

**PEDAGOGICAL GRAMMAR AS THE FRAMEWORK OF TEFL
RESEARCH. PART 15. AGE AND FOREIGN LANGUAGE
ACQUISITION: BIOLOGICAL, COGNITIVE AND AFFECTIVE
FACTORS**

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The paper presents a comparative analysis of the three groups of factors (biological (neurological), cognitive and affective), which are believed to be related to the impact of the learners' age on the foreign language acquisition. Having analyzed the available research data concerning the possible role of biological aspects the hypothetic critical age may be based on (laterization, puberty, plasticity of specific brain areas, neurons' maturation time, the thalamus hypothesis), the author formulates the preliminary conclusion about the contradictory data on the issue and the need for further research in the area. The same generally applies to the cognitive and affective aspects of the problem. The age differences in the foreign language learning can only partially be explained by different attitudes to language as an object of acquisition of children and adults considering a wide range of varieties within each of the said groups. The difference in adult and child acquisition strategies can be explained by a number of cognitive factors, such as the strong social attitude to the use of the native and foreign languages, as well as the ability of abstract thinking in adults. The cognitive development can explain why teenagers learn the language better than younger children, but it cannot account for the advantage of teenagers in the field of pronunciation acquisition or the children's better results in speaking over long periods of time. As far as affective aspects are concerned, many adults have problems in passing through the crucial stage (cultural stress) or they do not pass it through at all. In typical cases of language acquisition, most affective factors in the language environment are unfavorable for adults and favorable or neutral for children, creating unequal learning conditions. At the same time, some adults manage (due to individual and other factors) to approach the affective parameters of the child's conditions of acquisition. This may be an explanation for cases

of adults' rapid and effective acquisition of the foreign language.

Keywords: *affective factors, biological factors, cognitive factors, critical age, foreign language acquisition, learners' age.*

Problem statement. *Introduction to the series.* Numerous research projects in teaching foreign languages, specifically in the development of grammar competence, often seem to lack a common framework to integrate them into a single area with uniform approaches, terminology and criteria. It accounts for the *current importance* of the issue under consideration.

The aim. The *object* of this part of the series is outlining the impact of learners' age on the foreign languages acquisition, with the *subject* being the biological, cognitive and affective factors' role in this process, specifically their effect on its quality. Its *aim* is to outline a general picture in relation to the abovementioned three groups of factors. This is the fourteenth (see the previous issues of this journal [4]) in a series of articles focusing on the Pedagogical Grammar issue [1], where the author, basing on the theoretical models and research data, is planning to discuss the various aspects of the problem.

Analysis of current research and presentation of the main material. The higher efficiency of language acquisition by children (as compared to adults), observed in practice, has led to the widespread belief that there is a certain threshold, the "critical age" beyond which an adult is unable to learn a foreign language at the level of a native speaker. Although there is considerable variation regarding the specification of this critical period (various authors limit it to different life span – usually from 5 to 15 years of age), the existence of a period particularly favorable for the foreign language acquisition has been admitted (in one way or another) by many researchers [13; 18; 22]. Attempts to substantiate the reasons for this predisposition of the child to acquire a foreign language were usually reduced to biological, cognitive and affective factors.

Biological factors. Biological (neurological) reasoning is summarized in several hypotheses. The earliest of them was proposed by W. Penfield and L. Roberts [19], and then elaborated by E. Lenneberg [15] and may be reduced to the fact that the child's brain differs from the adult's one. In the most general terms, this difference involves lateralization, i.e., localization of the speech function in the left hemisphere of the brain, which, according to E. Lenneberg [15], is completed by the onset of puberty (10-12 years). There is no wonder

then it was this age that was labelled as the “critical” one. The revision of E. Lenneberg’s data showed that most of the results were related to clinical cases of five-year-olds or younger. Therefore, S. Krashen proposed to reduce the critical age threshold to five years. Further studies [10] showed, however, that a certain degree of lateralization is present even in newborns. Krashen tried to put forward a compromise hypothesis, according to which newborns possess a small degree of lateralization (or predisposition to it), which then progresses and is over by the age of five. It has also been suggested that the acquisition of a foreign language before and after lateralization occurs in different ways [12].

