



LEFT-HANDED CHILDREN AND THE LEARNING PROCESS

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ABSTRACT

The article gives a brief overview of theories about the causes of left-handedness. The paper considers the work of the left and right hemispheres of the brain, the mechanisms of their interaction. Special attention is paid to speech, as the most complex functions of the brain. It is emphasized that in the educational process of left-handedness, children by teachers and parents they should take into account the specific features of left-handedness, because it affects the success of their learning and the quality of social functioning.

KEYWORDS: *left-handedness, inter-hemispheric interaction, asymmetry, speech process, learning.*

INTRODUCTION

Left-handers, like those who differed from the majority in some individual characteristics, always caused surprise and attracted increased interest. As a rule, the attitude towards left-handers was wary, and at times sharply negative. This attitude has manifested itself in many cultures and languages. For example, in the Uzbek language there are still numerous examples of this kind: "left goods"-goods sold to the left (illegally), or fake, forged goods. In the same row: "left income", "left money". In English, the word "left-handed" has other meanings – "sinister", "hypocritical", "clumsy", "illegal". There are similar examples in other languages.

There are many interesting hypotheses about the origin of right-handedness and left-handedness, the listing of which would require writing a separate book. It has now been proven that it was not working articulate speech that caused the asymmetry. It arose in the process of evolution as an important adaptive trait even among our animal ancestors, which, ultimately, allowed the human race to take a leading place in the world of animals existing on earth.

In different eras, the number of left-handers was apparently constant and amounted to about 10 - 12 % of the population. There are about twice as many ambidextrous, that is, people who are equally good at both the left and right hand. In men, left-handedness occurs 1.5–2 times more often than in women, which is caused by the lesser specialization of the hemispheres in women and the easier ability to

retrain at an early age. With a variety of brain lesions in one of the hemispheres in left-handers, there are disorders that are never noted in right-handers. Such violations include mirror writing, that is, all letters are written on the contrary, in a mirror image, mirror reading, mirror perception, the phenomenon of expanding the space of vision, and the phenomenon of anticipation, that is, a clear description of events that have not yet happened and which occur later in time. Many of them show increased skin sensitivity. For example, they can detect the color of objects with their eyes closed and sometimes detect their image on paper. Their psyche is more vulnerable, mood swings are more noticeable, they often experience unaccountable anxiety and stress. Lefties, as a rule, have a more vivid imagination, artistic inclinations, the ability to reincarnate, a kind of vision of the world around them. No wonder the sculptors Michelangelo, Leonardo da Vinci, the painter Picasso, the artist Charlie Chaplin and many other representatives of art were left-handed.

Today there is a strong opinion that left-handers are unhappy people, since "the whole world" is against them. Indeed, if you take a closer look, it is easy to see that everything in our life is adapted for right-handed people. And this is not surprising-but: left-handed is still in the world's population constitute, according to various estimates, only 8-12 %.

In our time, the phenomenon of left-handedness is being actively studied. The results



obtained make it possible to change the stereotyped perception of left-handers, which makes it possible to develop methods of teaching them. If in the past they tried to retrain left-handers at school, to “adjust” them to the right-handed class (and the teacher himself), today teachers already know that this is extremely harmful. They understand that it is necessary to take an individual approach to left-handed children, using other teaching methods that are more natural for them and therefore more effective.

METHODOLOGY

Subjects and application to practical class

There is still no consensus on the cause of left-handedness. The most developed and scientifically substantiated theory is the functional asymmetry of the cerebral hemispheres. We will consider these theoretical foundations more in detail, since we consider them leading in this phenomenon.

Let's start with human speech as the most delicate, fragile, and complex function of the brain. Well-developed speech is just that feature of a person that sharply distinguishes him from the animal world. The mechanisms of speech, their representation in brain structures have always been the subject of keen interest of researchers. However, it should be noted that systematic observations on this issue have been conducted not as long as one could imagine: only since the 30s. XIX century. It was at this time, more precisely in 1836, that the French physician M. Dax made a report at the medical society, in which he summarized the results of observations of 40 patients who suffered from speech loss due to cerebral hemorrhages. In all patients, the left hemisphere was affected, which, in addition to speech disorders, caused partial paralysis of the right extremities. Here the anatomical structure of the nervous system should be recalled. The left half of the brain controls the work of the right half of the body and the right half of the work of the left half of the body. This feature is caused by the intersection of nerve pathways leaving the brain, at the level of its stem structures. Therefore, paralysis of the right limbs indicates damage to the left hemisphere and vice versa. From his observations, Dax rightly concluded that speech is controlled by the left hemisphere.

