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Vygotsky's natural history of signs

Lauri Linask

Department of Semiotics
University of Tartu
Jakobi 2, 51005 Tartu, Estonia
e-mail: lauri.linask@ut.ee

Abstract. The paper organizes the topic of signs in Lev Vygotsky's various writings into a coherent whole in order to study signs' role in child development. Vygotsky related conventional signs that have their origin in interpersonal communication, and are subject to cultural history taking place over generations during historical time, to psychological functioning of individual human beings. Vygotsky's "natural history of signs" is the study of how symbolic activity appears and develops. The paper outlines the process of inclusion of symbols within the behaviour of the child and gives an account of various changes in psychological functions and their interrelations that it brings along. In cultural development specifically human forms of behaviour appear, and children's relationship to social and material environment is changed qualitatively. Vygotsky outlines the formation of sign use and analyses its developmental steps. Vygotsky's approach explains how the use of various sign systems shapes both the cognitive processes in the person, the child, and the cognitive development as a whole. Vygotsky's approach to signs is presented within the conceptual framework of its time.

Keywords: development of symbols; development of sign use; signs as tools; symbolic activity; cognitive development

Introduction

Lev Vygotsky's (1896–1934) works have enjoyed great popularity in recent years, supported by a rising number of their new publications, interpretations and re-evaluations in English. Besides developmental and cultural psychology, Vygotsky's approach has also been slowly gaining ground in semiotics, especially in its educational applications (e.g. Liu 2011; Robbins 2001, 2003). Thanks to several collections of works by various authors, edited by James Wertsch (e.g. Wertsch 1985a; Daniels *et al.* 2007), and of course his own writings (e.g. Wertsch 1985b; 1985c; 1991), Vygotsky's approach has to some extent been acknowledged

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as semiotic in its core. Yet as concerns the interpretations of semiotic topics in Vygotsky's works in psychology, signs have remained secondary or marginal compared to the focus on psychological processes, and therefore under-reflected in terms of semiotic theory. Often, Vygotsky's writings on signs have been adopted for semiotics and psychology only in fragments, which have left either a one-sided or even a contradicting impression of them. In addition, while being discussed in psychology, education, and semiotics, it is particularly his treatment of the topic of signs that has been mostly covered only from the distinct point of view of signs as tools. The extent to which signs take the dominant central part in his approach has thus been realized much less. The present paper aims to improve this situation by collecting and organizing Vygotsky's writings on signs into a coherent whole. The paper outlines a psychological and developmental approach to signs, as well as a study of the role of culture in the individual development of humans.

Vygotsky's approach to signs provides a framework for research into a variety of specifically semiotic topics regarding the development of signs and sign use in children. By organizing Vygotsky's concept of signs, this study brings together various aspects of the problem of children's "cultural development". It relates the use of cultural sign systems, which are developed during historical time – e.g. language, writing, gestures, etc. – to different psychological functions such as, among others, perception, attention, memory, practical problem solving and tool use, which develop in the individual, providing an integrative cognitive theory of signs. By doing that, it gives a developmental account of the acquisition of the use of these signs systems, and at the same time, an account of the concomitant changes that take place in the psychological functions. It also provides an analysis of the dynamics of changing relationships between these functions in such a way that acquisition of sign use reorganizes them in relation to one another from a higher level. As a result of this development, the signs that children learn to use change, giving ground to new psychological functions, which are based on their inclusion, forming a history of signs and their use that is, to a degree, independent of the processes of organic maturation. This study provides a broad framework for studying the relationship between culturally shared sign systems and the cognitive development of children.

Sources regarding the topic of signs in Vygotsky's works

Vygotsky's views on development and signs evolved considerably over his short, but very productive career in psychology in the late 1920s and early 1930s. As with other author-centred discussions, the question is to what extent his works form a

consistent whole, and to what extent truthfulness and authenticity to his original writings depends on including their full extent. A short outline of sources used for this paper and the principles of their selection is in order, as well as a discussion of some of the problems with using these sources.

The main sources for the present study include "The problem of the cultural development of the child" dating from 1929 (Vygotsky 1994[1929]); "Tool and symbol in child development"[1] from 1930 (Vygotsky, Luria 1994); "The history of the development of higher psychological functions" from 1931 (Vygotsky 1997); and "Thinking and speech" from 1934[2] (Vygotsky 1986[1934]).

The first of these outlines the so-called cultural-historical theory; the second adds in detail what acquisition of symbols brings to practical thinking and cognition, including a comparison with Köhler's (1925[1921]) findings in species other than human; the third provides somewhat more detailed descriptions of Vygotsky's and his colleague's experiments regarding symbols, and explains what symbols bring to various psychological functions, e.g. perception, memory, attention, practical problem solving, to name but a few; and the last focuses on the stages of changes in the relationship between verbal symbols in speech and thinking. All these works partly overlap and complement one another.

Vygotsky's writings show that he comes back to the same topics repeatedly, rephrasing, correcting, and (re-)developing them. Vygotsky explicitly distinguishes between signs and meanings in his writings as early as in 1924, already then focussing on the latter (Van der Veer, Valsiner 1991: 65), and he writes about signs in various published and unpublished papers; however, the core and all the main components of his approach to signs should emerge well in these four.

As Vygotsky's interests and views changed, and his health deteriorated in time, his writings are very heterogeneous. Thus, despite appearing as such in various secondary writings, Van der Veer and Valsiner (1991: 390) conclude that he could not come up with a fully developed system of thought; there is major fragmentation of ideas, a great deal of repetition, and a lack of cohesion. Overall, Vygotsky's writings provide a complex of thought in which different ideas apparently overlap and complement one another only partly.

The second problem already present in Vygotsky's original works is how he himself presents and expresses his ideas in the current ideological, political, and

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1 Sometimes translated as "Tool and sign [in the development of the child]", with only Vygotsky given as the author, e.g. in *The Collected Works of L. S. Vygotsky. Vol. 6: Scientific Legacy*, edited by Robert Rieber (1999). It looks as if there is good reason to name Alexander Luria as the second author, cf. Van der Veer and Valsiner's (1994: 170) notes. Apparently, the lost original was titled as "*Orudie i znak*" (Van der Veer, Yasnitsky 2016b: 171).

2 Partly compiled of writings from between the late 1920s and early 1930s.

historical climate. Vygotsky was very well acquainted with and heavily influenced by his predecessors from the 1890s and early 1900s. He wrote in dialogue with and as a critique of many of his era's major movements of research into child development, from behaviourism and reflexology to *Gestalt* psychology, of which only a few are mentioned in this paper. At the same time, the constant turmoil in Soviet society institutionally greatly affected and even threatened all academic endeavours. Vygotsky actively sought to include the views on science that were prevailing in Soviet society in his project. Van der Veer and Valsiner (1991) have given a chronological account of the development of Vygotsky's ideas in his writings, and Van der Veer and Yasnitsky (2016a) tell the very complicated story of the publication of his works[3], which mostly did not take place during his lifetime. Apparently, of the writings that the present paper uses, two were not published in full until the 1990s, one comes from 1986, and only the first (i.e. Vygotsky 1994[1929]) was published during his lifetime.

Regarding Vygotsky's approach and even his writings as sources, a topic often arising is the relationship between him and his collaborators. Among many others, Stetsenko (e.g. 2003, 2004) argues that there is no good reason to look at the other authors involved in the so-called cultural-historical school, that has become to be known by Vygotsky's name, independent of one another, as for her they make up a genuine "Vygotsky-Leontiev-Luria school", including a whole group of like-minded researchers. Then again, other authors (e.g. Van der Veer, Valsiner 1991: 183–184; Yasnitsky 2016) rather stress the dynamic relations between various collaborators and find less reason to necessarily include them in one circle, as has often been done after Vygotsky's death. Be it as it may, Vygotsky's writings indeed heavily depend on experimental and theoretical research conducted by his fellow collaborators and students, which is largely left out of this study.

The paper at hand relies on the selected sources. A detailed overview of Vygotsky's works available in English, and of the variety of major problems with these translations (and already with the Russian originals, on which they were based), is presented in a repeatedly expanded and republished review by Van der Veer and Yasnitsky (2016b). Translations of Vygotsky's and his collaborators' works have been particularly erroneous over the years, with significant changes, leave-outs and add-ins, in comparison to the original drafts in Russian. This includes even indiscriminate editing together of fragments from originally different published and unpublished materials, as is the case, for example, with one of the perhaps best-known books attributed to him, *Mind in Society* (Vygotsky 1978).

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[3] Even the available publications in Russian are deeply flawed as sources (cf. Van der Veer, Yasnitsky 2016a).

In case of this irregular and problematic book, the present study has followed its contents to its more relevant sources regarding the topic of signs (Vygotsky 1994[1929], 1997; Vygotsky, Luria 1994), but focuses less on many other topics, e.g. that of the zone of proximal development, which has received more attention in educationally oriented applications of semiotics before.

There have been multiple English editions of *Thought and Language*, or more correctly, *Thinking and Speech*. While according to Van der Veer and Yasnitsky (2016b: 162–163), the 1986 edition used here is better than others so far, these authors still correctly judge that it is "abridged and as such unfit for genuine scientific study". Thus, for its purposes of reconstructing a coherent approach to development and signs, the present paper still relies on translations thought of as partly unreliable. This puts any English-based researcher interested in engaging with Vygotsky's approach in an awkward predicament, as it remains unclear to what extent discussions are limited by sources in regard of the authenticity of translations or even their originals, and claims about the approach known by Vygotsky's name will therefore be restricted.

Yet in these selected sources, assumed to be better than the others, Vygotsky's programme as a whole remains largely intact, as do the general sentiment and philosophical position. This conviction also underlies the premise of this discussion. The task that this paper takes up is not to give a historical account of the development of Vygotsky's thought: in striving to provide a framework for semiotics for studying children's acquisition of symbols, the task at hand is to review and organize the topic of signs in Vygotsky's works. The governing principle of handling these sources is the organization of his approach to signs in such a way that their place in development would be understood in an integrative whole, even if the original writings themselves historically come from different stages of thought.

Signs, tools, and practical intelligence

Vygotsky explicitly centred on signs in his analyses of practical intelligence and problem solving in humans, in discussion of conclusions drawn from Wolfgang Köhler's *Intelligenzprüfungen an Menschenaffen* (1917/1921)[4] and Karl Bühler's *Abriss der geistigen Entwicklung des Kindes* (1919/1929)[5]. The term 'practical

[4] Originally published in 1917, but developed with this title as the 2nd edition, 1921, Berlin: Julius Springer. Translated into English as *The Mentality of Apes* (Köhler 1925[1921]).

[5] Originally published in 1919, but developed as a summary of a broader work as the 5th edition published by Verlag von Quelle and Meyer in Leipzig in 1929 and translated into English as *The Mental Development of the Child* (Bühler 1930[1929]).

intelligence' is to be understood as the ability to use external means or aids in practical problem-solving tasks, of which the most important at the time of Vygotsky's studies appeared to be tasks that included the use of tools.

In his classic experiments conducted on the island of Tenerife, Köhler observed systematic tool use by *insight* in captive chimpanzees – contrary to popular beliefs held at the time, which attributed tool use only to humans. However, Köhler (1925[1921]: 267, 305) maintained that in chimpanzees, speech to "designate or describe objects" (i.e. specifically referential speech) was completely missing. Subsequently, Karl Bühler studied small children's practical intelligence, "i.e. the realization of mechanical connections and the invention of mechanical means for mechanical ends" (Bühler, K. 1930[1929]: 51), comparing it to the capabilities of Köhler's chimpanzees, and found considerable similarities in both the expression of these capabilities, as well as their developmental timelines (Bühler, K. 1930[1929]: 48–49).

Thus, Charlotte Bühler (1930[1927]: 91–92) observed the first simple appearances of tool use in children at the seventh month of age along with systematic, coordinated movement and perception which aligns with great changes in the development of the brain and hands. It followed from there that the child's system of activities – i.e. the methods and forms of behaviour (including intelligence in terms of practical activity), conditioned by the organs and organization of the whole – is determined at any stage of development both by the degree of organic development (i.e. the chronological age) and the degree of the child's ability to use tools (Vygotsky 1997: 21). In children, these first appearances of use of external aids in practical activity, and the corresponding bodily changes take place before the appearance of speech. Consequently, both Karl Bühler (1930[1929]: 51) and Charlotte Bühler (1930[1927]: 92), deriving from Köhler's study and their own findings, concluded that instrumental thinking precedes speech and develops "quite independently" (Bühler, K. 1930[1929]: 51) of it in later life as well.

However, having adopted this view, many psychologists had subsequently assumed (cf. Vygotsky, Luria 1994: 102–106) – because of its early appearance and the relative independence of early practical, instrumental thinking from language – that, essentially, tool use in humans remains the same over the course of the entire development of a human being. It was thought that there was thus no general qualitative difference between thinking in humans and other apes, except in speech and other specifically symbolic activity. Behavioural differences between species appeared to lie merely in the quantitative extent of the development in psychological functions (e.g. perception, attention, practical intelligence etc.). The human specific forms of practical activity, similar to other apes in young children, simply appeared to expand on forms basic and characteristic of all apes.

