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Section: Theoretical framework

Vygotsky's Concepts of "Inner Speech", "Sense", "Inner Speech Field" and Situation Model of Text

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Abstract

In this article, we address the contribution of Vygotsky to contemporary knowledge of language comprehension and production including their development. We compare his concepts of "sense" and "sense field", or "inner speech field", with state-of-the-art concepts of situation model of text and embodied comprehension. According to Vygotsky, the speech comprehension comprises several sequential stages which include decoding of the external speech meaning, then its translation into senses in inner speech, and, finally, identification of a thought and motive of an interlocutor. Language production is a reversed process.

Therefore, in Vygotsky's opinion, sense is the content of inner speech which mediates language production and comprehension. Vygotsky's concepts are compatible with present understanding of the situation model of text on the deepest levels of language production and comprehension. Furthermore, his ideas have greater explanatory power, in particular, due to developmental analysis of the inner speech field. Its development implies interiorization of external forms of mental activity and divergence between optical and sense fields, resulting in emergence of the internal aspect of consciousness.

Key words: inner speech, sense, inner speech (sense) field, situation model of text, Vygotsky

Contemporary studies of text comprehension unanimously suggest that a reader or listener generates a situation model (Van Dijk & Kintsch, 1983) or a mental model (Johnson-Laird, 1983) of what the text is about in the final stages of its comprehension. Nowadays the majority of authors hold the opinion that a comprehender generates a representation of the surface structure of a text and a propositional representation of the semantic content which are complemented by an analog model of the situation described in the text (Schnotz & Bannert, 2003; Weaver et al., 1995; Zwaan & Radvansky, 1998). Therefore, the generation of the situation model assumes the integration of a verbal semantic structure with an analog visual or polymodal perceptual representation (Barsalou, 2008; Zwaan, 2016). During familiarization with the text, symbolic and sensorimotor representations complement and restrict each other online. These representations activate associations in long-term memory, thereby actualizing the inferences (Graesser et al., 1994; Johnson-Laird & Byrne, 1991; Kintsch, 1998; Zwaan & Madden, 2005). As a result, a comprehender constructs a holistic meaningful gestalt of the situation model where personal experience and its emotional evaluation also play an important role (Bartlett, 1932; Kneepkens & Zwaan, 1995; Zwaan, 2016).

As for the brain underpinnings of this process, text comprehension is reported to be associated with bilateral hemispheric activation, in contrast to predominantly left-sided lateralization of language production. Novel studies with simultaneous PET-fMRI revealed that language comprehension engaged language areas of the left hemisphere and homologous regions of the right hemisphere. Furthermore, the language areas were functionally coupled with the regions important for creation of the situation model (anterior medial prefrontal cortex, temporal-parietal-occipital region in the right hemisphere, and precuneus) and the regions involved in the generation of a sensorimotor representation of events described in the text (AbdulSabur et al., 2014; Chow et al., 2014, 2015). During reading of literary texts, one

group of readers mentally simulated the actions of the characters and demonstrated higher activation in motor and visual cortices, whereas another group of readers imagined the described emotional experience which predominantly engaged the mentalizing system, in particular the anterior medial prefrontal cortex (Nijhof & Willems, 2015). The temporo-parietal junction in the right hemisphere, a part of the mentalizing system, is also activated in social inferential tasks and non-social observations (for instance, Posner's spatial cueing tasks). Therefore, it is possible to assume that this region "computes the orientation or direction of the behavior in order to predict its likely end-state (or goal)" (Van Overwalle & Baetens, 2009).

The presence of a sensorimotor representation of a text (or mirroring) as a part of the situation model allows researchers to consider embodied comprehension. According to this theoretical framework, comprehension involves a multimodal simulation including the retrieval of a comprehender's perceptual, motor, and affective knowledge through reactivation of the brain regions responsible for perception, action, and emotions (Barsalou, 2003; Chow et al., 2014, 2015; Kurby & Zacks, 2013; Meteyard et al., 2012; Zwaan, 2016; Zwaan & Madden, 2005). The comprehender's past experience associated with situations and actions described in the text was found to selectively modulate functional connectivity between the lower- and higher-order brain regions involved in visual or motor processes. These intermodal interactions substantially contribute to the integration of personal knowledge on the described situation with an emerging representation of the text content (Chow et al., 2014).

