MODELING THE PROCESS OF IMPLICIT LEARNING USING A MULTI-LEVEL TEST GAMING PLATFORM

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Abstract

The article describes the phased development of a gaming test platform using information technology to simulate the process of implicit learning. An author's method of studying the process of implicit learning based on a modification of Method A of the Rib is proposed, and a psychological justification of the developed multilevel test gaming platform for fixing the process of learning and its results is given.

Key words: implicit learning, "artificial grammar" method, intuitive knowledge, game learning.

Implicit learning is manifested in various areas of life, as in a rapidly developing information society one often has to deal with a large amount of new information, learn something new

Accordingly, the processing of this information is complicated. Implicit learning is the process of the unintentional and largely unconscious acquisition of knowledge, in which the individual is not able to explicate the content of the

knowledge, but can use it to solve new problems. Thus, implicit information processing is useful in that it allows you not to overload conscious activity with those actions and decisions that can be carried out automatically.

The term “implicit learning” was introduced by the American scientist Arthur Reber in 1967 [1], but similar studies have been done before. He considered this type of learning in the framework of the two-system theory of information processing, in which the implicit knowledge system is a late evolutionary superstructure of the explicit system [2,3]. Arthur Reber began to study the process of implicit learning, guided by the goal of explaining the process of mastering grammar, having developed the classical method of “artificial grammar” for this. However, researchers used similar methods earlier, studying the processes adjacent to implicit learning.

It is important to note that the process of this type of learning is not realized by a person, therefore, it can be compared with what is called intuition. In domestic psychology, even before the start of A. Reber's experiments, Ya.A. Ponomarev was engaged in the processes of acquiring implicit knowledge. He called this knowledge intuitive. In his works, Ponomarev decided that if the subject has intuitive knowledge, he can be accessed only with the help of a certain key that lies at the level of action. He conducted several experimental studies. In one of his experiments, subjects put the planks in a pattern, then, after a break, they had to repeat this pattern. The subjects could not remember and describe him, but they could perform it again.

It is worth mentioning the study of learning processes. One of the first attempts at an experimental study of unconscious learning in humans was made by E. Thorndike, but C. Hall's experiment on the implicit assimilation of concepts on the material of pseudo-Chinese characters is more famous. [4] In the classical studies of A. Reber, the concept of “artificial grammars” was directly introduced. In one study, subjects were asked to learn a certain number of letter sequences, which they classified as true or false. Typically, subjects can successfully complete this task at a level that exceeds the probability of random guessing, but are not able to formulate

these rules verbally. The discrepancy between the level of the assignment and the verbal report just gave Reber grounds to call this kind of learning implicit.

The same applies to studies with sensorimotor sensitivity. A. Reber conducted an experiment in which subjects are asked to press certain buttons on the keyboard in accordance with the incentives that appear in different parts of the screen (the incentives appear according to grammatical algorithms). The subjects who are presented with such material are characterized by a decrease in reaction time compared with the subjects who are presented with a random set of incentives. This suggests that the acceleration of the responses of the first group of subjects is the result of their awareness of the structure of the sequence or the rules that determine it. However, subjects usually cannot give a verbal report on these rules [1]. Subsequently, a number of studies were conducted to study implicit learning, both in Russia and abroad. Each of them helped bring some clarity to this topic.

Employees of the Laboratory of Cognitive Psychology of SSU conducted a study of implicit learning using the method of artificial grammars, namely, determining the relationship between the effectiveness of implicit learning and cognitive personality traits. To identify the ability for implicit learning, a test was developed that is based on the original algorithm of A. Reber, however, squares of a certain color appear instead of alphabetic characters.

The test included the use of feedback, that is, providing the subjects with the correct answer after each task, and without it. Based on the results of this test, we identified groups of students who implicitly learned the algorithm, logically learned the algorithm, and failed to learn the algorithm. These groups were evaluated on three developed scales for determining the effectiveness of implicit learning. The obtained indicators were correlated with indicators of the level of non-verbal intelligence (high, above average and average according to the Wechsler test) and indicators of cognitive style (field-dependent and field-independent according to the Gottschaldt technique of hidden figures). The study found that the higher the level of field independence, the higher the control results of learning, and the higher the level of

non-verbal intelligence, the higher the learning results, including part of the training series with feedback [5]. After reviewing the results of experiments to study this issue, we can say that basically all the studies are of the same type, since they use the same demonstrative base - sequences constructed according to a certain algorithm or set of rules. But meanwhile, these test methods are of little interest to the subjects, which leads to the risk of insufficient diligence and attentiveness in the performance of tasks. Researchers of implicit learning around the world are trying to diversify the course of their experiments. The work of V. Salven and E. Norman in 2016 presented the process of implicit learning by working with the original model of the sugar factory D. Berry and D. Broadbent and performing the classic sensorimotor experiment, which was a more diverse and motivated learning process

Domestic scientists from St. Petersburg State University, as incentives, use the classification of fictional characters and determining the mood of the interlocutor using emoji [3,6]. In addition, they developed a computer model that includes blocks of unconscious and conscious learning processes [7]. In our research, we aim to use game stimulation through a computer platform to study the assimilation of hidden knowledge.

