EXPERIENCE OF APPLYING NEUROSCIENCE IN TEACHING KAZAKH AS A SECOND LANGUAGE

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Abstract. Teaching and learning the Kazakh language as a second language are one of the main state issues in Kazakhstan. In the modern realities we need very efficient and sufficient approaches and methods of teaching the Kazakh language to non-natives living in Kazakhstan. Teachers and educators are looking for different ways to teach Kazakh as a second language. Nowadays there are not many researches related to the application of the advanced methods of teaching it. This article aims to establish the connection between neuroscience and the teaching of Kazakh as a second language. The article presents the theoretical basis of neuroscience and its basic concepts. This article represents results of conducting an experiment of teaching Kazakh as a second language to adults. Based on these neuroscientific concepts and strategies for teaching Kazakh as a second language, we designed and applied a Kazakh language course as a second language for adults. At the end of the course adult learners passed a final test according to the Kaztest system. During and at the end of the experiment course there was not any special preparation for the final test. The results of the experiment showed that implementation of the neuroscientific concepts and strategies was efficient. According to the results of the experiment course we state that we can effectively construct the Kazakh language teaching course by having a thorough understanding of the brain function that neuroscience studies. Using the results of this experiment, educators and teachers of the Kazakh language can improve their methodology and contribute to the effective learning of the language by learners.

Keywords: teaching the Kazakh language, second language teaching, language teaching, Kazakh language, Kazakh as a second language, neuroscience, neuroscientific strategies, brain functions, memory

Basic provisions

For many years, the Kazakh language for non-native Kazakh speakers was taught in a traditional way as a native language. Fortunately, in recent years we have seen a trend of new methods and approaches in teaching Kazakh as a second language. Z.N. Utegulova et al. conclude that to help the Kazakh language learners master communicative competencies, a complex coverage of listening, reading, pronunciation, writing, and language activities facilitates the Kazakh language learning [1, p. 400]. R. Abnassyrova et al. suggest to study an experience of the global educational platforms for foreign language teaching, and also to create own teaching platforms based on advanced models for teaching the Kazakh language [2, p. 346].

We definitely see that modern reality requires a new perspective on teaching Kazakh as a second language. In this regard, we suppose that neuroscience - the knowledge about the brain and memory - can be useful for instructors teaching the Kazakh language as a second language to obtain high results and meet the needs of the learners. Scholars and educators state that designing educational courses without knowledge of the brain is like designing an automobile not understanding engines in full [3, p. 158].

Introduction

Neuroscience is a relatively new discipline that covers all achievements in the field of knowledge about brain and memory. When talking about neuroscience different terms are applied. Sometimes these terms are used separately or interchangeably. The main terms used in this sense are the following:

Neurology is a field of medicine studying the nervous system and its diseases.

Neurophysiology is the field of bilogy and neuroscience studying the process how neurons which are nerve cells receive and transmit information.

Neuroscience is the science studying relations of the brain and mind in all aspects.

Neuropsychology is a field of neuroscience that studies how psychological processes are arranged in the brain.

Neurolinguistics is a field of neuroscience that studies the relations between the brain and language in different aspects [4, p. 22].

Neuroscience is not limited to the fields listed above. It also includes cognitive science, chemistry, informatics, linguistics, medicine, physics, philosophy and psychology. As E.R. Kandel et al. state the task of the neuroscience is to understand the mental processes by which we perceive, act, learn, and remember [5, p. 2].

Brain cells called neurons are the main functional parts of the learning. These billions of neurons encode, store and recall the information when necessary, and control all aspects of the human behaviour. The brain changes physically when we learn. Neurons in the brain form connections (synapses) when we receive information or learn a new skill [5, p. 3]. These synapses transfer the information. We can strengthen these connections by constant repeating the information or practicing a skill. The learning process is successful only if changes in the brain activity take place.

