



Andrew E. Budson ed Elizabeth A. Kensinger, *Why We Forget and How to Remember Better: The Science Behind Memory*, Oxford, University Press, 2022

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Andrew E. Budson and Elizabeth A. Kensinger's book *Why We Forget and How to Remember Better: The Science Behind Memory* presents a comprehensive exploration of the mechanisms of memory, structured in accordance with principles of cognitive science to enhance learning and retention. The authors carefully design the book to align with strategies that support memory, such as spaced repetition and the interleaving of related topics. They advise readers to engage with the content over multiple sittings, ideally interspersed with sleep, to facilitate optimal memory consolidation.

The book opens by emphasizing that memory is not a monolithic faculty but comprises multiple distinct systems. Long-term and short-term memory, along with systems such as episodic, semantic, procedural, and working memory, each have unique roles and characteristics. Sensory memory initiates the process, with working memory acting as a gateway for information to enter episodic memory.

Procedural memory, often dubbed "muscle memory," encompasses learned skills and habits performed without conscious thought, such as driving or playing a sport. This type of memory is susceptible to disruption by substances like alcohol, which impairs the cerebellum. Improvement in procedural skills relies on deliberate practice, feedback, and mental imagery. These automatic behaviors can be overridden by the central executive of working memory when adaptation is required.

Working memory enables the temporary storage and manipulation of information. It is limited in capacity, typically holding only three to four chunks of information at a time. Chunking, the process of grouping related items, can enhance this capacity. This system engages both hemispheres of the brain—verbal tasks primarily involve the left hemisphere, while visual-spatial tasks engage the right. The central executive, located in the prefrontal cortex, oversees goal-directed behavior, attention regulation, and coordination of various memory systems.

Episodic memory allows us to recall specific life events, encompassing the processes of encoding, storing, and retrieving memories. Encoding requires focused attention and often fails when attention lapses. Rich episodic memories involve multiple sensory modalities and emotional engagement. The strength of episodic memory underpins the formation of semantic memory, which stores generalized knowledge and facts.

Semantic memory, constructed from multiple episodic experiences, enables us to recognize categories and concepts—knowing, for example, that a tiger is dangerous even without direct

experience. This system is updated continuously and forms the foundation of shared, or collective, memory, which underlies cultural and societal knowledge.

Intention and effort are essential for creating durable memories. Simply paying attention is insufficient; effortful processing that organizes, understands, and relates information is necessary. Divided attention, as in multitasking, impairs memory formation. Anxiety exacerbates these effects by diverting cognitive resources.

The encoding process benefits from several key strategies: focusing attention, organizing content, striving for deep understanding, and relating new information to existing knowledge. Enhancing distinctiveness through emotion, sensory engagement, or uniqueness also strengthens memory traces. Importantly, individuals should acquire content in ways that mirror anticipated retrieval scenarios.

Retrieval is an active, reconstructive process. Strategies to enhance retrieval include maintaining calm, minimizing interference, generating diverse cues, and recreating the original learning context. Reflective practices and sleep further bolster retrieval success.

Memory associations form the bedrock of recollection. The prefrontal cortex and hippocampus collaborate to bind disparate elements into cohesive memories. Failures in source monitoring—distinguishing imagined from real events—contribute to false memories, a phenomenon particularly relevant in contexts such as eyewitness testimony.

Control over memory is twofold: individuals can choose what to encode and what to retrieve. Emotional salience often retroactively enhances memory for related information. Strategies to manage memory include prioritization, deliberate forgetting, and selective retrieval.

False memories arise from suggestibility and the reconstructive nature of memory. Familiarity and context can lead to the creation of inaccurate recollections, even in vivid memories like those surrounding significant public events. Recognizing the malleability of memory is essential for avoiding errors.

As individuals age, memory—particularly episodic memory—can decline due to diminished prefrontal cortex function. Repetition and structured memory strategies can mitigate these effects. In more severe cases, neurological conditions such as Alzheimer's disease or vascular dementia may underlie memory impairments.

Memory can also be impaired by other neurological or psychiatric conditions, including stroke, traumatic brain injury, chronic infections, and anxiety disorders. Anxiety disrupts attention and interferes with multiple memory systems by elevating stress hormones that affect the hippocampus.

The notion of photographic memory is debunked, although superior autobiographical memory is recognized as a real, albeit rare, phenomenon. Such individuals can recall personal life events with remarkable detail.

Lifestyle choices significantly impact memory health. Physical exercise supports cognitive function by enhancing cardiovascular health and reducing risk factors for stroke. Nutritional strategies, such as the MIND diet, contribute to brain health. Sleep is indispensable for memory consolidation, and its deprivation hinders encoding, storage, and retrieval. Avoiding all-nighters and spacing study sessions allows the hippocampus to transfer information to long-term storage.

Other activities, such as listening to music, maintaining social connections, practicing mindfulness, and cultivating a positive attitude toward memory, further bolster cognitive performance. Mindfulness enhances attention, a critical component of memory, and reduces anxiety that can otherwise impair learning.

Memory aids and external tools, such as calendars, to-do lists, and structured routines, can support daily memory function. Effective study habits include the use of acronyms, mnemonic devices, and strategies like the method of loci (memory palace), which relies on visualizing information within a familiar spatial environment.

Advanced mnemonic techniques also involve chaining (linking images in a sequence), phonetic number systems (converting numbers to sounds), and the peg system (associating items with rhyming cues). Distinctive, emotionally salient, and multisensory imagery enhances memory trace formation and retrieval.

In their book, Budson and Kensinger emphasize the integration of memory strategies into daily life. They encourage readers to select one actionable method to implement, ensuring that insights from the book are not only learned but remembered. Through understanding how memory works and applying deliberate strategies, individuals can enhance their ability to retain and retrieve information effectively.