

Super Memory: Leveraging An Acquired Skill

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Abstract

Memorizing a 3040-digit number in one hour and the order of a full deck of cards in 13.9 seconds, memory athletes set new world records at the 2017 WMSC World Memory Championships in Shenzhen, China. Over three days, memory athletes converged to perform seemingly impossible feats of memory from memorizing the order of 37 decks of cards in an hour to memorizing a single deck of 52 cards in 13.96 seconds. Yet more amazing than their feats is that none of the competitors claim to have a special talent or innate genetic ability. These individuals credit a sparsely known mnemonic technique that anyone can use for their seemingly superhuman performances. This paper deconstructs this unique process behind competitive memory such that it can be extrapolated into other areas of thinking. In doing so, the paper also puts forward the notion that this cognitive shift could alter the traits that our society values most. Using the techniques of memory athletes as an underlying framework, there is an opportunity to revolutionize education, create more mindful individuals, and increase our ability to make discoveries. Knowledge is the most valuable commodity and memory is the gateway to knowledge.

INTRODUCTION

The foundation of elite memory is technique and not innate skill. This is the crux of why memory techniques are so powerful with such far reaching implications. Certain human beings possess rare genetic traits that allow them to demonstrate superhuman mental abilities. The iconic savant Kim Peek for example, could read the left and right pages of a book simultaneously by focusing one eye on each page. He could recite nearly 12,000 books word for word. This was due to him being born with a missing corpus callosum and a damaged cerebellum [1]. What was initially seen as a critical detriment also unlocked phenomenal mental capacity. The case of Kim Peek is a prime example of superhuman traits due to an extraordinary circumstance. While impressive from an observer's standpoint, the problem with these savant characteristics is that they are not scalable. They cannot be used by the broader population because they do not stem from acquired knowledge.

To the contrary, the cognitive ability used to perform feats such as those at the world memory championships is entirely skill-based. The top memory athletes personally attest to this [2]. Though these athletes do not have special abilities, they do use special techniques. It is these techniques which account for the vast difference in their results compared to the average individual.

MEMORY TECHNIQUES EXPLAINED

Underlying Elements

There are two guiding principles behind the memory techniques. Both have a well-documented scientific backing. The first is the principle of visualization. Known in scientific terms as the picture superiority effect [3], this phenomenon indicates that visual images are far more easily remembered than words. Words are a social construct designed to convey ideas. However, they are still a "middle-man" between concept and understanding. This is not true for pictures. Sight is not only one of the five senses, it is a sense that humans are notably proficient in compared to other animals such as dogs who are more proficient in smell. Evolutionarily speaking, humans have dealt with visual information far longer than auditory information. The use of pictures to communicate far predates the advent of language.

The second principle of memory techniques is association. By establishing a mental link between information the brain is trying to remember and information that is readily available, the probability of recalling that information increases significantly. Such memory not only involves the hippocampus but engages the prefrontal cortex as well, generating more synaptic connections [4]. The more synaptic connections which are formed, the stronger the memories will be.

When students attempt to memorize information, they typically subvocalize the information in their mind, repeating it over and over internally with the hope that repetition will lead to retention. Simply repeating the meaning of material without drawing any associative connection is known as rote memorization. Rote repetition is the most common form of memorization, yet it is highly ineffective. It neither relies on imagery nor any concrete mental association.

Applied Discipline

All competitive memory seeks to convert intangible data into tangible, highly graphic images and then store those images through association. Memory athletes do this by creating a visual journey that is familiar to them. These journeys range from imagining walking through your house or a neighborhood park to walking through a favorite movie scene and are completely personal preference. The best memory journey is one that is unique and personable to the creator. These journeys have the strongest existing memory connection and therefore serve to form the most memorable associations. The next step is to identify several key pitstops throughout the journey. These act as anchor points for bits of data that are trying to be memorized [5].

During memorization, the athlete converts intangible data into associated graphic images and then places an image in each of these designated locations (known as loci). By mentally retracing their steps through the journey, they can recall the images and their respective associations [6]. This method is based on an ancient Roman practice known as the method of loci or memory palace. It was originally used to memorize epic sagas such as the Iliad. While this technique may appear abstract and unsubstantiated to those outside the niche discipline, every known memory athlete uses these techniques and their results are undeniable.