In brief, the development of practical intelligence in children, which at earlier stages manifests in non-verbal behaviour, was often related to "natural" forms of activity only (Vygotsky, Luria 1994: 108), that is, to biologically inherited and organically formed behaviour – independent of social activity with other people. Speech as a specific activity appearing at a later age did not seem to add anything to thinking in general, but was considered a parallel line next to practical activity in the environment.

For Vygotsky, these studies, focussing on isolated elementary functions similar in many species, did not help to explain what was behaviourally specifically human (Vygotsky, Luria 1994: 106). In comparing psychological functioning of different species with that of humans, often individual functions were observed separately, as if innate and ready-made, and reduced to their elementary components (Vygotsky 1997: 2). Psychological functions of humans, including practical intelligence, were studied out of their social contexts, their social and cultural environment where they naturally belonged (Vygotsky 1997: 9). If psychological functions were studied in isolation, indeed, only little difference between species, and little change over the course of life might be apparent.

Likewise, the psychologists who focused on "the origin and development of speech, and of all other symbolic action" (Vygotsky, Luria 1994: 107) neglected relations of practical activity to children's symbolic processes. At the time, language was mostly taken to be a purely intellectual, abstract conceptual system. Development in speech among the rest of the conceptual activity was observed mainly in its referential function, and out of the context of its actual social use. Speech was not taken as an integral part of the development of the system of children's activities as a whole, and speech as an activity was seen as isolated from practical operations with objects. Their accidental co-occurrence was seen as caused by external factors, and thus the relations between them remained unstudied from the point of view of speech, as well as from the point of view of the system of activities.

Especially Jean Piaget in his *Le langage et la pensée chez l'enfant* (1923)[6] and William Stern, perhaps the most important authors on the development of symbolic thought at the time, found that children come to realize "the relationship between signs and their meaning" (Vygotsky, Luria 1994: 107) *spontaneously*, on their own. For these authors, Vygotsky and Luria (1994: 107) argue, the use of signs in their referential function seemed to appear in children either as a result of a logical inference or as a sudden discovery – i.e. not as part of the development

[6] Originally published in 1923, Neuchatel, Paris: Delachaux and Nestle; translated into English as *Language and Thought of the Child* (1959, London: Routledge and Kegan Paul).

as a continuous (historical) process. In the approaches of these authors, children appeared to grow into thinking in socially shared word meanings on their own. The importance of language to individual development was ignored both as a mediator of thought from one generation over to another, and from peer to peer, as well as in how language influences cognitive processes reflectively.

In words,[7] for example, psychologists broke up "the living union of sound and meaning …//… into two parts, [...] [which were] assumed to be together merely by mechanical associative connections" (Vygotsky 1986[1934]: 5) as if their mutual interrelation had no effect on the broader behaviour within the surrounding social and physical environment. Word meanings were as if living in a universe of pure ideas, free from both thinking and practical activity, e.g. talking itself. Speech was recognized as a communicative phenomenon (for exchanging messages), yet as nothing that would actually influence the thinking of its users, as the mechanism that connected speech with the rest of the practical activities appeared external to it. From the point of view of cognitive processes, words were taken as mere labels of experiences, an independent faculty, irrelevant to thinking in the individual. In laboratories, practical intelligence was isolated from speech and their interrelations were left unobserved, even if speech actually accompanied problem solving during experiments. As practical problem solving was assumed to be exclusively individual, social activity as a significant factor in the development of thinking was simply ignored.

However, while there are small differences in the physiological and the basic elementary psychological functions of humans and their closest evolutionary relatives, there is a radical difference in their behaviour and activities (Vygotsky 1997: 17). If the overall behavioural changes remain unaffected by the adoption of speech and the symbolic behaviour, the vast differences between practical activities of humans and other apes, as they occur in their natural habitats, outside the confined conditions of laboratories, in which experimentally isolated problem solving tasks were conducted, could not be explained.

In Vygotsky's predecessors' studies it remained unclear how such small differences in the practical activities of humans and other apes and the systems of activity in their early development end up as such great differences in their later development – even more so if speech itself was, as it should have been, included in the system of activities (Vygotsky 1997: 37). If practical intelligence and the system of activities indeed remained untouched by the acquisition of the specific

[7] In Russian, the word '*slovo*' may designate both 'word' and 'speech' (in Russian, also '*rech*', which can also be used for words), and Vygotsky analyses both individual words and speech, sometimes alternately.

domain of speech, the root of these differences in behaviour and activity were left entirely obscure.

Further, adopting this view would also make it impossible to explain how speech and other human-specific symbolic forms of behaviour would ever emerge in the first place, both from a phylogenetic and an ontogenetic point of view. It would remain unclear, how symbolic behaviour develops outside the system of activities, while these behaviours seem to play an essential part in the evolution of *Homo sapiens* as a species.

Finally, questions as to what psychological processes underlie different social and cultural activities, specifically characteristic of human societies, and *vice versa*, what effects those activities have on psychological functioning of individual human beings, remained unanswered. In this view, the entire cultural sphere appeared isolated from individual engagement.

The natural history of signs

Vygotsky and Luria (1994: 108) argue that if practical problem solving and communication appear isolated in apes, as Köhler's observations seemed to show, then in the development of children practical activity and speech, two initially independent lines, develop in close integration and "the unity of these two systems is [...] specific to the complex behaviour" of humans.

From the cognitive point of view, Vygotsky's predecessors missed that in social interaction, the child's entire behaviour, the system of activities, including tool use, problem solving and communication is transformed onto a higher level of organization with the aid and mediation of speech and, more broadly, symbols.

Vygotsky seems to have had no problem with the idea of the evolution of humans from other animals as a gradual process, but the differences, in his view, lied not only in degree but, as the result of the transmission and mastery of products of culture, also in kind (Van der Veer, Valsiner 1991: 193). No doubt the differences in the behaviours of humans and other apes must also be rooted in the biologically inherited factors, e.g. the phylogenetic and ontogenetic differences in the brain, but the differences between their actual cognitive capabilities become striking in the context of their activities within the surrounding environment. While neural conditions are necessary, they are not sufficient to explain human-specific meaning making.

Although there appear no new elementary psychological functions in *Homo sapiens* compared to other species, these functions develop differently. For Vygotsky, the behavioural differences between species should not be attributed to

simple addition of speech only, as if it was some kind of a parallel faculty among other psychological functions. It is not so much the intricate differentiation of interpersonal communication that sets human behaviour apart from other species, but the organization of the behaviour as a whole, which it brings along. He argued that psychological functions should not be studied only individually, but in their interrelations, within the system in which they operate. The behavioural differences should be rooted in what makes such reorganization of the whole unity of practical activity possible.

Vygotsky argued that when analysing the relationship between thinking and speech, both social and intellectual functions of language have to be taken into account, whereas the latter was often neglected. Language serves a double function: it is a means for social coordination of actions of people, useful for communicative purposes – and it is a tool for thinking, a means for organizing one's own behaviour, similarly to the way it is used to organize the behaviour of others.

Vygotsky (1986[1934]: 6) claimed that it is in the internal aspect of the word, the word meaning, in which thinking and speech are linked into verbal thinking. It is precisely on the level of word meanings that the unity of behaviour and thinking is most apparent, as the unity of the physical stimulus and the word meaning tied to it relates the social and the individual, and the communicative and organizing functions of language.

He argues that the advantage of words over concrete experience as symbolically unorganized thought is that they do not refer to any specific experiences, to single objects, but to classes of objects, generalized reflections of experience, abstractions (Vygotsky 1986[1934]: 6). In his view, the act of generalization is a verbal act of thought. This does not at all mean that after acquisition of speech, speech and thinking are the same, nor that all thinking becomes verbal or symbolic, as specified below in the analyses of development of concepts.

Initially, speech constitutes a part of the social environment of the child, fulfilling a communicative purpose, but during development it comes to organize individual activity itself, as it acquires an "intellectual" function. The acquisition of sign systems constitutes a change in thinking itself. In time, speech as a social activity becomes to be utilized for individual purposes. Symbolic activity, which emerges in this process as a higher level of organization, entails the unity of psychological functions.

Vygotsky and Luria (1994: 109) argue that for the child, speech is "inalienable and internally necessary part of the operation, [...] as important as that of action in the attainment of a goal. Speech and action are one and the same complex psychological function, directed toward the solution of the given problem". The more complex the action demanded by the situation and the less direct its solution,

the greater the importance played by speech in the operation as a whole. Vygotsky and Luria (1994: 109) explain that children solve practical tasks with speech as they use eyes and hands. Children act and speak for a purpose – the use of symbols as an activity is practically useful, because it organizes the solution of practical problems in the same way as coordinated movement and guided attention. In that sense, for Vygotsky, in verbal thinking, words are analogous to tools.

As the child learns to "master" the surrounding environment with the help of speech, the child's own behaviour is reorganized as well, and thus new relations with the environment are formed (Vygotsky, Luria 1994: 109). Human beings characteristically grow up among other humans in the cultural environment. In humans, in fact, cultural development is normal development (Vygotsky 1997: 175). Historical development in communicative means and other artefacts compensates individual development – e.g. once invented, the numeral '0' does not have to be invented by each new generation again. Culture itself is adapted to the normal typical human being, while certain organic structures have developed to serve precisely as prerequisites of cultural development (Vygotsky 1997: 24). Thus, the adult thinking includes cultural forms of behaviour as well as "natural" ones, also in case of cultural isolation. The acquisition of speech and the cultural signification of the surrounding environment makes it possible to engage perception and movement for the purposes of the symbolic activity.

Vygotsky (1994[1929]: 57) explained that in human development the line of natural development of behaviour, "closely bound up with the processes of general organic growth and [...] maturation", and that the line of "cultural improvement of psychological functions", "methods of reasoning" and "behaviour" are intertwined. From the point of view of ontogenesis, the natural and the cultural lines of development form a single, although complex process:

> Both processes represented in separate forms in phylogenesis and combined with respect to continuity and succession are presented in a merged form and actually form a single process in ontogenesis. (Vygotsky 1997: 19)

In this single process, as Vygotsky and Luria (1994: 148) describe it, the "natural" and the "cultural" lines are interweaved in such a way that a succession of developmental stages is formed. Psychological functions such as (among others) perception, attention, memory, volition, concept formation and, of course, problem solving in practical intelligence, and even early communication, similar in chimpanzees observed by Köhler – the "lower functions" with "natural" roots – begin to form as the primary and the earlier stage of development.

However, "mastering external materials of cultural development and thinking" (Vygotsky 1997: 10) such as for example language, writing, arithmetic – arise as

the secondary stage as means of control and mediation of the "lower" functions. These "higher functions" are the result of inclusion of "symbolic forms of activity" (Vygotsky, Luria 1994: 136) in the lower functions. The higher functions, rising as specific new forms, as new structural entities (Vygotsky, Luria 1994: 142) form a psychological system that is essentially a new stage of development to the system of lower functions.

Since various psychological functions are not isolated, but interrelated already at their early development, the formation of higher psychological functions also reorganizes the lower functions and their interrelations on a higher level:

> […] the higher functions of perception, memory, attention, movement and so on, prove to be internally connected with the development of the sign using activity of the child, and their comprehension is possible only on the basis of an analysis of their genetic roots and of that reconstruction which they underwent in the course of their cultural history. (Vygotsky, Luria 1994: 136)

While for Vygotsky language is the prototype among the higher, mediated systems, he also discusses on various occasions gestures, number systems, drawing, diagrams, maps, throwing dice and many other examples of symbols or symbol systems of social origin, more or less dependent on conventions at least at some stage of their use.

Their use or inclusion within behaviour itself is a result of a historical process with its own laws, which arises by way of development (Vygotsky, Luria 1994: 148–151; Vygotsky 1994[1929]: 62) – "the natural history of sign operations":

> sign operations appear as a result of [...] complex and prolonged process that reflects all the typical features of real *development* and is subject to all the basic laws of psychological evolution. This means that they are not simply invented or passed down by adults, but rather arise from something that is originally not a sign operation and that becomes one only after a series of qualitative transformations, each of which conditions the next stage and is itself conditioned by the preceding one and thus links them like stages of an integral process, historical in nature. In this respect the higher psychological functions are no exception to the general rule and do not differ from other elementary processes. *They, too, are subject to the fundamental law of development which knowns no exceptions*. They appear in the child's general process of psychological development not as something introduced from without or from within, but as the natural result of this same process. (Vygotsky, Luria 1994: 147, original emphasis)

The natural history of sign operation thus consists of (Vygotsky 1994[1929]: 63; Vygotsky, Luria 1994: 138–141): convergence of certain internal and external factors (e.g. mastery of any cultural method is only possible at a certain level

of internal development); "a determining influence" of the environment to accomplish this development; and transformation, not accumulation of experience, as the relationship between the two factors is "materially changed" (Vygotsky 1994[1929]: 63). In this transformation, what emerges is "a higher order, determined mainly by the particular combination of a series of more elementary functions into a new whole" (Vygotsky, Luria 1994: 140). Finally, in case of pathological disintegration of higher psychological functions (e.g. in aphasia), and the degeneration of signs, the link between the symbolic and the natural functions is destroyed, and speech starts functioning as a more or less independent structure as before (Vygotsky, Luria 1994: 141). Disintegration of higher functions thus proceeds by the reverse of their formation.

