

Operations with sign systems and their role in the development of the child psyche

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Abstract

In the article the main postulates of the historical-cultural theory of L. S. Vygotsky have examined, in particular the function, the formation, the genesis and the structure of the higher psychic functions; the symbolic activity and the means (sign systems) with which it operates. The relationships between psychic development and teaching have analyzed.

Keywords: childhood development; language; historical-cultural theory.

Las operaciones con los sistemas de signos y su papel en el desarrollo de la psiquis infantil

Resumen

En el artículo se examinan los principales postulados de la teoría histórico-cultural de L. S. Vigotski, en particular la función, la formación, la génesis y la estructura de las funciones psíquicas superiores; la actividad simbólica y los medios (sistemas de signos) con los que opera. Se analizan las relaciones entre desarrollo psíquico y enseñanza.

Palabras clave: desarrollo infantil; lenguaje; teoría histórico-cultural.

As operações com os sistemas de signos e seu papel no desenvolvimento da psique infantil

Resumo

Neste artigo se examinam os principais postulados da teoria histórico-cultural de L. S. Vigotski, em particular a função, a formação, a gênese e a estrutura das funções psíquicas superiores; a atividade simbólica e os meios (sistemas de signos) com que se opera. Analisam-se as relações entre desenvolvimento psíquico e ensino.

Palavras-chave: desenvolvimento infantil; linguagem; teoria histórico-cultural.

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In a globalized society, where technology and audio-visual media seem to have absolute control over the minds of people, what role can literacy learning play? How important is reading and writing?

It could say that this problem was present in previous centuries and up to the middle of the 20th century. However, the socio-economic transformations, which took place from the 1950s onwards and substantially, modified both the means of production in addition, the social structure. In this sense, they seem to have put an end to ideas about the need to “educate the sovereign” (that is, to make the people learn, at least, to read and write). According to the expression of Domingo F. Sarmiento (Argentine thinker and politician, president of the Argentine Republic in 1868-1874), title to one of his most famous works, published in 1900.

For some reason, which is not difficult to discover, they try to convince us that this society, where “the social ascent” constitutes the distant goal (and, very often, unattainable for the majority), is fair and gives everyone the possibilities to grow (to the extent of their abilities!).

If it is a question of skills, will not it be an objective of the school (in general education) to develop them? Of course, no educational institution is omnipotent: child development is a complex and complicated process, in which many social and psychological factors come into play, (I do not specifically include biological ones, because they do not act directly), on which the school and other educational institutions, not always, far from it, can influence positively and decisively.

If we accept as a premise of all pedagogical activity, for which educating is, in the first place, discovering and developing the abilities of all children, it is evident that:

1. The pedagogy must constantly feed on the ideas and conceptions of psychology as a fundamental framework for the teaching activity and

2. It must take into account the results of psychological research in relation to the learning processes of children.

Regarding the importance of what we call “literacy” in the development of the infant, we affirm that learning to read and write does not constitute, much less, the acquisition of a “habit”: it is the great gateway to knowledge and privileged means of development of the individual, of his thought.

Of course, *the literacy by itself does not necessarily guarantee psychic development*. Vygotsky points out that, *at the earliest age, play is the fundamental way of the cultural development of the child and, in particular, the development of his activity with signs*, without neglecting the importance of learning to read and write.

To expose the essence of this complex and difficult process of acquiring the instruments of thought, I will refer in detail to the considerations made at the time, almost a century ago, L.S. Vygotsky, founder of the “historical-cultural theory” about the human psyche.

In his work “The instrument and the sign in the development of the child”, written in 1930 and published for the first time in “Works” in 6 volumes (Vigotski, 1982a), he analyzed in detail the modifications that, in the “natural behavior” introduces, radically changing, the use of instruments and signs.

Vygotsky distinguished the “natural” psychic functions from those he called superior or cultural, whose development has linked “internally with the development of the child’s symbolic activity.” It is possible to understand them, says Vygotsky, on the basis “of the analysis of their genetic roots and of the transformation they have undergone in the process of cultural history” (Vigotski, 1982a, p.54).

He also points out that psychic functions appear in development twice: as inferior or natural functions (later he called them elementary) and as superior, cultural functions, in whose formation the system of signs plays a decisive role, and in particular, language. This indicates that higher psychic functions have a social origin.

There is no need to interpret superior or cultural psychic functions as “natural (or elementary) psychic functions + the sign system, in general, culture”.