Talking about neuroscience we need to note the basic concepts of the neuroscience which are neuroplasticity, learning and memory, learning and emotions. *Neuroplasticity*. Formation of synaptic connections, their constant reconstruction and the changes occurring in the nervous system are called neurplasticity. We do not stop learning during our whole life. The human brain is a learning brain that has an ability to change and adjust itself according to the

environmental demand throughout the life. Our brain grows and makes new synapses constantly [6, p. 2]. *Learning and memory.* Any learning process needs memory. Learning and memorizing cause formation of new neural connections. By understanding the learning process in the brains of the learners, we can say why they face difficulties to recall some themes. Memory is a process of storing and retrieving of information, however, it is not the same thing as learning or understanding. When we talk about memory, we mean deep and fundamental processes in the brain. These processes make basis for making long lasting neural connections [7, p. 36]. *Learning and emotions.* Emotions significantly affect the success or failure of learning. Positive emotions raise a student's attention which is important for learning. Uninteresting educational content cause inefficient learning. Additionally, positive emotions cause the release of the dopamine hormone and affect the memory greatly. Emotional arousal benefits the encoding and consolidation of information in memory. Neutral and negative emotions have a negative effect on the memory. In a stressed situation stress hormone called cortisol is released which affects memory and blocks the ability to learn. Negative emotions mostly lead to false memories, and positive emotions help for successful recollection [8, p. 223]. Therefore, when designing educational courses, it will be useful to take into account the above-mentioned concepts which have a positive effect on the educational results.

Materials and methods

The following methods were used in this article: theoretical analysis of the foreign scientific literature, generalisation, systematisation, interpretation, and conducting an experiment. Conducting an experiment consisted of two stages. The first stage of the experiment included the creation of an educational program with implementation of neuroscientific strategies. At this stage a theoretical modelling was used. The second stage was providing the experiment. The experiment was conducted at the course of teaching Kazakh as a second language to adults. The experiment lasted 72 hours (3 times a week during 6 months). At the end of the course, a final test was conducted according to the Kaztest system for level A1.

Participants

In total there were six female Russian speaking participants that passed the Kazakh language course. We present general information in the following table.

Table 1. General information about the learners

Learner No	Age	Nationality	First language	Initial level of Kazakh
Learner 1	45	Kumyk (from Dagestan)	Russian	Beginner
Learner 2	39	Russian (married to a Kazakh)	Russian	Beginner, but there were Kazakh language lessons at school

Learner 3	40	Kazakh (married to a Russian)	Russian	Beginner
Learner 4	37	Russian	Russian	Beginner, but there were Kazakh language lessons at school and in the college
Learner 5	44	Russian	Russian	Beginner, but passed several Kazakh language courses
Learner 6	34	Russian	Russian	Elementary (had some knowledge of Kazakh from school)

Results

Kaztest is a Kazakhstani system of assessing the proficiency level in the Kazakh Language complying with the principles and requirements of international systems for assessing the proficiency level. The structure of Kaztest includes five blocks:

Listening consists of dialogues and monologues with 20 tasks;

Vocabulary-grammar test consists of 50 tasks for grammar and vocabulary;

Reading comprises texts with different content and style and includes 50 tasks;

Writing is the writing of a dictation, summary, or essay, depending on the level. The number of tasks varies from 2 to 4.

Speaking covers tasks for speaking, such as answering the questions in a dialogue and speaking without stops for 4 minutes.

In the final test we recreated all the blocks of the Kaztest using official materials [books Kaztest]. Further below in Figure 2 we show the results of every learner, and in Figure 3 we present the average results of the final test according to the Kaztest system. To confirm the level, it is necessary to score a threshold of 60% in every block of the test [9].

Table 2. Results of each learner in every block of the final test

Learner No	Listening (max. 20)	Vocabulary-grammar (max. 40)	Reading (max. 40)	Writing (max. 50)	Speaking (max. 50)	Total (max. 200)
Learner 1	16 (80%)	32 (80%)	34 (85%)	41 (82%)	43 (86%)	166 (88%)
Learner 2	14 (70%)	31 (77.5%)	31 (77.5%)	39 (78%)	40 (80%)	155 (77.5%)
Learner 3	13 (65%)	27 (67.5%)	29 (72.5%)	38 (76%)	35 (70%)	142 (71%)
Learner 4	14 (70%)	30 (75%)	32 (80%)	40 (80%)	42 (84%)	158 (79%)
Learner 5	15 (75%)	29 (72,.5%)	33 (82.5%)	42 (84%)	39 (78%)	158 (79%)
Learner 6	15 (75%)	30 (75%)	35 (87.5%)	41 (82%)	41 (84%)	162 (81%)

