

THEORIES OF FORGETTING

Forgetting was first studied in detail by Hermann Ebbinghaus (1885/1913). His basic measure of forgetting was the **savings method**—the reduction in number of trials for re-learning compared with original learning. Findings suggest that the forgetting function is approximately logarithmic. Forgetting is fastest shortly after learning and the rate then decreases with time.

Rubin and Wenzel (1996) found evidence to support Ebbinghaus from group data, but suggest that autobiographical memory does not fit the model. Baddeley (1997) found that the forgetting rate was unusually slow for continuous motor skills e.g., riding a bike. Most studies look at explicit memory and findings with implicit memory have been inconsistent.

REPRESSION

Freud (1915, 1943) argued that very threatening or anxiety-provoking material is often unable to gain access to conscious awareness—he called this **repression**. Repression is difficult to study under laboratory conditions. Non-experimental evidence where adults recover repressed memories of childhood abuse exists but there is controversy as some argue that the "memories" are false. Andrews et al. (1999) looked at reports of recovered memories from 236 therapy patients. 41% reported corroborative evidence. Only 28% claimed that the trigger for the first recovered memory occurred during a therapeutic session.

Some patients have admitted reporting false memories (e.g. Lief & Fetkewicz, 1995). People can be misled into believing the existence of events that didn't happen. Ceci (1995) showed that preschool children found it hard to distinguish between real and fictitious events.

Clancy et al.'s (2000) study supported a hypothesis that women who report recovered memories of sexual abuse are more prone than others to develop certain types of illusory memories.

Evaluation

There are arguments for and against the genuineness of recovered memories and we need to find more sensitive techniques for distinguishing between genuine and false recovered memories. It is clear that most forgetting cannot be explained in terms of repression.

INTERFERENCE THEORY

This was the dominant approach to forgetting through the 20th century. Interference theory assumes that the ability to remember can be disrupted by what we have previously learned or by future learning. Interference by previous memories is **proactive interference**. Interference by later learning is **retroactive interference**. Underwood and Postman (1960) showed that interference is:

- Maximal when two different responses have been associated with the same stimulus.
- Intermediate when two similar responses have been associated with the same stimulus.
- Minimal when two different stimuli are involved.

Strong evidence for retroactive interference comes from studies which show that post-event questioning can alter memory of an event. Jacoby et al. (2001) argued that proactive interference might occur for two reasons: Due to problems in retrieving the correct response (discriminability); Due to the strength of the incorrect response learned initially (bias or habit) Research shows the latter to be the case.

- Lustig and Hasher (2001) used a word-completion task to show that implicit memory is vulnerable to interference. Most research is based on the probably incorrect assumption that individuals *passively* allow themselves to suffer from interference.
- Kane and Engle (2000) found that individuals with high attentional or working-memory capacity would be better able to resist proactive interference unless they were performing an attentionally demanding task at the same time as the learning task.

- Anderson (2003) argued for the role of control mechanisms, which allow us to select certain memories whilst inhibiting others.
- Anderson and Green (2001; see E&K p. 219) provided evidence for an inhibitory mechanism.

Evaluation

There is strong evidence for both proactive and retroactive interference. It is probable that much forgetting can be attributed to both types of interference. Research is limited in several ways:

- Few studies of processes used to minimise interference.
- The theory largely ignores the role of inhibitory processes.
- Implicit memory information is lacking.
- Special (non-real-life) conditions are needed to see substantial interference.
- Associations learned outside the lab seem less liable to interference than those learned inside.

CUE-DEPENDENT FORGETTING: ENCODING SPECIFICITY PRINCIPLE

Tulving (1974): Two major reasons for forgetting:

- Trace-dependent forgetting—information no longer stored in memory.
- **Cue-dependent forgetting**—information in memory cannot be accessed.

Tulving and Psotka (1971) compared the cue-dependent approach with interference theory. The notion that there should be less forgetting when the mood state at retrieval matches that at learning is called **mood-state-dependent memory**.

- Ucross (1989) reviewed studies and concluded there was reasonable evidence for this.
- Kenealy (1997) found that mood state affects memory when no other powerful retrieval cues are available.