The higher psychic functions, says Vygotsky, do not exist side by side or on the lower ones (elemental or natural). They penetrate and transform even the deepest layers of behavior (Vigotski, 1982a, p.59).

The culture, of which the subject must appropriate (because it is not a process of osmosis!), represents a huge set of “neoformations”, which radically transform the psychic activity, turning it into a **human** psychic activity.

If, in child development, the use of the sign system is of primary importance, it is logical to include, in the conceptual body of psychology, in addition to language, other forms of symbolic activity such as reading, writing, drawing, arithmetic, etc.

This inclusion supposes to consider the peculiar forms of conduct, constituted in the history of the sociocultural development of man and of the child and represent the external line of development of the symbolic activity. The internal line has represented by the cultural development of functions such as practical intelligence, perception, memory, etc.

Seen above, the higher functions make up a unit by its genetic nature, although they are different by the composition of the psychological system, based on different grounds to the one that supports the system of elementary psychic functions.

This unit has given by 1) its common origin; 2) its structure and 3) its functions.

- 1) Their common origin means that they arose (in phylogenesis) not as a product of biological evolution, but of the historical development of behavior. In the ontogenetic plane, they also have their own sociocultural history.

- 2) Regarding its structure and unlike the unmediated reactive structure of elementary processes, they are built based on the use of media-stimuli (signs) and therefore have a non-direct character, but mediated.

- 3) In the functional plane, they fulfill in the behavior a new and essentially different role to the elementary functions:

they allow the domain of the own behavior and, consequently, an active adaptation to the given situation, which implies the possibility of its modification to “benefit” of the subject.

Vygotsky analyzed the origin of the organization of psychic functions by sign systems and pointed out that the origin of the operations carried out through its use is a supra-individual process. As well as it is part of the history of the social formation of the child’s personality: “the Man’s behavior is the product of the development of a system that is broader than that of his individual functions, namely, the system of social relations and bonds, of collective forms of behavior and social cooperation” (Vigotski, 1982a, p.56).

Only the genetic analysis shows the path that unites the initial and final forms of the functions, since in both points (beginning and end) they appear as individual functions, exclusively belonging to the individual.

One of the major conclusions of this analysis is that the higher forms of perception, memory, attention, movement, etc. Vygotsky pointed out that “are internally linked to the development of the child’s symbolic activity and it is possible to understand them only on the basis of the analysis of their genetic roots and of the transformation they have undergone in the process of cultural history” (Vigotski, 1982a, p.54).

Vygotsky posed the following problem: what is the origin of the organization of psychic functions by the sign system (what characterizes the higher psychic functions)?

The origin of operations linked to the use of sign systems **it may not inferred from the formation of habits or from individual spiritual “inventions”;** **it is not a process that can understood within the frameworks of individual psychology.** It is part of the history of the social formation of the child’s personality. He points out that “human behavior is the product of the development of a system that is broader than that of its individual functions, namely the system of social relationships and bonds, of collective forms of behavior and social cooperation” (Vigotski, 1982, p. 56).

All superior psychic function began as a peculiar form of psychological cooperation and only later becomes an individual procedure of behavior, introducing into the psychological system of the child that structure that retains all the fundamental features of a symbolic construction (Vigotski, 1982).

In “History of the development of higher psychic functions” he says, “Every psychic function in the cultural development of the child appears on the scene twice, in two planes: first in the social, then in the psychological; first among people, as an intrapsychological category; then within the child, as an interpsychological category” (Vigotski, 1982b, p.145).

For his part, D. B. Elkonin points out that in the ontogenetic development of the child, the primal is the interpsychological form of behavior organization, in which one subject organizes the behavior of the other. The important thing is that this action is joint: the orientation to the action of the other is, simultaneously, the orientation of the own action (Elkonin, 1989).

At the beginning, the sign acts on the child’s behavior as a means of social relation, as an interpsychological function and then becomes a means to master one’s behavior. The main genetic law is the following: all symbolic activity of the child was, at some point, a social form of cooperation. The history of higher psychic functions is the history of the conversion of the means of social behavior into means of individual-psychological organization (Vigotski, 1982b, p.56).

Main rules of development of higher psychic functions

1) The history of the development of each the higher psychic functions is not the simple continuation and subsequent improvement of the corresponding elementary function, but it implies a radical change of the direction of development and the subsequent movement of the process on a completely plane different.

2) In the phylogenetic plane, it is not difficult to expose this difference: the biological formation and the historical formation of any function belong, evidently, to different forms of evolution. In ontogenesis, both lines of development have so closely intertwined that one seems the simple continuation and development of the other.