Results of the final test

Listening — 72,5%
Vocabulary-Grammar — 74,6%
Reading — 80,8%
Writing — 80,3%
Speaking — 80,3%
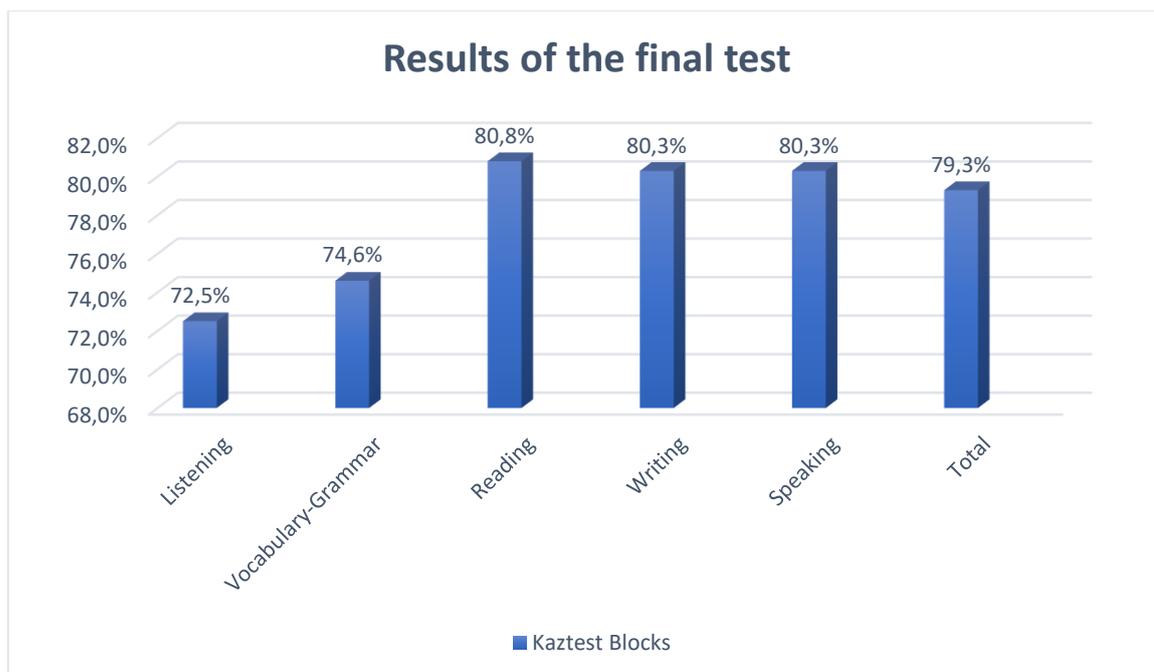Total — 79,3%

■ Kaztest Blocks

Figure 1 – Average results of the learners in every block of the final test

As we see in Table 1 and Figure 1 all the learners have shown a result of 60% in each Kaztest block necessary for confirming the A1 level. The total average score of the group is 79.3%. Lower results are in listening and vocabulary-grammar blocks, while better results are in reading, writing, and speaking.

Discussion

At the beginning of the course five learners were beginners and one had an elementary level. Most of them are representatives of nationalities other than Kazakh. During the course we applied all the neuroscientific strategies stated before. At the end of the course, according to the Kaztest system, all learners demonstrated score higher than 60% in every block of the final test, which was necessary for confirming the A1 level. These results show that the learners have mastered the course programme at a high level. In addition, we note that there was not any special preparation for the final test.

The educational programme of the experiment included the following grammatical themes: personal pronouns and endings, cases, possessive pronouns and endings, transitional present tense, imperative mood, past tense, present continuous tense, etc. Also, the programme covered the following lexical and speaking themes: Who am I; Professions; My routines; My Family; My City; My Home; At the Doctor's; In the Shop/Market; Hobbies and Sport; Giving Advice; Giving Orders; My Biography, etc.

During the course we used such neuroscientific strategies as grouping similar themes, spaced learning, recycling, purposeful hometasks, and using

music. Further below we give an explanation for every mentioned neuroscientific strategy.

