba E, Cem E, Baskak S. Peculiar word use as a possible trait marker in schizophrenia. *Schizophr Res*. 2008;103:311-317.
11. Cohen BD, Cami J. Schizophrenic performance in a word-communication task. *J Abnorm Psychol*. 1967;72:240-246.
12. Kuperberg GR, McGuire PK, David A. Reduced sensitivity to linguistic context in schizophrenic thought disorder: evidence from on-line monitoring for words in linguistically anomalous sentences. *J Abnorm Psychol*. 1998;107:423-424.
13. Adewuya O, Adewuya AO. Predictability of speech and language in Nigerian patients with psychosis: a controlled study. *Psychiatry Res*. 2006;143:199-204.
14. Belinchon M. Esquizofrenia y lenguaje. In: Ruiz Vargas JM, editor. *Esquizofrenia: Un Enfoque Cognitivo*. Madrid, Spain: Alianza; 1987.
15. Elvevåg B, Fisher JE, Gurd JM, Goldberg TE. Semantic clustering in verbal fluency: schizophrenic patients versus control participants. *Psychol Med*. 2002;32:909-917.
16. Faust M, Chiarello C. Sentence context and lexical ambiguity resolution by the two hemispheres. *Neuropsychologia*. 1998;36:827-835.
17. Gernsbacher MA, Tallent KA, Bolliger CM. Disordered discourse in schizophrenia described by the structure building framework. *Discourse Studies*. 1999;1:355-372.
18. Brébion G, Stephan-Otto C, Huerta-Ramos E, et al. Abnormal functioning of the semantic network in schizophrenia patients with thought disorganization. an exemplar production task. *Psychiatry Res*. September 1, 2012. In press.
19. Meilijson SR, Kasher A, Elizur A. Language performance in chronic schizophrenia: a pragmatic approach. *J Speech Lang Hear Res*. 2004;47:695-713.
20. Spitzer M, Weisker I, Winter M, Maier S, Hermle L, Maher, BA. Semantic and phonological priming in schizophrenia. *J Abnorm Psychol*. 1994;103:485-494.
21. Stephane M, Pellizer G, Fletcher CR, McClannahan K. Empirical evaluation of language disorder in schizophrenia. *J Psychiatry Neurosci*. 2007;32:250-258.
22. Thomas P. Thought disorder or communication disorder. Linguistic science provides a new approach. *Br J Psychiatry*. 1995;166:287-290.
23. Linscott RJ. Thought disorder, pragmatic language impairment, and generalized cognitive decline in schizophrenia. *Schizophr Res*. 2005;75:225-232.
24. Musiol M, Verhaegen F. Apprehension and categorization of schizophrenic symptomatology expression in verbal interaction. *Annales Médico-Psychologiques*. 2009;167:717-727.
25. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders: 4th text revision*. Washington; 2000.
26. Borofsky LA, McNealy K, Siddarth P, Wu KN, Dapretto M, Caplan R. Semantic processing and thought disorder in childhood-onset schizophrenia: insight from fMRI. *J Neurolinguistics*. 2010;23: 204-222.
27. Goikoetxea E, Aznar S, Cortajarena C, Ponte J, Ugarte K, Uriarte J. WAIS-III in schizophrenic patients: findings on its validity. *Rev Psicol Gen Apl*. 2001;54:245-257.
28. Salavera C, Puyuelo M. Semantic and pragmatic aspects in persons with schizophrenia. *Revista de Logopedia, Foniatria y Audiología*. 2010;30:84-93.

