Chapter 8: Forgetting
Learning activity suggested answers

Learning Activity 8.1 (p. 314)

1 How is forgetting defined in psychology?
   Forgetting: the inability to access or recover previously stored information.

2 a Explain the meaning of availability and accessibility of information in relation to memory and forgetting.
   - Availability: information is stored or represented in memory (and therefore available for access).
   - Accessibility: information can be recovered from memory and brought into conscious awareness at a specific time and/or place.

   b Create a definition of forgetting that refers to both availability (or available) and accessibility (or accessible).
   Example: Forgetting occurs when information that is available in memory/an LTM-store cannot be accessed when required/at a specific time and/or place (and can therefore not be brought into conscious awareness).

3 In what way(s) is forgetting from both STM (or working memory) and LTM adaptive?
   Explanation may refer to:
   - Difficulties/loss of efficiency in everyday functioning that may be created by clutter/excessive information in conscious awareness,
   - Difficulties/loss of efficiency in retrieval,
   - Lack of necessity to remember everything in order to cope effectively with living independently in everyday life.

4 What effect could a participant’s past experience have on the results of an experiment on forgetting?
   Explanation should refer to the need to control past experience as it is a potential confounding variable, i.e. prior knowledge of/experience with material to be learnt and remembered in an experiment on forgetting may account for participant results (e.g. rate and amount of forgetting) rather than the IV under investigation.

5 a What is a forgetting curve?
   A forgetting curve is a graph showing the pattern or rate and amount of forgetting that occurs over time.
b Describe the pattern of forgetting indicated by a typical forgetting curve, ensuring you refer to the rate and amount of forgetting over time.

Generally, a typical forgetting curve shows that:

- forgetting is rapid soon after the original learning, then the rate of memory loss gradually declines, followed by stability in the memories that remain,
- more than half the memory loss occurs within the first hour after learning,
- virtually all the material that will be forgotten is lost in the first eight hours (about 65%),
- information that is not quickly forgotten seems to be retained in memory over a long period of time.

6 What factors can affect the rate and amount of forgetting?

Factors affecting rate and amount of forgetting include:

- meaningfulness of material, e.g. the more meaningful the material being learned, the slower the rate and amount of forgetting,
- how well information is encoded when first learnt, e.g. the better the initial learning (good quality encoding), the longer the material is likely to be retained; well learned material shows the rate of retention is about the same, regardless of the degree of difficulty of the material; easily learned material does not appear to be retained longer than more difficult material.

7 Samir has booked in for his learner permit test in four weeks. He intends to spend every second night in the next four weeks learning the road rules. What impact would you expect this approach to learning over an extended period will have on both the rate and amount of forgetting after the test?

Impact of distributed practice/learning over an extended period would primarily depend on quality of encoding during learning, e.g. use of elaborative rehearsal (rather than maintenance rehearsal) to enhance meaningfulness, storage and retrieval from LTM.

Learning Activity 8.5 (p. 322)

1 Define the term retrieval cue with reference to examples of different types of retrieval cues.

A retrieval cue is any stimulus/prompt that assists the process of locating and recovering information stored in memory.

Examples of different types of retrieval cues for the term 'dachshund':

- semantic cue: a type of dog, a German breed
- phonetic cue: two syllables, starts with ‘d’
- physical appearance: short dog, little legs, floppy ears, that dog in the dog show/ dog book, sausage, hot dog
- phonological cue: sounds like dash-hound.

Consider distinguishing between context-dependent and state-dependent retrieval cues.
2

a What is retrieval failure theory?
Explanation of retrieval failure theory should refer to forgetting due to lack of or failure to use the right cues to retrieve information stored in memory/LTM.

b Why is retrieval failure sometimes called cue-dependent forgetting?
Explanation should refer to forgetting viewed as primarily attributable to use of an inappropriate or faulty retrieval cues, thereby making information in LTM temporarily inaccessible or unavailable, (rather than forgetting being due to information being inaccessible or unavailable due to fading or permanent loss).

3 Give an example of retrieval failure not referred to in the text.

• Discuss student examples to clarify conceptual understanding, ensuring that the examples of forgetting given are attributable to lack of an appropriate retrieval cue or failure to use a correct/appropriate cue.