The most complete evidence for the asymmetry of the hemispheres was obtained by the French physician P. Broca. He, like Dax, observed patients with loss of speech, and always found in them concomitant paralysis of the eight limbs. The area of the brain, the defeat of which causes loss of speech-aphasia, in medical terminology has become firmly

established in science under the name of “Broca's zone”. It is located in the left hemisphere in the lower third of the frontal lobe near the anterior central gyrus. In further research, it was noticed that aphasia can exist in several forms. What Broca observed is now called expressive aphasia and is manifested in the violation of the patient's own speech. At the same time, understanding of someone else's speech is preserved. Such a patient either does not speak at all, or speaks with great difficulty, with hesitation and long pauses, without intonation, and with a violation of the grammatical structure of the phrase. There is an accompanying writing disorder, but the comprehension of written language is preserved.

Another type of speech disorder, mainly associated with understanding speech, was first described in 1874 by the German researcher K. Wernicke, who, like Brock, associated this disorder with a well-defined area of the brain. This area is now called the “Wernicke zone”. It is also located in the left hemisphere in the posterior portion of the first temporal gyrus between the primary auditory cortex, the portion of the cerebral cortex, which receives signals from the auditory organs, and the angular gyrus, in which visual signals are converted into auditory. The defeat of Wernicke's zone leads to receptive aphasia: the patient experiences great difficulty in understanding speech, but to a much lesser extent loses the ability to speak. At the same time, the fluency of speech and rhythmic stress are preserved. In addition, in contrast to patients with expressive aphasia, patients with receptive aphasia do not notice defects in their speech and get angry when they are not understood by the people around them.

Even in our time, after so many years and receiving numerous new data, Wernicke's scheme is considered correct. According to him, understanding speech and composing phrases occur in the zone named after him. From there, the information is transmitted to Broca's zone, which details the program and gives commands to the corresponding muscles to form the sounds of the voice. The implementation of the motor response, i.e., the movement of the lips and tongue, occurs through the motor fields of the anterior central gyrus. The heard word enters the primary auditory cortex located near Wernicke's zone, where the auditory signal is directly perceived at the speech level. With the visual perception of a word (reading), it first enters the visual cortex, located in the occipital regions of the brain. From there, information enters the angular gyrus, where it is translated into a form accessible to Wernicke's zone, i.e., into the code of auditory receptors.

All the processes described above occur exclusively in the left hemisphere of the brain. What about the right hemisphere? What are its



functions? If the left hemisphere operates with words, it means that it operates with thoughts and, logically, is the leading or, as they say, dominant in the work of the brain as a whole. For a long time, it was this point of view on the work of the hemispheres that prevailed among scientists. However, the last 40-60 years have made significant adjustments to these views.

In particular, it was found that, contrary to popular belief, only 15% of left-handed people have speech centers in the right hemisphere. In 70% of left-handed people, speech functions, like in right-handers, are performed by the left hemisphere, and in 15%, speech centers are presented in both the left and right hemispheres of the brain.

A significant difference in speech specialization of the hemispheres in men and women was shown. In males, the specialization of the hemispheres is formed up to 5-7 years, in females - not earlier than 13, and sometimes it does not occur at all. In women, even during the period of intrauterine development, the accessory speech center, located next to Wernicke's zone and subsequently participating in the formation of syllabic speech, is duplicated, passing from the left hemisphere to the right. Thanks to this feature, girls begin to speak earlier and are more capable of learning languages than boys. The same feature is observed in left-handed men. Naturally, the presence of an additional speech center in the right hemisphere somewhat reduces his ability for imaginative thinking and thought processes based on it. In particular, the ability of foresight, intuition, etc. A broader representation of speech functions leads to the preferred use of verbal analytical strategies for solving non-verbal problems. This can significantly slow down the speed of thought processes since the amount of information processed with the figurative decision strategy characteristic of the right hemisphere turns out to be 10^6 times greater per unit time than with the verbal one.

What conclusions can be drawn on the basis of all the data learned using various methods in healthy and sick people over the past decades? Has the conclusion about the dominance of the left hemisphere in right-handers been confirmed? No, it seems that interhemispheric relationships are much more flexible than previously thought. Indeed, speech functions are under the jurisdiction of the left hemisphere, but not as fully as expected. The fact that the right hemisphere is involved in the processing of signals in the brain, including and speech. Primary parametric processing includes the distribution of signals by tonality, loudness and some other physical characteristics, without the isolation of which further circulation of the signal in the brain is impossible. In case of damage to the right hemisphere, the left hemisphere

can take over these functions, but it will perform them much slower and less efficiently, and in difficult cases it may not be able to cope at all. This is similar to when, instead of a professional master, a beginner starts to do the job. No skills, no dexterity, and the tool is not the right one. Therefore, injuries to the right hemisphere also affect speech functions in right-handers, although less noticeably than injuries to the left hemisphere.

In our studies, for example, it was found that 80% of children have stuttering visible EEG (startup image recording, recording using the electrical device brain biotoki) irregularities in the parietal temporal area of the right cerebral hemisphere. In addition to ineffective performance of uncharacteristic functions, the left hemisphere as a result of additional work is overloaded and begins to perform worse in its immediate activity, which, apparently, causes stuttering.