This historicity in development entails, for example, that at one point the child acquires language, at another, with the aid of the first, the numeral system. While language, found in all cultures, brings at least to a certain extent common characteristics to the thinking of all people of all cultures, other sign systems bring certain specific characteristics to psychological operations depending on the way in which they function.

It is important to note that the division of the natural and the cultural lines of development, as well as lower and higher psychological functions are not dualisms of body and mind, but explicitly (e.g. Vygotsky, Luria 1994: 163) set as such to overcome this dualism by showing in which way the two often treated as apart are merged in the development of the system of the human behaviour as a whole. In Vygotsky's writings, natural and cultural lines appear as opposed to each other in ways characteristic of his era, which took culture as something that rules or masters over nature. In Vygotsky's writings, culture is essentially taken as a part of nature, but not (always) as far as terms are concerned.

From the point of view of language acquisition or development of symbols broadly, incorporating symbols among psychological functions is not a result of accumulation of habits, nor training or repetition, nor are signs invented or discovered, and the development of sign operations does not proceed along purely deductive lines as a pure logical operation (Vygotsky, Luria 1994: 115, 137). The metaphysical view that holds that internal psychological schemata are somehow available before interactions within the environment can only lead to supposing that higher psychological functions are somehow available *a priori*. Vygotsky found, on the contrary, that symbols and speech are not ready-made from the start, "but form[ed] [...] in the same way as walking supplants creeping and speaking baby talk, and not because the child becomes convinced of the advantage of the one over the other" (Vygotsky, Luria 1994: 115). It entails a qualitative structural change in the behaviour.

At the same time, the use of signs in children shows its dependence on social means. Words and their meanings depend on both individual activity and their social use and the organic growth in symbolic thinking has both individual and social aspects. Not only is use of speech and other symbols a social activity, and their acquisition a result of social activity, they bring a social component to the entire behaviour.

Thus, Vygotsky provides the theoretical framework and outline for studying how symbols are taken into practical use and the entire system of activities is transformed. The task for observation is to find out whether and in which way acquisition of symbols and converging lines of development change psychological functions; in which way different cognitive functions relate to one another in this process; and how those psychological functions that depend on culture and historical development depend on the forms of thinking that are similar in many species besides humans.

The concept of signs

The cultural development of the child is essentially the natural history of signs, in which cultural forms of behaviour have natural roots in natural forms "tied to them by a thousand threads" (Vygotsky 1997: 94). Vygotsky (1997: 93, 104) distinguishes altogether three (sometimes four) stages in the child's cultural development, "sequentially replacing each other and arising one from another":

> Instinct, or the innate, inherited resources of methods of behaviour, forms the first stage. Above this rises the second stage, which might be called the stage of training, [...] or, in other words, the stage of habits or conditioned reflexes, that is, those learned and acquired through the personal experience of conditioned reactions. And, finally, the third stage rises still higher, the stage of the intellect or intellectual reactions that fulfil the function of adaptation to new conditions and represent [...] an organized hierarchy of habits directed toward solving new problems. (Vygotsky 1997: 101)

In principle, all psychological functions – memory, attention, volition, concept formation etc. go through the same stages of cultural development, once they become structured by language and other symbols and symbol systems, which provide the mediating link between earlier and later stages of development.

Characteristically of the 1920s, Vygotsky conceptualized the foundations of his approach to cultural behaviour in terms of behaviourism, or reflexology, as one of its version was called in the Soviet Union. The idea was that every elementary

form of behaviour includes a direct reaction to a stimulus. A situation (or the task that the organism has at hand) is a stimulus for a (memorized) behaviour, and the reaction the established response (S→R), the relationship between the two an "associative or conditional reflexive connection" (Vygotsky 1994[1929]: 60).

A sign operation (Vygotsky 1994[1929]: 60; Vygotsky, Luria 1994: 147; Vygotsky 1997: 54) brings into this elementary behaviour an intermediate link, which can be a word, but also any other kind of (external) auxiliary aid, X, a secondary stimulus between S and R, which Vygotsky then calls 'sign' (which itself is subsequently subject to development, as shown below). Instead of one, two other connections are established that lead to the same result, but in different ways:

> Each of the connections taken separately is the same conditioned-reflex process of closure in the cerebral cortex as the direct associative connection. New is the fact that one connection is replaced by two others; new is the construction or combination of nerve connections; new is the direction of the specific process of closure of the connection with a sign; what is new are not the elements, but the structure of the whole process of the reaction. [...] Analysis shows that the lower form is the basis and content of the higher form, that the higher form appears only at a certain stage of development and in turn itself continuously passes into the lower form. (Vygotsky 1997: 81)

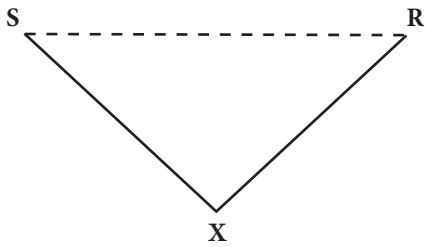

Figure 1. The model of sign operation (adapted from Vygotsky 1994[1929]: 61; Vygotsky, Luria 1994: 144). S – stimulus; R – reaction; X – secondary stimulus, sign; SR – associative connection.

This secondary stimulus is actively included in the operation, where it begins to fulfil "as means" for the specific function of "serving its organisation" (Vygotsky, Luria 1994: 145) and creates a new relationship between S and R. When bringing in this intermediate link, the direct impulse is inhibited, and the operation is acted indirectly. Different means, e.g. different signs provide different structure for the operation – as memorizing with the help of writing differs structurally from memorizing with, say, cuttings in wood.

In terms of the environment, both the original stimulus (S) and the sign (X) function in the same way, all the component parts of the sign operation being conditioned reflexes – it is only that the sign functions in relation to S as well, including both itself and the original stimulus within the behaviour in which it is acted (e.g. the sign brings the original stimulus to the mind). The organism actively brings into a behaviour an external stimulus – resulting in a controlled, regulated behaviour – an operation. The ability to control one's own stimuli "brings about an organised adaptation to the situation" (Vygotsky, Luria 1994: 137).

For that difference, though, it is not just a two-stage model of a stimulus-response reaction. Although both the relationship between the new stimulus and the original stimulus, and the new stimulus and the reaction, is in essence the same (S→R), the sign is not just a transference of reaction from one connection to another, but when used, it actively changes the structure of the entire process as a whole, and also the individual relations of its aspects (S and R). Signs are thus means of "autostimulation" (Vygotsky 1997: 54; Vygotsky, Luria 1994: 111, 145, 153) and

> every conditioned stimulus created artificially [...] is a means of mastering behaviour – that of another or one's own – is a sign. Two points are therefore essential for the concept of a sign: its origin and its function. (Vygotsky 1997: 54)

In this way, every cultural behaviour involves conditioned reflexes as "natural" psychological processes as its material, but cannot be reduced to them, as a higher "functional and structural unity" is formed (Vygotsky 1994[1929]: 61). Vygotsky (1994[1929]: 59; 1997: 107) even goes on to say that culture creates nothing new, it just modifies nature to suit its goals:

> The only new features are the substitution of two connections for one, the construction or combination of nervous connections, and the direction given to this process of connection by means of a sign. (Vygotsky 1994[1929]: 60)

Active use of these external stimuli enables humans to control their behaviour from "without" (Vygotsky, Luria 1994: 145) by raising the entire operation to a higher organization, in which "the sign and methods of its use are the functional, determining whole or focus of the whole process" (Vygotsky 1997: 84).

By controlling the connections in the brain by artificial stimuli, humans control their bodies (Vygotsky 1997: 55). While the child goes through substantial biological development, cultural development may not imply deep organic changes at all.

At first, the organism's responses are determined by external stimuli. Both language and other aids are initially set from without the child, in the social and

physical environment, inseparable of the activity as other stimuli, and only as a result of transformations do they become fully internalized mental forms. Maturation of the organism provides conditions for the use, but the environment provides motives and means, the artificial sign systems – and in the case of symbols, it is the environment of sociocultural meanings. In that sense, individual development is also socio-culturally determined. The process of development itself, however,

> [...] always originates inwardly, although it is modelled by the deciding influence of external problems with which the child is faced and the external signs with which it operates. After the structure comes into being, it does not remain unchanged, but is subject to a lengthy change. (Vygotsky 1994[1929]: 62)

In several places, Vygotsky (e.g. 1997: 104–105) used the famous example of a pointing finger to illustrate the development of a sign. At first, for the small child, the pointing gesture is a simple unsuccessful grasping movement directed toward a desired object. If the object is a little too far away, the hand is left stretched out in the air, fingers set towards the object. When the mother comes to help, recognizing an attempt at grasping in the stretched-out hand, the entire situation changes. The pointing movement becomes a gesture for another person. It is not the object that provides a response, but another person, who carries out the attempt by handing the object. And only by that new situation as a whole the movement of grasping becomes the sign of direction for the child. Both the function and the appearance of the movement change: it is no longer directed towards the object, but to another person. When grasping movement is adopted for communication purposes, its external appearance is simplified, contracted, and differentiated from among other movements with the purpose of handling objects as an independent gesture of direction, no longer only for another, but also for oneself. In this process, the movement develops into a new sign, and interpersonal communication is turned intrapersonal. Thus, Vygotsky repeats the general law already given by Pierre Janet:

> […] every function in the cultural development of the child appears on the stage twice, in two planes, first, the social, then the psychological, first between people as an intermental category, then within the child as a intramental category. This pertains equally to voluntary attention, to logical memory, to the formation of concepts, and to the development of will. We are justified in considering the thesis presented as a law, but it is understood that the transition from outside inward transforms the process itself, changes its structure and functions. (Vygotsky 1997: 106)

Thus, the development of higher psychological functions is by its very nature "a part of the history of the social formation of the child's personality" (Vygotsky, Luria 1994: 138):

> The sign primarily appears in the child's behaviour as a means of social relations, as an inter-psychological function. Becoming afterward a means by which the child controls its behaviour, the sign simply transfers the social attitude toward the subject within the personality. The most important and basic of genetic laws, to which the study of the higher psychological functions leads us, reads that every symbolic activity of the child was once a social form of co-operation and preserves through-out its development, to its highest point, the social method of its functioning. The history of the higher psychological functions is disclosed here as the history of the transformation of means of social behaviour into means of individual psychological organization. (Vygotsky, Luria 1994: 138)

In the development of sign operations, several further changes are possible, including regression to simple sensory-motor behaviours on the elementary level, the degeneration of signs, if the auxiliary stimulus is no longer necessary, becomes excluded, and the connection between a stimulus and a response becomes direct again. Also, although an operation may include an aid in the construction of an internal behaviour, after a period of repetitions of the operation, it might still lose its specific psychological function and thus the operation may lose its integral unity, so that it simply takes place in two sequential stages, and the aid becomes fossilized.

Signs as tools

Vygotsky is often cited (e.g. in the context of semiotic theory, Nöth 2009) for adopting the view that signs are similar to tools – especially based on his earlier writings (in this paper, e.g. Vygotsky 1994[1929]). While tools are used to change something in the external situation, signs as psychological tools, tools for thinking, directed inward, are used to change something in the mind of the person (Vygotsky 1997: 62, 89). Vygotsky adopted the metaphor to set speech within the context of activity as practically useful, not merely an abstract system of relations external or parallel to other psychological processes. Signs are similar to tools in practical activity because, from the point of view of instrumental thinking, they can be invented and used for solving a (practical) problem (e.g. Vygotsky 1994[1929]: 69).

He sometimes differentiates between two classes of stimuli – stimuli means and stimuli objects. Structurally, higher functions are a result of separation or

differentiation in the primitive whole of the stimulus-sign and stimulus-object (Vygotsky 1997: 85–86). When combined, they make up instrumental acts. In some sense, there is an analogy between signs and tools in the early period of the child's practical intelligence when speech is similar to other external aids in the surrounding environment. At a certain developmental point (e.g. the instrumental period, when the sound of the word becomes to be used for something), the use of signs as external aids for solving psychological problems can be quite close to tool use – e.g. speech at its early stages as used as an instruction or a command (which is also the reason why it develops to subordinate motor reaction), as in the finger pointing example. Vygotsky initially used the term '*priem*' ('device', 'means', 'method'), which he borrowed from the formalist Shklovskij, for instrumental, cultural acts (Van der Veer; Valsiner 1991: 218). The uniqueness of instrumental acts lies in their structure: both use of tools and use of signs as activities are "mediated activities" (Vygotsky 1997: 62) in terms of their relationships to their environments. In that sense, Vygotsky speaks about the instrumental function of signs.