Grouping themes. Our brain always detects patterns. In every portion of new information the brain tries to find something already known. When the brain finds known patterns, it compares new and old information set in the memory and then defines what information is missing. L.H. Lewis and C.J. Williams state that teachers should base new learning on the prior experience of their learners [10, p. 5]. To follow this concept, we tried to group themes that are close to each other or complement each other. Firstly, we grouped Kazakh grammar themes with similar endings and then complemented these themes with lexical and speaking themes. This way we grouped personal pronouns and endings, and present transitional tense that had the same endings for the verbs in this tense and locative case. Then we completed with lexical and speaking themes like "Who am I?", "My work", and "My everyday routine". The second group of themes were possessive pronouns, endings of the possessive case, and adverbs of place for grammar with "My family", "I have a…", "My home", and "My city" for lexis and speaking. The third group was an accusative case with recycling of the present transitional tense with "My favorite things". The fourth group were an imperative mood and an ablative case for grammar with "Giving Advice", "Giving Orders", "Wishes for holidays", and "In the Shop/Market" for lexis and speaking. The fifth group was an instrumental case for grammar with "Hobbies and Sport" for lexis and speaking. The sixth group were past tense, ordinal numbers, and writing dates with "My Biography" and "What time is it now?" (which has the past tense in its structure). The last seventh group was a present continuous tense with "Actions in the moment" and "At the Doctor's".

Spaced learning. Teachers can enhance memory by using spacing for presenting concepts, which means providing small amounts of content [11, p. 148]. Since learning requires long-term memory, it is useful to break some grammar themes into several lessons rather than introducing them in whole in one lesson. J.J. Donovan and D.J. Radosevich found out that learners showed better results in spaced learning conditions than learners in massed learning conditions [12, p. 799]. The spaced learning condition made the acquisition and retention of new information better. Space and time conditions for learning a theme depend on the difficulty of that theme. If the theme is difficult, it is necessary to provide more time and space for it. In our experiment we started the course with the personal pronouns and endings, which do not have analogues in the first language of the learners. For this reason, in the first lesson we introduced only first-person pronouns and endings in singular. In the next lesson second-person pronouns and endings in singular were given, and in the next class the plural forms of the personal pronouns and endings were given. The negative and interrogative forms of the said personal and endings were introduced in the next lessons. As well, we made revisions to the previously learned forms in every lesson. Such spaced

learning was also used for teaching possessive pronouns and endings, cases, and tenses of the verb.

Recycling. Recycling and revisiting themes covered previously in the course solidify the long-term memory. This fits the principle of the neuroscience, which says, "Use it or lose it". According to this principle, the learning needs constant recycling and review of the information; otherwise, it will be lost [11, p. 149]. We adhere to this principle by revisiting previous themes and structures in every lesson at the stage of warming up. Since recycling should be incorporated into the plan of the lesson, repeating the information over and over activates different neuronal networks, which ensures faster retrieval [11, p. 153].

Purposeful hometasks. As it was mentioned before the stronger the neural networks, the faster and better the retrieval of information. That is why, while doing the homework, learners recall the theme and strengthen their neral networks. Such homework helps the learners extend their understanding outside the classroom. But the main requirement is that hometasks must be meaningful and purposeful [11, p. 200]. At the course we gave hometasks for drilling and consolidating grammar and lexis. B. Knight claims that most institutions focus on the number of classroom hours; however, the most important is the self-study time of the learner [13, p. 9]. Furthermore, to provide more target language exposure every week, the hometask was to watch an episode of the series and complete tasks according to it.

Using music. Music can be used as an emotional learning tool. Music affects our emotions, bodies, and mental images. Music can change the mood and state of a person. As E. Jensen states, "music works marvelously to energize, align groups, induce relaxation, stimulate prior experiences, develop rapport, set the theme or the tone for the day, stimulate the mind, facilitate fun, and inspire" [14, p. 164]. In order to get a positive effect of the music in the lessons the learners listened to Kazakh songs. We choose specific lyrics and songs that match our grammatical and lexical themes. A work with song was incorporated into the plan of the lessons, and only an appropriate part of it was selected for learning purposes.

Taking into account the final results we think that designing the course of the Kazakh language as a second language with the application of neuroscientific strategies and without special preparation for the final test has been efficient.

