Relearn

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Relearning (The Savings Method)

Primary Disciplinary Field(s): Cognitive Psychology, Experimental Psychology, Educational Psychology

1. Core Definition

The concept of **relearning**, formally recognized in psychological literature as the **savings method**, is an indispensable technique for empirically measuring the retention of previously acquired information or skills, particularly when that material appears to have been entirely forgotten. It posits that even if an individual cannot consciously recall or recognize learned material--indicating a lapse in retrieval strength--a measurable memory trace, or storage strength, remains. Relearning quantifies this residual memory by calculating the reduction in time or effort required to achieve the original level of proficiency during a subsequent learning session compared to the initial acquisition phase. This differential effort, or "saving," serves as the objective index of how much the material was retained implicitly.

The significance of the savings method lies in its sensitivity. Traditional measures of memory, such as free recall or recognition testing, often hit a floor effect when the retention interval is long, yielding results of zero retention. The savings method, conversely, can detect minute, latent memory traces that persist long after conscious access is lost. For example, if it took ten hours to master a foreign language vocabulary initially, and after a year of non-use, it only takes two hours to reach that same mastery level again, the savings method indicates a substantial retention rate (80% savings), despite the learner perhaps feeling as though they had forgotten everything. This methodology underscores the durable nature of long-term memory encoding, proving that forgetting is often a failure of retrieval rather than a complete erasure of stored information.

2. Etymology and Historical Development

The genesis of the relearning concept is inextricably linked to the foundational work of German psychologist Hermann Ebbinghaus, who, in his seminal 1885 work, *Über das Gedächtnis* (On Memory), pioneered the systematic and empirical study of memory processes. Prior to Ebbinghaus, memory was largely discussed philosophically; Ebbinghaus sought objective, quantifiable metrics. Because he was often the sole subject of his own experiments, testing himself on lists of nonsense syllables (CVCs like DAX, QEL, or JID) to eliminate the confounding variables of prior knowledge and meaning, he needed a way to measure retention over varying intervals.

Ebbinghaus realized that simply testing for recall after long intervals yielded zero success, making it impossible to measure the rate of forgetting scientifically. He devised the savings method precisely to overcome this limitation. By painstakingly recording the number of repetitions or the total time necessary to perfectly memorize a list initially, and then repeating the process weeks or months later until the same criterion of perfect recall was met, Ebbinghaus could calculate the "savings." If the second session required fewer trials, that difference was attributed to the residual memory trace. This methodological innovation was crucial; it allowed him to plot the famous Forgetting Curve, which demonstrated the rapid initial decline of memory followed by a slower, leveling-off rate of loss. The development of the savings method thus marked the entry of memory research into the realm of rigorous experimental science.

Following Ebbinghaus, the savings method became a staple in experimental psychology throughout the 20th century, confirming the durability of learning across different modalities, including motor skills (e.g., riding a bicycle), procedural memory (e.g., mathematical operations), and conditioned responses. While subsequent advancements introduced more sophisticated measures like signal detection theory for recognition, the savings method remains the gold standard for demonstrating implicit memory retention over extended periods where explicit measures fail.

3. Methodology: The Savings Calculation

The application of the relearning technique requires two distinct phases: an initial learning phase (T1) and a relearning phase (T2), separated by a predetermined retention interval (I). During T1, the subject learns the material until a specific mastery criterion is met (e.g., two consecutive error-free recalls, or 90% accuracy). The primary metric recorded is the total effort expended, which may be measured in total learning time (minutes), number of trials, or total number of repetitions. This measure represents the original effort investment, designated as E1.

After the retention interval (I), during which the subject is prevented from practicing the material, the relearning phase (T2) begins. The subject is again exposed to the material until the identical mastery criterion achieved in T1 is met. The effort expended during this phase is recorded as E2. Crucially, E2 is almost invariably less than E1 if any memory trace remains. The calculation of **Percent Savings** is mathematically formalized to quantify the retention:

$$\text{Percent Savings} = \frac{\text{E1} - \text{E2}}{\text{E1}} \times 100$$

A high savings percentage indicates minimal forgetting and strong retention, while a low percentage suggests that most of the material must be relearned almost entirely from scratch. This calculation is a powerful statistical tool because it controls for individual differences in initial learning ability; the subject serves as their own control group across the two trials. Methodological rigor requires strict control over the learning environment, the nature of the stimulus material (e.g., complexity, meaningfulness), and the duration of the retention interval, as all these variables significantly influence the resulting savings score.