In addition to complex interactions, there are a number of functional features inherent in each hemisphere. One of the most important of these features is undoubtedly the way information is processed and the associated thought processes. The left hemisphere is characterized by logical processing, expressed in sign form, and the processing method itself is very similar, apparently, to the principles laid down in modern electronic computers (ECM). Sign information is fixed in spatial and temporal coordinates, and therefore is easily perceived. But it is precisely such a feature that is completely uncharacteristic of the right hemisphere, which operates with images and resembles an analog computer more, albeit with even greater stretch in comparison than a computer for the left hemisphere. The mental processes of image formation turn out to be fundamentally unconscious, since their most important feature is the impossibility of ordering information in space-time coordinates. Probably, a processing method based on holographic principles is used here.

The unconscious has always seemed strange, frightening to a person. In this regard, the observations of the psychologist L.V. Zankov are very interesting, who noticed that the right half-space associated with the left hemisphere of the brain is associated with truth, a bright world, kindness and clarity. The left half-space is endowed with opposite properties. Analysis of the most ancient and later monuments of painting shows a reliable predominance of the left-right direction of movement of the depicted objects. Even an examination of the monuments of Neolithic art (rock art) shows that the depicted animals move from left to right and are represented by their right profile. Psychologically, this coincides with the process of transformation into a real sign of the stream of images from the



unconscious right hemisphere. "By depicting animals, the artist thereby called them out of nothingness, the other world; the act of creativity was a simultaneous act of creation".

Summing up all the data available to date on the work of the cerebral hemispheres, it can be noted that the most characteristic feature is not dominance, but interaction based not only on some duplication of functions, their complementarity and, but also some opposition.

We now turn to the question of some other reasons for left-handedness. The most common is the so-called genetic left-handedness. Until now, the exact transmission mechanisms of this trait are not known, but it has been reliably established that left-handedness is approximately 10 times more common in families in which at least one of the parents is left-handed. Genetic left-handers may not have any developmental disorders, then this is considered simply an individual identity, a variant of normal development.

Allocate the so-called "compensatory left-handedness" associated with damage to the brain of any genesis, more often, as mentioned above, its left hemisphere. Since the activity of the right hand is regulated by the left hemisphere, when it is damaged at an early stage of the child's development, the right hemisphere takes over the corresponding functions: the left hand becomes the leading one, more active when performing everyday activities, including writing.

In children and found "hidden left-handedness." Here we are talking about changing the dominant hemisphere. Above, we talked about that critical period when the main functions of the brain are evenly distributed between the two hemispheres, after which their specialization occurs (in boys, the specialization of the hemispheres is formed up to 5-7 years, in girls-not earlier than 13). At this critical juncture, "hidden left-handers" begin to dominate the right hemisphere, and they are often called "hidden" or "psychic" left-handers, implying that the signs of their left-handedness are not associated with the dominance of the left hand in a "pure" form.

It should also be mentioned "forced left-handedness", when the choice of the leading hand is associated with an injury to the right hand. This left-handedness can also be the result of imitation of someone from significant people (relatives, friends, etc.).

Left-handedness. Here we are talking about atypical mental development, when in the critical period the dominant hemisphere in relation to the hand is not formed in children. In this case, approximately equal use of both hands occurs. It also happens that a child eats with his right hand and writes with his left.

CONCLUSIONS

To ensure that a child is left-handed and successful in learning, both educators and parents need to know about the reasons for his left-handedness. They may be different, and because of them, the development of certain individual qualities may depend on the child.

Left-handedness gives some advantage in sports that require quick reactions - boxing, wrestling, tennis, etc. In right-handed people, the image is perceived by the right hemisphere, and motor commands go from the left hemisphere to the right hand. In a left-handed person, everything happens in one hemisphere, so the speed of the movement is higher. From all that has been said, it follows that a left-hander cannot be regarded as "the opposite right-handed." This is a peculiar and original device of the central nervous system.

If there is reason to believe that the child's left-handedness is caused by violations of the specialization of the cerebral hemispheres, then it is necessary to turn to specialists (psychologist, neuropsychologist, neurophysiologist) who can conduct special sessions to correct interhemispheric connections. Often, even after a small number of lessons, the child begins to write and draw with his right hand without any compulsion.

For a more accurate determination of the individual characteristics of left-handed children, it is necessary to take into account the entire set of human asymmetries. Therefore, in modern psychology, the term "individual profile of laterality of the organization of functions" (PLO) is used, which reveals a certain combination of sensory and motor asymmetry. To determine the PLO, and with it - the identification of a possible left-handedness, the technique, koto-paradise consists of three groups of tests: to determine the dominant hand, leading the ear and lead the eye (sometimes further define and lead the foot, although this information is not input IT analysis the resulting profile.

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