UNCONSCIOUS MEMORY IN ACQUIRING NEW VOCABULARY USING FLASHCARDS

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Abstract. Most people tend to memorize different things unconsciously, without even taking notice of this process. However, it comprises a vital and effective function of the human mind that requires little effort. Following this perspective, the article aims to analyze the possibility of applying this function in the language learning process, particularly in facilitating the process of memorizing new foreign words. The experiment was conducted to prove the effectiveness of the proposed method and consisted of two phases. First, three focus groups of students were to observe the flashcards alongside the translation of words for the time period of 16 weeks, unconsciously memorizing them. Then, there were two control tests to determine the effectiveness of such a learning method. The present paper also relies on the articles and research activities of numerous scholars, e.g. Standing (1973), Urgolites (2013), Nikolic (2007), Brady, Konkle (2011), Schurgin & Cunningham (2018), showcasing the effectiveness of visual memory in retaining the information for a longer period of time. These studies emphasized the associations that people make while memorizing different things. Our research posits that color flashcards with the translation of words facilitate the process of creating associations among students, ensuring high results of their memory performance. Foreign language teachers can hence use the research results to facilitate learning new words by students.

Keywords: *memory, language learning, vocabulary memorizing, long-term memory, flashcards.*

Подоляк Михайло. Несвідома пам'ять під час набуття нової лексики за допомогою флеш-карток.

Анотація. Більшість людей запам'ятовують різні речі несвідомо, не усвідомлюючи процесу. Це дуже важлива та ефективна функція людського розуму, яка вимагає невеликих зусиль. Враховуючи це, дана стаття намагається проаналізувати можливість використання цієї функції в процесі вивчення іноземної мови. Зокрема – у полегшенні процесу запам'ятовування нових іноземних слів. Тому експеримент проводився для доведення ефективності запропонованого способу. Три групи студентів спостерігали за картками з перекладом слів протягом 16 тижнів, несвідомо запам'ятовуючи їх. В подальшому було проведено два контрольних тести для визначення ефективності такого методу навчання. Численні статті та дослідницька діяльність вчених (Standing, 1973; Urgolites, 2013; Nikolic, 2007; Brady & Konkle, 2011; Schurgin & Cunningham, 2018) доводить ефективність зорової пам'яті в утримуванні об'єктів протягом тривалого часу. Більшість із них роблять акцент на асоціаціях, які люди роблять, запам'ятовуючи різні речі. Тому в нашому дослідженні кольорові картки з перекладом слів полегшують процес створення асоціацій у студентів, забезпечуючи високі результати роботи пам'яті. Таким чином, результати дослідження можуть бути використані вчителями іноземних мов для полегшення вивчення студентами нових слів.

Ключові слова: *пам'ять, вивчення мови, запам'ятовування словникового запасу, довготривала пам'ять, картки.*

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Introduction

While going to some unfamiliar places for the first time, people are inclined to use the Internet and different devices so as to learn the route in detail. They search for bus or subway stops, bus numbers, and the locations where they need to get off public transport. It is considered a rather typical procedure. However, when people are going home from work or from/to some familiar place, they do not search information about commuting to this place. They know the route, public transport numbers, and stops. They do it automatically and unknowingly, because they take the same route very often. They unintentionally memorize public transport numbers, stops, and places where they must get off.

The US website "Psychology Today" states that the person first gets the information into sensory memory, then this information is transferred into short-term memory or working memory, where the information is being processed and then placed into long-term memory. It is the latter type of memory the person utilizes every time he/she goes the same way because – after a while – the person will need little effort to recall necessary information. Therefore, this process is done automatically, without any prior thinking, and is based on associations that occur in the person's memory, making it long-term. In addition, this long-term memory becomes implicit because the person is using and relying on it unconsciously.

Memory, especially its visual aspect, has been the object of numerous studies. Scholars have researched the storage function of long-term visual memory (Shepard, 1967; Standing, 1973); visual working memory (Brady et al., 2016; Curby et al., 2009); retrieval function of visual long-term memory for the objects, which were memorized once in the past and were not maintained (Squire, 2004; Cowan, 2008; Brady et al., 2011). However, the issue of using unconscious memory for memorizing new words has not been yet the object of the research. Nevertheless, it is important to bring to the fore and research the retrieval function of such a methodology of words memorization in the long-term perspective. Thus, taking into account the data presented above, the present study premised on the initiative to apply the methodology of unconscious words memorizing by using flashcards along with the translation of words during the process of foreign language learning. Specifically, the analysis deals with learning and memorizing the English language words.

Following this line of reasoning, the aim of the research was to investigate the storage capacity and retrieval function of long-term memory by applying the method of visual words memorization by voluntary observing colored flashcards, providing as well words' translation.

