

Formal Thought Disorder and language impairment in schizophrenia

Alteração formal do pensamento e prejuízo da linguagem na esquizofrenia

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ABSTRACT

Schizophrenia is a psychiatric illness in which disorders of thought content are a prominent feature. The disruption of normal flow of thought, or “Formal Thought Disorder” (FTD), has been traditionally assessed through the content and form of patients’ speech, and speech abnormalities in schizophrenia were considered as a by-product of the disruption in conceptual structures and associative processes related to psychosis. This view has been changed due to increasing evidence that language *per se* is impaired in schizophrenia, especially its semantic, discursive, and pragmatic aspects. Schizophrenia is currently considered by some authors as a “language related human specific disease” or “logopathy”, and the neuroanatomical and genetic correlates of the language impairment in these patients are under investigation. Such efforts may lead to a better understanding about the pathophysiology of this devastating mental disease. We present some current concepts related to FTD as opposed to primary neurolinguistic abnormalities in schizophrenia.

Key words: schizophrenia, thought disorder, language disorders, thinking, linguistic, psychotic disorders.

RESUMO

A esquizofrenia é uma doença psiquiátrica na qual as alterações do conteúdo do pensamento são uma característica marcante. A ruptura do fluxo normal de pensamentos, ou “Alteração Formal do Pensamento” (AFP) é acessada através da forma e conteúdo da fala do paciente. Alterações de fala e linguagem em esquizofrênicos eram consideradas como conseqüentes à ruptura de seus sistemas conceituais e processos associativos relacionados à psicose. Esta visão alterou-se pelo aumento nas evidências de comprometimento primário da linguagem na esquizofrenia, especialmente em seus aspectos semânticos, discursivos e pragmáticos. A esquizofrenia é atualmente considerada por alguns autores como uma “doença humana específica relacionada à linguagem”, ou “logopatia”. Os correlatos neuroanatômicos e genéticos do prejuízo linguístico nestes pacientes estão sendo investigados. Estes esforços podem levar à maior compreensão da fisiopatologia desta grave doença mental. Nesta revisão, apresentamos conceitos atuais sobre AFP e sua diferenciação das anormalidades linguísticas primárias na esquizofrenia.

Palavras-Chave: esquizofrenia, pensamento, transtornos da linguagem, pensamento, linguística, transtornos psicóticos.

Formal thought disorder (FTD) is a syndrome with several different symptoms, leading to thought, language and communication problems¹, being a core feature in schizophrenia.

Eugen Bleuler, who named schizophrenia, regarded FTD as central for the conceptualization of the disorder². Today FTD remains as one of the diagnostic criteria for schizophrenia according to the DSM-IV-TR³. Although FTD is listed as one of the five characteristic symptoms of the disorder, it has not been operationalized in the manual.

Since early FTD descriptions, there has been a debate on ascribing the symptom to the field of language or thought. Bleuler used the expression *Beziehungslosigkeit* (associative loosening), attributing the symptom to thought. In a different approach, Chaika⁴ recurred to the expression “speech

disorder” to describe the symptom. She stated that only the language is appreciable, not the thought. Likewise, Andreasen argued that we can analyze only the speech, while thinking remains always somehow inaccessible⁵. When approaching FTD, Andreasen used the expression thought, language and communication (TLC), pointing to the construct complexity. Ultimately, the basis for FTD analysis is the verbal behavior, the speech of the patient.

Empirically, thought and language are not perfectly related. For instance, people can use language to hide or distort what they really think. Also, aphasic patients find it difficult to express in words what they are able to think.

In the last two decades the debate on the nature of FTD led to an increasing interest in the relation between

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FTD and primary language disturbances found in schizophrenia. Crow⁶ postulated FTD could be derived from a lack of hemispheric asymmetry in language areas. This article reviews studies on FTD and its association with neurolinguistic abnormalities.

FORMAL THOUGHT DISORDER SYMPTOMS

FTD can be divided into abnormalities of amount and form of speech. Abnormalities concerning amount are poverty of speech (laconic speech) and pressure of speech, while disconnection symptoms relate to the abnormalities in the form^{1,7-9}. Disconnection encompasses distractible speech, loss of goal, derailment (loose associations), illogicality (*non sequitur*), and incoherence.