Encoding specificity principle

The **encoding specificity principle** (Wiseman & Tulving, 1976) essentially means that memory performance depends directly on the similarity between the information in memory and the information available at retrieval. Kenealy (1997) is an example of this. Thomson and Tulving (1970) provide another example. Higham (2002) however, found much less support.

Recognition memory is better than recall memory. According to Tulving this is mainly because the overlap between the information contained in the memory test and that contained in the memory trace is greater.

Evaluation

There is convincing evidence that whether we remember something depends on:

- The nature of the memory trace.
- The information available in the retrieval environment.
- Contextual information in retrieval is also valuable.

Encoding specificity principle is limited in various ways:

- The danger of circularity.
- The extent to which retrieval information allows us to *discriminate* the correct response from incorrect responses is more important. See also the evidence from Nairne (2002; see below).

The view that the information available at the time of the test is compared in a simple and direct way with the information stored in memory is implausible, and most people use a complex problem-solving strategy. Tulving assumed that context influences recall and recognition in the same way, but that is not exactly true. According to Baddeley (1982), recall is influenced only by intrinsic context.

Context change

Studies have shown that changes in contextual information between storage and test can produce substantial reductions in memory performance.

- Bouton et al. (1999) argue that the passage of time may change the background context and make it less likely that target material will be retrieved—this is the *context change account of forgetting*.
- Mensink and Raaijmakers (1988) proposed a version of this theory and a mathematical model which predicts a wide range of phenomena including proactive and retroactive interference.

Evaluation

Cue-dependent forgetting is of major importance. The notion that forgetting over time can be attributed to a contextual fluctuation process is speculative and there is little strong evidence. Context-change theory is not clear on why the rate of forgetting is much faster shortly after learning than later on.

CONSOLIDATION

Wixted (2004) argued that the secret of forgetting may lie in consolidation theory. Consolidation is a process lasting for several hours, or possibly even days, which fixes information in long-term memory. This is the most popular theory among neuroscientists but has been largely ignored by most cognitive psychologists. Consolidation involves:

- A rapidly formed and relatively long-lasting increase in the probability that postsynaptic neurons in the hippocampus will fire in response to neurotransmitters released from presynaptic neurons.
- The assumption that recently formed memories still being consolidated are especially vulnerable to interference and forgetting.
- The notion that new memories are clear but fragile and old ones are faded but robust.

Evidence

- Predictions of consolidation theory fit with the typical forgetting curve. In patients with **retrograde amnesia**, hippocampal damage may have a permanently adverse effect on consolidation processes thus resulting in the most recently formed memories being most impaired (Manns et al., 2003).

- Jenkins and Dallenbach's (1924) classic study showed that there is much less forgetting when participants sleep between learning and test—this is explained as a reduction in disruption to the consolidation process.
- However, Hockey et al. (1972) found that the time of day was more important than whether participants slept.
- People who drink excessive alcohol sometimes suffer from "blackout". This is probably due to a failure in consolidation.
- Interestingly, memories formed immediately before drinking alcohol are often better remembered and this may be due to alcohol preventing the formation of new memories which would interfere.

According to consolidation theory, retroactive interference should have a greater adverse effect of recently formed memories than older ones. Wixted (2004) found studies which support this.

Evaluation

Consolidation theory offers the most complete account of forgetting. It provides an explanation of why the rate of forgetting decreases over time. The greater fragility of new memories helps us account for findings relating to retrograde amnesia, sleep and alcohol.

The theory has various limitations however:

- There are uncertainties about the details of the process.
- We lack good evidence that the effects described are all due to consolidation.
- The theory does not explain why interference is greatest when two different responses are associated with the same stimulus.

So What Does This Mean?

Freud argued for the importance of repression, in which threatening material in long-term memory cannot gain access to consciousness. There is controversial evidence of recovered memories in adults who claim to have suffered childhood abuse. Strong effects of proactive and retroactive interference have been shown in the laboratory. However, insufficient

attention has been paid to active strategies that individuals use to minimise interference effects.

Much forgetting is probably cue-dependent, and the cues can be either external or internal (e.g., in mood-state-dependent memory). However, it is not clear that forgetting over time can be explained in cue-dependent terms. It may well be that forgetting over time depends mostly on failures of consolidation.

Consolidation theory provides an explanation for the form of the forgetting curve and for reduced forgetting rates when learning is followed by sleep or alcohol.