Analyzing E. Lenneberg’s hypothesis [15], D. Singleton [24; 25; 26] concludes that it is questionable. Such a conclusion was formulated on the basis of four arguments: 1) lateralization ends much earlier than puberty (and is possibly present even at birth); 2) brain hemispheres at no stage have an equal potential with respect to language acquisition; 3) lateralization is never absolute; 4) the results of studies on the native and foreign language acquisition do not support this hypothesis [24: 229].

In his later works, S. Krashen [13] suggested that some linguistic aspects may be localized in the left hemisphere later, by the moment of puberty. Those aspects, in Krashen’s view, may involve elements of linguistic competence, which are necessary for operating complex (in relation to their length) combinations of linguistic signs [13: 207]. Similar assumptions have been made by other authors. Some [9] believed that the right hemisphere may play a more significant role in younger children. Others [11; 16] assumed that this role may increase as a person grows older. However, these hypotheses have not been confirmed in experimental studies. In particular, experiments on electrical stimulation of different zones of the brain [24; 29] have shown that all languages are localized practically in the same areas.

Feeling insufficient validity of the hypothesis about the connection between lateralization and the existence of a hypothetical “critical age” for language acquisition, S. Krashen comes to a logical denial of such a connection. Following it, he concludes that the end of lateralization does not mean the ultimate loss of the ability to acquire a foreign language, and that the processes of a foreign language acquisition and lateralization are independent of each other [13: 207]. S. Krashen associates the very progress of the left hemisphere cerebral dominance

with the mental abilities maturation that is supposed to be based on the native language acquisition, which, in its turn, is the function of the said abilities' development.

The inadequacy of the classical "critical age" theory, which attempted to connect the hypothetical existence of the latter with the lateralization phenomenon, stimulated the advancement of new hypotheses based on neurophysiological data. One of them is the assumption about multiple "critical periods" [23]. According to this theory, the process of localization of language functions progresses gradually, over a long period. Moreover, different aspects of language are learned at different times, which depends on the degree of plasticity of a specific brain area. The latter, in turn, depends not only on age, but also on the individual characteristics of an individual (see also [8; 17]). This, in the view of the author of the hypothesis, helps to explain the fact that some adults learn a foreign language no worse than children.

Similar explanations are offered by other authors [27], who believe that different aspects of language (for example, phonetics and grammar) are served by different types of neurons. The time of their maturation is different, so children have the advantage in mastering pronunciation, and adults are better in grammar, which represents a higher degree of abstraction. An attempt to specify this hypothesis was made by C. Diller [5], who suggested paying attention to the differences in the character of cells in long and short axons. Information is transmitted through axons. In long axons such transmission is carried out with the help of the so-called pyramidal cells, and in short axons – by means of ray cells.

Pyramidal cells mature by the age of 6-8 years, which, in the author's opinion, may explain the impossibility of forming a new language center at an older age. Such cells provide the connection of the language and other neural control centers. Besides, they are important for the realization of neuromuscular control. Thus, the possible loss of their plasticity after the age of 6-8 years, in the opinion of the author, can explain the weakening of the ability to master pronunciation [5: 76]. Ray cells provide for more complex functions, including learning. Their maturation period is much longer, lasting at least 20-30 years, which is explained by their relatively slow differentiation. Consequently, these characteristics of the ray cells help to understand, why learning a language is possible after the age of eight, as well as why the more abstract aspects of the foreign language

are better learned by adults, although pronunciation may still remain a problem for them [5: 76].

