MNEMONICS – THE ART OF MEMORY

Nabiyeva Saida Muhammadkarim qizi
O`zbekiston Jurnalistika va ommaviy komunikatsiyalar Universtiteti

Memory is a psychological process that involves retaining and retrieving perceived things, events, or past experiences when necessary. It is one of the characteristics of the nervous system and is related to the ability to store information about external world events and the organism's reactions for a long time, and to repeat it in conscious activity and within the scope of behavior and actions.

The following key processes are distinguished in the field of memory: retention, storage, recall, and forgetting. These processes do not occur separately but rather constitute different aspects of a single process. The emergence and development of memory are connected to human activity. The retention of specific material is linked to the accumulation of individual or personal experience during one's life. Using the acquired experience in future activities requires recall. If some material ceases to participate in the activity or is no longer involved, it leads to forgetting.

What distinguishes humans from other beings is precisely the superior nature of human memory compared to other creatures. Early scientific perspectives on memory can be found in the works of Eastern thinkers and Greek philosophers (such as Aristotle, among others). In particular, Farabi viewed memory as an integral part of the intellectual process in cognition, emphasizing that memory is not exclusive to humans but is also characteristic of animals. Recent research shows that all animals have the same level of short-term memory.

"When we talk about short-term memory, it works almost identically for all animals. Surprisingly, monkeys do not remember better than rats, but the results are clear. Human memory stands out because it is extremely sensitive; anything seems to stay in the memory for a very long time," says Johan Lind, Associate Professor in the Department of Ethology at Stockholm University.

100 Memory Experiments

Researchers from Stockholm University and the Center for Cultural Evolution Studies at Brooklyn College conducted a meta-analysis of nearly 100 memory experiments in 25 different types of memory systems. The research shows that animals have various memory systems. Simply put, animals have short-term memory and special memory systems. In short-term memory, animals store information about almost everything, but the information is quickly lost. Animals also have different special memories, which, on one hand, can store only certain types of information, but on the other hand, this information can be stored for a long time. Among animals, elephants and orcas (killer whales) stand out with their long-term memory. Elephants typically remember information for 60-70 years. Orcas, in turn, can recognize family members and

individuals within their groups and retain the history of their group, as well as their migration routes.

Short-Term Memory and Special Memories

For example, a crow can remember the locations of hidden walnuts over the course of months, but animals generally find it difficult to retain other things in their memory, even for a minute, in different contexts. Specialized memories, however, store information for a long time. For instance, animals can remember other individuals, food-rich places, or the fact that some foods are toxic for a long period of time. However, the events that trigger these special memory systems disappear after a few seconds or minutes. Professor Magnus Enkvist of Stockholm University's Department of Ethology emphasizes, "This seems to apply to all animals, except humans."

MNEMONICS – THE ART OF MEMORY

The term "mnemonics" comes from the name of the Greek goddess of memory, "Mnemosyne." Mnemonics are tools used to aid in remembering things. They are a set of techniques that help in recalling information that is difficult to memorize.

The basic idea behind mnemonics is to find an easier way for our brains to remember complex information. Our brains have evolved to retain images, colors, structures, sounds, various sensations, and languages. Most people know mnemonics as a technique that helps with memory. However, in books, it is often narrowly defined as the process of organizing unstructured information into meaningful patterns. It also refers to the act of adding additional meaning to the material being studied. As a result, the information being memorized becomes more meaningful and logical.

Memory can be the key to your success and enjoyment of life, or it can, conversely, be the cause of your mistakes. Almost everyone experiences both of these situations in relation to memory. As Dale Carnegie pointed out, "An average person complains about their memory because they don't understand how their brain works."

My interest in memory and the human brain led me to complete the "Super Brain" course by Davron Turdiyev, the president of the Uzbekistan Mnemonics Federation and a participant in Russia's "Ydivitel'nye Lyudi" ("Amazing People") and "Ya Mogü" ("I Can") shows. In writing this article, I aim to share general concepts about mnemonics, the methods used for remembering, the human brain, memory, and scientific research related to mnemonics, based on my own knowledge and experiences.

I have been practicing mnemonics for two years, and now I can memorize a sequence of 200 numbers in 5 minutes. Below, I will share my knowledge on the topic.

The Science and Art of Memory

What is Memory?

Usually, people respond to this question simply, but in reality, memory is a very complex biological and chemical process. To explain in more detail, the nerves in your brain communicate with each other through synapses, using electrical impulses to store information in a particular way. Let me introduce the types of memory and how it works in the simplest possible manner.

The process of memory retention can be divided into three stages: Encoding, Storing, and Retrieving. To better explain these stages, let's use the example of a filing cabinet. You write down the information you need on a piece of paper; this is the storage stage. Then, you place this paper in the correct section of the filing cabinet; this is the encoding stage. The third stage is retrieval, where you go to the relevant section and get the information you need, and you feel satisfied. Typically, people try to memorize things, but the main problem is that, in the first stage, the information often doesn't stay in memory. Sometimes, the challenge in memory retention is that retrieval becomes difficult. Therefore, the first and second stages are crucial and help improve the third stage—retrieval.