To illustrate this technique, imagine standing in front of your home. Instead of your doormat, there is a giant steak stretched out and dripping grease on the floor. Above the steak, leaking out of the doorbell are drops of milk running down the wall. When you open the door and go to hang up your coat, you find that all the clothes have been replaced by coats made of bright green lettuce. Then you go to walk up the stairs and see giant eggs come rolling down the stairs, their yoke coming out as they hit the steps. In this case, your household is the memory palace and the loci are your doormat, doorbell, closet, and stairs. While the example only consists of a shopping list of four items, it is far easier to recall those items (especially were you to wait 30 minutes without reviewing them) compared to if you simply repeated the words in your head. Often, the images in memory techniques are intentionally absurd. A ridiculous image stands a greater chance of being remembered compared to a normal one due to the distinguishability of its absurdity.

In elite memory competitions, there are far more complicated systems that built upon the foundation laid by the method of loci. For example, numbers unlike a shopping list cannot simply be converted into a tangible example by reading them. Instead, athletes use a phonetic code where each number translates to a consonant sound and those consonant sounds then form tangible words [7]. Conversely, every word can be decoded into a specific number. Through innovation, even the most seemingly boring string of data can be transformed into a vivid and memorable journey.

EXTRAPOLATING VALUE

The Differentiator

The truest mark of greatness behind memory training is not the world records that have been set. At its core, memory training has shown that the natural way of thinking is flawed and that we can devise methods that overcome our natural cognitive limitations. It is possible - by designing and perfecting a formulaic mental pipeline - to vastly increase the amount of data the brain can memorize. This is a discipline which previously was thought to simply be a natural and undisturbed function. Memory techniques are unique in that they are not simply a refined method that builds upon prior approaches. They mark the first time any sort of predefined approach has been used on memory.

School

For 200 years of American education, memory has not been taught as a discipline. It has simply been an expectation placed upon students without any overarching instructions. Nevertheless, memory is the baseline for all academic subjects. Facts are what enables conceptualization, reasoning, and logical thinking. With a standardized method of incorporating techniques, students can recall information learned in the classroom far more effectively [8].

Speed Reading

Pundits have argued for decades that the natural speed at which humans read cannot be dramatically altered. Multiple courses offering claims of significantly boosting reading speed have since been debunked [9]. Recent advancement in memory has shown that by expanding the brain's capacity to store information, speed reading can overcome the prior shortcomings of other speed reading techniques. Where speed reading has fallen short is with comprehension. This is due to a rapid influx of words without any means of analyzing those words or storing their meaning. By applying memory techniques to encode words in visual markers and associate them in a logic fashion, memory training addresses the primary concern of speed reading: comprehension.

Speed “Thinking”

Speed readers as I have witnessed at the World Speed Reading Championship have demonstrated the capacity to eliminate the sub vocalization of text, effectively altering their natural processing of words so that immediately picture the image rather than hearing words in their head [10]. The top memory athletes use the same phenomenon. They eliminate the sub vocalization of the numbers they read and form images with. When reading a given string of numbers, the athletes instinctively see images without ever repeating the numbers in their mind. Therefore, the technique is not only applicable to hard writing but to more abstract forms of data as well. By the same principle, perhaps we will one day develop the capacity to “speed think” where we will not be slowed down in our thinking having to formulate words and internally talk to our minds. As aforementioned, words, languages, and numbers are all artificial constructs that operate as middlemen between the formulation of thoughts in the mind and interpersonal communication of those thoughts. For this reason, it is possible to bypass the use of such training wheels. We could simply be able to act on the neurological impulses that prompt cognition alone.

Mindfulness

Humans constantly experience sensations that we are not aware of or have long forgotten [11]. Through memory journeys, individuals leverage these sensations thereby becoming more aware of their own experiences. They achieve a heightened form of mindfulness. In creating and using a memory palace, the individual shifts their perspective to see every aspect of the individual locations. They pay attention to unique qualities of objects such as their reflectance, texture, temperature, and shape in order to best associate data with the loci. Without this concerted awareness, those details go unnoticed.

Consider the process of creating a memory palace. If you attempted to engrain your daily walk to work into a memory palace, you would need to pick out specific loci markers, new and distinct elements of your journey. Whether it be the luminosity of a mural, the texture of a particularly interesting crosswalk button, or the shape of an architecturally notable building, you are grounded in the present rather than walking through life with other thoughts occupying the mind. Every day, in constructing the palace, you notice new observations. In this manner, creating memory palaces is a means of forcing the brain to practice the act of mindfulness.