Conclusion

Having experienced the practical application of neuroscience in teaching Kazakh as a second language, we conclude the following. We can claim that this Kazakh language course, based on some strategies of neuroscience, was efficient for the learners. We recommend language teachers use concepts and strategies from neuroscience in Kazakh language lessons. Language teachers should understand how the human brain works and functions. In the new progressive era implementing only a pedagogical approach to teaching languages is not enough.

So, language teachers should have a sufficient knowledge about brain function, principles of learning, memory and emotions that affect learning. This way they will be able to adapt available courses and programs to the level and abilities of the language learners, as well make these programs and courses emotionally positive. Also, language teachers should understand that all the obtained information is forgotten over time. That is the reason why language teachers should pay more attention to the recycling and restoration in memory activities.

We assume that we have not explored all the opportunities of neuroscience in our experiment. It is necessary to provide other experiments implementing neuroscience for different language teaching aspects and themes. We conclude that the Kazakh language teachers with knowledge of neuroscience and the ability to implement neuroscientific findings will have the best outcomes in teaching Kazakh as a second language.

REFERENCES

[1] Utegulova Z. N., Orazbayeva F. S., Orazalieva E. N., Shalkarbek A. Tildik kommunikatsiya: ustanymdar men kuzyrettilikter (Language communication: attitudes and competences) // Abylai khan atyndagy KazHKzhaneATU Khabarshysy. Filologiyalyk gylymdar" seriyasi**.** – 2024. – № 1 (72). – B. 400-416. [in Kaz.]

[2] Abnassyrova R.1, Iskakova Zh. 2, Yeskermessova G. 3, Satbekova A. Kazak tilin okytudagy innovatsiyalyk tasilder: ashyk bilim beru platformalarynyn til uiretudegi aseri (Innovative approaches to teaching the Kazakh language: impact of open educational platforms on language teaching) // "Abylai khan atyndagy KazHKzhaneATU Khabarshysy". "Filologiyalyk gylymdar" seriyasi**.** – 2024. – № 1 (72). – B. 346-364. [in Kaz.]

[3] Sham D. P. L. et al. The Significance of Neuroscience for Teaching English as Second Language (TESL) in the Digital Era // English Literature and Language Review. – 2019. – T. 5. – № 9. – P. 158-163.

[4] Danesi M. Second language teaching: A view from the right side of the brain. – Springer Science & Business Media, 2003. – T. 8. – 172 p.

[5] Kandel E. R. et al. (ed.). Principles of neural science. – New York: McGraw-hill, 2000. – T. 4. – P. 1227-1246.

[6] Kweldju S. Educational neuroscience for second language classrooms //J-ELLiT (Journal English Lang. Lit. Teaching). – 2019. – T. 3. – № 2. – P. 1-9.

[7] Johnson S., Taylor K. (ed.). The neuroscience of adult learning: new directions for adult and continuing education, number 110. – John Wiley & Sons, 2006. – T. 81. – 96 p.

[8] Li L., Gow A.D.I. and Zhou J. The Role of Positive Emotions in Education: A Neuroscience Perspective // Mind, Brain, and Education. – 2020. – № 3(14). – P. 220-234.

[9] Kazakh Language Knowledge Level Assessment System. – URL: http://kazakhtest.kz/about-center/KAZTEST-system-testing-procedure/ 27.02.2024

[10] Lewis L. H., Williams C. J. Experiential learning: Past and present //New directions for adult and continuing education. – 1994. – T. 1994. – № 62. – P. 5-16.

[11] Tokuhama-Espinosa T. Making classrooms better: 50 practical applications of mind, brain, and education science. – WW Norton & Company, 2014. – 440 p.

[12] Donovan J. J., Radosevich D. J. A meta-analytic review of the distribution of practice effect: Now you see it, now you don't // Journal of Applied Psychology. – 1999. – T. 84. – № 5. – 795 p.

[13] Knight B. How long does it take to learn a foreign language // Experience Better Learning. – 2018. – P. 15

[14] Jensen E. (ed.). Super teaching: Over 1000 practical strategies. – Corwin press, 2008. – 216 p.