4. Key Characteristics of Relearning

Implicit Measurement: Relearning is uniquely suited to measuring memory that exists outside of conscious awareness. A student might fail a quiz on algebraic procedures (as noted in the source material), demonstrating zero explicit recall, yet during a relearning session, they progress much faster than a novice. The savings score reflects this latent, implicit memory for the procedure or material.

Durability Assessment: The method is primarily used to assess the long-term durability of memory storage. Ebbinghaus demonstrated that while the rate of forgetting is steep initially, some memory traces stabilize and persist almost indefinitely, which the savings method can detect reliably even after decades.

Application Across Memory Systems: While initially applied to verbal memory (lists of syllables), the savings method is effective across the different types of long-term memory. It measures retention of episodic details, semantic knowledge (facts), and procedural skills (motor tasks). The savings observed in procedural tasks, such as relearning to type or play a musical instrument, are often exceptionally high, reflecting the robust nature of procedural memory encoding.

Relationship to Overlearning: Research has shown a strong positive correlation between the degree of original overlearning (continuing to practice after reaching the mastery criterion) and the resulting savings score. Material that is significantly overlearned demonstrates a greater resistance to forgetting and yields higher savings scores when relearning is required, further validating the sensitivity of the method to variations in encoding strength.

5. Applications in Educational and Clinical Settings

In **educational psychology** and curriculum development, relearning data offers critical insight into the efficacy of teaching methods and the necessary frequency of review. Educators can use the concept to determine how well core knowledge is retained years after a course concludes. For instance, testing how quickly university graduates can reacquire specialized knowledge or language skills forgotten since their undergraduate studies helps institutions fine-tune curriculum scheduling, emphasizing the need for spaced repetition and cumulative review to maximize long-term retention rather than temporary performance.

The specific example of algebraic procedures highlights a practical application. A student who learned algebra in middle school may find that they cannot perform complex equations years later. A relearning session--where they are timed on how fast they regain the ability to execute the procedures--provides a true measure of their retention. If the procedures were deeply encoded initially, the savings will be high, requiring only a quick review session to restore performance to the original standard. This contrasts sharply with a student who achieved superficial mastery initially, whose savings score would be low, suggesting the material must be taught almost anew.

In **clinical neuropsychology**, the savings method is utilized to assess subtle memory deficits that might not manifest under standard recall testing. Patients suffering from mild cognitive impairment (MCI) or early stages of neurodegenerative diseases sometimes show reduced savings scores compared to age-matched controls, indicating a compromised ability to consolidate and retain memory traces, even if their short-term memory remains intact. This sensitivity makes relearning a valuable diagnostic tool for understanding the underlying pathology affecting memory consolidation and retrieval mechanisms.

6. Theoretical Underpinnings

The phenomenon of memory savings strongly influences modern theories of forgetting. It provides compelling evidence against the simplistic notion of memory decay, which suggests that memory traces simply fade away completely over time. If a trace had decayed entirely, E2 would equal E1, resulting in zero savings. Instead, the persistent savings scores indicate that information is largely retained in storage, but its accessibility--or retrieval strength--diminishes. The memory system appears to maintain a high degree of **storage strength** even when **retrieval strength** is low.

Furthermore, the savings method supports theories related to retrieval practice and consolidation. When material is learned, the initial neural pathways are established. Even if those pathways become obscured by subsequent learning (interference theory) or simply become difficult to access over time, the relearning session rapidly reactivates and strengthens the original neural network. The savings observed reflect the system's ability to quickly repair and restore the original synaptic connections, rather than creating entirely new ones, confirming the structural persistence of the memory trace.

7. Debates and Criticisms

While highly influential, the savings method is not without theoretical and practical criticisms. One major practical drawback is its demanding nature: it requires two full learning sessions separated by a long interval, making large-scale studies cumbersome and resource-intensive. Furthermore, it measures the outcome of the learning process rather than the process itself, offering limited insight into the specific cognitive operations involved in retrieval failure and successful relearning.

A theoretical debate centers on what exactly the savings score measures. Critics argue that a faster second learning session might not reflect residual memory but rather an improvement in general learning skills or strategies acquired during the first session (e.g., the subject simply becomes better at memorizing CVC lists). While Ebbinghaus attempted to mitigate this by using non-meaningful materials, the potential for non-specific transfer effects remains a persistent methodological challenge. Additionally, the definition of the mastery criterion must be rigorously standardized across both sessions; failure to do so can artificially inflate or deflate the savings score, compromising the internal validity of the experiment.

Further Reading

Hermann Ebbinghaus and the Savings Method (Academic Overview)
The Ebbinghaus Forgetting Curve and Retention Measurement (Psychological Review)
Simply Psychology: Ebbinghaus's Work on Memory