However, Vygotsky (1997: 62, 89) uses the same metaphor to argue for the difference between tools and signs as devices by their origin and function:

> Thus, a tool directed outward and a sign directed inward fulfil technically different mental functions. Depending on this, the very character of the detours differs in an essential way. In the first case, we have certain objective detours consisting of material bodies; in the second case, detours of mental operations. These circumstances simultaneously indicate similarities and differences between the structures we are considering and the structures of detours. (Vygotsky 1997: 89)

While both signs and tools are artificial devices, using the tool in the external environment involves a material effect on the tool, and then, by tool, on the object, whereas "sign changes nothing in the object itself, it only gives a new direction or reconstructs the mental operation" (Vygotsky 1997: 89). Words, for example, a distinct class of stimuli, become part of operations during the development of practical intelligence as social activity between people, substituting tools (e.g. sound), because they provide applicability to objects that are absent from the immediate present of the situation. Speech enables the child to seek and prepare stimuli which can be applied in problem solving, planning for the future, and organizing thought – in fact, sharing thoughts with other people. Signs involve a higher organization, and by the inclusion of signs within the behaviour, practical activity with external objects is fundamentally reorganized as well. Children then master the external situation fully by first mastering and reorganizing their own behaviour.

> For this reason, we must not anticipate finding much similarity to working tools in these devices that we call signs. Moreover, together with similar and common characteristics in one activity or another, we must ascertain the essential characteristics of the difference in a certain relation-contrast. (Vygotsky 1997: 60)

Vygotsky goes on to argue explicitly against carelessly adopting the metaphor of tools when writing about signs:

> In this sense, based on the conventional, figurative meaning of the term, we usually speak of tools when we have in mind the mediating function of some object or means of some activity. True, such common expressions like "language is a tool of thinking," "auxiliary devices of memory" (*aides de memoire*), "internal technique," "technical auxiliary device" or simply auxiliary devices with respect to any psychological operation (*Geistestechnik* – "spiritual technique," "intellectual tools," and many others), are found in abundance among psychologists, are devoid of any specific content, and have scarcely any meaning beyond a simple metaphoric, picturesque expression of the fact that some objects or operations or others play an auxiliary role in the mental activity of man.
>
> In addition, there is no shortage of attempts to ascribe a literal sense to similar signs, equating the sign and the tool, to erase the profound difference between the one and the other, to dissolve in general psychological determinations the specific distinctive characteristics of each type of activity. (Vygotsky 1997: 60–61)

The development of *sign use* is not only specific to practical intellect (the ability to use tools), as analogous development from "lower" to "higher" organization takes place in all other activities that were shaped organically at their earlier stages (Vygotsky, Luria 1994: 136). The laws of development of practical intellect, while involving a certain unity of psychological functions, are only a particular case of laws of development of all higher psychological functions.

While Vygotsky's approach was more "instrumental" in the beginning, later he even appears to say that it is fundamentally misleading to compare words with ordinary objects (e.g. sticks used by Köhler's chimpanzees), which could do nothing to explain (the development of) word-meanings as signification (1986[1934]: 215–216).

The development of speech and its relationship to other cognitive functions

As already explained, Vygotsky thought that if communicative speech and practical thinking (the two among other "lower" functions) start to develop inde-

pendently, their convergence is the specific characteristic of *Homo sapiens*, once communicative speech is turned to organize the behaviour of the individual him- or herself as it is used with others, first externally and then internally. Once speech and other psychological functions are intertwined, the lower functions are reorganized on a higher level, while the way in which lower functions operate changes as well. Vygotsky believed that human behaviour is layered similarly to the earth's crust, in which the lower levels are the material for the higher (Vygotsky 1997: 101; Vygotsky, Luria 1994: 131). To explain this convergence, it is helpful to look briefly at how Vygotsky (cf. 1997: 118–122, 244–245) sees the basic development of speech and other communicative activities (as from a "lower" to a "higher" psychological function).

At first, the child's vocal behaviour, e.g. crying, takes place purely externally, and as a reflex. Once it develops into a conditioned response, it takes place not to any specific signal, but to the situation as a whole – to a number of signals that make up the complex situation and that have something in common – e.g. they occur together. If one of the signals occurs more frequently, the reaction begins to differentiate and, slowly, the reaction begins to correspond only to a selected stimulus. The reaction itself does not develop in isolation, but within an organic group of reactions – there is no single vocal reaction, but a series of movements among which the vocal reaction is just one.

As the vocal response is connected with a certain external impression, an independent reaction gradually develops from within the whole. Because in communicative situations the vocalization turns central, and other corresponding movements are eliminated one by one, the vocal reaction itself starts to develop, putting the rest of the complex of reactions in the background. While the earliest reactions are "emotional", once the vocal reactions become conditioned, and vocalizations become functional, the reaction becomes to serve "social contact" – which thus becomes the response for the vocalizations of people around the child around at one month (Vygotsky 1997: 122). Speech as a means of social contact becomes the starting point of all subsequent cultural development, as "initially, the sign is always a means of social connection, a means of affecting others, and only later does it become a means of affecting oneself" (Vygotsky 1997: 103). At a certain point of development, adults begin to instruct the child[8].

Subsequently, at six months, the child vocalizes to call attention and responds to adults' words with specific movements, at nine months the child calls attention

[8] Indeed, as Van der Veer and Valsiner (1991: 226) have found, Vygotsky and Luria used the 'scaffolding' metaphor in this context (anticipating Bruner's later work) in 1930, *Etyudy po istorii povedeniya. Obez'yana. Primitiv. Rebenok*. (Moscow, Leningrad: Gosudarstvennoe Izdatel'stvo, page 202.)

with tugging clothing, and at ten months shows an object to an adult demonstratively (cf. Vygotsky 1997: 245). One of the more important aspects of this development of speech is its relation to thinking.

Vygotsky believes that originally, linguistic meaning, and thus also symbols develop from "gestures" (Vygotsky 1997: 248) as external (vocal, manual etc.) behaviour, as already illustrated by the finger pointing example. Vygotsky thinks that the first words "serve not an affective expressive function, but an indicating function. They replace or accompany the pointing gesture" (Vygotsky 1997: 248). Therefore, it appears that for Vygotsky, the development of indicative (i.e. referential) signs from among other (e.g. emotional, instructional) single-word constructions (i.e. holophrases) denotes the differentiation of the semantic aspect of the word, and therefore is the beginning of intellectualization of speech[9]:

> Speech and the meaning of words develop naturally, and the history of how the meaning of a word developed psychologically helps to cast light to a certain degree on how signs develop, how the first sign appears naturally in a child, how mastery of the mechanism of signification occurs on the basis of a conditioned reflex, how from this mechanism a new phenomenon arises that extends as if beyond the boundaries of the conditioned reflex. (Vygotsky 1997: 126)

In this development, initially, what is sometimes called 'sign-carrier' – speech as external behaviour – acquires a relationship no longer with a specific external object *hic et nunc*, but with what is formed as a generalized idea.

> Indicating which sets abstraction into motion is also, in our opinion, a psychological model of the first assigning of a certain meaning to a sign, in other words, it is a model of the first formation of a sign. (Vygotsky 1997: 171)

Vygotsky (1997: 126) suggests that what the child initially masters is "the external structure of the meaning of words" – that each thing has a name, and that the thing and the name are structurally united in the context of their use. This is evidenced in that for small children, "the word standing for the thing becomes as if the property of the thing itself" (Vygotsky 1997: 126), and that at early stages, children idiosyncratically extend words to mean all (locally, functionally etc.)

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[9] Caution is advised here, because at a different place, Vygotsky (1986[1934]: 218-219) also claims somewhat surprisingly that while thinking develops with the help of speech from wholes to parts, speech develops from parts (words) to wholes (phrases), in essence differentiating between psychological and linguistic (grammatical) propositions. If that were indeed the case, this claim here would only apply to linguistic development, to be exact – to the development of "linguistic meaning".

contiguous or similar objects of their contextual co-occurrence, before their word meanings – what they take words to stand for – are gradually set at conventional meanings (a process to be more closely analysed below[10]):

> Precisely as in the development of our speech, words do not arise arbitrarily, but always arise in the form of a natural sign connected with some image or with some operation, and in children's speech, signs do not appear from what the child himself invents; the child obtains signs from those around him and only later realizes or discovers the functions of these signs. (Vygotsky 1997: 128)

For Vygotsky (1997: 134–135, 1986[1934]: 102), things, including words, become signs functionally. Even if a small child recognizes the similarity between the drawing and an object, the child takes the drawing to be a similar object, "not as a representation or symbol" (Vygotsky 1997: 140). First, the word and the object share an actual context of their use, and only later that real connection between the spoken word and its object is broken (Vygotsky 1997: 130). This way, speech develops as any other conditioned reflex and, in this sense, speech initially occurs "independently" of thinking. At first, the child masters the connection between the word and the object or the thing as a simple contact between two stimuli, rather than the relationship between the "sign and meaning" (Vygotsky 1997: 130). Slowly, the seams between the spoken word and the particular object are lost in favour of the word meaning as a socially shared generalized concept. The development of these concepts will be discussed below.

This point, though, is just the beginning of the development of symbolic thinking as a distinct, developmentally differentiated internal structure. The main interest, for Vygotsky, is the development of cultural forms of meaning making in relation to natural and practical forms of thinking.

Changes in perception accompanying symbol acquisition

Language acquisition and symbol use more broadly brings great qualitative changes to cognitive processes, but it is not so much individual psychological functions that change, but their organization in relation to each other. Already in their "natural" forms, it is not so much functions separately that are important, but how they work together, and how their relationships change in the complex whole. The relationship between practical intelligence and speech includes several

[10] Vygotsky's idea of how word meanings develop in children's speech was strongly inspired by how Alexander Potebnya saw the historical development of word meanings in languages.

different psychological functions. Vygotsky discusses these changes in comparison and contrast to the cognitive abilities observed in chimpanzees by Köhler, whose findings Vygotsky accepted almost entirely (Van der Veer, Valsiner 1991: 203). The main difference between humans and chimpanzees lies in the use of symbols, that is, it is rooted in the way symbols cognitively reorganize psychological functions. Different psychological and symbolic functions and forms of representation (which are results of the acquisition and use of different sign systems) also develop at different paces. Thus, relationships between psychological functions significantly depend on the degree of their development.

On the visual field, elements are perceived all at the same time, thus it is "integral" compared to speech, which demands indication of elements, ordering and joining elements together into a sentence structure, and thereby "analytic" (Vygotsky, Luria 1994: 126). In the beginning, perception is integral, differentiating only in time.

As already explained, the early speech of the child functions externally, within the situation, together with the object and other activities of the child. At the time, in order to deal with the object, the small child needs a whole set of additional bodily movements to compensate for the lack of verbal development. Asking the parent to pass him or her a toy, the child may use finger pointing even when knowing the name of the toy. According to Vygotsky, the function of the early words and movements within the situation as a whole is indication.

In perception, indication with the help of signs enables the child to single out and distinguish concrete single objects from the situation as a whole (Vygotsky, Luria 1994: 125). Naming the toy enables the child to focus the situation for the parents. Using words, adults guide the attention of the child at some objects and not others.

Words become centres of the perceptual structure – adoption of words organizes the natural structure of the situation around their meanings:

> […] speech articulates its perception, singles out in the entire complex salient points of support, introduces an analytical factor into perception, and thus supplants the natural structure of apperception by a complex and psychologically indirect one. (Vygotsky, Luria 1994: 126)

Thus, perception is no longer only an observation of some shape or colour – it is not isolated, but categorized. In a way, humans perceive with the aid of speech.

With the help of symbols, the child can infer from the environment without having to resort only to his or her senses. After the acquisition of speech, operations of a child are characterized by radically greater freedom of behaviour

from the immediate present of the visual situation of the application of these operations. The child learns to prepare the solution of a problem – a complex set of preliminary acts with a long chain of auxiliary means – beforehand, in the field of speech, and only then realize it in the motor activity. Young children manipulate objects in their given field of vision, whereas the child's symbolic operations become detached from this "natural" field. With the aid of speech, the child creates auxiliary stimuli standing between the child and the environment, acquiring a relative freedom from the situation at hand, the impulsive behaviours thus transformed into a planned, organized behaviour. Engaged in various activities, the child no longer has to follow the visual connection between his or her activity and its goal in the situation at hand and an activity may acquire a purpose or goal that is not visible in the concrete present. The child may include aids, indirect methods or means, bring along new additional stimuli (e.g. verbally, spelling out words) that are not present in the immediate perceptual field.

Other functions are no longer dependent on the structure of the perceptual field, nor on the perceptual apparatus – symbolic activity enables control over the perceptual field and guides the apparatus. It enables (planning of) tool use for solving practical problems outside of the direct sensory field.

Vygotsky and Luria observe that a two-year-old can perform and dramatize the meaning of a picture or a situation shown to him or her earlier than explain it verbally, the child at this point yet unable to generalize the meaning of the situation in its parts (Vygotsky, Luria 1994: 125; Vygotsky 1997: 193–194). At this early stage, the control of speech is insufficient to guide the attention purposefully from part to part, although the meaning of the picture is comprehensible to the child integrally, as a concrete experiential whole. Later, intellectual mechanisms related to speech no longer need words merely as indicators – speech becomes functionally "synthetic", and the intertwining of words and the situation allows more nuanced articulation.