ҚАЗАҚ ТІЛІН ЕКІНШІ ТІЛ РЕТІНДЕ ОҚЫТУДА НЕЙРОҒЫЛЫМДЫ ҚОЛДАНУ ТӘЖІРИБЕСІ

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Аңдатпа. Қазақ тілін екінші тіл ретінде оқыту және тіл үйрену Қазақстандағы басты мемлекеттік мәселелердің бірі болып саналады. Қазіргі шынайы жағдайда қазақ тілінде сөйлемейтін азаматтарға қазақ тілін оқытудың тиімді тәсілдері мен әдістері қажет. Сол себепті мұғалімдер мен оқытушылар қазақ тілін екінші тіл ретінде оқытудың түрлі жолдарын қарастыруда. Өйткені қазіргі уақытта қазақ тілін оқытудың озық, заманауи әдістерін қолдану негізінде жасалған зерттеулердің аз екендігін байқадық. Сондықтан қазақ тілін екінші тіл ретінде оқытуда нейроғылымды қолдану маңызды. Зерттеу мақаламыздың мақсаты – ми қызметі мен есте сақтау ерекшеліктерін зерттейтін нейроғылымды және қазақ тілін екінші тіл ретінде оқыту әдістемесін байланыстыру. Мақалада нейроғылым негіздері және олардың негізгі тұжырымдамалары көрсетілген. Аталған мақалада ересектерге қазақ тілін екінші тіл ретінде оқыту бойынша жүргізілген тәжірибе нәтижелері талданады. Нейроғылым тұжырымдамалары мен стратегияларына сүйене отырып, тәжірибе ретінде ересектерге қазақ тілін екінші тіл ретінде оқыту курсын өткіздік. Курс соңында білім алушылар Қазтест жүйесі бойынша қорытынды тестілеуден өтті. Курс барысында және соңында қорытынды тестілеуге байланысты арнайы дайындық жасалмады. Тәжірибе нәтижесі нейроғылыми тұжырымдамалар мен стратегиялардың тиімді екендігін көрсетті. Тәжірибе курсының нәтижелері негізінде қазақ тілін үйрету курсын ми қызметінің толық түсіндірмесін қамтитын нейроғылым арқылы қалыптастыру тиімді деп айта аламыз. Бұл мақалада жүргізілген тәжірибе нәтижелері қазақ тілі оқытушылары мен мұғалімдерінің өз әдістемесін оңтайландыруға және білім алушыларға тілді тиімді үйренуге мүмкіндік береді.

Ключевые слова: қазақ тілін үйрету, екінші тілді оқыту, тіл үйрету, қазақ тілі, қазақ тілі екінші тіл ретінде, нейроғылым, нейроғылым стратегиялары, ми қызметі, есте сақтау

ОПЫТ ПРИМЕНЕНИЯ НЕЙРОНАУКИ В ПРЕПОДАВАНИИ КАЗАХСКОГО КАК ВТОРОГО ЯЗЫКА

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Аннотация. Преподавание и изучение казахского языка как второго являются одной из главных государственных проблем в Казахстане. В современных реалиях необходимы эффективные подходы и методы обучения казахскому языку для граждан, не говорящих на казахском языке. Учителя и педагоги находятся в поисках различных способов преподавания казахского языка как второго. На сегодняшний день есть не так много исследований, связанных с применением передовых методов преподавания казахского. Целью данной статьи является установление связи нейронауки и преподавания казахского языка как второго. В статье представлены теоретические основы нейронауки и ее основных концепциях. В данной статье представлены результаты проведения эксперимента по обучению казахского как второго языка взрослым. Основываясь на данных нейронаучных концепциях и стратегиях преподавания казахского языка как второго, мы разработали и провели курс казахского как второго языка для взрослых. По окончании курса взрослые обучающиеся сдали итоговое тестирование по системе Казтест. В течение и по окончании курса эксперимента какой-либо специальной подготовки к заключительному тесту не проводилось. Результаты эксперимента показали, что применение нейронаучных концепций и стратегий является эффективной. По результатам экспериментального курса мы заявляем, что можем эффективно построить курс обучения казахскому языку, обладая глубоким пониманием функций мозга и памяти, которые изучает нейронаука. Применив результаты данного эксперимента, преподаватели и учителя казахского языка смогут усовершенствовать свою методику и способствовать эффективному изучению языка учащимися.

Ключевые слова: преподавание казахского языка, преподавание второго языка, преподавание языка, казахский язык, казахский язык как второй, нейронаука, нейронаучные стратегии, функции мозга, память