4 Outline the strengths and limitations of retrieval failure theory.
Strengths include:
• a useful explanation for why we sometimes fail to retrieve information including when we’re sure we ‘know’ the information is in LTM but cannot be immediately retrieved.

Limitations include not being able to account for:
• failure to access certain anxiety-laden memories
• disrupted or lost memories as a consequence of brain trauma (e.g. brain injury) or a neurodegenerative disease (e.g. Alzheimer’s disease)
• memories interfering with one another.

5

a What is the tip-of-the-tongue (TOT) phenomenon?
Description of tip-of-the-tongue (TOT) phenomenon should refer to two key characteristics:
• a state or ‘feeling’ that occurs when an individual is aware of knowing something and confident that they will eventually remember it, but is unable to retrieve it from memory at that point in time; and
• when the sought-after information is eventually recalled, it tends to occur suddenly, seeming to ‘pop’ out of a memory, often when the individual is not consciously thinking about it.

b Give a psychological and a physiological explanation of why TOT occurs.
Psychological explanation should refer to:
• TOT’s partial retrieval process can be accounted for in different ways, as we generally can remember some features about the information we are trying to retrieve
• The process reveals that specific types of information are stored in LTM in an organised way and in a variety of forms
• Each piece of information retrieved allows us to ‘home in’ on the source of the TOT.
Physiological explanation should refer to:

- Retrieving a specific memory can involve a number of different locations in the brain, and for the complete memory to be retrieved, each of these locations must be accessed. So when a TOT is experienced, it demonstrates not completely recovering all information pertaining to this specific memory successfully.

c. What does TOT suggest about LTM storage?

Explanation of significance should refer to TOT illustrating several aspects of the retrieval process, such as:

- information retrieval from LTM is not an all-or-nothing process, e.g. we can often remember part of what we want to retrieve,
- bits of information can act as retrieval cues for the required information, helping to ‘hone in’ on the sought after information,
- information is stored in LTM but is not accessible without the right retrieval cue,
- information in LTM is stored in a variety of forms and a certain type of cue (e.g. semantic or phonetic features of a required word/information) may assist retrieval,
- information in LTM is stored in an organised way and connected in relatively logical ways, e.g. partial retrieval process whereby recalling one bit triggers/acts as a retrieval cue for recall of related bits.

6 Explain whether TOT provides evidence for the semantic network theory.

Explanation should refer to support for the semantic network theory with reference to the TOT partial retrieval process.

Individuals experiencing TOT can often describe some features of the concept they need to remember, such as how many syllables it has, which letter it may start with, a word it sounds like, a concept it is similar to. Recall of such information triggers/acts as a retrieval cue for recall of related bits of information/concepts/nodes. As more retrieval cues are accessed, the individual hones in on the target information, node-by-node, suddenly identifying the target TOT concept.

Learning Activity 8.6 (p. 326)

1 Briefly describe the interference theory of forgetting.

Explanation of interference theory should refer to forgetting due to other memories interfering with the retrieval of sought after information from LTM (particularly if the other memories are similar).

2 Define retroactive interference and proactive interference.

- Retroactive interference occurs when new information interferes with the ability to remember old information.
- Proactive interference occurs when information learned previously interferes with the ability to remember new information.

3 Explain the key feature that distinguishes retroactive interference from proactive interference.
Key feature should refer to previous vs later learning, or old vs new information, i.e. retroactive interference is interference by later learning/new information whereas proactive interference is interference by previous learning/old information.

4 What two suggestions could be given to a VCE student studying for exams to help them minimise forgetting that may result from interference?

Suggestions should take account of relevant research findings, i.e.

- interference (and therefore forgetting due to interference) is more likely when information is similar,
- the more similar the information, the more likely it is that interference will occur (and therefore forgetting due to interference),
- if learning of the similar information occurs close in time, interference is more likely (and therefore forgetting due to interference).

Therefore, an appropriate suggestion is to avoid studying similar materials in the same study session or to separate material that is similar and study in different sessions, and to spread it over time to minimise the likelihood of interference.

5 A friend of yours who is studying VCE French and Italian comments: ‘Sometimes I find that studying for Italian actually makes it harder to remember the material I previously studied for French. Am I just imagining this or could this really happen?’ Describe a response you could give with reference to one or more theories of forgetting.

Explanation should refer to interference theory due to similarity of French and Italian (specifically the possibility of retroactive interference since new learning of Italian makes it harder to remember old learning of French), rather than retrieval failure theory.