And in this approach, the first question was asked how to organize the learning process, while leaving it implicit, making it interesting and having motivation for the learner. To create a platform that implied a computer game, we used some principles of game training. “Game training is a learning technology that aims to ensure the personal-active nature of the assimilation of knowledge, the acquisition of skills; activates independent cognitive activity aimed at the search, processing, and assimilation of knowledge, acquisition of skills; activates independent cognitive activity aimed at the search, processing and assimilation of educational information using game methods of involving students in creative activities”[8]. This form of learning is called education. This concept includes various forms of educational activities without coercion, based on the practice, accessibility and attractiveness of the learning process [8, 9]. The form of game learning is part of the problem-learning

method, which is very relevant and in demand in the modern education system and educational strategies [10, 11].

Thus, we came to the conclusion that a specialized game test platform is required to study implicit learning. Developing this technique, we were guided by the fact that in everyday life implicit learning takes place in a natural environment that does not always require memorization and does not always imply similar conditions for repeating material. In turn, this form of learning effectively models a motivating situation in which it is necessary to extract the necessary knowledge to solve the tasks.

On the basis of SSU, a test platform is being developed to study the process of implicit learning by the employees of the laboratory of cognitive psychology together with the staff of the department of computer technology. This platform has the form of a computer game in the genre of "quest" of intellectual and intuitive orientation. Stylistically, the design of the game is made in the genre of minimalism. The research methodology is artificial grammar; the color was taken as a grammatical unit. The grammatical basis of the stimulation is 5 colors. The color arrangement algorithm is as close as possible to A. Reber's original algorithm. In the design of the game, the given algorithms fit into the presented location and are its basis.

So, the concept of implicit learning in the framework of the game being developed is that the processes of implicit learning and implicit memorization are divided into several stages. The process of implicit learning involves the assimilation of information gradually through many repetitions, therefore, it most successfully occurs in the framework of a long study [12, 13]. However, even if the study does not imply a longitudinal approach, implicit learning in any case requires a certain amount of time and dynamics. In the future, the project is planned to be expanded, including increasing the overall time of the quest, however, in this case, we decided to divide the learning process into stages. This greatly simplifies the task of extracting the rules of simulated grammars for the subject. In the presented stages, the learning process

will appear in batches, gradually manifesting itself, based on the player's intuitive preferences. The following steps were highlighted:

1) Introduction

2) Part with a logical task

3) Part on mindfulness

4) Part for selection

5) The control part

Each stage has its own purpose.

Introductory part. At the first stage, the player is introduced to the game situation, the plot is presented. The process demonstrates the necessary incentives inscribed in the design. Also here are mentioned options for tasks coming up during the game, thereby setting the participant to the passage of the plot.

It should be noted that the introductory part does not articulate the requirement to memorize, detect, or learn something. Since we designated the genre "quest", the participant should simply carry out the tasks presented, search for something, remember details that are not related to incentives and continue to connect "intuitive knowledge". These tasks will be announced during the course of the game. When compiling tasks through which an individual should be taught, we were guided by the principles of E. Thorndike, according to which the simplest form of learning is the trial and error method or what he originally called the choice and establishment of connections [4].

Learning process step: introducing incentives

The part with a logical task. This part consists in the fact that the player is given tasks in which it is required to solve certain problems. They are quite simple and run very quickly. In the process, you need to choose one or another answer option. The correct version is fixed by the desired sequence or contains it. Thus, the player implicitly memorizes the proposed grammatical sequences.

Stage of the learning process: familiarization with grammar, memorization of grammatical sequences.

Part on attentiveness. Here, the participant needs to recall some details that do not relate directly to the grammar, but only the plot of the game. This part focuses on intuitive preferences, that is, it begins to activate implicit learning, while not giving the opportunity to guess about the underlying algorithm. Meanwhile, the correct variations contain the necessary grammatical sequences.

Stage of the learning process: fixing sequences, repetition.

Part to choose from. This stage relies solely on the intuitive selection of the right option to continue the game. The tasks set do not include tasks that need to be solved logically or focusing on memory. The player is required to select the necessary sequences, not assuming that he really can know them. Here the complete activation of implicit knowledge takes place.

Stage of the learning process: the use of fixed implicit knowledge.

The control part. The purpose of this part is to validate enshrined knowledge. The player must randomly play several sequences. If the knowledge has consolidated quite successfully, the respondent can finish the game.

Stage of the learning process: checking for the presence of implicit knowledge.

At the moment, a test version of the gaming platform is being developed, and the total number of tasks in the initial version is 17. The number of tasks in the training parts is greater, however, at the moment their number varies

When developing sequences for the platform, a nondeterministic finite state machine and a generation system with custom weight functions are used [14]. In addition to the direct generation of sequences, this allows you to calculate the category and complexity of the mistakes made by the player and concentrate on those parts of the sequences that are given to the player most difficult. The error category was also developed; its assessment is based on the player's perception of combinations of stimulus fragments, his input and input data, and sometimes even the possible length of the sequence. In the event of an error, the game throws the player from the test level to one of the initial ones - training or fixing - depending on the

category of error. At the development stage, there is a feedback mechanism with the player, which includes a report on his orientation in the decision-making process, as well as a player reporting mechanism on his mistakes to collect data on the player's learning process.

In the future, we plan to expand the project both within the framework of the overall design and the fullness of the levels, and in the scope of practical research of the processes of implicit learning. So, with the help of this project, it is possible to continue the study of the relationship between the effectiveness of implicit learning and the cognitive characteristics of a person, expanding the range of quest tasks, including stylized tasks to determine the cognitive style and level of intelligence of the subject.

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