The Russian psychology of speech and language considers the process of text comprehension to be a transition from a word to sense (Leontiev, 1969, 1997, 2001; Luria, 1976, 1979, 2004; Murzin & Shtern, 1991; Sorokin, 1985; Vygotsky, 1987; Zalevskaya, 1999; Zimniaya, 1976). To what extent is the Vygotskian concept of sense compatible with

the state-of-the-art understanding of text comprehension? How does the Vygotskian framework contribute to the body of knowledge on this process?

According to Vygotsky (1987), sense is a word's meaning determined by the context:

A word's sense is the aggregate of all the psychological facts that arise in our consciousness as a result of the word. Sense is a dynamic, fluid, and complex formation which has several zones that vary in their stability. Meaning is only one of these zones of the sense that the word acquired in the context of speech. It is the most stable, unified, and precise of these zones. In different context, a word's sense changes. In contrast, meaning is a comparatively fixed and stable point, one that remains constant with all the changes of the word's sense that are associated with its use in various contexts... The word absorbs intellectual and affective content from the entire context in which it is intertwined. (pp. 275-276)

In his monograph "Thinking and Speech", Vygotsky (1987) writes that only identification of the *motives* which lead to emergence of a thought and direct its flow allows one to fully understand the thought of an interlocutor. The *thought* itself is characterized by Vygotsky (1987) from two points of view. First, "any thought strives to unite something with something else. Thought is characterized by a movement, unfolding. It establishes a relationship between one thing and another. In a word, thought fulfills some function. It resolves some task" (p. 280). Second,

Thought does not consist of individual words like speech. I may want to express the thought that I saw a barefoot boy in a blue shirt running down the street today. I do not, however, see separately the boy, the shirt...I see all this together in a unified act of thought... Thought is always something whole, something with significantly greater extent and volume than the individual word... *What is contained*

simultaneously in thought unfolds sequentially in speech. (p. 281, italics by Vygotsky)

To understand the relationship between these two characteristics, namely how the simultaneous holistic thought unfolds and is mediated by an inner word, we need to consider the Vygotskian concept of the field of senses (sense field, *smyslovoye pole*), or inner speech field (*vnutrennee rechevoye pole*)¹. Vygotsky introduced this concept on the basis of Lewin's ideas about the psychological field in 1932-1934 (Zavershneva & van der Veer, 2018) and applied some concepts of the field theory. In his work "The Problem of Mental Retardation", Vygotsky (1993) cited Köhler's opinion that an intellectual act involves a change in structural relationships in the field: "Structures in the field of vision change abruptly and a new grouping of individual wholes takes place within these structures" (p. 222). The field is restructured through the generation of the whole similar to gestalt, when "two elements, which are separate from one another, become dependent parts of a single whole, or an initially single entity splinters into relatively independent areas" (Vygotsky, 1993, p. 227). This ability of the inner speech field to create gestalts underlies the integrity of sense which is the starting and the end point in speech production and comprehension. Importantly, Vygotsky ascribes two different fundamental characteristics to sense in the field: sense exists in the field as a *dynamic* and *integral* structure. Therefore, Vygotsky addresses a dynamic gestalt which does not coincide with the classical understanding of gestalt as a static structure in equilibrium.

Sense is the content of inner speech. Together with motive and thought it underlies the future utterance or completes text understanding (Vygotsky, 1987). Inner speech characterized by reduced phonetics, predicativity, and unique semantic structure (Vygotsky, 1987) serves to translate thought into word and word into thought. According to Vygotsky (1987), language production "moves from the motive that gives birth to thought, to the

¹ The term *smyslovoye pole* / *vnutrennee rechevoye pole* was translated not as "semantic field" which is the common translation (e.g., Zavershneva & van der Veer, 2018) but as "sense field" / "inner speech field". We chose this translation as the translation "semantic" mixes two terms which are contrasted in Russian, namely "*smysl*" (sense) versus "*znachenie*" (meaning; "semantic" is related to meaning).

formation of thought itself, to its mediation in the internal word, to the meanings of external words, and finally, to words themselves” (p. 283). During language comprehension, the movement is reversed: external speech – level of meanings – inner speech – thought – motive.