As D. Singleton [24-26] points out, the assumption of the existence of a series of “critical periods” is probably more valid than E. Lenneberg’s hypothesis [24: 229]. On the other hand, some provisions of the hypothesis under consideration contradict the observed facts. For example, many people master the pronunciation of a foreign language at a good level (and some – at the level of a native speaker) even after the age of eight. Besides, at the present stage of neurophysiology development, it seems hardly impossible to localize any particular aspect of language in a particular type of neuron [24: 175].

The said objection probably also applies to the so-called “thalamus hypothesis” proposed by H. Walz [28]. According to it, different parts of the brain serve different aspects of language, and the time of their maturation differs as well. In particular, the author assumes that “grammar” and “phonetics” are not stored in the cerebral cortex, but in the thalamus, i. e., in the limbic system (the area around the brain stem). The author based his assumptions on the absence of disturbances in the grammatical and phonetic aspects of speech as a result of cortical damage. Thus, and also basing on the fact that grammar and phonetics are learned at an early age, he suggested that these aspects of language can only be stored in an organ that matures early and remains virtually unchanged throughout later life. Such an organ, in the author’s opinion, is the thalamus. At the same time, H. Walz proceeded from the fact that different aspects of linguistic ability develop independently of each other, with different speed and in different conditions [28: 104].

However, D. Singleton raises a number of objections that do not allow to consider the thalamic hypothesis to be adequate. Specifically, he points out that neurological studies do not support the assumption that language functions (except for the most primitive stages of development) are served by the thalamus. According to these studies, the involvement of the thalamus in providing such functions is mainly limited to vocabulary. The thalamus hypothesis also contradicts the observed facts, because many people adequately master the foreign language phonetics and (especially) grammar after reaching the age of five (the time of thalamus maturation) [24: 177].

Cognitive factors. Attempts to substantiate and explain the “critical age” in language acquisition have also been made using arguments

related to cognitive development. According to some authors [20], age differences in the foreign language learning are explained by different attitudes to language as an object of acquisition of children and adults (see review in [7: 108-109]). According to E. Rozanski, the child does not realize that he or she is acquiring a language, they are not fully aware of what is happening, they are focused on themselves, are cognitively “open”, see only similarities in the observed phenomena. It creates conditions for subconscious (without actual awareness of the structure) language acquisition. The adults learn language in a different way. In addition to similarities, they also notice differences, consider language as an object of study, are capable to analyze it as a structure, are focused more on the external world, than on themselves, need explanations concerning the structure of language [20: 99]. In general, in language acquisition, adults apply a more conscious strategy to achieve a result that may seem similar to the one achieved by the children [13: 209]

The difference in adult and child acquisition strategies can be explained by a number of factors, among which, besides those mentioned above, are the strong social attitude to the use of the native and foreign languages, as well as the ability of abstract thinking in adults. These factors, according to E. Rozanski, compel adults to view language acquisition as an intellectual problem to be solved using the procedures based on making hypotheses and testing them by the deductive logic application [20: 98]. E. Rozanski has suggested that it is abstract thinking that prevents adults from acquiring a foreign language in the same way as children do. The latter also explains the difference in the results achieved by them. The period of puberty (10-12 years of age) has been recognized as the critical point in language acquisition, because approximately by this time the development of the abstract thinking ability is completed as well. Thus, within the cognitive hypothesis, the “critical age”, as well as in some neurophysiological approaches, is limited to the age of about 12 years.

The abstract thinking ability implies verbal manipulation of relations between concepts (instead of concrete objects), which opens up the possibility of learning new concepts through verbal, rather than concrete, experience [2: 66]. S. Krashen explicitly links abstract thinking with conscious foreign language acquisition, believing that the adults’ abstract thinking results in at least three consequences [13: 210]: 1) adults’ considerably greater awareness of language structure;

2) higher acquisition efficiency in most adults; 3) higher adults' acquisition rate (especially at the initial stage), due to the use of conscious grammar as a monitor for the transformation of the surface native language structures into corresponding foreign language ones

Thus, the concept of "critical age" (within the cognitive approach) assumes that, in principle, the "natural" language acquisition ("acquisition" proper, in the terminology of S. Krashen) is possible up to approximately the age of twelve. After that "critical age", the language is mostly learned, i.e. acquired through "learning".

