

Exploring the Evolutionary and Protective Roles of Memory in Human Survival

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Abstract: Memory is essential to human survival. It enables to recall critical needs informed by intuition or experience. It sharpens through repetition. Since time immemorial, memory has formed the foundation of the literary journey. Its origin is rooted in the traditional concepts of *shruti* (that which is heard) and *smriti* (that which is remembered). We have now made astounding progress in neuroscience. This has widened our knowledge related to the subtle and complex nature of human brain and its cognitive functions, especially information processing, retention and retrieval. Memory connects the past experiences to the present challenges and makes the future safe. Cognitive decline is caused by neurodegenerative diseases like Alzheimer's or dementia. The burden of it is too much for the families. The miracles of enviable memory not only smoothen our mundane journey with safety, security and glory, they help us deal the challenges with confidence and contentment. It protects human beings through its diverse retrieval functions like threat avoidance, pattern recognition, adaptive selection and recalling prior solutions. Computer memory is a fixed, literal storage of exact digital data kept in hard disc and processed through CPU, its brain. Computerized memory is more technical or mechanical than human memory which is a function of our intuitive urge and inner impulse. Memory consolidation operates on a structured psychophysical architecture. It grows amazingly in people endowed with both a biological reserve and an attention mechanism. The enigma of Swami Vivekananda's photographic memory lies in two integrated principles: *Brahmacharya* (the continuous preservation of vital energy) and intense concentration (the narrow deployment of executive cognitive control). This dual framework provides a holistic explanatory model for heightened mnemonic endurance and accelerated information retention. Keeping all these aspects in mind, this paper explores the evolutionary and protective roles of memory in human survival.

Keywords: Human survival, Cognitive decline, Neurodegenerative disease, Digital data, Photographic memory, Intuition.

1. Introduction

According to psychology, human memory is the dynamic cognitive system that encodes, stores, and retrieves information and past experiences. It is the definitive tool to protect our very survival through two most effective pathways- recognizing danger and adapting behavior. Firstly, memory helps one to identify threats impending as well as to remember what to avoid, like staying away from a hot stove or a dangerous animal from his past experiences. After this initial identification of dangers, memory takes him to decide his next course of action

i.e., to go with adapting behavior enriched with output of the brain that retrieved similar situations happened earlier. The role of memory thus is not only immense in exploring the smoothened journey of life but a vital need to arrest a complete loss of independence, severe safety risks, and a decline in overall quality of life.

2. Literary Journey of Memory

Since time immemorial, memory has formed the foundation of the literary journey, beautifully encapsulated in the traditional concepts of *shruti* (that which is heard) and *smriti* (that which is remembered). Ancient Rishis (seers) viewed memory (*smriti*) not merely as a psychological tool, but as a sacred cosmic faculty essential for preserving, living, and transmitting divine knowledge (*shruti*) across generations without alteration. 'Vedic Literature' or the literature based on the Vedas is a major source of knowledge about the Aryans and the Vedic period. Before writing them, the Vedas existed in oral form and were passed down exactly from generation to generation. This sacred literature is divided into two categories namely Shruti and Smriti and these two sections are the very foundation of Hinduism. The following may be seen in this regard-

"Shruti is a word of Vedic literature that is in the Sanskrit language. In Sanskrit, the word 'Shruti' means 'what is heard'. The texts in Shruti are also called sacred texts. This is because it has been revealed by God himself. Thus, they are unquestionable and authoritative. The shruti consists of the four Vedas which deal with different aspects of Hinduism. The Vedas are in the form of poetic hymns. Four Vedas are - Rigveda, Yajurveda, Samaveda and Atharvaveda.

"Smriti is the other part of Vedic literature and is derived from Shruti. In Sanskrit, the word means 'what is remembered'. It is a little less authoritative than Shruti. The sacred texts of Smriti are traditionally written by ancient seers and sages. The Smriti texts are modified through the experiences or the tradition over the period. On the basis of texts, Smriti is broadly classified under four categories, namely- Vedangas, Upavedas, Upangas and Darsanas" [1].