Changes in the process of selection during symbol acquisition

At first, the child's selection takes place entirely in the sensory-motor sphere as analytically undifferentiated associative behavioural sequence. In categorization tasks, the child's responses are entirely confined within the motor sphere – with no preliminary plan of action, no internal operation (of thinking through the problem at hand) – and take place from among previously acquired motor behaviours as operations as wholes. Even once selection begins to rely on memory

(in the sense of previously acquired experience) – once conditioned, instead of being determined by the stimulus – it cannot differentiate within it (Vygotsky 1997: 207). The child does not mark or signify the central feature or aspect from within the situation to coordinate the response accordingly. The child does not even start problem solving with observation of the situation as an adult might, but proceeds with an immediate response. Even when the child already speaks, i.e. can use words as means of communication, speech is not used for "thinking" through the selection (Vygotsky 1994[1929]: 59), e.g. analytically. The child selects directly the entire response that the moment calls for – the selection itself is the response – the movement corresponds to the perceptual situation at hand and series of trial movements substitute the actual selection, if the response fails (Vygotsky, Luria 1994: 128–129).

Initially, the sensory and motor process form an integral unity in which various psychological functions are fused with one another within dynamic wholes in which they are psychologically undifferentiated. The same general structural relationship between sensory and motor processes is maintained also in cultural development at first, but in time, the primary structural connection is broken or discontinued:

> this primary natural relation between perception and movement, their inclusion in a common psycho-physical system, disintegrates in the process of cultural development, and is replaced by relations of quite different structure, beginning from the moment when words or some other sign is introduced between the initial and concluding stages of the reactive process, and the entire operation assumes an indirect character. (Vygotsky, Luria 1994: 128–129)

At the beginning, the stimulus for the child's behaviour, the concrete experience of an object (as its "reference") dominates over the selection, but during the development of speech, the generalized meaning starts to dominate (as discussed in detail below). With the differentiation of sensory processes and their motor responses, the direct response is inhibited, and intellectual life as an independent psychological function emerges. When operations become acted internally, thinking as preliminary planning of external behaviour is differentiated from perceptual thinking.

Inclusion of symbols reconstructs the process of selection from an opposite direction, enabling construction of a preliminary plan to execute it accordingly by representing and keeping "in mind", by bringing to the fore the relevant features and aspects, and reorganizing the situation at hand around them appropriately. The symbol is thus given a function as the decisive point in relation to the problem

at hand. Acquisition of symbol use has therefore an effect on the entire cognitive process of selection.

Signs make it possible to distinguish the construction of the problem from its sensory field and enable to differentiate a previously mastered operation into its analytical parts in relation to the problem. The child no longer approaches the problem impulsively, determined by the factors in the environment, but from the point of view of the purposefully selected aspect, chosen appropriately. Signs make up "a functional barrier" between the stimulus and the response by internally creating a relationship between the stimulus and the corresponding sign, the movement is detached from direct perception and taken under the control of "preliminary symbolic combinations" (Vygotsky, Luria 1994: 130–131).

The cultural development of attention

The organic base of attention develops according to changes in the broader organization of the behaviour:

> Initial attention occurs through hereditary nerve mechanisms that organize the reflex processes according to the principle of the dominant that is familiar in physiology. This principle establishes that in the operation of the nervous system, the organizing point is a dominant focus of excitation that inhibits the process of other reflexes and is augmented at their expense. (Vygotsky 1997: 153)

At first, the child's attention is entirely dependent on the properties of the external object on the perceptual field, and the child's own interest in them. The cultural development of attention (and "its distraction", Vygotsky, Luria 1994: 132) entails change in the means of control and the operation of attention, and bringing them under the control of the person's will (Vygotsky 1997: 153). In other words, mastery of attention lies in mastery of external stimuli as devices. Volition itself lies in control of one's own behaviour with overcoming stimulus-response cycles by inclusion of signs.

Speech begins to reconstruct the structure of the perceptual field, selecting certain aspects of the situation and not others, guiding the attention onto them, against their background. Thus, the early "indicative function of words" enables sign users to control their attention by creating corresponding centres of attention, guiding the attention independently of the actual present situation of the surrounding environment (Vygotsky, Luria 1994: 132). In attention, signs have a "pointing function" (Vygotsky 1997: 243). With the aid of symbols, children thus reorganize their visual spatial field, and from this point on, the perceptual

field (as a kind of a response on its own) no longer coincides with the attention. Voluntary attention therefore functions similarly to involuntary attention, but is guided independently of the perceptual field at hand. Vygotsky (1997: 161) argues that voluntary attention is mediated attention turned inward. Mastery of attention entails a substantial change in the relationship between the subject and the object, or put simply – a young child sees something, and turns attention to it, while an older child turns attention to see something.

The child's attention becomes guided very early. First, the adults direct the child's attention with words "creating as if additional pointers – arrows – to the things around the child", but then the child begins to turn the attention of the adult by the same words, as instructions (Vygotsky 1997: 167–168). In social contact, these early words function as instructions or commands, while subsequently they come to indicate the corresponding object intellectually.

> The word that signifies the concept actually appears first in the role of an indicator that isolates some traits of an object, calls attention to these traits, and only then does the word become a sign that represents these objects. Ach[11] says that words are the means of directing attention so that in a series of objects that have the same name, common properties are identified on the basis of the name which thus leads to the formation of a concept. (Vygotsky 1997: 172)

For Vygotsky, voluntary attention thus is a social phenomenon – the process of voluntary attention directed by language or speech is initially a process in which the child is relatively more likely to be dependent on the adult than to manage his own perception.

The development of cultural memory

In symbolic thinking, signs as stimuli substitute things, situations and other objects external to the situational present, e.g. by representing relevant past experiences in the active present of the situation of remembering. Symbols become means for remembering.

Vygotsky distinguishes between two basic types of memory – first, the unsystematized, unmediated expression of experience, close to perception itself, with which it has not broken off immediate connection (Vygotsky 1994[1929]: 57) as an immediate impression of the material of the memory (Vygotsky, Luria 1994: 143).

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[11] In his writings on the development of concepts, Vygotsky relied on the works by Narziß Ach. See below.

As a physiological function, it is characteristic of the stage in which intellectual operations are not yet fully formed, part of the "natural" line of development, and does not involve cultural aids. By the time of Vygotsky's writings, it was well-known that "the plasticity of our nerve substance is expressed in its capacity to change under the influence of external actions and to preserve a predisposition toward their repetition" (Vygotsky 1997: 179).

The second type, the sociocultural memory, on the other hand, at least to some degree independent in its origin from the natural type, is determined by the cultural history, is passed down from generation to generation by sociocultural interaction, and includes in its organization symbolic signs. Vygotsky (1997: 187, 189) claims that language itself is a "mnemotechnical tool" – functioning as a kind of an organization of memory by signs, and that writing as external system of symbols developed as auxiliary means for memorizing. In cultures, symbols are used to convey accumulated experience, while they are of course not the only means. In individual people, development of cultural memory involves rapid rise in the power and ability to memorize, which is the result of reorganization of memory, which is taken under active and voluntary control by cultural means (Vygotsky 1997: 184). Voluntary memory, as preliminary planning of action and cultural thinking in general, develops when external means of memorizing have become internal.

In the beginning, the sign only recalls a certain stimulus orderly paired with it, and the sign and the stimulus itself are not completely separated from each other. They form a syncretic structure involving both the sign and its object, and the symbol brought in to control the behaviour cannot be purposefully used as means of memorizing yet, as it is entirely dependent on the object, the original stimulus (Vygotsky, Luria 1994: 148). A reverse operation with the pair (e.g. using the object to recall the sign) is not possible and leads to formation of a completely novel (syncretic) association. In fact, according to Vygotsky and Luria (1994: 149), the child might even arrive by a series of associations carrying him or her step after step at the starting point. However, these are merely series of individual (syncretic) associations of signs one after another, whereas there still is no purposeful (instrumental) use of the sign in relation to the original stimulus. An auxiliary verbal structure cannot be made use of to support memorizing.

This early stage is followed by the next in which active intellectual recall becomes possible by perceptual similarity between the expression and content (the sign can be used as means of recall if it resembles the object), and the operation of recall becomes reversible at least to an extent (Vygotsky, Luria 1994: 150). This "intermediate stage" has its own laws of connections and relations, out of which the indirect relation fully develops only later.

From the stage of using symbols associatively, the development takes place in the further direction of differentiation, so that the need for a motivated relationship between the expression of the sign and the content is eventually lost. The sign operation is thus acted free of the constraints arising from the expression (in principle, any sign can be linked to any meaning), "reverse action" (Vygotsky, Luria 1994: 143) becomes possible, but thinking is still acted externally, by external means.

It is not until adolescence that the symbols utilized for performing operations can become entirely independent of their particular expressions and external aids are substituted by inner stimuli (Vygotsky 1994[1929]: 65), and from "external-instrumented operations", the process becomes an "inner-reconstructed operation" (Vygotsky, Luria 1994: 152). Thus, the most characteristic of full development is when the child, after mastering the structure of the sign operation, constructs the internal processes according to the type, so that the same operation can be applied in all analogous situations, even if external conditions have changed radically.

In relation to the perception of time, mediated memory enables children to reorganize the temporal aspect of their surrounding visual space: symbols create the "field of time" (Vygotsky, Luria 1994: 132). Verbalized function of attention enables singling out and combining elements of the sensory field of both its past, present, and future states. In this way, past, present and future are purposefully joined together onto one field of attention in a linear line of successive events, e.g. as cause and consequence, or means to an end. Certain moments of the past are interpreted from the point of view of the present, using certain aspects of memories and not others for the purposes of setting up a potential future state of the sensory field. Hence, the unification of the past, the present, and the future of the perceptual field also entails new ways of organizing memory. In the process, memory in terms of a simple response is differentiated and forms an independent representation, and thus – what Vygotsky deems as "cultural memory" (Vygotsky 1994[1929]: 60). Among many other phenomena, it is the underlying condition for why there is narrative construction of thought instead of a temporal extension of an operation by adding links or postponing responses, common to behaviour (of many species) also before the acquisition of speech.

Furthermore, the "symbolic form" of anticipated elements belonging to potential future states of the sensory field allows the inclusion of these elements in the organization of present activities (Vygotsky, Luria 1994: 134). This way, the motoric action is separated from the present sensory field:

> […] the actually perceived elements of the present situation are included in one structural system with symbolically represented elements of the future. An absolutely new psychological field for action is created, leading to the appearance

> of the function of *formation of intention* and previously planned *purposeful action*. (Vygotsky, Luria 1994: 134, emphasis in the original)

In interrelations between the symbolic functions, attention, and memory, in relation to the actual present context of the behaviour, the symbolic representation starts planning present activities for the purposes of reaching a future goal or aim. As the functional barrier between perception and motoric processes, instead of simple purposeful activity in the immediate context of the behaviour, the symbolic function enables free action and planning of future activities.

In summary, the older child remembers not only better, but differently – the cultural development of memory entails organizing one's behaviour "by means of a geographical map or by means of a plan, a scheme or a summary" (Vygotsky 1994[1929]: 58). All these mnemonic devices, which do not constitute memory directly, "carry out in the general structure of the new operation the function formerly fulfilled by direct retention" (Vygotsky, Luria 1994: 143). These incorporated artificial, self-generated signs and symbols as aids extend memory beyond the biological dimensions of the nervous system. In the process of their use, it is essential that they were external at a certain stage, and instead of having to rely on one's natural capacities, they provide the recourse to external manipulations within their culturally shared contexts. For Vygotsky (1997: 50–51), affecting the memory of another person structurally takes place as affecting one's own memory, which is the grounds for cultural transmission over generations with the aid of conventional signs.

Internalization of speech in the development of sign operations

As already discussed, every "higher psychological function" begins with social activity, and with "external means":

> In the beginning the sign, as a rule, is an external auxiliary stimulus, an external means of autostimulation. This is conditioned by two causes: first, by the fact that the roots of this operation are found in the collective form of behaviour which always belong to the sphere of external activity, and, second, because of the primitive laws of the individual sphere of behaviour which, in their development, have not yet become separated from external activity, are not set apart from direct perception and external action (for instance, from practical thought in the child); yet the laws of primitive behaviour state that the child masters its external activity earlier and with less difficulty than inner processes. (Vygotsky, Luria 1994: 153)

The transformation of inter-psychological operations into intra-psychological operations does not take place immediately, as it has to go through several external changes before it can be turned inwards definitely. In fact, while others gradually become internal, for many functions, the stage of external signs is the final one (Vygotsky, Luria 1994: 154).