Additionally, memory can be categorized based on how long the information is retained: short-term and long-term memory. Short-term memory holds information temporarily, such as remembering a phone number or a sequence of digits for a brief period. Long-term memory stores information for a longer duration.

Short-term memory holds data that we forget after a few seconds, like phone numbers we don't need to remember after dialing. We can store about 7 pieces of information for 15 to 25 seconds in short-term memory before we forget it. This is referred to as working memory or active memory. It is through this working memory that we perform tasks, execute functions, and think.

A key challenge of short-term memory is that it fades quickly, often within 2 seconds. One way to address this is by repeating the information, or as some sources suggest, by maintaining focus on the information for up to 7 seconds. Short-term memory is very susceptible to distraction, and even slight interruptions can lead to the loss of information. This is why short-term memory struggles with handling multiple tasks at once.

The concept of a person's ability to remember 7 ± 2 numbers or elements is related to "short-term memory capacity" in psychology. This idea was first introduced by Harvard psychologist George A. Miller in his 1956 article "The Magical Number Seven, Plus or Minus Two." According to Miller, short-term memory can usually hold between 5 to 9 pieces of information at a time.

The book "Seven Sins of Memory" by Daniel Schacter, who was the head of the psychology department at Harvard University and is currently a leading expert in the field of memory, discusses these errors in detail. According to Schacter's theory, our memory is not inherently flawed, but there are seven "sins" or errors that hinder us from improving our memory. These flaws continue to puzzle scientists, and interestingly, they can worsen as we age. The seven sins of memory are: transience, absent-mindedness, blocking, misattribution, suggestibility, bias, and persistence.

Memory Systems

Memory is considered the treasure and guardian of all things. — Cicero

The earliest form of mnemonic art dates back to the 5th century BC. The ancient method, known as the "Memory Palace," was created by the Greek philosopher and poet Simonides of Ceos. His famous method, known as the "Method of Loci," is recognized as

a classic mnemonic technique. This method is based on the events that occurred in a specific place. Simonides was at a banquet when he left the room, and shortly after, the roof of the building collapsed, killing everyone inside. However, identifying the bodies was difficult. Simonides, however, could remember where each guest had been sitting and used this knowledge to help identify the bodies. This event led him to understand the connection between spatial awareness and memory. After this, Simonides developed a method of storing locations and memories in an orderly and logical way, which is used in remembering words, numbers, and other information. This method involves two main ideas:

- Choose specific locations that are familiar to you and organize them in a way that is easy to remember.
- Link the information you need to remember to those locations.

For example, you can memorize a sequence by imagining it from the door of your house to the refrigerator, choosing a sequence of locations. This ordered placement ensures the proper arrangement of the information you want to retain.

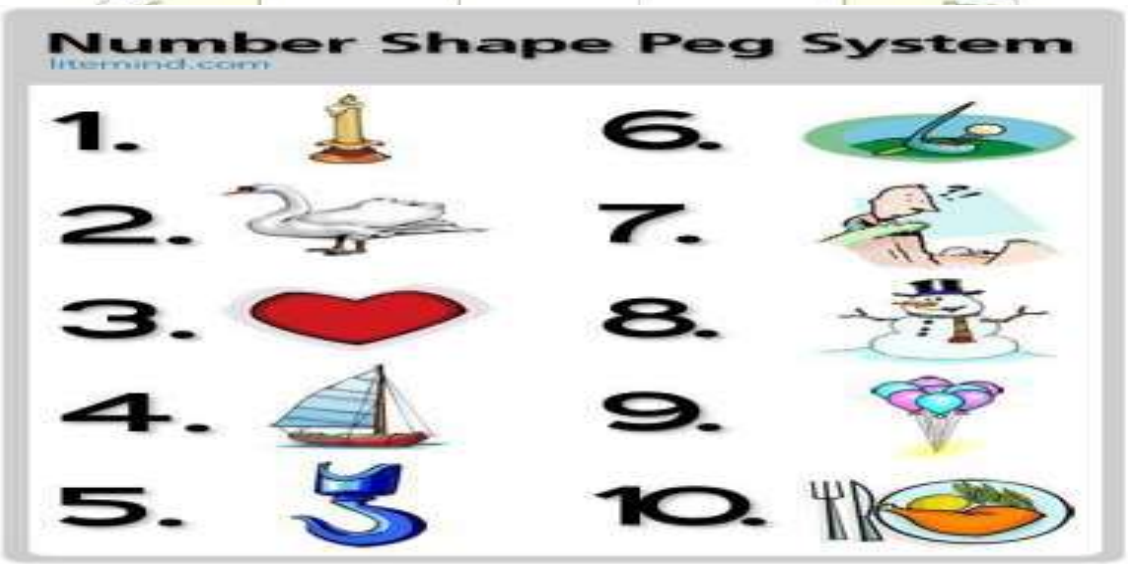
Even Julius Caesar used this method in his speeches. Before delivering a speech in front of the Senate or the people, he would review the locations and connect his speech to those locations in his mind, which helped him recall the speech without written notes. This was the secret of the memory art of the ancient Romans.