It is not about the evolution of the lower forms, but the dialectical process of constitution of new psychic forms.

In another word: higher psychic functions have not constructed as a “second floor” on elementary functions, but they constitute new psychological systems that include the elementary, those that begin to act according to new laws.

3) In the cases of alterations of the higher psychic functions, the relation between the symbolic and the natural functions has eliminated, because of which the natural processes begin to function according to the primitive laws. In aphasias, for example, the patient not only shows alterations of the symbolic operations, but they also suffer a return of all the higher psychic functions. The patient, in practical actions, is entirely subject to the elementary laws of the optical field; his activity shows any differentiation of the sensory and motor spheres, a return to the primitive forms of imitation, etc.

One of the fundamental conclusions drawn by Vygotsky is that the higher forms of perception, memory, attention, movement, etc., “are internally linked with the development of the child’s symbolic activity. It is possible to understand them only on the basis of the analysis of their genetic roots and of the transformation they have undergone in the process of cultural history” (Vigotski, 1982b, p.54).

He points out that the social nature of all higher psychic function was not detected by the researchers, “who did not even think about the development of logical memory ... as part of the social formation of the child. He highlights ... “All functions higher psychic begins to be a peculiar form of

psychological cooperation and only later becomes an individual behavioral procedure [...] incorporated into the psychological system of the child (Vigotski, 1982b, p. 56).

It's important to remember here the famous statement of Vygotsky: the psychic function appears twice, first as an interpsychic function and then as an intrapsychic function. In addition, he deciphers this affirmation in the following way: the sign acts initially in the child's behavior as a means of social relation, as an interpsychic function; later it becomes a means of dominating one's own behavior, transferring the social relation to the person's internal plane (Vigotski, 1982b).

In this sense, we can affirm that, in its origin, the psyche, the psychic is in the space of the interrelation of the child with the adult.

All symbolic activity of the child was, at some point, a social form of cooperation. **The history of higher psychic functions is the history of the conversion of the means of social behavior into means of individual psychological organization** (Vigotski, 1982b).

In order to characterize the operations with signs, Vygotsky studies its structure, its genesis (origin) and the subsequent destiny of them in the infantile psychic development.

As for its **structure**, it differentiates, for example, immediate or natural memory (which is the immediate impression of the present material: memory is not separated from direct perception) of mediated memory (superior, cultural), mediated (initially by the use of elements alien to the situation, for example, notches, knots). The subject organizes, organizes his behavior by organizing things, objects, thus creating artificial stimuli directed at himself.

As the same as all higher psychic function, the mnemonic operation with signs was, first, a means to stimulate the other and then became an intrapsychic function (language is the privileged example in this sense).

The operations with signs not only involve the passage to a higher level of organization of the psychic processes, but the passage of the natural history of the psyche to the historical formations of behavior.

The use of the sign leads in man to a new and specific structure of behavior, to a new cultural-psychological form of behavior. This extends the given limits of memory, for example, and, unlike the natural memory, the cultural one develops.

This essential difference and this development are not the product of associative or structural laws, which do not explain the specificity of the operation with signs. This must be reversible. For this to happen, the child must have a relationship between the sign and the meaning (thing, object, relationship, etc.)

As for the **genesis (origin)**, Vygotsky says that the mediatisation of psychic functions does not occur finally nor is it the result of a purely logical operation; nor is it reached through intuition (as if the ability to intuitively create and reach the understanding of symbols existed in consciousness).

The operations with signs are the result of a complex process of development (the child does not invent

them or learn them by heart) and various experiments allow us to conclude, says Vygotsky, that, in early childhood, **play is the main path of cultural development of the child and, in particular, of his activity with signs.**

As far as language is concerned, it is first necessary to emphasize that it is a system of signs developed throughout the historical development of society and transmitted culturally.

Here we must point out that culture is not a kind of "breeding ground", from which the subject extracts and swallows certain contents and the relations between them are not automatic.

Culture is not the determinant of development or its driving force, but rather an "inviting force", not so much an envelope as a challenge (according to the expression of the poet Mandelstam (Zinchenko, 1990, p.7). It is an invitation to the subject takes ownership of its contents: it is not "assimilation", but appropriation in the sense of making their values their own, which implies an active attitude.

In an early stage of language proficiency, the child refuses to change the denomination of things: for him, changing the name is changing the quality of the thing (for example, refusing to call the floor "lamp"). He sees no relationship between the sign and the meaning. The naming function does not arise from a discovery, but has its own long history. The internal relations between the sign and the meaning have formed gradually and this process lasts several years.

