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The Meaning of Statements in Thought Disorders

ABSTRACT

Background and Objectives: In psychiatry, a great role is played by the knowledge of psychopathology, psychiatric semiotics, without which the practical work of a psychiatrist is impossible. A special place in psychiatric semiotics belongs to thought disorders, which symptoms are difficult to define. There are some contradictions in their description and interpretation, but the fact that thought disorders are reflected in the speech of patients is beyond question. Studies of the nature of the relationship between thinking and speech have not yet led to an unequivocal result. Therefore, there is a need to study the diagnostic value of the patients' statements in mental illnesses associated with the pathology of thinking. This is the purpose of this research.

Methods: The paper used the author's method of assessing the meaning of the patients' statements by comparing with a reference meaningful text.

Results: The author analyzed some examples of statements by patients with speech incoherence and schizophasia. The obtained results confirm the main hypothesis of the study: the statements of patients *a priori* have at least some share of meaning.

Conclusions: If a person has problems with thinking and has lost the ability to think consciously, then his/her statements (text, speech) will be deprived of the part of meaning that allows one to freely perceive and understand their sense. However, these statements will contain meaning.

The research results are a discussion paper. It provides a theoretical justification for the hypothesis put forward on the existence of meaning in the statements of patients with thinking disorders. The paper is recommended for discussion and may be of interest to researchers of thought disorder and practicing psychiatrists.

Keywords: Meaning; Thought disorder; Speech; Speech incoherence; Schizophasia.

INTRODUCTION

Scientists have long noticed that a special relationship is established between thinking and language. There are two main approaches to this issue. Proponents of the first approach believe that thinking is inextricably linked to language. This point of view can be traced in the studies of Kant, V. von Humboldt, Muller, other philosophers and linguists. Proponents of the second approach believe that mental activity is possible without the participation of language. This point of view

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can be traced in the studies of Piaget, Vygotsky, Russell and other scientists. For example, Piaget believes that "language does not fully explain thinking... language is a necessary but not sufficient condition for the construction of logical operations" [1]. In this question we adhere to Nalimov's point of view about spontaneity of consciousness [2]. This view leads to an understanding of the probabilistic relationship between thinking, language, and speech. The question of the nature between thinking and language has been repeatedly discussed by various psychological doctrines, but so far it has not been possible to come to an unequivocal answer to this question. The only fact that almost no one doubts, is that thought disorder is reflected in the speech of patients.

In case of incoherent thinking, human speech consists of individual fragments of past memories, between which it is impossible to establish any connection. It is characterized by a random, chaotic set of words that are not related either to the semantic or grammatical context. In case of schizophasia, phrases are constructed correctly, but do not carry any semantic sense. In severe epileptic dementia, patient responses are monotonous and stereotyped.

Despite all the difficulties in communicating with a patient suffering from thought disorder, a doctor should carefully clarify his/her thinking specifics, logics of statements and reasoning, focus, criticality and literacy of constructing phrases. The appearance in the lexicon of a person of new, usually not used words and turns of speech, excessive detailing of facts warns of disturbed thought processes.

In such circumstances, when the patient and the doctor speak as if in "different" languages, the conversation is a very difficult task. Even experienced and knowledgeable doctors often lack the ability to properly talk with those mentally ill, and as a result they cannot get the necessary information about the clinical picture of the disease. Gannushkin [3] describes the skill of talking with a patient as follows: "Our best psychiatrists – Kraepelin being German, Magnan – French, Korsakov – Russian, were great masters, even artists, in talking with patients, in knowing how to get from a patient what they needed to; each of them approached the patient in his own way, each of them had strengths and weaknesses, each reflected himself in this conversation, with all his spiritual qualities. Korsakov brought his extraordinary gentleness and kindness, his inquisitiveness to the conversation with the patient; in his followers, these qualities turned into hypocrisy. Kraepelin was abrupt, sometimes even rude. Magnan – mocking and grumbling. This, however, did not prevent all three from loving the mentally ill person most of all – the patients understood this and willingly talked with them".

Studies of the nature of the relationship between thinking and speech have not yet led to an unequivocal result. Therefore, there is a need to study the diagnostic value of the statements by patients with mental illness associated with the thought pathology. This is the purpose of this research.

METHODS

Basic concepts of the method of probabilistic evaluation of the meaning of statements

When examining a patient, the doctor, first of all, seeks to understand the meaningfulness of his/her speech. From the author's point of view, meaning is a person's thought encoded by certain language signs or signals, emerging in the process of thinking. Signs and signals form a chain of meaningful connections – a code containing the meaning.

The method for estimating the value of meaning used in this study was developed on the basis of the author's publications [4-10] and an analysis of the literature [11-13].