According to Vygotsky, a word in inner speech carries the content extending well beyond its meaning. Similarly, one of the famous contemporary researchers of language comprehension argues that the current meaning of a word, particularly an abstract one, is instantiated by the situation. A word can either serve as a pointer to previous information (sensorimotor representation) in memory, or be used as a placeholder in working memory for the accumulation of subsequent information on situational instantiation (Zwaan, 2016). There is an important similarity in the structure of inner speech and the situation model of a text. Words in inner speech, in addition to their linguistic meaning, carry the situational and personal meanings provided by the sense field. The situation model combines a propositional verbal structure with analog perceptual information. Word meanings with their permanent location in the categorical (significative) semantic network (or referential network in the case of concrete meanings) acquire the situational content through inferential links including perceptual representations. Therefore, in inner speech, or, in the terms of cognitive science, in the situation model of a text, the meaning of a word (symbol) serves as two-faced Janus. One side addresses linguistic systems, and the other side refers to the situational associations which create a dynamic unity of senses.

Russian neuropsychological studies revealed that lesions to the posterior frontal regions of the left hemisphere led to the adynamia of thinking (Luria, 1966a, 1966b), whereas dysfunction of the right hemisphere was associated with impaired retention of sense integrity in picture descriptions (Akhutina, 2005, 2009, 2014; Akhutina et al., 2009). For example, when a participant was describing a picture with a boy on a tram inviting an old woman to

take his seat, this participant could say: “He invites this woman to visit him” / “An old woman wants to give him a cake”. This is a distortion of meaning of the situation. These data correspond to the viewpoint of cognitive researchers on the role of the right hemisphere in text comprehension and construction. They postulate that “right hemisphere processing is best characterized as ‘integrative’; new information is compared directly with context information” (Federmeier & Kutas, 1999, p. 373); “the right hemisphere plays a critical role in managing inferred or implied information by maintaining relevant information and/or suppressing irrelevant information. Deficits in one or both of these mechanisms may account for discourse deficits following right hemisphere damage” (Johns et al., 2008, p. 1038). The existing data suggest that the left hemisphere is characterized by narrow and strong categorical semantic activation which is especially important for selection of words during language production. The functioning of the right hemisphere, meanwhile, is associated with weak and diffuse activation of a broader semantic field. It is effective in the understanding of a metaphor or context and in linking different contexts (Beeman, 1998; Fassbinder & Tompkins, 2006; Johns et al., 2008; Jung-Beeman, 2005). To conclude, these data indicate the compatibility of Vygotsky's concept of sense with the state-of-the-art understanding of the situation model in text comprehension.

In our opinion, Vygotsky's contribution to the body of knowledge on text comprehension also includes his analysis of the emerging inner speech fields in childhood. Vygotsky's ideas on the interiorization of external forms of mental activity shared between a child and an adult, and their transformation into internal higher mental functions explain the embodiedness of speech comprehension revealed by contemporary studies. According to Vygotsky, the development of mental systems (e.g., executive control of actions) is a three-stage process. The first – inter-psychological – stage implies cooperative external actions. The second – extra-psychological – stage involves independent external actions of a

child. Finally, the third stage which includes independent internal actions is intra-psychological (Vygotsky, 1987). As it was correctly noted by Zavershneva (2015), the sense (inner speech) field in its genesis passes through the same stages and creates an internal aspect of consciousness (*vnutrennii plan soznaniya*) as a result. In his article “Play and its role in the Mental Development of the Child”, Vygotsky (1966) argues that the central fact of consciousness common for children at an earlier age is a unity of affect, perception, and motor action. He clarifies:

At this age perception is generally not an independent feature but an initial feature of a motor-affective reaction; i.e., every perception is in this way a stimulus to activity. Since a situation is always communicated psychologically through perception, and perception is not separated from affective and motor activity, it is understandable that with his consciousness so structured the child cannot act otherwise than as constrained by the situation – or the field – in which he finds himself. (Vygotsky, 1967, p. 11)

Making further comments, Vygotsky draws on Lewin's theory on the incentive character of objects in earlier childhood, when the objects dictate what a child must do, dictate field behavior. At this inter-psychological stage, the field of action, perception, and affect (sensorimotor, or optical field) and the sense field have not been divided yet.