It is also possible for us to make note of spontaneous thoughts that creep into our mind by creating mental markers using the principles of association and visualization. Instead of simply being mindful of the world arbitrarily, memory techniques give both function and form to mindfulness as a discipline.

This state of thinking is known as original awareness [12].

Happiness

In an unrelenting drive for success, many individuals have struggled with some of the most important raw emotions of life, namely happiness. Memory, due to its innate and direct connection with the brain can bring them back in touch with happiness. Humans are not unhappy because of the experiences around them, they are unhappy because of how they perceive those experiences. By the same logic, individuals can learn to be happier with what they have simply by changing how they process their surroundings.

When a person recalls old memories, the brain is flooded with all sorts of sensations from that experiences [13]. This includes sounds, smells, and the area of most significance to this topic: emotions. By recalling a fond memory of the past, individuals can experience sensations of happiness triggered by that memory [14]. Unfortunately, in the heat of a

moment, it can be particularly challenging to distract the mind from its train of thought. The challenge then, is being able to recall old memories in times of need. It is impractical to simply rely on one or two bland memories through rote recollection as a source of emotional motivation. There arises a need for a means of recalling far more memories and recalling memories in vivid detail to maximize their emotional effect.

This is where memory techniques play a role. Engraining fond memories of the past in a palace makes it possible to recall them at will. An individual can examine memories from their past and select a series of particularly notable happy memories to file in their memory palace. When an individual suffers from sadness or depression, they can travel through their preconstructed memory palace of stimulating positive memories to cheer them up [15].

It is also worth noting that happiness is not black and white. There are many nuanced emotions embedded within sadness or discontent. A particular individual may feel a sense of stress causing their unhappiness which would necessitate a memory that invokes calmness. Conversely, an individual may feel unhappy due to boredom in which case a memory that invokes excitement or determination would most effectively neutralize that emotion.

We possess the capability to change how we feel without having to change our physical reality. The happiness of our past can fuel us and the sensations of the present can ground us if we preserve them with memory.

Problem Solving

Logic is composed of if-then type statements. In the case of a computer, this is clearly formatted in lines of code [16]. Regarding human cognition, there is no clearly defined logic statement, but the framework of processing remains the same. Humans solve problems by systematically running through possible scenarios and cross referencing them with past experiences. Unfortunately, where humans fall significantly short of computers is that there are inefficiencies in their thinking and they often repeatedly analysis the same thought without being able to draw a conclusion or pair it with other thoughts [17]. This makes the mental work of problem solving conducive to overthinking. Unlike a computer which performs greater calculations given a greater amount of time, humans often achieve the same results even when consuming a greater amount of time because they overthink the problem or get sidetracked by a mental tangent. By understanding the train of thought needed to arrive at a particular conclusion and plotting the relationship of ideas rather than simply relying on the mind to arrive at the conclusion arbitrarily, the process of problem solving can be rapidly accelerated.

For example, memory techniques can be applied to memorize formulas. Consider the applicability of memorizing all the formulas needed for an entire academic field. Though there is a clear, tangible benefit, the question remains whether an individual can use the formula that is memorized in the context of a problem. Formulas also require an understanding of their application in addition to knowing the formula itself in order to be properly used. To address this, streams of consciousness that apply to executing a particular technique

By altering how we think through memory techniques, we generate greater efficiency between time and results. In the discipline, there is nearly a direct correlation between time and effort put into memorization and the amount of information that is successfully memorized. That strong correlation does not exist for rote memorization [18]. The justification for this again falls back on the formality of the structure that exists for memory techniques. As discussed in “The Differentiator,” we can apply predefined approaches to natural disciplines such as memory. The same advancement can be extended to problem solving. Using a predefined thinking pipeline, solving problems can be made far more efficient.

Accelerated Learning

The culmination of improvements in the fields of data intake (speed reading), processing (problem solving), and retention (memory) is the ability to learn at a much faster rate. This is the area where the field of memory intersects with marked relevance in the real world.

GOLDEN TRAIT OF THE FUTURE?

As society evolves under a dynamic environment, the characteristics that are valued most change as well. From the paleolithic age to the stone age, physical characteristics were in the highest demand. With the advent of science, engineering, and intellectualism, intelligence unseated physical strength as the most prized characteristic. Now human

society is poised for yet another global shift. The world has already garnered a substantial amount of information. We now have access to more information through the internet, made more accessible than ever through smart phones and search engines like Google than at any point in history. The growing challenge is not how to obtain more information but rather how to manage the information that already exists. Nearly one hundred years ago, Albert Einstein remarked that, "The value of an education [...] is not the learning of many facts but the training of the mind to think something that cannot be learned from textbooks." [19]. Memory techniques and related skills such as speed reading are knowledge management tools. They can be used to monetize and capitalize on the existing reserves of knowledge, extracting value that will benefit society.