Summarizing the analysis, one may agree with R. Ellis [7] that the cognitive hypothesis, as well as the neurological one, is based on the false assumption that language acquisition after twelve is less effective than before that "critical age". However, experimental studies do not support this thesis (see more on it in our publication in the next issue of this journal). At the same time, as R. Ellis points out [7: 109], it is the cognitive development that can explain why teenagers learn the language better than younger children. On the other hand, the hypothesis in question cannot explain why there is no advantage for teenagers in the field of pronunciation acquisition, why teenagers learned better than adults in a number of studies, or why children achieve better results than adults in speaking over long periods of time [6: 92].

Affective factors. Cognitive variables, i.e., the abstract thinking ability, can explain the advantage of adults (compared to children) in short-time courses. In most cases, however, children outperform adults over long periods. S. Krashen believes that the latter can be explained by affective factors [13: 218]. The impact of affective factors deserves a separate discussion. Here we give only the most general analysis and only from the point of view of the "critical age" hypothesis. Some authors [6], basing on the results of experimental studies [21], believe that the development of the abstract thinking ability simultaneously leads to affective differences between children and adults. Adults cannot achieve the degree of openness and relaxation that children possess. As S. Krashen points out [12], children are less intimidated by the sounds of the foreign language and they willingly accept the superiority of outsiders who can help them learn. Adults, on the other hand, have already formed their self-esteem, they have achieved a certain position in society, so it is not easy for them to cope with the situation of dependence, which they may involuntarily resist and avoid

[21: 230]. According to some researchers [14], this state of constraint can have a negative effect on the quality of acquisition. In the case of their first language, children are as open as possible because this process takes place in a friendly atmosphere, they do not make a problem of their complete dependence and they care little about how they look in the eyes of others. The latter is also connected with the weak development of abstract thinking and inability to view oneself "from the outside".

Adolescents who have internalized this ability, develop the notion that everyone around them thinks about the same things as they do (i.e., about themselves) [6: 93]. This leads to the development of introversion, which is believed to have an adverse effect on the quality of the foreign language acquisition [14]. Children also adapt more easily to a new culture. There are four stages in this process [3], from the initial excitement, euphoria, through the culture shock and stress, to assimilation or adaptation to the new culture. Many adults have problems in passing through the crucial stage (cultural stress) or they do not pass it through at all. In typical cases of language acquisition, most affective factors in the language environment are unfavorable for adults and favorable or neutral for children, creating unequal learning conditions. At the same time, some adults manage (due to individual and other factors) to approach the affective parameters of the child's conditions of acquisition. This may be an explanation for cases of adults' rapid and effective acquisition of the foreign language. It is believed that most people lose the ability to adapt easily by the age of twelve. It is this age that limits the hypothetical "critical age" within this concept. Affective factors certainly play an important role in language acquisition, but they can hardly be an insurmountable obstacle and therefore cannot be viewed as the reason for the existence of any "critical period".

Conclusions. The analysis carried out in this paper shows that there are many ambiguities in the domain of the learners' age impact on the efficiency of their foreign language acquisition. On the one hand, the observed facts give the impression of an unconditional advantage of children over adults in the aforementioned process. It may stimulate the search for the magic critical age beyond which the successful acquisition of a new language is impossible or at least very problematic. On the other hand, theoretical analysis of three groups of factors (biological, cognitive, and affective) shows that this process is

far from being straightforward, and many of the observed discrepancies between adults and children can be explained by reasons other than age. In addition, besides the factors mentioned above, other variables, such as duration of learning, its speed, quality, etc., can also affect the efficiency of foreign language acquisition. Therefore, the problem of the age factor in the foreign language acquisition requires supplementary study, which is the prospect of further research.

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