Methods

82 students of the specialty "Veterinary Medicine", aged 17–18 years old, took part in the research project. The students had been studying the English language at school for about 10 years, passed External Independent Testing, and enrolled at the

University. The level of their English language competence varies from A1 to B2. All students were split into four groups:

Group No. 1 (*control group*) consisted of 24 students, who had English lessons 3 times a week;
Group No. 2 comprised 18 students, who had English lessons 3 times a week;
Group No. 3 contained 21 students and had English lessons 3 times a fortnight;
Group No. 4 included 19 students that attended English lessons 3 times a week.

It is worth mentioning that one lesson lasted 90 minutes. The words were printed on three flashcards of size 1 m x 85 cm, in color, located under the pictures and accompanied with Ukrainian translation. The flashcards were of the following topics: household tools (32 words), laboratory equipment (34 words), and emotions (14 words).

The experiment lasted for 2 semesters, 16 weeks each, starting from September until May. It was decided to divide the process of research into two stages, according to the semesters: *stage 1* – first semester, *stage 2* – second semester.

The research project started with the evaluation of students' knowledge in the format of a vocabulary test. It consisted of the following two parts: first, the students are to translate the words from Ukrainian/English into English/Ukrainian (15 words each value 2 points); afterwards, they are asked to fill in the appropriate words in the sentences (10 sentences each 4 value 4 points). The total that the students can score at the test is 100 points.

Chronologically, the test was given three times during the research project with such objectives:

- at the beginning of stage 1: to evaluate the general level of students' English vocabulary competence and determine what words they know;
- at the end of stage 1: to evaluate the number of memorized words during their observation;
- at the end of stage 2: to estimate the number of words recalled by the students after 16 weeks.

It is necessary to note that the words from flashcards were not actively used during the class discussions so that the students memorized words mainly by observation.

Generally, each group of students majoring in Veterinary learns English for one year that is equal to two semesters. The experiment was framed according to the following criteria and stages:

At the beginning of the first stage students were given a vocabulary test with a task to translate the words and fill the missing words. They were not informed that there would be the test, therefore they could not prepare or revise any materials for it. However, the first group (which later became the focus group) was warned that the test would be given, so they received the words to memorize. The results of the test were the following:

Group No. 1 (focus group) scored 84 points on average out of 100;
Group No. 2 got 8 points on average out of 100;
Group No. 3 scored 6 points on average out of 100;
Group No. 4 received the average of 8 points out of 100.

These scores manifest that Groups No. 2, No. 3 and No. 4 knew less than 5% out of all vocabulary of the research at the initial stage of the project. The students must know less than 10% of the total words in order to meet the entry criterion for the research in their memory abilities.

All flashcards, arranged in different colors and accompanied with the translation of words, which were the focus of the abovementioned test, were hung on the walls of the room during the next lesson. Students of the 2nd, 3rd, and 4th groups had lessons in this room during the entire academic year. Students were sitting in a row, 2 persons at each desk. For the entire semester the students have a chance to observe these flashcards each time they have English lessons. The words from the flashcards are not learned intentionally and used minimally during the English lessons. The flashcards were hung in different positions for every set of students:

Group No. 2 had flashcards on the sidewalls. Students were sitting on the left and on the right to the flashcards. The left and the right sides had 3 flashcards at each wall.
Group No. 3 faced the flashcards on the front wall, so they were positioned in front of the students.
Group No. 4 also had flashcards on the front wall, thus the flashcards were situated in front of the students.

One can thus assume that students having flashcards with words in front of them observed them more than did the students with flashcards placed sideways. The distance between students and flashcards was from 0,5 meter (flashcards on the sides) to 6 meters (flashcards on the front wall and students at the back desks).

The control test, the same as the first one, was given to students of all groups at the end of the first stage in order to see how well they have memorized the given words. The flashcards were taken away at the beginning of the second stage and students had lessons in the same room. The other control test was given at the end of the second stage to all groups to check how well words are recalled from their memory. The control group memorizes words and takes the word test. They are placed in the other room, without flashcards, and are given the same test on the words at the end of the first and second semesters in order to compare two different types of words memorizing.

Results and Discussion

To begin with, let us present the results of the voluntary memorizing words on flashcards. The test results at the end of *the first stage* (16 weeks after the start) were the following:

Group No. 1 scored 62 points on average out of 100;
Group No. 2 got 38 points on average out of 100;
Group No. 3 had 54 points on average out of 100;
Group No. 4 received 66 points on average out of 100.