The words have separated from the concrete objects they designate, because they are not only the denominators of things, but also the carriers themselves, in their structure, of the concepts. Therefore, language is the most powerful, widest and most flexible instrument.

Teaching and psychic development

We must now dwell on the problem of relations between education (in a broad sense) and child psychic development. Vygotsky (1935) points out that this is one of the most complicated questions of psychology. In "The dynamics of the scholar's mental development in relation to teaching", says that the problem of the relationship between teaching and child development in school age it is the most important, the darkest and the least clarified of all the main concepts on which pedagogical practice can be supported.

This is the central problem, without solving which cannot even consider the tasks of pedagogical psychology and pedagogical analysis (Vigotski, 1935).

In essence, says Vygotsky, all attempts to solve this question can divide, schematically, into three groups.

The first group has as a central thesis the independence of the child development processes with respect to teaching.

Here, teaching is an external process, which must be coordinated with development, but which does not take an active part in it. Vygotsky considers that this is the position assumed by J. Piaget in his research on children's intelligence.

For this group it is typical the affirmation, explicit or covert, that the task of pedagogy is to establish to what extent have developed in the child those functions that are necessary to assimilate certain areas of knowledge and to acquire certain habits. For example, to teach arithmetic, the child must have a sufficiently developed memory, attention and thought, and it consists of determining to what extent these functions have matured so that it is possible to teach him arithmetic.

The development must conclude its predetermined cycles and the functions must mature before the school can initiate the teaching of certain knowledge.

The cycles of development always precede the cycles of education, which lags behind development. **The maturation of functions is the premise of teaching and this does not change anything in the course of development.**

The second group holds exactly the opposite: teaching is at the same time, development and this is, in essence, the process of acquiring habits or customs.

One must place in this group, says Vygotsky, reflexology and behaviorism.

It may seem that this point of view is more progressive than the one analyzed above, because it gives teaching a central importance in the course of child development

However, both coincide in the central point and are very similar: they conceive **the development as a purely natural process and its laws as natural laws, which education cannot change at all.**

While there is no doubt innate reactions have subordinated to natural laws, the point is that these theories consider that human development has also governed by natural laws.

The third group of theories tries to overcome previous conceptions through their simple union. On the one hand, the development process has conceived as independent of teaching; on the other hand, school learning itself has thought to be identical to development. It is a dualistic conception of development, whose most important example can be Koffka's theory of the child's psychic development.

According to this theory, development has, at its base, two processes that, although they have linked and mutually conditioned, are by their nature different: 1) maturation, which depends directly on the development of the nervous system, and 2) the teaching that, by itself and according to Koffka's own definition, is also a process of development.

In this conception 1) two contradictory points of view are united (this indicates that both points of view are not mutually exclusive, since, in order to be able to join them, they must have something in common); 2) the idea of mutual dependence and influence of the two fundamental processes, from which development is made up.

The examination of the three groups of theories on the relationship between development and teaching allows Vygotsky to sketch the most correct way to solve this problem.

First, he points out that the teaching of the child begins long before he enters school: every school education has its prehistory in the infant's life. He uses arithmetic as an example (when the school starts, the child already has some

idea of the number and operations of adding, subtracting, dividing, etc.) and concludes that teaching and development are not "found" for the first time once in school age, but they are intertwined from the first day of life.

Vygotsky wonders what the relationships between these two processes are in general and what the specific peculiarities of those relationships are at school age.

In this sense, he says that a concept of extraordinary importance is that of "zone of proximal development".

That teaching, in one way or another must be in accordance with the level of development is something that has already demonstrated empirically many times.

Nevertheless, the issue is what level it is: at least, says Vygotsky, we must determine two levels of development:

1. The current (level of development of the psychic functions of the child that had formed because of certain cycles of its development). This level is what the tests measure, and

2. The level of proximal development, that is, of what tomorrow will be current and that today is possible because of cooperation with the teacher, direct family members, peers, etc. This is the most important, because it signals the future of development.

Vygotsky says that it is necessary to overcome the conception according to which the level of mental development of the child is only its autonomous activity. This idea is at the basis of all the tests (only the results of the tests that the child can solve alone, without help) have taken into account.

Köhler's experiments showed that, in higher animals, the possibilities of imitation almost never exceed the possibilities of the individual's own activity.

In the child, the situation is different: it can imitate a series of actions that are far beyond the limits of one's own possibilities.