Besides this most usual description of FTD symptoms, other authors analyzed FTD in the perspective of communication failure^{10,11}. FTD symptoms described by Gordinier and Docherty¹¹ include inadequacy in language structure leading to confusing references (a word or phrase that can refer to at least two references), conceptual weakness associated with the use of ambiguous word meanings and vague expressions, and missing information references (citing something not known by the listener and not previously presented).

FORMAL THOUGHT DISORDER MIGHT BE USEFUL IN THE DIFFERENTIAL DIAGNOSIS OF SCHIZOPHRENIA

Bleuler assigned FTD a prominent place in diagnosing schizophrenia, leading many American psychiatrists to regard thought disorder as a *sine qua non* finding for this diagnosis⁵. Over time, however, FTD has been shown to be associated with many other psychiatric conditions, especially bipolar mania^{12,13}.

Although there are no FTD symptoms which are specific for any disorders, their evaluation might be useful in the differential diagnosis of schizophrenia/schizoaffective disorder and bipolar mania with psychosis (Table). Schizophrenia patients show a greater frequency of vague expressions in discourse than manic patients¹⁴, are more likely to construct ill-formed sentences¹², and to present poverty of speech and its content^{13,15}. In the follow-up, FTD tends to normalize in

bipolar mania and to present little improvement in schizophrenia/schizoaffective disorder¹.

In mania, FTD shows more combinations of confabulatory, incongruous, and mocking elements¹⁶. In turn, FTD in schizophrenia/schizoaffective disorder shows more disorganization, confusion and conceptual or ideational fluency, as well as the use of more peculiar words and phrases^{16,17}.

FORMAL THOUGHT DISORDER – NEUROLINGUISTICS PERSPECTIVE

Many studies focused on speech abnormalities in schizophrenia, and they often do not distinguish what is understood as thought and/or language disorders and cognitive function. In other words, there is not a clear distinction between the content of mental representations stored in the brain, which are derived from innate programs and the progressive experience of interaction with the environment, and language itself, conceptualized as a symbol system that organizes information mentally and also as a behavior that allows interaction with other individuals. A major methodological difficulty arises from the fact that “thought disorders” shall be measured by the verbal output of the patient, making it extremely difficult to differentiate between the former and a primary language disorder. In fact, the terms “thought disorder” and “speech disorder” are often used interchangeably in psychiatric literature.

The first studies on language disorders in schizophrenia described the similarities between this disorder and aphasia, arguing that episodes of “intermittent aphasia” occurred in schizophrenia¹⁸. The speech of schizophrenics apparently shared some characteristics with fluent aphasia: increased fluency on spontaneous speech, paraphasias, impoverishment of content, and idiosyncrasies in the use of words. Comparative studies have also demonstrated similar performance between schizophrenics with language disorder and aphasia on tasks of language comprehension, naming and repetition, with abundant semantic paraphasias present in both cases. However, this approach was not sufficiently consistent across different studies^{19,20}.

The finding that schizophrenia patients have cognitive decline in several areas obscured language impairment, which came to be regarded as secondary to an overall cognitive deficit, and not due to a primary problem in language processing. However, the idea remained that in schizophrenia there

Table. Formal thought disorder in schizophrenia and bipolar disorder.

Disorder	Most characteristic symptoms	Follow-up
Schizophrenia/ Schizoaffective disorder	Disorganization, confusion and conceptual or ideational fluency, and the use of odd words and phrases.	Persistence or little improvement
Mania	Confabulatory, incongruous and mocking associations	Trend to normalization

are difficulties in semantic association and activation of lexical networks, and that these flaws would be responsible for symptoms such as bizarre content of speech, neologisms, and the classic symptom of “word salad”.

