

# Neurodidactics In Teaching Foreign Languages

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**Annotation:** In this article, the term "neurodidactics" is used as a way of interpreting the process of teaching foreign languages from the point of view of neurosciences. Neuroscience is a relatively new term that combines methods and directions that study the brain: how it works and how it works. From a neurobiological point of view, learning is the formation of populations of neurons in the cerebral cortex. Each person already comes to this world, possessing about 100 billion neurons, weakly connected to each other. As the child gradually learns, "chaotic" neurons connect to neural networks.

**Key words:** formation of populations of neurons in the cerebral cortex, unpleasant, important or unimportant, interesting information

During the learning process, the brain reacts to stimuli (visual, auditory, etc.). First, in the limbic system of the brain, information is sorted according to criteria: pleasant or unpleasant, important or unimportant, interesting information or not. The criteria for pleasantness and importance are highly individual for each person. Relevant information is passed on to working memory (the cerebral cortex is a layer of the brain, consisting mainly of neurons). Unimportant or uninteresting information is discarded. New important, emotionally significant information is compared with the already existing knowledge and is connected (anchored) to the already existing knowledge. At the biological level, a new neural connection is being established. With the repeated introduction of the same information, the same neural connections are affected, and the transmission of a signal from one neuron to another is accelerated many times over (repetition leads to the consolidation of information).

Can the limbic system be stimulated? Since the new information is compared with the already known, it is necessary, when introducing new information, to activate the already existing knowledge, for example, using the method of associationograms (mental maps), and also to clearly show the students what scientific, cultural, social or personally significant value the introduced educational material has ... It makes sense to show students how knowledge functions in the brain, and compare a photomicrograph of a neural network and a mental map (assogram) to understand the benefits of this method. Age features of training. As we mentioned above, with the development and learning of a person, there is a steady formation of neural networks from chaotic neurons. The perception of language begins in the last third of the prenatal period, and immediately after birth, infants are able to distinguish between their native language (the one they heard while still in the mother's body) and a foreign language. It has been experimentally proven that when speaking to babies in their native language, the rate at which they suck at the mother's breast increases. In addition, babies are able to distinguish the familiar voice of the mother (heart rate increases). The more diverse and attractive the external stimuli, the faster neural networks are formed in children. Therefore, advice to pregnant women to talk to the unborn child and listen to music "together" is neurodidactically quite justified. Up to 9 months, children are able to distinguish all 160 phonemes of the world: for example, Japanese children at this age are still able to distinguish between the phonemes [l] and [r], but by the end of the second year of life this ability is lost. By the age of 4–5, children have mastered the basic structures of the language or, in the case of bilingualism, the basic structures of languages.

Two or more languages in the brain. All recent studies show that children who grew up in multilingual families (bilinguals, trilinguals) receive significant cognitive advantages over those who grew up in a monolingual environment. They have greater self-control, learn synonyms faster, integrate phonemes of another language more easily, and generally have a higher linguistic flair and developed social competencies.

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In fig. Figures 5 and 6 show images of scanned areas of the brain of a trilingual child and a 10-year-old child who began to learn two foreign languages at the age of 10.

Rice. 5. Trilingua brain at the age of three. Three languages - L1, L2, L3 form one overlapping neural network:

- L1 - yellow-red;
- L2 - blue;
- L3 - green

Rice. 6. Three languages - L1, L2, L3 were studied sequentially after the age of 10 years. There are some overlapping areas, but three different neural networks are clearly visible:

- L1 - yellow-red;
- L2 - blue;
- L3 - green

Conclusions: early age is a sensitive period for language learning. The more languages are learned at an early age, the easier it is to learn them further. Disabled or poorly trained students from the point of view of neurodidactics are students with few active neural networks and connections. The process of checking information according to criteria of importance, attractiveness, significance takes them a lot of time. Such students lack awareness of grammatical phenomena, the ability to distinguish foreign phonemes is also limited. They do not understand the meaning of typical types of exercises, such as elementary substitution, multiple choice, etc. Such students need increased teacher support and gradual accustoming to independent work.

Up to level A2 or B1, the assimilation (anchoring) of words is based on the vocabulary of the native language. The limbic system checks whether the input vocabulary unit is relevant, and then looks for which existing neural network to embed the new knowledge into. Therefore, a complete refusal or even a ban on using the native language in the classroom has no neurobiological basis, and for novice students it is simply harmful.

Languages at an elegant age

From about 55 years old, the processes of age-related changes in the brain begin, namely, the death of neurons. In this regard, the reactions of information processing slow down, the volume of working memory decreases. However, this natural process can be slowed down and partially stopped if the brain is kept active, which is facilitated by the study of foreign languages, which stimulates the so-called secondary (adult) neurogenesis - the formation of new neural connections. It should also be noted that the hormonal background changes with age: in particular, the level of the hormone cortisol (the hormone of caution) increases, the level of dopamine, on the contrary, decreases, which negatively affects the ability to concentrate and memorize information.

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