In this process of "internalization" or "interiorization" of cultural forms of behaviour, the reconstruction of psychological activity on the basis of sign operations, what was an outward process at first is transformed into an inward process, giving birth to a new psychological system:

> On the one hand, the natural process undergoes radical reconstruction, being transformed into an indirect, instrumented act; and on the other hand, the sign operation itself changes, ceasing to be external and becoming transformed into the most complex inner psychological systems. (Vygotsky, Luria 1994: 155)

Internalization is the central process in which speech and practical activity are intertwined and leads to the control of one's own behaviour, thus an aspect of what has already been covered from various points of view. In brief, internalization is simply reorganization of behaviour (including thinking) with the help of symbols. To the extent that any cultural behaviour includes symbols, the very process of this organization itself, integration of symbols within thinking essentially entails internalization. One of its results is a specific internal process of thinking, which includes means that were originally external and socially shared as its principle of organisation.

Vygotsky (e.g. in debate with Piaget, 1986[1934]: 15–40) observed the process of internalization in the development of speech. According to Vygotsky, internalization occurs when "egocentric speech", speech for oneself, is gradually differentiated from social speech as it acquires an independent psychological function, and is eventually turned into "inner speech", a speech completely independent and separated from social use for others, used for purely intellectual purposes.

At earlier stages of "cultural development", the communicative use of speech mostly entails children turning to their parents for help or assistance. Speech initially accompanies the child's activities and increases in case of a need or a problem to be solved. In these situations, slowly, speech develops as means of reflection to describe and analyse the task or the problem at hand – often together with parents, peers and others, who provide the assistance. Speech enables bringing the process of thought *reflectively* on the thought itself.

The reflective and planning functions are closely related, the latter emerging from the former (Vygotsky, Luria 1994: 120) and in the structure of the situation,

speech progressively moves to the positions before it and its turning points, as planning becomes the distinct functional centre of the operation. In the beginning, the structure of the "verbal action" follows the structure of the problem at hand, action dominating over speech, but in time, the verbal structure starts to provide the mould for the operation, and speech acquires control (Vygotsky 1997: 201). The child both acts on and pays attention to what is present in the situation at hand, and plans the separate parts of the operation in words (Vygotsky 1997: 200). In an older child, reasoning with the help of words gets even stronger. Cognitive processes and practical intelligence become interdependent with speech as it becomes the instrument of the problem's organized solution. As the social activity is transferred within the child, the same self-directed process starts to organize speech for the purposes of planning individual activity. Thus, two types of speech begin to differentiate – speech for others and speech for oneself.

At first, egocentric speech manifests audibly as children often talk to themselves, in play and especially during situations in which increased speech can provide structure for a solution of a problem (e.g. making a choice among pencils when the right colour is not available, as in Vygotsky 1986[1934]: 30). In the beginning, its appearance is very similar to speech for others, increasing in case of a need or a problem, and, in fact, only occurring in the presence of others because of its social roots, while its purpose or function is directed distinctly at the activity in process. The child actually seems to be under the impression of being understood by other children. However, in time, social and egocentric speech develop along separate lines progressively differentiating from each other. The more egocentric speech differentiates functionally, the more it comes to differ structurally. Although in the beginning, egocentric speech resembles social speech more, it slowly comes to resemble closely inner speech (Vygotsky 1986[1934]: 226), which is different from egocentric speech in that it is completely silent and fully formed for individual use.

Vygotsky (1986[1934]: 182, 225, 242–243) suggested that inner speech, and more precisely all speech for the purposes of oneself – "an autonomous speech function", a "distinct plane of verbal thought" (Vygotsky 1986[1934]: 248) – has its own particular structural characteristics related to the functional purposes it served. It has a special condensed and abbreviated, highly elliptical syntax with a tendency towards predicativity with subject of the utterance omitted (as there is no need to tell oneself the subject of the talk). It is full of idioms and words used in idiosyncratic meanings incomprehensible to others. It is the structural opposite of writing, in which everything needs to be explained fully in order to be intelligible (Vygotsky 1986[1934]: 242).

Strangely, Vygotsky did not illustrate the syntax of inner speech by providing examples from his observation protocols (Van der Veer, Valsiner 1991: 366). Instead, he gives analogies from literature and ordinary speech,[12] where previous contextual knowledge is available in the discourse, e.g. the case of answering a question; a situation in which the subject of the sentence is known to both the speaker and the listener who form a unified situation and discourse (Vygotsky 1986[1934]: 236); the example of Levin's declaration of love to Kitty from Tolstoy's *Anna Karenina* (Vygotsky 1986[1934]: 237) and others.

While in inner speech, syntax and sound are reduced to minimum, semantics comes in the forefront. Referring to Paulhan's work (1928), Vygotsky (1986[1934]: 244–246) claimed that in egocentric and inner speech, sense [*smysl*] dominates over word meaning, signification [*znachenie*]. In this terminology, the sense of a word is the accumulated sum of individual experiences, a dynamic, fluid, and complex whole with several inner zones of stability, while the word meaning, the "dictionary meaning" is shared within a community as one of these zones, perhaps the most precise and stable one. A word appearing in a particular context adopts both a narrower and a broader sense, it changes in minds and situations, deriving its particular sense from the sentence and, in turn, the paragraph and the text. In this view, the relation of word to thought "is not a thing but a process, a continual movement back and forth from thought to word and from word to thought" (Vygotsky 1986[1934]: 218). In social speech the central, conventional word meanings dominate over particular experiences, while in inner speech the sense dominates over the meaning, the sentence over the word, and the context over the sentence (Vygotsky 1986[1934]: 245–246). The different reactions to words in different people are different senses (sometimes different connotations), while signification is shared by all people:

> The linguistic milieu, with its stable, permanent words meanings, charts the way that the child's generalizations will take. But, constrained as it is, the child's thinking proceeds along this preordained path in the manner characteristic of the child's own stage of intellectual development. Adults, through their verbal communication with the child, are able to predetermine the path of the development of generalizations and its final point – a fully formed concept. But the adult cannot pass on to the child his mode of thinking. He merely supplies the ready-made meanings of the words, around which the child builds complexes. (Vygotsky 1986[1934]: 120)

[12] Vygotsky borrows these examples from Lev Yakubinskij's paper "On dialogical speech" (1928), which had already given examples of abbreviated speech such as monosyllabic answers, explicit comparison of written and normal speech, the example from Tolstoy's *Anna Karenina*, and another one from Dostoevsky's *Diary of a Writer* (Wertsch 1985a: 86–88; Van der Veer, Valsiner 1991: 368). Both Bakhtin and Lotman also adopted the same examples.

Speech becomes part of the solution itself by school age, when the child becomes able to solve problems through an entirely internal process – intellectually, free of the present perceptual field – but of course in many tasks external aid remains irreplaceable. Also the development of internal thought and practical intelligence in the direction of socialization, as well as in communication of experience and practical thinking to other people, is not finished at this point.

The cultural development of concepts in children

Not only is it important how, during their acquisition, culturally shared symbols structurally change psychological functioning as its constituents and organizers, but also what kind of changes take place in their own development in the relationship between thinking and its external and internal context.

As Van der Veer and Valsiner (1991: 166–167) note, if in the middle of the 1920s Vygotsky's focus was on a structure of reactions united by a dominant, then by the end of his life he began to view word meaning as the unit of analysis. The idea of 'the unit' was that the structure of the behaviour as a whole had features different from the sum of its composite elements, thus structure was to be taken as the unit, rather than its constituents, the conditioned reflexes.

Word meanings bear the mediating role in individual thinking of a person, as they transform and organize elementary, concrete experience. Thus, words are means for forming concepts, in which the sensory material is incorporated into conceptual structures. The main characteristic of words, though, is that they do not "refer to a single object, but to a group or to a class of objects" (Vygotsky 1986[1934]: 6).

Vygotsky (1986[1934]: 5–7) argues that the difference between sensation and thought is the generalized reflection of reality in the latter, which also happens to be the essence of word meaning – therefore an act of thought. A word without meaning is an "empty sound", no longer human speech; hence, meaning must be an inalienable part of the word itself, belonging to both the realms of language and thought. Learning an expression of the word and associating it with an object itself will not lead to formation of concepts; because the association can either strengthen or weaken, expand by new connections of similar things or disband, the relation itself does not change (Vygotsky 1986[1934]: 213–216). From that point of view, word meaning cannot develop at all. The idea of individual associations between spoken words and surrounding things leaves semantics unaccounted for. Without class, there is only correspondence of words to existing objects, no class relations, and only horizontal hierarchy. Therefore, it is not only the expression,

but also the meaning that begins to structure the experience. At the same time, thought without its expression is pure abstraction – without history, origin, and development. In word meanings, "the internal aspect of the word", thinking and speech are united in verbal thinking (Vygotsky 1986[1934]: 5–6). While both the phonetic side and thinking can be studied separately in principle, the study of the relationship between speech and thinking is essentially the study of their unity – the word meaning, which has all the characteristics of the whole.

Communication requires a system of means. Vygotsky (1986[1934]: 7) argues that it was often thought that the expression of the word, the sound, was the means of communication that could then be associated with any experience and thus convey the same content between people. He finds that what is really shared in communication is both the expression and its content, their "live union". In interpersonal communication, the content is not an experience or thought, but its generalization – the word meaning. There is no other way to share an experience or thought with another person but to refer to it by a category or class known by both communicating participants – psychologically, the word meaning as the shared concept.

In "Thinking and speech" (1934) Vygotsky sets out to analyse how children's concrete concepts develop into abstract concepts by the way they comprehend word meanings, tracing its stages from the early use of verbal signs until their full formation during adolescence. As already explained in case of speech as a "higher function" – in the beginning of the development, there is a concrete, external, factual relationship between the expression of the word and 'the thing', not 'the symbol' and its 'object' (Vygotsky 1986[1934]: 92–93, 105, 133) – there is no internal ready-made concept. For the child, the word is at first a characteristic or a property of the thing itself. The development of word meanings relies on this "objective connection between the word and the thing" (Vygotsky 1997: 105) that the child and the adult socially share. In the beginning, words as other external stimuli belong to the situation as a whole, together with its accompanying gestures, other objects and activities, e.g. the vocalization for 'mother' goes together with the grasping movement, an object, and the mother, and can be translated as something like "*Mum*, *pass me the ball*". As the child's use of speech is situated in its extralinguistic context, its external structure is acquired first. From this point on, conceptual thinking starts differentiating from 'perceptual thinking', guided by communication with culturally articulate adults – mediated by speech.

To differentiate the meaning of the word (an expression) from its reference, the thing that the word denotes, Vygotsky (1986[1934]: 130–131) adopts Husserl's famous example of 'winner at Jena' and 'loser at Waterloo' and adopts the terms 'meaning' [*znachenie*; intension], and extralinguistic reference, or 'object reference'

[*predmetnaya otnessennost'*]. Vygotsky then argues that "using this terminology", "the child's and the adult's words coincide in their referents but not in their meanings" (Vygotsky 1986[1934]: 131), as the latter may result from different operations. Subsequently, in the case of concept development, he applies this new terminology to his findings, saying that what must be studied are changing word meanings, while referents remain the same, as the child and the adult rely on different psychological operations when thinking about the object. Thus, when children acquire language, they adopt word meanings *referentially* (in other words *contextually*, and *concretely* – a 'ball' is associated with personal experiences with a particular ball), forming a concrete concept as the meaning of the word.

As concept formation cannot be studied directly, Vygotsky observes it in children's functional use of words, trying to derive it from the way children "operate" with word meanings – the way children understand them. He does not deny concept formation as an individual process, but maintains that it is predetermined by the meanings of words that they have already met in the speech of adults (Vygotsky 1986[1934]: 120). The development of word meanings as individuals use them is therefore culturally guided since the earliest communicative contact with caretakers and the surrounding culture. However, the development of children's concepts and, thus, the way children comprehend words, does not take place as a result of a sudden spontaneous discovery – concepts as categories do not appear as ready-made – but entails a stage-like process of cultural development as with other psychological functions.

Vygotsky's studies of concept formation in children relied on earlier experimental work by Lev Sakharov and the famous experiments by Narziß Ach[13], which Vygotsky continued and developed, but as all details of his own experimental setting and results are scarce, the relationship of his conclusions to his experiments unfortunately remains vague (Van der Veer; Valsiner 1991: 267).

Vygotsky (1986[1934]: 110–124) outlines the development of concepts in three main stages, but at least a preliminary stage can be added for, although Vygotsky does not appear to develop the idea much, Vygotsky and Luria note:

> […] the earliest flowering of the most complex sign operation occurs as early as in the system of purely natural forms of behaviour, and thus [...] the higher functions have their 'pre-natal' period of development linking them with the natural foundation of the child's psyche. (Vygotsky; Luria 1994: 148)

[13] Vygotsky used the following work: Ach, Narziß Kaspar 1921. *Über die Begriffsbildung. Eine experimentelle Untersuchung*. Bamberg: C. C. Buchners Verlag.

This early transitional stage in the development of symbols, perhaps analogous to signs used in communication of other species, precedes development in 'word meanings', or it is a simpler form of its early steps in which speech has not yet come to be the means for organizing thinking. By the apparent behaviour, before the age of one, "the pyramid of concepts is built specifically from non-differentiation of the particular; the child goes from the general to the particular, gradually isolating ever smaller groups and the single object is evidently isolated later" (Vygotsky 1997: 247). However, the process of concept formation is not a quantitative growth of this early associative activity of the "immediate" intellectual processes, but a qualitatively new type (Vygotsky 1986[1934]: 109).