Using the framework of memory that the fields outlined above are built upon, it will be the greatest practitioners of memory who are the most skilled learners, readers, and thinkers. Memory techniques rely heavily on creativity. Every image and mental association that is formed takes creativity. Once the process for remembering is laid out, it takes creativity to carry out that process. If memory is the grand enabler for learning and managing information and it necessitates creativity more than intelligence, then it would indicate that creativity is poised to become the golden trait of the future.

REFERENCES

1. Opitz JM, Smith JF, Santoro L (September 2008). "The FG syndromes (Online Mendelian Inheritance in Man 305450): perspective in 2008". *Adv Pediatr*.
2. Dresler, Martin & R. Shirer, William & Konrad, Boris & C.J. Müller, Nils & Wagner, Isabella & Fernández, Guillén & Czisch, Michael & D. Greicius, Michael. (2017). Mnemonic Training Reshapes Brain Networks to Support Superior Memory. *Neuron*. 93. . 10.1016/j.neuron.2017.02.003.
3. Curran, T.; Doyle, J. (2011). "Picture superiority doubly dissociates the ERP correlates of recollection and familiarity". *Journal of Cognitive Neuroscience*
4. Fanselow, Michael S.; Poulos, Andrew M (2004-08-30). "The Neuroscience of Mammalian Associative Learning". *Annual Review of Psychology*.
5. O'Brien, D. (2000). *Learn to remember: practical techniques and exercises to improve your memory*. San Francisco: Chronicle Books.
6. O'Keefe, John; Nadel, Lynn (December 7, 1978). *The Hippocampus as a Cognitive Map*. Oxford: Oxford University Press. ISBN 978-0198572060.
7. PISONI, DAVID B. "Auditory and Phonetic Memory Codes in the Discrimination of Consonants and Vowels." *Perception & psychophysics* 13.2 (1973): 253–260. PMC. Web. 8 Jan. 2018.
8. Ralby, A., Mentzelopoulos, M. and Cook, H. (2017) Learning Languages and Complex Subjects with Memory Palaces. In: Immersive Learning Research Network. iLRN 2017. Communications in Computer and Information Science, vol 725. Springer, pp. 217-228. ISBN 9783319606330
9. Noah, Timothy (Feb 18, 2000). "The 1,000-Word Dash". *Slate*.
10. Charlotte Emigh (2011), "Subvocalization", *Accelerated Reading*, University of Puget Sound Center for Writing, Learning & Teaching
11. "Absolute Threshold." *Gale Encyclopedia of Psychology*. 2001.
12. Sven Bernecker (8 May 2008). *The Metaphysics of Memory*. Springer Science & Business Media. pp. 3–.
13. Horner, A.J. et al. Evidence for holistic episodic recollection via hippocampal pattern completion. *Nat. Commun.* 6:7462 doi: 10.1038/ncomms8462 (2015).
14. Lerner, J. & Keltner, D. (2000). Beyond valence: Toward a model of emotion-specific influences on judgment and choice. *Cognition and Emotion*, 14(4), 473-493.
15. Dalglish, Tim & Navrady, Lauren & Bird, Elinor & Travers-Hill, Emma & Dunn, Barnaby & Golden, Ann-Marie. (2013). Method-of-Loci as a Mnemonic Device to Facilitate Access to Self-Affirming Personal Memories for Individuals With Depression. *Clinical Psychological Science*. 1. 156-162. 10.1177/2167702612468111.
16. Poole, David; Mackworth, Alan; Goebel, Randy (1998). *Computational Intelligence: A Logical Approach*. New York: Oxford University Press. ISBN 0-19-510270-3.
17. Luger, George; Stubblefield, William (2004). *Artificial Intelligence: Structures and Strategies for Complex Problem Solving* (5th ed.). Benjamin/Cummings. ISBN 0-8053-4780-1.
18. Jones, Dorian (2007-03-21). "Turkey: Revolutionizing The Classroom". *Deutsche Welle*.
19. 1921 May 18, *New York Times*, Einstein Sees Boston; Fails on Edison Test: Asked to Tell Speed of Sound He Refers Questioner to Text Books (Special to The New York Times), Quote Page 15, New York. (ProQuest)