Segregation of these fields takes place in the game for the first time, at the extra-psychological stage, when objects lose their incentive feature. A child begins to act regardless of what he or she sees but relying on his or her inner motives. Thus, the sense field is considered an “inner independent field” which enables to break away a thought from a thing (Zavershneva, 2015). Vygotsky (1967) clarifies: “But the moment the stick—i.e., the thing—becomes the pivot for severing the meaning of “horse” from a real horse, the child makes one thing influence another in the semantic sphere”² (p. 13). Therefore, a child makes

² More precise translation: in the sense field (T.A., Ya. P.).

an object to influence another object in the sense field. This example demonstrates the possibility of interplay between senses and their transmission in the sense field of the game. Vygotsky addressed this issue while characterizing word semantics in inner speech. In fact, the same is meant by Zwaan (2016) who refers to the change of word meaning in a particular situation when the constant linguistic meaning becomes a carrier of the sensorimotor representation. What is the difference between the movement in the sense field in preschoolers' game and its change in an adult? Vygotsky (1967) wrote:

This movement in the field of meaning predominates in play: on the one hand, it is movement in an abstract field (a field which thus appears before voluntary operation with meanings), but the method of movement is situational and concrete (i.e., it is not logical but affective movement). (p. 15)

Emergence of the sense field contributes to the development of abstract thinking and voluntary action as it provides an opportunity to separate the action's sense from the action per se and the situation's sense from the circumstances in which it takes place (Zavershneva, 2015).

Only the extra-psychological stage in the development of the sense field was described in detail by Vygotsky³. Data on previous developmental stages of the child's orientation in the world are provided by Michael Tomasello, the famous researcher of phylo- and ontogeny of the human mind. According to him, a capacity for shared intentions provides the basis of human activity, communication, and thinking (Tomasello, 2008).

Tomasello (2008) considers pointing and iconic gestures to be the first specifically human ways of communication. The pointing gesture plays a primary role in children's communication. To apply a gesture, someone needs to identify the interlocutor's intention which requires a skill of following the gaze, joint attention, and gained experience of

³ For the description of further stages, see the work by Zavershneva (2015).

interaction. The revolution in social and cognitive development takes place at the age of 9 months old, according to Tomasello (2008). The children acquire an ability to follow the direction of an adult's gaze and the key prerequisites to understand and share intentions of other people. By the age of 9 months old, infants increase attention to the objects which are in the focus of joint attention in contrast to other objects (Striano et al., 2006). This triadic joint attention (a child, an adult, and an object) establishes the conditions for matching an object to its name and further development of language and thinking (Bates et al., 1975; Bates et al., 2003; Tomasello, 2008).

According to Tomasello (2008), the abilities to understand intentions of other people and share them are almost completely developed before language acquisition is started. This basic structure allows participants of communication to create shared conceptual spaces. These spaces contain *the context of senses, or the sense field*, which is integrated with an optical field but enables children to match a word to a meaning and explore the world through joint actions with an adult. In line with some data, children divide sequential actions into units by setting boundaries that correspond to the start and the end of intentions (Baldwin et al., 2001, as cited in Brooks & Kempe, 2012). Therefore, we may assume that the shared conceptual spaces are represented in children as goals. The experiments demonstrate that as early as by 12 months infants encode goals in preference to sources (location of an action); they spend more time looking at the situations with the changed goal compared to the changed action location. By 18 months, the infants are able to imitate an intended action even if an adult being observed failed to complete it (Lakusta et al., 2007 and Meltzoff, 1995, as cited in Brooks & Kempe, 2012). Therefore, the abilities to share intentions and identify the aims of actions (i.e., understand the situation sense) underpin the accumulation of knowledge about the world and the development of consciousness. Knowledge acquisition in childhood is closely linked to the affective and volitional basis of perception and action. These

associations have been revealed in the studies of embodied cognition including embodied text comprehension.

To conclude, our analysis demonstrated the compatibility of Vygotsky's concepts of inner speech, sense, and sense field with the state-of-the-art concepts of speech comprehension, situation model of a text, and embodied comprehension. Furthermore, Vygotsky's theory is able to explain the embodied comprehension through the development of inner speech field. This development implies interiorization of external forms of mental activity shared with an adult and divergence between the sense field and the optical/sensorimotor field. We agree with Ekaterina Zavershneva (2015) who states that in Vygotsky's approach, the sense field, on the one hand, is a theoretical construct, on the other hand, it is a real entity characterized by a clear process of development including the extra-psychological stage when the field is externalized in game and the final stage when it becomes an internal aspect of consciousness. We also agree with her that the concept of sense field reflects the word's mediatory role between consciousness and the world, and demonstrates the contribution of language to the reorganization of consciousness in human cultural development.

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