Number Memorization Systems

There are mnemonic systems designed to enhance human memory, specifically for remembering numbers, and these systems turn numbers into images, words, or stories. We'll explore these systems below.

The PEG System is one of the simplest mnemonic systems. Its logic is that you link a sequence of words with numbers from 1 to 10 and then firmly fix this information in your memory through vivid imagery. In this system, you must create an image for each number's shape. Think of it as a mental "cabinet" where you place the necessary information, and when needed, you can retrieve it or replace it with something else.

This is the "number-shape" PEG system.



For example, for the number 1, we have a candle, for 2 it's a swan, for 3 it's a heart, for 4 it is ship and 5 it's a hook, for 6 it's a golf stick, for 7 it's an axe, for 8 it's a snowman, for 9 it's balloons, and for 10 it's a fork and plate.

Now, let's say you want to memorize 10 words. You connect all of them with these associations. For example, if the first word is "phone," the candle burns and turns into ash with the phone on it. If the second word is "car," the car hits the swan, and so on.

MAJOR SYSTEM

The Major system was discovered by Johan Wilhelm in 1648 and is essentially a code system that converts numbers into phonetic sounds. These sounds are then transformed into words, and those words are turned into images that our brain can understand. The main purpose of this encoding is to associate numbers with something familiar to us, and then assign our own associations to the numbers from 00 to 99.

Table 1: Major system of Memory.[12]

Digit	Sound	Memory Aid
1	T or D	The letter T and D has one down stroke.
2	n	n has two down strokes.
3	m	m has three down strokes.
4	R	Final sound of the word, "four" is R.
5	L	Roman numeral for 50 is L.
6	J, sh, ch, g	The letter J turned around is almost like the number 6.
7	K, c, g	Capital K contains two sevens
8	F or V	F or V as written f looks like eight
9	P or b	P is a mirror image of nine
0	Z or S	The first letter of zero is Z
No Value	a, e, i, o, u and w, h, y	The vowels and the letters w, h, y do not carry any value

POA SYSTEM

The Person Object Action (POA) system is an effective method. Each two-digit number from 00 to 99 is associated with a person, object, and action. For example:

- 12 - Messi (person) - soccer ball (object) - kicking the ball (action)
- 45 - Sherlock Holmes (person) - magnifying glass (object) - breaking (action)

For each 6-digit number, a visual scene is created: For example, the number: 124587

9. 12 - Messi (person)
10. 45 - magnifying glass (object)
11. 87 - playing the guitar (action)

Image: Messi is playing the guitar with a magnifying glass. You place each combination into familiar locations.

MEMORIZING FOREIGN WORDS

Learning a foreign language is certainly related to vocabulary. To memorize words, we use the TOG method:

- T (Translation)
- O (Image)
- G (Germanization).

This method was discovered in the 1970s by Stanford University professor Richard Atkinson. In this method, you take a foreign word and find a similar word in your native language, then "Germanize" it, or connect them. This method may initially seem difficult, but over time it becomes almost a reflex. I, too, initially spent a whole day finding an image or a key word for one word, but now when I hear a foreign word, an image automatically comes to my mind.

Even 8-time world champion Dominic O'Brien, a famous mnemonist, memorized 3,000 words in two days. Let's try this method with Spanish:

- Niño [ninio] – Child. Imagine that "niño," meaning a little child, is playing with a Minion. Repeat this image several times.
- Marido [marido] – Husband. For this word, imagine the game "Mario." The husband (Marido) is playing the Mario game on the computer.
- Perro [perro] – Dog. Imagine a dog (Perro) chasing a parrot. Visualize it well and say it out loud.

When learning Chinese characters, you create a mental image of the character's translation in the form of a pictorial representation.

In this case, the black lines represent the hieroglyph, and the rest are considered images associated with it. The goal is to assign meaning to dry memorization, linking unfamiliar information to what we already know, and thus improving our memory. The rest can be fully studied through the website. Most importantly, practice is key. Additionally, the *chineasy.org* website uses mnemonic-like techniques but with images, aiming to teach Chinese more easily and ensure the information is retained in visual memory. Therefore, if you become a member of that group, it will be beneficial. Also, join *memrise.com*, which is a website tailored for memorizing words with scientifically proven techniques. This website includes dictionaries for nearly all languages and focuses on spaced repetition.

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