

Memory Inhibition

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In psychology, memory inhibition is the ability not to remember irrelevant information. Memory inhibition is a critical component of an effective memory system. For example, imagine if, when a person tried to remember where he had parked his car, every place he had ever parked his car came to mind; this would not be beneficial. In order to remember something, therefore, it is essential not only to activate the relevant information, but also to inhibit irrelevant information.

There are many memory phenomena that seem to involve inhibition, although there is often debate about the distinction between interference and inhibition.

Part-set cuing

Presenting a subset of previously learned items as retrieval "cues" often impairs recall for the remaining information. (Roediger, 1973)

However, relearning part of a set of previously learned associations can improve recall of the non-relearned associations.

Retrieval-induced forgetting

Anderson and Spellman conducted a three-phase study to demonstrate unlearning as inhibition.

Phase I: Participants study a list of A-B and A-C pairings where B and C are semantically similar to A (e.g. Food-Cracker, Food-Strawberry, Red-Tomato, Red-Blood).

Phase II: Participants are cued to retrieve the C component of some of the A-C pairs (e.g. Food-Cr___, Red-Bl___). This process repeats until the participant correctly recalls all A-C pairs in Phase II.

Phase III: There is a twenty minute delay. Given each item A as a cue, the participant tries to recall its B and C counterparts (e.g. Food-Cr___, St___, Red-To___, Bl___).

Anderson and Spellman observed that for a given item A, C was more likely to be recalled than B. This effect can be explained with associative competition, where the A-C connection is stronger in memory than the A-B connection, so it is more likely to be recalled. They also observed that words that shared semantic attributes with B were less likely to be recalled than other words. Using the example from above, recall of strawberry decreased as recall of tomato decreased, even though strawberry is part of a different pair. This finding suggests that associative competition is not the only factor in retrieval difficulty. They theorized that the brain suppresses, or inhibits, non-practiced attributes. This explains why an item that is very similar to tomato, but not from the same pair, also exhibits decreased recall rate.

Think/no-think task and intentional memory suppression

During 1990s, when the recovered memory debate was raging, cognitive psychologists were dubious about whether specific memories could be repressed. One stumbling block was that repression had not been demonstrated in a research study. While it does not address the question of whether traumatic memories can be suppressed, a study provided evidence of intentional memory suppression in a lab study. Participants were trained with a list of unrelated word pairs (such as ordeal-roach), so they could respond with the second member of the pair (roach) when they saw the other member (ordeal). Then, on each trial in the think/no-think phase, one of the cues from each pair (e.g., ordeal) would appear on the screen, either in red or green. Green would indicate the participant should say the other member of the pair (e.g., roach). Red would indicate they should look at the cue but not think about or say the associated word. The more frequently participants had tried to not think about a particular word, the less likely they were to retrieve it on a final memory test. Importantly for the inhibition argument, this impairment even occurred when participants were given an "independent probe" test, for example, asked to fill in the blank: insect-
r_____.

Rebound effect after mental control

In contrast with Anderson's think/no-think task, in which people do successfully inhibit associated words, when people are asked not to think about something, such as "don't think about a white bear," they can suppress thoughts of white bears for a little while, but when they stop trying, suddenly they find themselves thinking of white bears. This rebound effect has been found to occur in dreams after a day of trying not to think of something, as well.

What might explain the difference between the think/no-think successful inhibition and the rebound effect seen after trying not to think of a white bear? One possibility is that in the think/no-think procedure, participants are asked not to think of the word linked with another word (e.g. "ordeal"). However, when the control process specifies the thing to be suppressed (for instance, if someone tried not to think of a roach), that control process itself is a reminder of the thing to be avoided. This is an ironic aspect of this type of mental control: what eventually reminds the person of roaches is the very control process that is trying to coordinate the suppression of thoughts of roaches.

Amnesia for trauma or abuse

A range of studies have concluded that at least 10% of physical and sexual abuse victims forget the abuse. The rate of delayed recall of many forms of traumatic experiences (including natural disasters, kidnapping, torture and more) averages among studies at approximately 15%, with the highest rates resulting from child sexual abuse, military combat, and witnessing a family member murdered. The rate of recall of previously forgotten traumatic events was shown by Elliot and Briere (1996) to be unaffected by whether or not the victim had a history of being in

psychotherapy.. Williams found that among women with confirmed histories of sexual abuse, approximately 38% did not recall the abuse 17 years later, especially when it was perpetrated by someone familiar to them. Hopper cites several studies which indicate that some abuse victims will have intervals of complete amnesia for their abuse. Peer reviewed and clinical studies have documented the existence of recovered memory, one list cites 43 legal cases where an individual whose claim to have recovered a repressed memory has been accepted by a court.

A 1996 interview survey of 711 women reported that forgetting and later remembering childhood sexual abuse is not uncommon; more than a quarter of the respondents who reported abuse also reported forgetting the abuse for some period of time and then recalling it on their own. Of those who reported abuse, less than 2% reported that the recall of the abuse was assisted by a therapist or other professional.

Aging and impaired inhibitory processes

Older adults show impairments on tasks that require inhibiting irrelevant information in working memory, and these impairments may lead to problems in a variety of contexts.

Evidence against inhibition in memory

The idea that subjects can actively inhibit a memory is not without its critics. More generally, the idea of inhibition in cognitive control has been challenged by MacLeod, In Opposition to Inhibition. His primary argument is that inhibition can be attributed to conflict resolution, which is the error-prone act of choosing between two similar values that do not necessarily have the same pair. Re-examine the pairs from above: Food-Cracker, Food-Strawberry, Red-Tomato, and Red-Blood. Memory inhibition theories suggest that recall of strawberry decreases when recall of tomato decreases because tomato's attributes are inhibited when red-blood is learned. MacLeod argues that inhibition does not take place, but instead is the result of confusion between similar word-pairs like food-tomato and red-strawberry that can lead to errors. This is different than tomato's attributes being inhibited.

Selective memory loss

A form of amnesia, selective memory loss is a rare side effect of head injuries when the victim loses certain parts of his/her memory. Not much is known because this only results when certain areas of the head are traumatized. Common elements that may be forgotten: relationships, special talents (e.g.: juggling, whistling, instrumental talents, etc.), living area, abilities in certain areas (e.g.: a new gymnast forgetting she can not cartwheel yet), and events such as concerts, shows, traumatic events (e.g.: a death/suicide of a loved one or attempt on one's own life). More research

is being done into elements that are forgotten and what areas of the skull must be traumatized to cause SML.

Weapon focus

Weapon focus is a factor affecting the reliability of eyewitness testimony. Weapon focus signifies a witness to a crime diverting his or her attention to the weapon the perpetrator is holding, thus leaving less attention for other details in the scene and leading to memory impairments later for those other details. Elizabeth Loftus, Yuille and Burns, have all been associated with studies showing the existence of a weapon focus effect. According to a 2001 survey of eyewitness experts, 87% found the effect sufficiently reliable to form the basis of expert testimony in criminal trials.

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