At the end of *the second stage*, that is 32 weeks after the start of the English course, the results of the same test were as follows:

Group No. 1 got 40 points on average out of 100;
Group No. 2 scored 26 points on average out of 100;
Group No. 3 received 38 points on average out of 100;
Group No. 4 had 48 points on average out of 100.

The results are displayed in Table 1.

Table 1
The Results of Two Stages in Students' Testing

	The results of the test at the beginning of the experiment	The results of the experiment at the end of the 1st stage, 16 weeks after the beginning of the experiment	The results of the experiment at the end of the 2nd stage, 32 weeks after the beginning of the experiment; 16 weeks after the words were not observed by students
Group No. 1 (Focus group)	84	62* *the group did not observe words for 16 weeks	40** **it did not observe words for 32 weeks.
Group No. 2	8	38	26
Group No. 3	6	54	38
Group No. 4	8	66	48

It is reasonable to state that unconscious words memorizing can be an effective way of foreign words learning. Using this methodology can facilitate both the learning and teaching process. Returning to the aim of the present research project, i.e. to analyze the efficiency of learning new vocabulary by voluntary observing flashcards with new words and their translation, as well as to research the potential time period these words can be stored in memory and the possible results of their restoring after some time, the paper underscores the fact that the position of flashcards towards the students plays a crucial role in words memorizing. Specifically, flashcards placed in front of the students have better results for words

memorizing in comparison with the flashcards, placed sideways. The other outcome of the project lies in the fact that the more frequently students observed flashcards, the better were the results.

The results demonstrated that this method is a productive way to support the process of new vocabulary learning. Visual means of learning new information are efficiently used by a number of teachers for presenting new vocabulary. A great number of scholars have proven the efficiency of visual tools of memorizing information. In 1973, Standing presented 10,000 pictures to observers in his experiments to examine their memory capacity, and they remembered approximately 80% (Standing 1973). The other scholars (Brady et al., 2008) presented 2500 images, and the result was above 80% as well. The study of Bui and McDaniel (2015) proved the efficiency of a visual type of learning as well. Based on the results of their research, it has been concluded that illustrative diagrams, which are supported by text description, facilitate the learning process and recalling of information. The other study by Carney and Levin (2002) proves the efficiency of pictures in the information perception and learning excellence. It is important to mention that the authors highlight the indispensible role of pictures in a text intended for children with the help of which the language and literacy of kids are being improved. Moreover, pictures improve text comprehension, make the reader more focused on preventing the loss of attention, and facilitate mnemonic function. Concerning the mnemonic illustrations, Carney and Levin (2002) stressed upon the research done by Dretzke, mentioning that mnemonic illustrations foster recalling of text information among younger and middle-aged adults.

Having completed the experiment, we organized a questionnaire for a range of students from each group, who answered the principal question: «What served the facilitating function for you in the process of words memorizing?» In most cases, the answers were as follows: «Pictures helped to make associations», or «We have seen flashcards many times per week». Similar results were obtained in the study by Karpicke (2016). The paper emphasizes the role of retrieval in long-term learning, stating that the best way to learn new material is to create associations that can be easily retrieved from memory and can therefore promote long-term learning. In addition, it is important to constantly retrieve information from memory in order to acquire its nets for a longer period of time. The other factor, highlighted in the abovementioned article, that also supports the results of the present research, emphasizes the interconnection of visual and repeated learning. Karpicke mentioned that the most effective way of learning the words is the one when the repetitions are spaced. The study by Terada (2017) supports the role of associations and repetitions as well. The author stresses upon the repetition of learned information using tests, as well as modern applications and websites. Terada's study also claims that information is easy to remember when it is presented in different ways, especially using visual aids (flashcards, pictures, tables, etc.).

The research of Brady et al. (2008) proves the efficiency of long-term memory in storing massive information, especially when it comes to images. The authors also turned to presenting 2500 pictures to observers and told them to memorize these pictures. The results were outstanding and proved the efficiency of the method. In addition, the researchers showed the pictures in such a manner that one picture

repeated on average once in eight images, and the results were tremendous as well. With this in mind, another research, conducted by Konkle et al. **(**2010**)** showcased the efficiency of image storage in memory when pictures are repeated. As far as our research is concerned, it should be mentioned that the students were observing a much smaller number of images than in the abovementioned experiment. On the other hand, the students were not told to memorize them, they did it unconsciously, having memorized words that denote those. So the image helped them to create associations. In addition, students had a different frequency of looking at pictures, as well as much longer time of their observance. However, our indicators are still lower than the ones of the abovementioned research, since there was a break of 16 weeks when students did not have the contact with previously presented images and words.