In this sense, psycholinguistic studies have shown that schizophrenic patients show difficulties in semantically clustering similar exemplars in tasks of verbal fluency. Another phenomenon observed was an increase in object chaining at the end of sentences (associative intrusions), which could explain the deviations of discourse on the disorder. It is unclear how much these changes are due to hyperstimulation of semantic networks or the nature of attention deficits. Signs of a possible increase in stimulation of semantic networks were also demonstrated in studies of priming in schizophrenics who have been especially sensitive to semantic priming, as compared to phonological priming. Thus, schizophrenic patients seem to have a semantic facilitation, so that the stimulus spreads faster and reaches more distant points in the semantic network²¹⁻²³.

This semantic facilitation could account for the symptom labeled as *glossomania*: when faced with a demand to produce a given word such as “bank” (a financial institution), the patient would be unable to inhibit the semantic associations with “bank” (the side of a river) and a flow of words related to the two meanings would be fired, being the individual unable to exercise adequate control over his production²⁴.

Lexical access difficulties lead schizophrenic patients to an *approximation conduct*, which refers to the use of words that approximate the intended meaning (paraphasias), as “reflector” to “mirror”, and in this approximation process the patient may even create non-existing words (neologisms)²⁵.

Semantic difficulties are particularly important in schizophrenia in order to be treated as the essence of FTD; moreover, schizophrenia is perceived by some authors as a disorder of semiotics^{26,27}.

Another finding is the difficulty in generating narratives based on pictures, with a high occurrence of irrelevant utterances, although without the naming difficulties exhibited, for instance, by aphasic patients²⁸.

The aforementioned findings indicate the predominant involvement in the macrostructure of the discourse, leaving intact the most basic aspects of linguistic processing, such as naming, repetition, and comprehension of words. However, more recent psycholinguistic studies using formal language testing have repeatedly shown deficiencies in the primary processing at various linguistic levels.

Disorders of segmental phonological level are virtually nonexistent in schizophrenic patients. Even when producing neologisms, these patients follow the phonemic, syllabic and emphasis rules of their native language, so that the listener can be induced to think the fault lies in his own perception, rather than on the production of the patient²⁷.

With respect to prosody, there are descriptions of the existence of production dysprosody (when the patient presents

a monotonous speech, which is unable to reflect his emotional state) and of comprehension dysprosody (the inability to identify emotional aspects of the speech of others)^{29,30}.

Pure morphological deficits, such as errors in verb conjugation or in affixation and suffixation to generate derived words are also rare in schizophrenia. When these occur, they are not easily distinguishable from lexical access or syntax errors²⁷.

Regarding syntax there is some degree of dysyntaxia, but not agrammatism. Schizophrenic patients tend to use more simplified phrases and less embedded sentences, showing greater repetition of words, fewer relative clauses, and the increase in syntactic complexity leads to semantic deviations. The grammatical impoverishment seems to be associated with negative symptoms and chronicity of the disease³¹⁻³³. Difficulties in the comprehension of syntax were also observed. However, it may be difficult to differentiate between the primary impairments in syntactic processing from those related to loss of memory, also described in schizophrenia, since changes in working memory may also interfere with the ability to comprehend more complex material. In fact, the interaction between memory deficits, attention and executive functions (supportive functions of language), also present in schizophrenia, may contribute to language impairments found in the disorder^{34,35}. Rodriguez-Ferrera et al.³⁶ suggest that the existing global intellectual impairment in schizophrenia is a determining factor for the bad performance in formal tests of language, also highlighting the difficulty of disregarding the thought disorder as an integral part of these difficulties, which leads to a cause-effect loop.

Losses in pragmatic aspects, or the contextual use of language, are most evident in patients with schizophrenia. They have great difficulty in maintaining the lexical cohesion of discourse, as well as the concatenation of speech segments around a certain theme, through the use of linguistic resources, such as conjunctions, pronouns, repetition, use of similar words, etc. Such handicaps, in turn, are closely related to the difficulty in establishing the reference of speech, or the subject being treated, which becomes based on lexical and prosodic features for the elaboration of the sentence chaining, and those with the preceding context. Moreover, they have difficulty in introducing new information (predicative speech)³⁴. This trait is particularly stable during the disorder, and seems to be related to FTD³⁷. The coherence of the discourse is also greatly affected in schizophrenia, in a way that the discursive production seems to obey no predetermined “plan” to communicate any particular ideas¹², but is rather formed by a succession of emissions not necessarily inter-related (or, as described above, through mechanisms related to phonological or semantic association).