At this early stage, the child's perception and representation of the world is situational. In the development of concepts, word meaning initially denotes for the child a *syncretic* image of objects grouped or set together by rather accidental, inconsistent and undifferentiated perceptual characteristics, in which subjective impressions of relationships are taken for relations between actual objects. Syncretic thinking takes place in undifferentiated clusters of objects, in situations as wholes (Vygotsky 1997: 192). Objects do not need to have a common objective feature to be merged into the same syncretic set; e.g. a word meaning may be formed by an association of trial-and-error, or simply by how objects are located in relation to one another spatially or temporally in the surrounding situation. Word meanings may often be extended to cover entire situations.

On the one hand, at this early stage words appear similar to proper names ("whose sole function is that of reference", Vygotsky 1986[1934]: 131), having a direct associative relationship between the word and a concrete object (the cluster). On the other hand, words often function as entire grammatically undifferentiated propositions, as "a whole sentence in meaning" (Vygotsky 1997: 88), denoting both a thing and a specific activity related to the thing[14].

A thing might carry a different name in a different situation because of belonging to a different complex. Conversely, a specific word may appear to have

[14] In this context, Vygotsky argues that early structures are propositionally "undifferentiated" and that the "external consideration" that "the child is at first pronouncing separate sounds, then separate words, and later begins to unite the words in two's and three's and makes the transition to a simple sentence which later develops into a complex sentence and into a whole system of sentences" is "deceptive" (Vygotsky 1997: 88). It is in sharp contrast with the speech of a three-year-old, in "which each [word] precisely indicates and signifies an object of action that constitutes the corresponding operation and grammatical relations that convey the relation between real objects" (Vygotsky 1997: 88). The difference between the 'primitive structure' and the 'speech structure' is that the initial cry is "an integral part in the merged complex of the situation", but the "present speech [...] has lost the direct connection with action on objects", and is shared both by the child and mother (Vygotsky 1997: 88).

a completely different meaning in a different situation, as the use of the word is rather guided by the specific situation and the child's subjective impressions than by the linguistic code. In sum, when a word is learned, its meaning is often extended to cover different contexts based on the child's subjective impressions of their contextual similarities, rather than objective features or linguistic conventions.

During this early stage, the child's use of words may align with the adults' use in reference to the same objects, but it is the result of a different psychological operation. Communication between children and adults is possible, because the meanings of words they employ are often 'functionally equivalent'[15] in their shared everyday contexts, as the referents in their surrounding world of objects are the same (Vygotsky 1986[1934]: 101). As the child's use of words is highly dependent on concrete situational contexts, caretakers might still comprehend their meanings, as far as they share the child's experience of usage.

While in the syncretic stage, classes are formed through grouping of external objects; later they come to be based on (particular) features that objects share. These features relate to one another as objects relate to one another. Yet Vygotsky (1986[1934]: 199) maintains that "verbal thought is no more than a dependent component of perceptual, object-determined thought".

During the second stage in the development of word meanings in children, objects are grouped into *complexes*, also called everyday concepts[16], in which they are no longer related to one another only by subjective impressions, but by objective factual features and relations between them. However, because of their unsystematic character and dependence on individual experience, the unstable criteria for the selection of elements into a set, often based on similarity, contrast or proximity, may still appear irrelevant or secondary from the point of view of an adult. Complexes are mainly formed by family resemblance, words functioning in communication similar to family names (Vygotsky 1986[1934]: 113), but in contrast to syncretic images in the previous stage – and importantly for further development – elements in them maintain their individual differences. Vygotsky divides the development of complexes into five substages described here as pure types, while in development, mixed forms often occur.

First, in *associative* complexes a relationship is established between the central core of the complex and any new member to the group, but the criteria

15 A term Vygotsky borrowed from Dimitrij Usnadze.

16 The term 'spontaneous concepts', originally used by Piaget, refers to those concepts that children develop on their own, whereas Vygotsky prefers the term 'everyday concepts'", as he suggests that even spontaneous concepts have a social component brought to them from the sociocultural environment.

for selection may change during the operation at every step, each member being related to the set by a new characteristic. First, a new element may be added by similarity in colour, the second element by shape, then by size, etc.

Secondly, complexes are formed by grouping elements into *collections*, where sets of elements are based on their complementarity in concrete functional contexts. Complexes like this are often compiled based on participation of objects in the same practical operation, e.g. the child may include a fork, a knife, and a spoon in a class of objects as they are all included in an eating situation, but not include, say, a glass and a vase. Children are able to group on the grounds of difference as a quality in itself, e.g. to compile a set of all different colours. Compared to associative complexes, where elements are chosen by similarity, collections are often characterized by "contrast" (Vygotsky 1986[1934]: 114).

Chain complexes are in a way similar to associative complexes, except that they lack a distinct core centre around which to build. Instead, the child includes each new element by an association to the last one, and the grounds for joining each new element may be different from the previous one. The process of grouping objects may take any direction – having selected triangles, the child may go on by selecting yellow objects, just because the last triangle happened to be yellow. Importantly, though, all single elements are added to the set as equal members.

Next, in *diffuse* complexes the classification is based on somewhat random and bold over-generalizations of characteristics taken as the ground for selection. For example, the child may pick a trapezoid after a triangle, because it roughly resembles triangles by some of its features. In further usage, the generalized feature that has given ground for the selection of a particular member may become clearer itself.

Finally, in *pseudo*-concepts, the most common kind of thinking in pre-schoolers (Vygotsky 1986[1934]: 119), children start forming sets more or less on the bases of common features. One abstract characteristic is chosen and differentiated or marked as the ground for the selection into the group, whereas the group is still a result of a "primitive" experiential association rather than a logical operation. Overtly, pseudo-concepts may appear similar to *scientific* concepts formed at the next stage, but they are still derived by an operation with concrete objects (Vygotsky 1986[1934]: 119). Thus, complexes are still formed on referential or contextual bases, not on the bases of relationships between abstract meanings themselves, e.g. at this stage, triangles are grouped, based on their concrete perceptual features, rather than on a formal definition.

Pseudo-concepts are an example of how word meanings in older children and educated adults (may potentially) already align in use, whereas they still understand each other qualitatively differently – the child from the "point of

view" of concrete concepts, an educated adult in abstract terms. The child using "pseudo-concepts" does not differentiate a concrete object from an abstract object.

The use of *scientific* concepts, or concepts proper ("real concepts", e.g. Vygotsky 1986[1934]: 121) is characteristic of adult thinking (while it constitutes only a certain type of adult thinking, which fluctuates between different levels as a whole), and actually starts to develop at school age. The term 'scientific' is somewhat deceptive, as it does not so much refer to concepts specifically used in science, but to a certain type of organization of thought.

In scientific concepts, all the elements are grouped based on the same denoted characteristic or feature and related to one another in the same precise way. While everyday concepts are derived from concrete and factual experience, scientific concepts are formed in such a way that all its elements are themselves generalized abstract features, independent of things and phenomena as particular objects:

> To form such a concept it is also necessary to abstract, to single out elements, and to view the abstracted elements apart from the totality of the concrete experience in which they are embedded. (Vygotsky 1986[1934]: 135)

In the beginning, all of the child's concepts belong to one horizontal row or line of experience without internal hierarchy. The reason is that they are externally, immediately related to, or refer directly to objects, not to a class of objects. Without "equivalency of concepts" (Vygotsky 1986[1934]: 200), an object can only be expressed through itself, and thus a hierarchical construction of concepts is impossible. In concepts proper, a concept can be explained through other concepts (e.g. in a number system by the ordinal and cardinal relations between numbers).

Scientific concepts (e.g. terms) are (at least potentially) used to systematize, to form hierarchized classifications and to define in integration within a (formal) system of symbols in relation to one another. The relations between formal concepts are reversible, even though operations in the process of activity are irreversible. Scientific concepts are first formed in the verbal environment and only afterwards related or applied to particular situations. In the surrounding environment, they make possible systematic study of objects which are unattainable directly, e.g., the study of molecules, atoms, or whales as mammals – requiring no direct individual experience of whales. They afford a systematic description of the world that is not experienced "directly". Sometimes scientific concepts have no relation to the surrounding world of things at all.

Vygotsky did not provide a reliable way how to differentiate between pseudo-concepts and concepts proper in practice (Van der Veer; Valsiner 1991: 267), as they appear very similar to each other functionally. The difference appears to lie

in the fact that while adults are able to define a triangle, and then, based on the definition, differentiate triangles from among other geometrical shapes, pseudo-concepts are formed based on perceptual similarity of the particular shapes at hand – in concrete thought.

While in general concept development takes place from a lower level of thought towards a higher one, scientific concepts develop from the higher towards the lower levels. Children adopt their use in interaction with parents. "Spontaneous" concepts arise from (immediate) experience with things, even if guided by interactions with adults. Scientific concepts, on the other hand, arise from mediated relations with things – they start with a concept and then "grow into its structure" (Vygotsky 1986[1934]: 193–194). Development of proper concepts takes place when concrete concepts related to particular experienced things develop into abstract concepts as classes. Some sign systems (e.g. writing and numeral systems) enable children to change from the use of spontaneous or everyday concepts, tied to their concrete contexts of usage to abstract scientific concepts (yet they are still always contextual within the thought as a whole, in its constituents), and some (educational) settings explicitly relate the two types of thinking. In fact, a proper concept is formed only when the abstracted traits are newly synthesized and the resulting abstract synthesis becomes the main instrument of thought (Vygotsky 1986[1934]: 139)[17]. Formal symbols are thus applied to concrete experience within their contexts (e.g., with their aid, individual apples can be counted by selecting a single generalized feature, the quantity), which in turn gives ground to sharing this kind of thought with other people (instead of presenting them an apple each, their number can be given).

The availability of concepts and awareness of them do not coincide either by the moment of their appearance, nor their function. Analyses of the surrounding environment by a concept appear earlier and might be completely independent of the analyses of the concept itself. The development of scientific concepts brings awareness of concepts, as they do not refer directly to experience, but to other concepts (Vygotsky 1986[1934]: 282). At first there is no awareness of one's own thought (i.e. metacognition – although it seems that Vygotsky occasionally identifies awareness of one's own thought with consciousness). At first, individual elementary functions (e.g. perception and memory) are undifferentiated, and there is no awareness of individual functions. Attention itself is a function of perception and memory and emerges, once the two differentiate in awareness.

[17] Toomela (2017: 50–53) argues that based on Vygotsky's writings, scientific concepts and proper concepts can be separated into two stages of thought: while scientific concepts are formal-logical, proper concepts bring into awareness the (formal) system of thought itself as a whole.

Systematizing concepts draws attention to concepts and thus leads to an awareness, and subsequent control, of them (Vygotsky 1986[1934]: 174). While spontaneous concepts concern the situational, empirical, and practical, the strength of scientific concepts lies in their conscious and deliberate character (Vygotsky 1986[1934]: 194).

Conclusion

The paper organized the topic of signs in Vygotsky's various writings into a coherent whole. The process of inclusion of symbolic signs within the behaviour of the child and an account of various changes in psychological functions that it brings along were outlined to study the role of symbols in the individual behaviour. As research into the behaviour of humans and other animals excluded language and symbols from their comparison, and the psychology of language sought to study acquisition of speech by considering language an independent system with its own internal rules, Vygotsky's predecessors apparently did not see language within the context of behaviour and psychological functioning as a whole. Language was seen merely as an abstract system, not as an activity, nor as something that generalizes and organizes experience within the surrounding environment. It was not realized that it may have a specific form at each stage of development. Even if language was taken as a means of communication of ideas, it appeared external to individual thought.

Vygotsky argues that for speech, action is not only an object; it is an activity and process itself, and should therefore be included among other psychological functions. He also suggests that to understand the specificity of human behaviour, various psychological functions should not be studied separately, but in their interrelations as an organized system. Observing the "lower functions" similar in many species, e.g. perception, attention, memory etc., in their interrelations with the "higher functions" which include the use of conventional sign systems – speech, writing, numeral systems, maps etc. – developed in cultural histories and passed from generation to generation, he outlines a developmental history which leads to children becoming full participants within their cultures. Vygotsky understood culture in terms of sign systems (Wertsch, Tulviste 2005: 66).

In the case of humans, language and thought are progressively intertwined during child development, so that language comes to organize behaviour. Acquisition of symbol use is fundamentally a social process that changes individual thinking. Symbols as human-specific natural, organic forms of interacting and engaging with their environments, bring along their interpersonal, cultural-historical origin and nature in addition to their cognitive components. The

human-specific cognitive processes have their individual and sociocultural aspects, which do not develop parallel to these processes, but in integration with them.

