

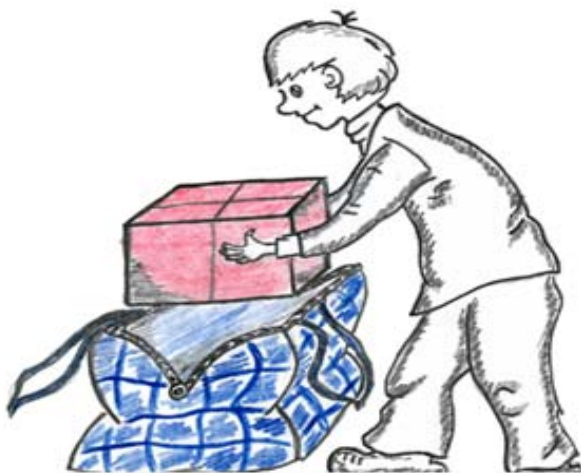
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Understanding logical-grammatical constructions: enhanced diagnostic test¹

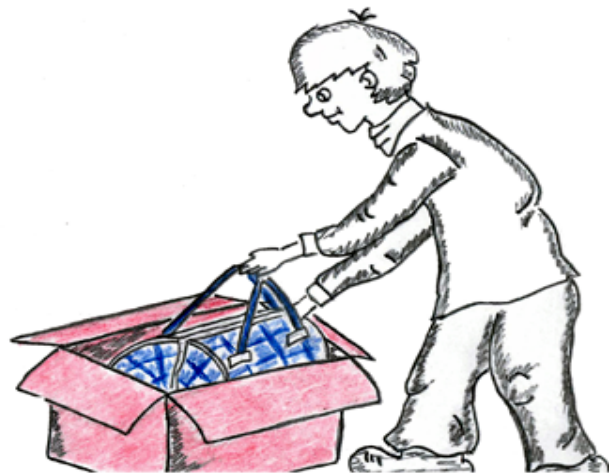
According to the theory of dynamic and systemic organization of higher cortical functions (Luria, 2002), spatial impairments show themselves not only in perception (visual or tactile), but also in understanding of certain sentence types – the so-called 'logical-grammatical constructions'. Testing these constructions is traditionally included in the neuropsychological diagnosis of semantic aphasia (Tsvetkova et al., 1981). The aim of this study was to design and standardize an enhanced diagnostic test, which would allow to more precisely detect the severity and the character of speech disorders in patients with semantic aphasia.

The test includes both linguistic (sentences) and corresponding visual (pictures) materials. At the first stage, 120 sentences were designed. They break into five main types (24 sentences each) of the reversible logical-grammatical constructions: prepositional (*The boy is putting the box into the bag*), comparative (*The tree is higher than the house*), possessive (*The pilot of the plane is burning*), instrumental (*The old woman is covering the hat with the scarf*) and temporal (*The boy eats before he goes to bed*). In these situations pragmatics does not help and only grammatical markers are a reliable source for interpreting relationships between the two objects.

In addition to linguistic materials, visual stimuli were developed: for each of the sentences two pictures were made. One illustrated the situation described in the sentence; the other illustrated an opposite situation. For instance, if we are talking about the sentence *The boy is putting the box into the bag*, the first picture will represent a boy putting a box into a bag (pic. 1), and the second one will represent a boy putting a bag into a box (pic. 2). The test includes 240 pictures.



Pic.1



Pic.2

Also, to make a contrast with reversible sentences, another 48 irreversible sentences belonging to the same five types were constructed: e.g. *The boy is putting the apple into the bag*. For each of these 48 sentences two pictures were made. One picture illustrated the situation described in the sentence (for the

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aforementioned sentence – see pic. 3), and the other was irrelevant (pic. 4). Since these sentences can be correctly interpreted regardless of grammatical indicators, they should not cause difficulties in patients with semantic aphasia.



Pic.3



Pic. 4

Next obligatory stage in standardized diagnostic test design is to find out how normal speakers assess the test materials. So, we collected and processed normative data obtained from healthy native Russian speakers. 89 adults without neurological disorders took part in this study. In most cases these were students of Moscow universities (64 females and 25 males, mean age – 21 years). Three lists of materials were distributed among respondents, 30 persons per list 1 and list 2, and 29 – per list 3.. Sentences were presented in a random order. The instruction was to estimate the plausibility of these sentences on a scale from 1 to 5 (1 - totally implausible sentence, 5 – totally plausible). The mean estimate was 4,1 (SD=1,2). All the sentences with estimates, which overstepped the limits of one standard deviation from mean estimate, were judged as unnatural and replaced. Statistical analysis revealed that irreversible constructions are estimated significantly higher than reversible. It can be explained by pragmatic accessibility of sentences, which removes ambiguity. This accessibility causes higher estimates, because interpretation of these sentences is supported with the real world knowledge. Secondly, it was found that there are constructions that are more ontologically accessible, because they describe observable real-world every-day situations. These constructions (prepositional, instrumental and temporal) are estimated significantly higher than constructions, which are based on the abstract metaphors of location and movement (comparative and possessive).

To conclude, a standardized set of natural Russian sentences has been designed. This set includes five types of constructions, which are traditionally used in the neuropsychological diagnosis of the semantic aphasia. Together with the visual material it creates a basis of the enhanced test for interpreting logical-grammatical constructions diagnosis: the subject gets to see two pictures (presenting two reversed situations) and one sentence. S/he has to find the picture, which corresponds to the meaning of the sentence. It is expected that reversible constructions will pose more problems for the patients with semantic aphasia, than irreversible ones. Still, as this effect has been observed also for the group of healthy respondents, for the diagnosis of speech pathology it is necessary that in patients significantly higher differences be observed. Another interesting effect is the Complexity Hierarchy for different types of logical-grammatical constructions. Whether a similar effect will be found in patients with semantic aphasia is the topic of further researches.