While doing our research, we took into account the notion and function of working memory in order to make the process of learning new words more effective. Moreover, new words should go through the working memory before entering the long-term memory. According to Schurgin et. al (2018), working memory is engaged when new and previously unstudied information is displayed to the students. In our experiment, students were facing new words and the images that they refer to. Therefore, the newly encoded information of the image and its semantics entered the long-term memory and was retrieved by stimuli (*flashcards*) for a multitude of times.

Moreover, Vulchanova et al. (2014) underlined that working memory is active in the tasks of retrieving information from the long-term memory. It plays a crucial role, particularly in the experiment conducted by the above listed group of scholars, proving that the visual semantics in combination with words has a better effect on memorizing information at length. It has also been proven by the current experiment, since students from Groups No. 2, No. 3 and No. 4 remembered almost the same amount of words as the students from Group No. 1 at the end of the experiment. However, the students from all Groups faced difficulties while recalling longer, multi-syllable words. Regarding this fact, Gathercole and Baddeley (1990) noticed such a tendency: immediate recalling declines when the length of the word increases. However, the experiment demonstrated that this statement could be applied to the long-term memory as well.

Other studies by Nikolic and Singer (2007) reiterate that working memory serves as a gate for the storage of information into the long-term memory. They mention that visual working memory plays an important role in the formation of visual long-term memory. Based on their second experiment, Nikolic and Singer even remarked that the time needed to memorize stimuli (images) was on average 30 seconds under the most difficult conditions. On the contrary, in our experiment the students had around 90 minutes to observe the pictures. Yet in the experiments by Nikolic and Singer there were no words encoding the meaning of the picture. In addition, the third experiment, examined in the abovementioned article, postulated that the performance of the long-term memory was 53%.

Gathercole and Baddeley (1990) also dealt with working memory, and their research puts the episodic long-term memory alongside the language and visual semantics. Moreover, the following observation was made: processing words in its perceptual appearance or spoken sound is less effective for words learning than learning them from their encoded meaning or its emotional tone.

In their studies, Sekeres et al. (2016) focused on recovering and preventing the loss of detailed memory. Such endeavor has proven that information retrieval from a memory with relatively little losses is possible shortly after it was encoded. Furthermore, their research foregrounds the importance of cues and repeated restorations in the process of memorizing and retaining of information in our memory. Therefore, one may state that memory retained the flashcards' information each time they were observed. In addition, these flashcards provided the cues, i.e. pictures and the words they mean. Thus, students memorized words well, as these two factors ensured the retention of words during a longer time period.

Vulchanova et al (2014) mentioned that memory is a key mechanism in language learning, emphasizing the importance of vocabulary development along with grammar among students. The researchers made a claim that it is often harder for students to acquire the meaning of abstract words than the meaning of words referring to physical objects. According to the authors, the ability to understand and learn abstract words depends on the semantic skills of each and every student. In the context of our research, we noticed that students faced some difficulties while learning abstract words (flashcards rendering the emotions). It is worth mentioning that students with better knowledge of a foreign language learned words referring to emotions faster and better than their peers with lower language competence.

An important factor that we took into consideration at the beginning of the experiment was whether flashcards should be in color or not. According to the research of Brady et al. (2013), color plays a principal role in visual long-term memory as well as in visual working memory. Taking into account the process of our experiment, it was decided to use colored flashcards for students in our research. To our mind, it helped to facilitate students in making associations and therefore memorizing new words.

Another factor worth considering is how the possible stress on testing memorized words could influence memory. The article by Smith et al (2016) notes that acute stress impairs memory retrieval. However, in our research students were not under any severe stress due to testing, since it did not have a chance to influence their semester mark. The location of flashcards and their distance as well as the frequency of their observance is also a crucial aspect of the experiment. Owing to this, we took into consideration the findings of the paper by Hughes et al. (2016). However, in contrast to the scholars, we placed our research focus not on auditory-verbal determinants of short-term memory, but on visual and spatial ones.

Conclusion

The results of the research can potentially find a wide range of practical implementation from parental teaching of their children to the university courses. However, it should be noted that the best way to use the method of voluntary observing of the words on flashcards is in connection with learning new vocabulary and its active use in speaking and writing. While the teacher presents new vocabulary and gives practical exercises to learn it, he/she can hang flashcards with these words on the wall in front of students in order to facilitate the learning process. The method

can be widely used at home as well. People, living in a building, full of colored flashcards, which they notice while doing housework or just walking, can facilitate the process of learning a new language. In addition, when the children or students are bored with waiting for the teacher or doing mundane exercises, they try to distract and entertain themselves. Mainly, it is done by using a smartphone, however if they are not allowed to use smartphones they would carefully observe the room, searching for something interesting. In such a vein they would find brightly colored pictures with words. They keep reading them, at least in their mind, for a couple of times and thus memorize them.

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