29. Titone D. Language, communication and schizophrenia. *J Neurolinguistics*. 2010;23:173–175.
30. Waszkiewicz J, Wciórka J, Anczewska M, Chrostek A, Switaj P. Language disorders and cognitive functions in persons with schizophrenic disorders. *Psychiatr Pol*. 2012;46:553–570. Polish.
31. Salavera C, Puyuelo M, Serrano R. Communication skills in young people with schizophrenia. *Boletín de AELFA*. 2011;11:2–8.
32. Kay SR, Opler LA, Linder Mayer JP. Reliability and validity of the positive and negative syndrome scale for schizophrenics. *Psychiatry Res*. 1987;23:99–110.
33. Wechsler D. WAIS–III: Wechsler Adult Intelligence Scale –Third Edition. Madrid, Spain: TEA Ediciones; 2000.
34. Axelrod BN. Validity of the Wechsler Abbreviated Scale of Intelligence and other very short forms of estimating intellectual functioning. *Assessment*. 2002;9:17–23.
35. Ryan JJ, Weilage ME, Spaulding WD. Accuracy of the seven subtest WAIS-R short form in chronic schizophrenia. *Schizophr Res*. 1999;39:79–83.
36. González-Montalvo JI. Development and validation of a reading test for the diagnosis of mental deterioration in the elderly. Doctoral thesis, Madrid Spain: Universidad Complutense de Madrid; 1991.
37. Moltó JM, Igual B, Pastor I, González-Aniorte R, Asensio M. Test accentuation of words Gonzalez-Montalvo in a healthy population. *Rev Neurol*. 1997;25:2062–2063.
38. Moltó JM, Igual B, Pastor I. Test accentuation of words as a tool to estimate prior cultural level. First International Congress on Neuropsychology: Uniting horizons in neuropsychology. 1999. Available from: <http://www.uninet.edu/union99/congress/libs/val/v09.html>. Accessed October 9, 2012.
39. Puyuelo M, Renom J, Solanas A, Wiig EH. *BLOC Screening Assessment Revised language. Folder with 5 elements*. Barcelona, Spain: Elsevier-Masson; 2004.
40. Puyuelo M. *BLOC Application Language Assessment populations with special educational needs*. Barcelona, Spain: Elsevier-Masson; 2007.
41. Salavera C, Tricás JM, Lucha O. Process dropping out cause of homeless people: personality disorders vs psychosocial problems. *BMC Psychiatry*. 2011;11:192.
42. Addington J, Addington D. Early interventions for psychosis: who refers? *Schizophr Res*. 2006;84:176–177.
43. Birchwood M, Tarrrier N. *Psychological Management of Schizophrenia*. Chichester, UK: Wiley; 1994.
44. Andreasen NC. Thought, language, and communication disorders I. Clinical assessment, definition of terms, and evaluation of their reliability. *Arch Gen Psychiatry*. 1979;36:1315–1321.
45. Andreasen NC. Thought, language, and communication disorders. II: diagnostic significance. *Arch Gen Psychiatry*. 1979;36:1325–1330.
46. Caballo VE. *Teoría, Evaluación y Entrenamiento de las Habilidades Sociales*. Valencia, Spain: Promolibro; 1988.
47. World Medical Association. Declaration of Helsinki. *Law Med Health Care*. 1991;19:264–265.
48. Bazin N, Sarfati Y, Lefrère F, Passerieux C, Hardy-Baylé MC. Scale for the evaluation of communication disorders in patients with schizophrenia: a validation study. *Schizophr Res*. 2005;77:75–84.
49. Peralta V, Cuesta MJ, de León J. Formal thought disorder in schizophrenia: a factor analytic study. *Compr Psychiatry*. 1992;33:105–110.
50. Harvey PD, Docherty NM, Serper MR, Rasmussen M. Cognitive deficits and thought disorder: II. An eight-month follow-up study. *Schizophr Bull*. 1990;16:147–156.
51. Kaufman AS. *Claves para la evaluación con el WAIS-III*. Madrid, Spain: TEA Ediciones; 2004.
52. Daalman K, Verkooijen S, Derks EM, Aleman A, Sommer IEC. The influence of semantic top-down processing in auditory verbal hallucinations. *Schizophr Res*. 2012;139:82–86.
53. Elvevåg B, Folz PW, Weinberger DR, Goldberg TE. Quantifying incoherence in speech: an automated methodology and novel application to schizophrenia. *Schizophr Res*. 2007;93:304–316.
54. Harrow M, O'Connell EM, Herbener ES, Altman AM, Kaplan KJ, Jobe TH. Disordered verbalizations in schizophrenia: a speech disturbance or thought disorder? *Compr Psychiatry*. 2003;44:353–359.
55. Henquet C, Krabbendam L, Dautzenberg J, Jolles J, Merckelbach H. Confusing thoughts and speech: source monitoring and psychosis. *Psychiatry Res*. 2005;133:57–63.
56. De Freitas C, Dunaway LA, Torres JJ. Preferential semantic fluency impairment is related to hallucinations, but not formal thought disorder. *Schizophr Res*. 2009;107:307–312.
57. Allen P, Amaro E, Fu CH, et al. Neural correlates of the misattribution of speech in schizophrenia. *Br J Psychiatry*. 2007;190:162–169.
58. Kerns JG, Berenbaum H, Barch DM, Banich MT, Stolar N. Word production in schizophrenia and its relationship to positive symptoms. *Psychiatry Res*. 1999;87:29–37.
59. Barch DM, Berenbaum H. The effect of language production manipulations on negative thought disorder and discourse coherence disturbances in schizophrenia. *Psychiatry Res*. 1997;71:115–127.
60. Alpert M, Clark A, Pouget ER. The syntactic role of pauses in the speech of schizophrenic patients with alogia. *J Abnorm Psychol*. 1994;103:750–757.
61. Doughty OJ, Done DJ, Lawrence VA, Al-Mousawi A, Ashaye K. Semantic memory impairment in schizophrenia – deficit in storage or access of knowledge? *Schizophr Res*. 2008;105:40–48.
62. Cabana A, Valle Lisboa JC, Elvevåg B, Mizraji E. Detecting order-disorder transitions in discourse: implications for schizophrenia. *Schizophr Res*. 2011;131:157–164.
63. Thibault L. Language semantic and pragmatic disorder: interest of linguistic analysis in psychiatry and pathological framework. *Neuropsychiatr Enfance Adolesc*. 2011;59:260–265. Spanish.

Neuropsychiatric Disease and Treatment

Publish your work in this journal

Neuropsychiatric Disease and Treatment is an international, peer-reviewed journal of clinical therapeutics and pharmacology focusing on concise rapid reporting of clinical or pre-clinical studies on a range of neuropsychiatric and neurological disorders. This journal is indexed on PubMed Central, the 'PsycINFO' database and CAS.

Submit your manuscript here: <http://www.dovepress.com/neuropsychiatric-disease-and-treatment-journal>

Dovepress

The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.