

SECONDARY MEMORY (SM)

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1. Core Definition

Secondary Memory (SM) is a historical term in cognitive psychology that designates the memory store responsible for the **long-term storage** of information. This system is defined by its ability to maintain numerous pieces of data, concepts, and experiences fairly perpetually, distinguishing it sharply from the temporary and severely capacity-limited nature of Primary Memory (PM). SM was the essential component of dual-storage memory models, serving as the permanent, enduring cognitive repository. The functional utility of SM is its capacity to hold information far beyond the immediate conscious experience, making it highly useful for retaining consolidated knowledge over days, years, or even a lifetime.

In modern cognitive neuroscience, the term **Secondary Memory** has been almost entirely replaced by the broader and more nuanced designation of Long-Term Memory (LTM). Despite this terminological shift, the original concept of SM is crucial for understanding the historical development of memory research, particularly the initial successful attempt to differentiate memory based on duration and capacity. It describes the phase where information, having been processed and encoded, resides until it is needed for later retrieval and conscious access.

2. Etymology and Historical Development

The distinction between immediate and permanent memory stores dates back to William James (1890), who first separated "Primary Memory" (the contents of present consciousness) from "Secondary Memory" (knowledge that must be retrieved from a dormant state). This conceptual framework gained empirical traction in the mid-20th century. A critical milestone was the 1965 model by Waugh and Norman, which formalized the idea of two distinct memory buffers based on different decay rates and rehearsal processes.

The most influential formalization of SM occurred with the development of the **Atkinson-Shiffrin Model** (also known as the Modal Model) in 1968. In this model, **Secondary Memory** was positioned as the final, highly robust storage unit, receiving information that had been adequately rehearsed and processed within the Short-Term Store (STS). This model provided a coherent, structural framework for memory, suggesting a linear flow: Sensory Registers → Short-Term Store → Secondary Memory. The success of this dual-store model in accounting for phenomena like the serial position effect (primacy and recency effects) solidified SM as the dominant term for the permanent memory reservoir throughout the 1960s and 1970s, marking a definitive stage in the history of cognitive psychology.

3. Relationship to Primary Memory and Short-Term Memory

The primary way in which **Secondary Memory** was operationally defined was through its stark contrast with **Primary Memory (PM)**, which corresponds roughly to modern Short-Term Memory (STM). PM was characterized by its extremely limited capacity--typically about seven items--and its brief duration, lasting only tens of seconds without active maintenance or rehearsal. Information within PM was thought to be primarily encoded phonologically, relying on sound or articulation.

Conversely, **Secondary Memory** was characterized by its effectively unlimited capacity and indefinite duration. The critical transition from PM to SM involved controlled processes, notably elaborate rehearsal, which ensured that information was not simply maintained temporarily but encoded semantically--meaning, it was linked to existing knowledge structures. This differentiation between the temporary, conscious workspace (PM) and the permanent, vast storage vault (SM) was central to the early understanding of how information was processed, transferred, and consolidated within the human cognitive system. Failures in memory were thus understood either as a failure of transfer from PM to SM (encoding failure) or a failure of access from SM back to consciousness (retrieval failure).

4. Key Characteristics of Secondary Memory

Near-Infinite Capacity: The most significant characteristic distinguishing SM from short-term stores is its immense capacity. While often theoretical, it is understood to be the ultimate limit of human learning and retention, capable of storing nearly all meaningful input over a lifetime.

Durable Encoding and Storage: Information in SM is structurally durable, suggesting that memories are stored through relatively permanent physiological changes, such as the growth of new synaptic connections or long-term potentiation (LTP).

Semantic Predominance in Encoding: Encoding into SM relies heavily on meaning, context, and association. Unlike the auditory coding of Primary Memory, effective transfer to SM requires deep processing where the information is integrated into the pre-existing semantic network of the individual.

Vulnerability to Retrieval Failure: Although storage duration is long, access to the stored memory is often complex and subject to errors. Retrieval failures are common, often due to interference from competing memories or the lack of appropriate retrieval cues, leading to the "tip-of-the-tongue" phenomenon.

Organization into Schemas: Storage in SM is not random; information is highly structured and organized into conceptual frameworks, scripts, and schemas, which facilitate efficient storage and subsequent recall.

5. Transition to Long-Term Memory (LTM) Terminology

The eventual obsolescence of the term **Secondary Memory** in favor of **Long-Term Memory (LTM)** was driven by advancements in empirical memory research that demonstrated the inherent complexity and heterogeneity of the permanent store. The original concept of SM implied a single, unitary repository. However, studies, particularly those involving neurological patients with selective memory deficits (like amnesics), revealed that long-term memory was functionally fractionated.

Eminent researchers like Endel Tulving (1972) provided compelling evidence that LTM was divisible into distinct systems, such as **Episodic Memory** (memory for personal events tied to specific time/place) and **Semantic Memory** (memory for facts and general knowledge). This realization that the long-term store was not one single mechanism but a collection of interconnected yet functionally independent systems necessitated a more encompassing term--LTM--to reflect this internal structure. Furthermore, the development of the Working Memory model by Baddeley and Hitch in 1974 successfully replaced the passive Short-Term Store, thereby dissolving the original theoretical framework that supported the rigid Primary/Secondary Memory distinction.

6. The Modern Structure of LTM (Superseding SM)

The functional complexity previously obscured by the unitary term SM is now understood through the organizational structure of LTM, which is broadly divided into two major types, based on the nature of recall: Declarative and Non-Declarative memory.

The **Declarative Memory** component, which represents the information we consciously recall, includes Semantic Memory (facts, concepts, and vocabulary--the typical target of the original SM definition) and Episodic Memory (autobiographical events). This system is highly dependent on the hippocampal formation for consolidation.

The **Non-Declarative Memory** component refers to implicit learning, skills, and conditioning that influence behavior without conscious awareness. This category includes **Procedural Memory** (motor skills and habits), classical conditioning, and priming. These distinctions demonstrate that the processes involved in permanent storage are far more diverse than initially hypothesized in the dual-store models that centered on Secondary Memory.

7. Contemporary Relevance and Analogous Systems

While the term **Secondary Memory** holds primarily historical significance within cognitive psychology curricula, the underlying concept of a large, non-volatile storage system remains highly relevant. The distinction between quick, volatile processing storage and massive, persistent

storage is widely utilized in other fields, most notably computer science.

In computing terminology, **Secondary Memory** refers to external storage devices (such as hard drives, solid-state drives, or archival storage) that are non-volatile and capable of storing immense amounts of data for indefinite periods. This computer science analogy is contrasted with **Primary Memory** (RAM), which is fast, volatile, and required for immediate processing. This parallel demonstrates the enduring conceptual utility of the primary/secondary dichotomy as a robust means of classifying storage based on speed, capacity, and permanence, regardless of whether the system is biological or digital.

Further Reading

[Atkinson-Shiffrin model \(Modal Model\)](#)

[Long-term memory](#)

[Memory Hierarchy in Computer Science](#)