3. Memory Classification Based on Duration

Human memory is the ability of the mind to encode, store, and retrieve information over time. We have now made

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astounding progress in neuroscience. This has widened our knowledge related to the subtle and complex nature of human brain and its cognitive functions, especially information processing, retention and retrieval. A dig into the scholarly literature on memory in psychology shows that retention of reaction to any external stimuli on brain varies widely from person to person. And this variation of duration is the basis of classification of memory namely sensory memory (Seconds), Short-Term / Working Memory (Minutes) and Long-Term Memory (Permanent). Stress and anxiety impair our memory to a great extent. The observation of Jon Simons, Professor of Cognitive Neuroscience in the Department of Psychology and Head of the School of the Biological Sciences may be seen in this regard from the following-

“When anxious thoughts flood our minds, they compete for space in our working memory and impair our ability to recall long-term memories. If we can find ways to reduce stress and anxiety, our memory can often bounce back” [2].

4. Impacts of Memory Loss: Individual and Familial Burdens

Memory loss is generally perceived as the development with advanced age. But practically it may manifest at any time due to diverse reasons like accidents, acute trauma, environmental variables or progressive etiologies. The onset of cognitive impairment unleashes a series of acute and enduring complications that severely compromise individual well-being and familial stability. The primary consequences of memory loss are categorized below:

Compromised Autonomy: Cognitive deficits hamper badly the executive functioning of an individual. Consequently, instrumental activities of daily living (IADLs), such as medication adherence and financial management are disturbed greatly.

Elevated Environmental Hazards: Memory decline elevates safety risks, including disorientation in familiar environments besides domestic hazards and an increased incidence of debilitating falls.

Psychosocial and Emotional Distress: Memory loss leads to chronic confusion and social isolation. It induces severe psychological morbidity, including tension, anxiety, profound frustration and major depressive symptoms.

Caregiver Burden: The onus of continuous monitoring being imposed on families with people of cognitive decline, it soon turns to be a caregiver burden. Resultantly the psychological, physical, and socioeconomic strain on family is havoc.

Pathological Progression: Neglect in clinical detection of the beginning of the cognitive decline and lapses of remedial steps thereof may accelerate the trajectory toward advanced neurodegenerative disorders, such as Alzheimer's disease and related dementias.

The following may be seen in this regard-

“Cognitive decline is a natural process that accompanies aging. In some cases, such as in sarcopenia-burdened or diseased older adults, the disease course may be more rapid. Declining cognitive function is associated with changes in the central nervous system per se or peripheral triggers that impair

cognition.... Blood-brain barrier (BBB) permeability appears to be a critical point for factors associated with aging that may accelerate cognitive decline” [3].

5. The Contrast between Human Memory and Computer Memory

Computer memory is a fixed, literal storage of exact digital data kept in hard disc and processed through CPU, its brain. Computerized memory is more technical or mechanical than human memory which is a function of our psychological elements like intuitive urge and inner impulse. While both systems receive data, save it, and retrieve it for later use, their structural and operational mechanics differ fundamentally in the following ways:

Physical Composition: Human memory relies on living neural networks and biological synapses, whereas computers depend on silicon chips and electronic circuits.

Processing Framework: Computers process data sequentially using a binary format (1s and 0s). The human brain, however, processes billions of parallel inputs simultaneously across interconnected neurons.

Integration: Unlike computers, which separate storage (RAM/Hard Drive) from processing (CPU), the brain seamlessly integrates memory and processing within the same neural architecture.

This distinction aligns with the observations of noted phenomenologist Robert C. on Quora, who noted that:

“Computer memory and human memory are fundamentally different due to the distinct nature of biological and electronic systems. Computer memory stores data electronically using circuits, capacitors, and other electronic components, enabling rapid access and retrieval of stored data for efficient processing and manipulation by the CPU. The data in computer memory is accessed using precise memory addresses, which streamlines the retrieval and storage of information” [4].