It follows that the level of child mental development must be determined with the help of the two levels of development: the current and the next.

This fact, apparently insignificant, has, according to Vygotsky, an essential importance in the question of the relationship between development and education, because until then the pedagogy should not leave the limits of the current level of development. This means, in fact, that the teaching should be oriented to yesterday or, in the best of cases, today, to the already completed stages of the child's development.

He points out that teaching that is oriented to the already completed cycles of development is ineffective for the further development of the infant.

Only the teaching that is ahead of development (and not the one behind it) is good, that is, the one that creates the zone of proximal development. **The teaching is not development, but its internal, indispensable and general, to develop, in the child, the human capacities that are not natural, but historically generated.**

The learning of the written language provokes the appearance of other cycles, extraordinarily complex, of

development of the psychic processes, whose emergence means a change of principles in the spiritual organization of the child.

The researches on the psychological nature of the learning processes of arithmetic, writing, natural science, etc., in primary school show that all these teaching processes revolve around the main neof ormations of school age. In the process of development, everything has intertwined and teaching sets in motion the internal processes of development. Following the emergence and destiny of these internal lines of development, which appear in relation to school education, is the main task of the analysis of the pedagogical process.

This approach changes the understanding of the relationship between teaching and development. From the traditional point of view, now when the child assimilates the meaning of a word or dominates some arithmetic operation, the written language, etc., the processes of its development are finished.

From the new point of view, says Vygotsky, they just start at this moment. For example, the domain of the four arithmetic operations begins a whole series of complex internal processes in the development of thinking in the child.

Our hypothesis, he says, establishes the unity, but not the identity between the teaching and development processes. It assumes the passage from one to the other and, in relation to this, it is necessary to show how the external meaning and the external ability of the child become internal.

In his work "The dynamics of the mental development of the scholar in relation to teaching" (Vigotski, 1933) and to clarify the relationship between learning and development, Vygotsky refers the experiments carried out with three groups of children, the first of which has an IQ of 110% the second between 90 and 110% and the third between 90 and 70. (Remember that the IQ (or coefficient of mental development) is the relationship between mental age and chronological age).

Which children will study best in school? It has assumed that the first group will have the best results and so on.

This assumption has based on simple observations and statistical investigations and this regularity has used in all schools.

However, a series of investigations (Therman in the USA, Blonski in the USSR) showed that children with the highest IQ tend to descend in the IQ scale, while those with low IQ increase it (those in-group II maintain it).

In order to explain this paradox it is necessary to introduce the concept of "relative success", in addition to the "absolute success" in learning.

This means that the relationships between the course of learning in school and mental development are more complex than could be assumed.

For further illustrate these concepts, Vygotsky says that if an adult starts studying at school, he will have the highest level of "absolute success", but he will not learn anything new; that is, their level of "relative success" will be much lower than the worst of the students.

The concept of "relative success" is extraordinarily important for children who learn in special schools (children

with mental retardation). It guides the pedagogue to consider the success of learning in a dynamic and non-static way and it has closely related to the concept of "next development".

For example, two children of the same chronological age (8 years) and with the same level of "absolute success" in learning can solve, with the help of the pedagogue, one corresponding task at the 12-year level and the other at the level of the 9 years. We call, says Vygotsky, "zone of proximal development" to this difference: between 12 and 8 and between 9 and 8 years.

The current level of development characterizes the results of the development to yesterday; the zone of proximal development characterizes the mental development of tomorrow.

In this article, we have analyzed some ideas of Vygotsky referring to the problems of psychic development, to the importance of the acquisition of the systems of signs, elaborated in the course of the history of humanity, and of the role played by the most privileged of such systems, that is, language, in the establishment of the human psyche.

In this sense, one of the essential pedagogical tasks is to make language become the most powerful mediating instrument.

It has also tried to make explicit the Vygotsky's "philosophy" in what it does to the processes of teaching, learning and development, essential to approach in a dialectical way the activity of the pedagogue.

We could affirm that teaching is the process capable of affirming and confirming the human in man and not so much the transmission of knowledge.

The intention of this article has been to encourage the study of the work of this brilliant psychologist, to reflect on his theory, from the point of view of its implications for the education of growing generations in this difficult and contradictory time.

I hope these reflections are useful for all those who have dedicated their lives and their spirit to the task of educating and teaching. As well as of transmitting to the new generations the most essential knowledge and the highest values of culture, a source of authentic enrichment of the being human, for whom a more just and equitable society is not a harmless and sterile dream.

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