Studies in pragmatics are closely inter-related to another cognitive skill that is greatly impaired in schizophrenia: the “Theory of Mind (ToM)”, or the ability to attribute mental states to others and predict their behavior from these assignments. In some circumstances the distinction between

purely pragmatic disorders and those involving a deficient ToM may be very difficult³⁸.

Advances in the knowledge of language alterations and the recognition of their intimate correlation with thought disorders in schizophrenia has led the disease to be described as a “logopathy”³⁹, or a “language related human specific disease”. One of the most intriguing questions in this topic relates to traits that can be found in relatives of schizophrenic patients, such as grammatical oversimplification and deviant verbalizations present in non-schizophrenic family members of affected subjects^{40,41}, suggesting a genetic association between language and schizophrenia. This association is widely supported by Crow⁴², who defends that the same genetic mutation that allowed the emergence of language made Homo sapiens vulnerable to failures in this system, and these failures may be clinically manifested as schizophrenia. Candidates for such schizophrenia vulnerability are the FOXP2 (which is linked to a familial language disorder and autism) and dysbindin 1 genes^{43,44}.

FORMAL THOUGHT DISORDER MAY BE A SCHIZOPHRENIA TRAIT MARKER

FTD symptoms are not specific to schizophrenia patients, but rather are correlated to schizophrenia spectrum disorders^{45,46} and to a family history of schizophrenia^{47,48}. Wahlberg⁴⁹ found that adoptees of parents with schizophrenia showed more FTD symptoms than adoptees of normal controls. Notably, Ott⁵⁰ and Gooding⁴⁸ found increased FTD symptoms previous to the development of psychosis. Docherty³⁷ showed that FTD symptoms (related to referential disturbances) were stable over time, independently of variances in clinical state, which reinforces that some FTD symptoms might reflect vulnerability to schizophrenia and may be schizophrenia trait markers.

FORMAL THOUGHT DISORDER IS ASSOCIATED WITH STRUCTURAL AND FUNCTIONAL BRAIN CHANGES

FTD in schizophrenia showed correlation with structural abnormalities in the left superior temporal gyrus

(STG)^{51,52}, the left *planum temporale*^{53,54} and the orbito-frontal cortex^{52,55}. Also, studies using positron emission tomography⁵⁶ and functional magnetic resonance imaging^{57,58} correlate left STG with FTD, being thus consistent with structural findings.

TRENDS AND PERSPECTIVES IN THE STUDY OF FTD AND LANGUAGE DISORDERS IN SCHIZOPHRENIA

One possible area of research is the evaluation of FTD and its relation with the outcome of the first psychotic episode. Another area that deserves attention is the relationship of FTD with functional and structural brain changes. The interdependence with the neurotransmitters present in the disease is also a field for research.

Regarding the primary changes of language in schizophrenia, some issues still deserve further investigation, since most of the work to date has focused on semantics and discourse. Other linguistic aspects such as phonology, syntax, prosody, and pragmatic studies still need to be investigated with better methodology, taking into account the recent advances in psychological and neurolinguistics theories and the most recent methods of functional neuroimaging. Studies correlating linguistic and biological dysfunctions (such as genetics and heredity) may also bring valuable contributions to the understanding of the relationship between linguistic processing and abnormal psychopathological processes in schizophrenia and other psychiatric illnesses. Language is a cognitive function that differentiates us as a species, and a deep understanding of its processes is essential. Language is important as a structuring element of thought and sense of self and world, as mediator of reasoning and communication and also for sharing experiences with other human beings. It has a potential to cause disruption of the harmonious functioning of the nervous system as well as the ability to assist in the remodeling of this operation, a factor exploited on a large scale in the various forms of “talking cure”.

Finally, it is worth noting that thought and language, although closely interrelated, are not isomorphic, and that FTD and language impairments are supposed to be studied as separate entities that coexist in schizophrenia.

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