In this process a line of developmental history is formed, which includes symbols among the factors in its own formation, and does not coincide with the line of organic maturation of the child, although both become merged in one single line of ontogeny. Vygotsky calls this line of development the natural history of signs (or sign operations). In case of conventional symbols, this history appears to explain how very small differences between humans and their close evolutionary relatives regarding the perceptual apparatuses and the isolated behavioural and cognitive capacities create such great discrepancies in their actual behaviour – in the entire variety of sign systems that they use, in societies organized as cultures, and in the effect that they have on the entire variety of the environments they inhabit. While constrained by organic maturation, the sociocultural development of human beings follows laws similar or analogous to historical development, in which means and functions characteristic of, and available in, earlier stages are replaced by and lead to new means and functions.

The beginning of complex sign operations takes place very early, but there are many intermediate forms of natural and cultural behaviours between early elementary and the higher behaviour. Genetically, functionally, and structurally, higher behaviour is any behaviour which includes mastering one's own behaviour (Vygotsky, Luria 1994: 164). Higher mental functions are a result of the development of mediated activity, in which mediators are conventional signs. The use of these psychological aids provides greater freedom of behaviour, which enables humans to adapt their surrounding environment according to their needs significantly more, and in a qualitatively different way, compared to other species. Compared to other animals, humans influence their relations with their environments to a much larger extent. In symbolic activity, the structure of the activity and psychological functions is organized by inclusion of conventional signs as its structural centre and dominant. In the beginning, signs are "indistinguishable from all other stimuli", including the objects they must designate (Vygotsky 1986[1934]: 102). Internal signifying activity is initially undifferentiated from the external activity. Signs are "intellectualized" only in time, as their semantic aspect starts developing from within the context, as they start functioning as generalized symbols. This involves substituting external stimuli with internal stimuli – children do not only change their responses or reactions towards the environment, but also the ways in which they arrive to these responses by creating and adding new means to operations and substituting some psychological function with others. For Vygotsky, signs do not change anything in

their object directly, but are a means of internal activity to control oneself.

Vygotsky was not entirely consistent in his terminology that we would take as semiotic today. The change in the various ways Vygotsky approached the topic of signs, although these are compatible with one another in principle, follows the development of Vygotsky as a researcher. Various works indeed contain discussions of signs as tools as "the connection between practical action and symbolic forms of thinking" to uncover the specifically human forms of practical intellect in the child and their main lines of development (Vygotsky, Luria 1994: 102). Still, developmental changes in the structure of problem solving are just instances of a broader psychological and symbolic activity that involves the entire organization of human psychological functioning, to which the metaphor of signs as tools does not extend, as Vygotsky (e.g. 1997: 60–61) himself realized. Signs are instruments in the same way as speech can be used as a means to an end. In this paper, the central position of signs was outlined in relation to various psychological functions, including signs as tools in Vygotsky's analyses of the development of the human psyche as a whole.

Acquisition of linguistic signs and their inclusion in the behaviour brings many changes to interrelations between various psychological functions. The relationship between thinking and its environment will change and symbols become part of the child's environment. Symbols enable selection of relevant operations from among other possible operations (in their semantic aspect). The child becomes able to pick a relevant point of view from possible other points to describe a situation, to pick words purposefully, to select pencils for drawing, etc. Symbols enable children to take into consideration not only one, but a number of perceptual fields at the same time, observe the same situation from various points of view, compare various possible sequences of events, and many other operations, which involve purposeful distinction of point of attention in relation to its situational *hic et nunc*. Symbols enable control not only over other objects, but also over the child's own behaviour as an object (Vygotsky, Luria 1994: 111). The child becomes his or her own subject and object of behaviour, mastering it by preliminary organization and planning the way the he or she masters external objects. When joined with practical thinking, speech enables planned operations, which, when executed, stimulate and iterate development in their own structure. Thinking, in this view, is internal organization of experience for the purposes of planning a following action. As a distinct and separate psychological function, it appears from among other functions when it starts preparing the behaviour of the organism as its organizer.

At first, speech is purely social, intermental, interpersonal. Only then, once speech is already socially functional, does it start to organize individual activity. As

signs are first taken into use for socializing, and only then for internal purposes, it follows that cultural development itself is based on the use of symbols. The whole system of cultural behaviour initially occurs in a social, external form, all higher functions passing through an "external stage" (Vygotsky 1997: 105). Speech for one's own purposes, specifically distinct in egocentric and inner speech, develops as means of thinking, of organizing the child's own activities, rather than a means of communication. At the beginning of the development, the child is highly dependent on external means, but in time the symbolic activity starts functioning as an internal process – conceptually.

Verbal symbols do not remain the same over the course of psychological development of their usage, but go through a stage-like development of changes in the interrelations between speech, thought, and their context. During this development, communication and thought that relies on concrete experience dependent on the situation at hand is gradually substituted with generalized word meanings, as the conceptual level of language differentiates within the thought process. Thus, children's intentions and goals acquire the shape of the intentions and goals of their parents, teachers, peers and other relevant people. Before adults' concepts are fully developed and functional, and formal concepts can be taken into use, there are several early forms of concepts. During this development, conceptual thinking takes it shape, and generalized word meanings are internalized to organize individual thinking.

One of the main strengths of Vygotsky's approach is that it is developmental – i.e. phenomena are studied in the process of their formation, which brings forth the formation of signs in the individual. Vygotsky demonstrated that mental functioning, signs and the use of signs do not remain the same during the development of children's activities, but change. Vygotsky provides an alternative for strictly "mentalistic" and "individualistic" approaches to mind and knowledge, which take processes of thinking and knowledge as if occurring within the head only, situating them in the activities taking place in the surrounding world. Vygotsky's view on 'mind' extends beyond the skin (Wertsch, Tulviste 2005: 66) – he does not take the mind, cognition, memory etc. as closed in individuals, but extending on to the surrounding material and social environment.

References

Bühler, Charlotte 1930[1927]. *The First Year of Life*. (Greenberg, Pearl; Ripin, Rowena, trans.) New York: The John Day Company.

Bühler, Karl 1930[1929]. *The Mental Development of the Child: A Summary of Modern Psychological Theory*. (Oeser, Oscar, trans.) London: Kegan Paul, Trench, Trubner & Co.

Daniels, Harry; Cole, Michael; Wertsch, James V. (eds.) 2007. *The Cambridge Companion to Vygotsky.* Cambridge: Cambridge University Press.

Köhler, Wolfgang 1925[1921]. *The Mentality of Apes*. (Winter, Ella, trans.) London: Kegan Paul, Trench, Trubner & Co.

Liu, Charlotte Hua 2011. *Vygotsky's Psycho-semiotics: Theories, Instrument and Interpretive Analyses*. Bern: Peter Lang.

Nöth, Winfried 2009. On the instrumentality and semiotic agency of signs, tools, and intelligent machines. *Cybernetics and Human Knowing* 16(3/4): 11–36.

Rieber, Robert (ed.) 1999. *The Collected Works of L. S. Vygotsky. Vol. 6: Scientific Legacy*. New York: Kluwer Academic/Plenum. [Retranslated from the Russian version, previously translated from the English version by Vygotsky and Luria (1994).]

Robbins, Dorothy 2001. *Vygotsky's Psychology-Philosophy: A Metaphor for Language Theory and Learning*. New York: Kluwer Academic/Plenum.

– 2003. *Vygotsky's and A. A. Leontiev's Semiotics and Psycholinguistics. Applications for Education, Second Language Acquisition, and Theories of Language.* Westport: Praeger.

Stetsenko, Anna 2003. Alexander Luria and the cultural-historical activity theory: Pieces for the history of an outstanding collaborative project in psychology. Review of E. D. Homskaya (2001), Alexander Romanovich Luria: A scientific biography. *Mind, Culture, and Activity* 10(1): 93–97.

– 2004. Scientific legacy. "Tool and sign in the development of the child". In: Rieber, Robert; Robinson, David (eds.), *The Essential Vygotsky*. New York: Kluwer Academic/Plenum, 501–512.

Toomela, Aaro 2017. *Minu Ise areng: inimlapsest Inimeseks*. Tartu: Väike Vanker.

Van der Veer, René; Valsiner, Jaan 1991. *Understanding Vygotsky: A Quest for Synthesis*. Cambridge: Blackwell.

– (eds.) 1994. *The Vygotsky Reader*. Cambridge: Blackwell.

Van der Veer, René; Yasnitsky, Anton 2016a. Vygotsky the published: Who wrote Vygotsky and what Vygotsky actually wrote. In: Yasnitsky, Anton; van der Veer, René (eds.), *Revisionist Revolution in Vygotsky Studies*. Hove: Routledge, 73–93.

– 2016b. Translating Vygotsky: Some problems of transnational Vygotskian science. In: Yasnitsky, Anton; van der Veer, René (eds.), *Revisionist Revolution in Vygotsky Studies*. Hove: Routledge, 143–174.

Vygotsky, Lev 1978. *Mind in Society: The Development of Higher Psychological Processes.* (Cole, Michael; John-Steiner, Vera; Scribner, Sylvia; Souberman, Ellen, eds.) Cambridge: Harvard University Press.

– 1994[1929]. The problem of the cultural development of the child. (Prout, Theresa, trans.). In: Van der Veer, René; Valsiner, Jaan (eds.), *The Vygotsky Reader*. Oxford: Blackwell, 57–72.

– 1997. The history of the development of higher mental functions. In: *The Collected Works of L. S. Vygotsky, Vol. 4*. (Rieber, Robert W., ed.; Hall, Marie J., trans.) New York: Plenum Press. [Originally from 1931. First five chapters published in 1960.]

– 1986[1934]. *Thought and Language*. (Kozulin, Alex, trans.) Cambridge: The MIT Press. [In original, *Thinking and Speech.*]

Vygotsky, Lev; Luria, Alexander 1994. Tool and symbol in child development. (Prout, Theresa, trans.) In: Van der Veer, René; Valsiner, Jaan (eds.), *The Vygotsky Reader*. Oxford: Blackwell, 99–174. [1930 – unpublished original.]

Wertsch, James V. (ed.) 1985a. *Culture, Communication, and Cognition: Vygotskian Perspectives.* Cambridge: Cambridge University Press.
– 1985b. *Vygotsky and the Social Formation of Mind*. Cambridge: Harvard University Press.
– 1985c. The semiotic mediation of mental life: L. S. Vygotsky and M. M. Bakhtin. In: Mertz, Elizabeth; Parmentier, Richard J. (eds.), *Semiotic Mediation: Sociocultural and Psychological Perspectives.* Orlando: Academic Press, 49–69.
– 1991. *Voices of the Mind – A Sociocultural Approach to Mediated Action*. Cambridge: Harvard University Press.
Wertsch, James V.; Tulviste, Peeter 2005. L. S. Vygotsky and contemporary developmental psychology. In: Daniels, Harry (ed.), *An Introduction to Vygotsky*. London: Routledge.
Yasnitsky, Anton 2016. Unity in diversity: The Vygotsky–Luria circle as an informal personal network of scholars. In: Yasnitsky, Anton; van der Veer, René (eds.), *Revisionist Revolution in Vygotsky Studies*. Hove: Routledge, 27–49.

Лев Выготский и естественная история знаков

Статья объединяет тему знаков в различных работах Льва Выготского в единое целое для изучения роли знаков в развитии ребенка. Выготский связал конвенциональные знаки, которыми люди пользуются в общении и которые принадлежат истории культуры в течение нескольких поколений в историческое время, с психологическими функциями индивидов. “Естественная история знаков” Выготского изучает возникновение и развитие символической деятельности. В статье описывается процесс включения символов в поведение ребенка и рассматриваются сопутствующие изменения психологических функций. В ходе культурного развития появляются специфически человеческие формы поведения, а отношение детей к социальной и материальной среде качественно меняется. Выготский описывает процесс использования знака и анализирует этапы его развития. Подход Выготского объясняет, как использование различных систем знаков формирует познавательные процессы в человеке, ребенке, а также когнитивное развитие в целом.

Lev Võgotski ja märkide looduslugu

Käesolevas töös uuritakse märkide rolli laste arengus, korrastades selleks koherentseks tervikuks mitmete Lev Võgotski kirjutiste märgitemaatika. Võgotski sidus inimestevahelisest suhtlusest pärit konventsionaalsed märgid, mis kuuluvad kultuuriajalukku (mis toimub põlvkonniti ajaloolise aja jooksul), individuaalsete inimeste psühholoogiliste funktsioonidega. Võgotski „märkide looduslugu“ uurib, kuidas sümboliline tegevus tekib ja kujuneb. Käesolevas töös kirjeldatakse põhijooned, kuidas sümbolid laste käitumisse seotakse, ning käsitletakse sellega kaasnevate psühholoogiliste funktsioonide ja nendevaheliste suhete muutusi. Kultuurilise arengu käigus ilmuvad spetsiifiliselt inimestele omased käitumiste vormid, misläbi laste suhe nende sotsiaalsesse ja materiaalsesse keskkonda muutub kvalitatiivselt. Võgotski kirjeldab märgikasutuse kujunemist ja analüüsib selle arenguastmeid. Võgotski lähenemine selgitab, kuidas erinevate märgisüsteemide kasutamine muudab tunnetusprotsesse, mis leiavad aset inimeses, lapses ja kognitiivses arengus tervikuna. Võgotski lähenemist märgiprobleemile uuritakse selle ajaloolises mõistestikus.