6. Exceptional Memory and its Prominent Real-Life Examples

People with exceptional memories are generally called Mnemonist or Memorist. A person with an exceptional ability to remember vast personal experiences and specific dates is said to have hyperthymesia, also known as highly superior autobiographical memory (HSAM). The ability to vividly recall an image or scene after seeing it only once is called eidetic memory. It is popularly known as photographic memory, the rarest kind of human memory. Jill Price, the American author with HSAM is learnt to have contacted scientists because of her inability to forget her past experiences. The famous American actress and author Marilu Henner, recalls specific details, dates, and even what she wore or ate on any given day from her life for her exceptional memory like HSAM. The following may be perused in this regard-

“Price is able to recite details of every day of her life from the time when she was fourteen years old. She can recall various obscure moments of her life in great detail. Her condition, termed hyperthymesia, or "hyperthymestic syndrome", is

characterized by a highly superior autobiographical memory.” [5]

“Give Marilu Henner a random date in the past and she can recall it with amazing clarity. Take April 30, 1980. “It was a Wednesday,” she says without hesitation. “I was in Cancun, Mexico, with my boyfriend at the time, who was soon to be my first husband.”

Henner can recall past events in almost photographic detail thanks to a highly superior autobiographical memory (HSAM), a rare condition that has been identified in only about 100 people in the world [6].

It is not out of place to mention here the name of Shakuntala Devi who was a real-life Indian mathematical genius known globally as the “Human Computer” for her ability to do complex math in her head faster than early computers.

7. The Enigma of Exceptional Memory

Swami Vivekananda, a spiritual leader, philosopher, and youth icon who dedicated his life to the upliftment of humanity and the harmony of religion, possessed a legendary photographic memory. Several well-documented historical anecdotes capture his astonishing ability to recall entire texts verbatim after just a single exposure. He never treated memory as a trick. On the contrary, he viewed it as a natural byproduct of absolute focus and mental purity. He explained the ‘secret’ behind his prowess using science rooted in two principles: first, Brahmacharya (continence), which emphasizes strict control over thoughts, words, and deeds to preserve physical and mental energy, allowing the brain to develop heightened intelligence; second, intense concentration, which trains the mind through meditation to focus entirely on a single subject without distraction, enabling the brain to naturally absorb and retain details like a camera capturing an image. The following may be seen in this regard-

“In November 1890, Narendranath (pre-monastic name of Swami Vivekananda) went to Meerut. At that time, some of Narendranath’s brother-disciples were staying in Meerut. One of them was Swami Abhedananda.

Narendranath had been a “voracious reader” from his childhood and used to spend much time in reading. Now, during the stay in Meerut, Narendranath, through brother disciple Swami Abhedananda, used to borrow and read one book from local library every day and return it the following day.

The local librarian was not ready to accept that Narendranath was reading the books; he thought that he was not reading anything at all and it was only an attempt to impress others. One day he clearly expressed his doubt to swami Abhedananda.

Narendranath, upon hearing this, went to the librarian and told him, politely- “Sir, I have read all the books very

attentively. If you have any doubt, you may ask me any question you like from these books we had borrowed.”

The librarian asked him a series of questions and Narendranath correctly answered each of them. The librarian was highly surprised [7].

8. Conclusion

Just to be brief, as memory acts as a bridge between past experiences and impending future challenges, its encoding, storage, and retrieval have an immense impact on our lives and the very journey of our existence. Despite the astounding progress of computer science, neuroscience, and artificial intelligence, human memory remains superior to any computer memory. Human memory is associative, adaptive, and meaning-driven but the computer memory is strictly literal, rigid, and passive. Both psychologically and physiologically, human memory is sharpened by repetition and retained for longer periods. However, the duration of this retention and the brain's reaction to external stimuli vary widely from person to person. Ultimately, how long we retain memories can make or break the very foundation of an individual's mundane journey. The role of memory is therefore not only immense in ensuring a smooth life journey, but vital in preventing a complete loss of independence, severe safety risks, and a decline in overall quality of life. The enigma of exceptional memory can be traced through the insights of Swami Vivekananda, allowing us to explore and enjoy the evolutionary and protective roles of memory in human survival.

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