The method is based on the following assumptions:

1. Meaning and sense are two different concepts. According to Frege, "value" is a "denotate" [13].

2. Meaning is the information that the sign carries about its denotate. The amount of meaning (meaningfulness) depends on the way a person presents this information.

3. Meaning has a probabilistic nature and is enclosed in a bundle of words (a chain of semantic links), combined by a person in a random way.

For a quantitative assessment of semantic links, it is necessary to calculate the entropy for each word [14], and then to find the difference of entropies between two adjacent words throughout the text. Since the selection of words by a person is a random process, the difference between the entropies *(ΔH) will be a random value. The histogram of ΔH* has an exponential distribution law, the parameter of which in the form of differential entropy *H(ΔH)* being the value of the meaning assessed. According to the approach proposed by Nalimov [2], the semantics of each specific text is given by its distribution function – the density of probability.

As an example, the author analyzed two types of texts with different levels of meaningfulness. The first is news [15] and popular comments on current topics on the Internet [16]. The second is comments on an article on schizophrenia [17]. The assumption that the texts of the first type contain more sense than the texts of the second type, has been confirmed by the results of calculations. It was found that the graphs of probability density functions for both types of text intersect at one common point. This may mean that in terms of semantic connections (differences of entropies of adjacent words) at the intersection point and its surroundings both types of texts have approximately the same meaningfulness. That is, if a graph of the probability density of a deliberately meaningful text is superimposed on a graph of the patient's statements, then it is possible to identify the bundles of words of statements that are likely to contain the meaning.

On the basis of the result obtained, the author formulated a hypothesis which is as follows. The patient's statements *a priori* have at least a certain amount of sense. If a person has problems with thinking, then his/her statements (text, speech) will be deprived of the part of meaning that allows one to freely perceive and understand their sense to other people. But, nevertheless, these statements will contain the meaning.

RESULTS

To test the hypothesis put forward, the author used such concepts of thought disorder as speech incoherence and schizophasia.

Speech incoherence is a speech disorder in which grammatical connections are broken and speech consists of an inordinate set of words ("verbal mix") or even meaningless neologisms. The following speech fragment, borrowed from [18], illustrates this disorder:

"How do you feel?"

"Where is Petya ... I went to sleep. What do they want? And yesterday was ... everything is there ..."

"Where are you?"

"Where ... Everyone is here ... Turn off the light. Where's my wife? I went ... So how? Lost glasses ...".

Schizophasia or speech discontinuity is a symptom of mental disorders, manifested in a violation of the structure of speech. At the same time, phrases are constructed correctly, but they do not carry any semantic sense. As an example of schizophasia, the following fragment is borrowed from [19]:

"Was born on Herzen Street, in a grocery store number 22. A well-known economist, by nature librarian. Among the people – a collective farmer. In the store – a seller. In economics, so to speak, necessary ...".

Figure 1 shows the graphs of the probability density functions of the exponential distribution of the random variable ΔH over the reference text (the first type of texts described above) and the text of speech incoherence from the above example.

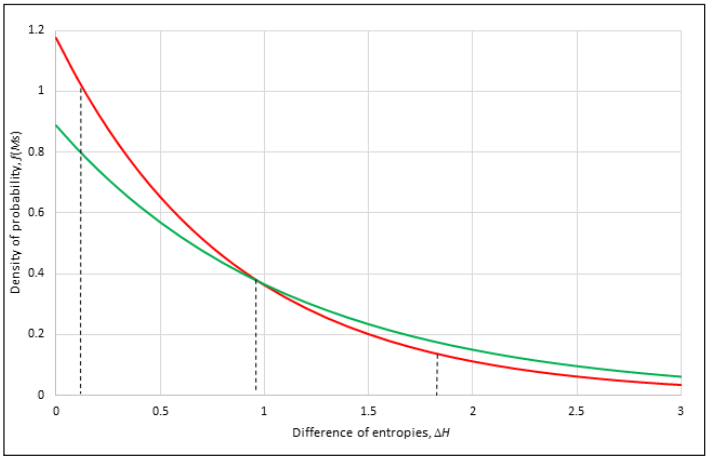

Figure 1: Graphs of probability density functions of exponential distribution of the random variable ΔH of the reference text and speech incoherence. Legend: green line – reference text; red – speech incoherence.

In Figure 1 it can be seen that both graphs intersect at the point corresponding to the difference of entropies ΔH = 0.98 bits / symbol. Taking into account the mean square error $\Delta H = \pm 0.85$ bits/symbol, the interval of possible values of ΔH will be within 0.12 ÷ 1.83 bits/symbol. In this range, the following bundles of words were selected from the text of speech incoherence: *what they want and yesterday was everything there are is here put out the light where is the wife go from here everything is good wife came again yesterday and the mother is so young.*

Highlighted words can be interpreted as follows. The patient is annoyed by the frequent presence of outsiders (*and yesterday was*). Obviously, he wants peace and solitude (*put out the light*), feels discomfort and wants to leave his whereabouts (*go from here everything is good*). Of people, the closest and dearest relatives are of interest to the patient: the wife (*where is the wife, the wife came yesterday again*) and the mother (*and the mother is so young*).

The interpreted text is the meaning (denotation) of the

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patient's statements. Although this text represents a subjective assessment of the authors, nevertheless, according to the hypothesis put forward, the selected words most likely contain the meaning.

Figure 2 shows the graphs of the probability density functions of exponential distribution of the random variable ΔH over the reference text (the same type) and the schizophasia from the above example.

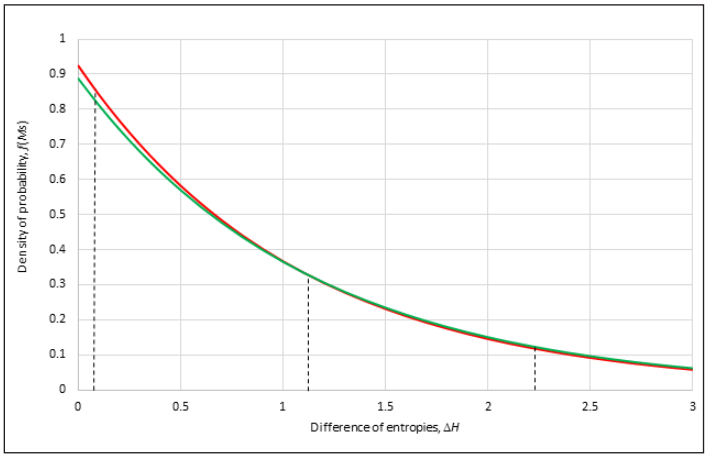

Figure 2: Graphs of probability density functions of exponential distribution of the random variable ΔH of the standard text and the schizophasia. Legend: green line – reference text; red – schizophasia.

In Figure 2 it can be seen that both graphs intersect at the point corresponding to the difference of entropies ΔH = 1.15 bits/symbol. Taking into account the mean square error ΔH = ± 1.08 bits/symbol, the interval of possible values of ΔH will be within 0.07÷2.23 bits/symbol. In this range, the following bundles of words were selected from the text of schizophasia: *born on Herzen street number twenty-two, a well-known economist by nature is librarian for the economy so to speak required for another line can be photographed to become an air ace fluctuates only for family in store twenty-two it can split economy into economists into sellers on the culture of trade*.

Perhaps the patient talks about his biography (*born on Herzen street number twenty two, a well-known economist*). However, he has fluctuations in relation to the profession of economist (*by nature is librarian for the economy so to speak required for another line*) and gives a list of possible activities (*can be photographed to become an air ace*). Most of all, he is worried about his family (*fluctuates only for family*). The patient often mentions a shop (grocery) at number twenty-two. It is possible that this store is associated with memories of the psycho-traumatic situation that occurred with him in this store (*in store twenty-two it can split economy into economists into sellers on the culture of trade*).

The text of this example consists of 283 words, but according to the hypothesis put forward, it is the given 45 words that most likely contain the meaning.

Thus, according to the approach developed in this work, the semantics of each specific text is given by its distribution function–the density of probability. The essence of the disclosure of meanings lies in the imposition over the universal global continuum of meanings (the reference text, which obviously contains the meaning) of particular texts (the statements of patients). The intersection point of the graphs of probability functions of the patient's statements and the reference text indicates the presence of meaning.

CONCLUSIONS

According to [18], some scholars have concluded that after discharge from the hospital, for patients with schizophrenia returning to their families, the prognosis is usually worse than for those who go to a special hostel for those mentally ill. Relapses are most frequent in families where relatives make critical remarks, show hostility and demonstrate signs of heightened emotional distress toward patients.

It is possible that a person suffering from thought disorder lives in his/her own separate world, with own language of communication, which is difficult for people from the "other" world to understand. Hence, there is a misunderstanding between people and, as a result, thought disorder continues to progress. This paper aims to fill this gap and learn to find common sense even in very spontaneous statements. An analysis of the bundles of words obtained by the described method will allow one to get to the core and understand the meaning of the patients' statements, i.e. find a common language with him/her.

The theoretical calculations presented in this paper require experimental verification in clinical conditions. However, this is a separate big topic for research. Currently, the authors continue theoretical studies on the relationship between thinking and language. In the basis of these studies is the Nalimov's hypothesis on the spontaneity of consciousness.

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