6 Suppose you meet Harry and Emma on your first day of a vacation at a Gold Coast resort. First, Harry tells you his room number. You listen carefully and commit it to memory. Later, Emma tells you her room number and you memorise it. That evening you try to go to Emma’s room but discover that you can’t remember which of the two numbers it is. You then try to recall Harry’s number and realise you are also unsure about this.

a Which type of interference would cause you to forget Emma’s room number? What information caused the interference?

Proactive interference: the information learned previously (Harry’s room number) interferes with the ability to remember new information (Emma’s room number).

b Which type of interference would cause you to forget Harry’s room number? What information caused the interference?

Retroactive interference: new information (Emma’s room number) interferes with the ability to remember old information (Harry’s room number).

7 Suppose you have been employed as an organisational psychologist to give advice on increasing productivity at a factory that assembles computers. Design an experiment to investigate whether training the same employees to do two different assembly tasks produces proactive interference. Present an outline of your experimental design in a flow-chart format. Ensure that you name the type of experimental design to be used and that you give a reason for your choice of experimental design.

Example of flow-chart completed by a student (see next page).
Using an independent-groups experimental design to control for unwanted order effects, randomly assign male and female volunteer assembly line workers into three experimental groups: (Group A, Group B and Group C).

Assembly Task 1 (involving clockwise rotation of 100 jar lids) and Assembly Task 2 (involving anti-clockwise rotation of the jars) are different but similar.
Both tasks are novel and unfamiliar to all participants.

IV: assembly line task
DV: task completion time (speed) and error rate (accuracy)

Group A: complete Assembly Task 1 then Assembly Task 2 immediately afterwards

Group B: complete Assembly Task 1 only

Group C: complete Assembly Task 2 only

speed and accuracy by Group A on Assembly Task 1 recorded

speed and accuracy by Group B on Assembly Task 1 recorded

speed and accuracy by Group A on Assembly Task 2 recorded

speed and accuracy by Group C on Assembly Task 2 recorded and compared with Group A scores for Assembly Task 2

Group A and Group B’s speed and accuracy for Assembly Task 1 should not be significantly different.

If Group A and Group C’s speed and accuracy for Assembly Task 2 are similar (or not significantly different), it may be inferred that learning Assembly Task 2 after Assembly Task 1 did not interfere with performance.

If Group A’s speed and accuracy for Assembly Task 2 are significantly worse than Group C’s, it may be inferred that proactive interference may have impacted on their performance. Therefore, the organisation should avoid requiring assembly line employees to complete similar assembly tasks close to each other in time, as productivity may be adversely affected.

If Group A’s time to accurately complete Assembly Task 2 are significantly better than Group C’s, it may be inferred that learning Assembly Task 1 first helped to improve Group A’s performance. Therefore, the organisation should further investigate transfer of learning between similar tasks that may enhance productivity.
8
a Can forgetting caused by interference be explained in terms of retrieval failure? If so, how?
If not, why not?
• Yes. The closeness of the time interval between stimuli and the more similar the stimuli are causes interference in creating a clear cues or retrieving a specific cues when there are similar cues competing for retrieval.
b Can forgetting caused by retrieval failure be explained in terms of interference? If so, how?
If not, why not?
• Not really. Retrieval Failure is not explained in terms of how recall of existing memories has been affected by interference of new information or how recall of new information has been affected by interference of an existing memory.

9 Outline the strengths and limitations of interference theory.
Strengths include:
• supported by considerable empirical evidence
• useful explanation of forgetting due to interference through similarity, both proactively and retroactively
• useful explanation of time as a variable impacting on interference-based forgetting
Limitations include:
• not accounting for forgetting due to our use of inappropriate or faulty retrieval cues, failure to access certain anxiety-laden memories or memories that are disrupted or lost due to brain trauma or neurodegenerative disease.
• many empirical studies supporting the theory have relied on the recall method rather than more sensitive methods of recognition and relearning. And stimuli used in many studies are not representative of the variety of information stored in the different LTM subsystems

Learning Activity 8.7 (p. 327)
1 Which data in the graph shows the results for group B? Explain your answer.
Group B: the blue ‘After normal waking activity’ line.
Explanation: shows lower level of retrieval of nonsense syllables when compared with retrieval by group A at different times after awakening.

2 Suggest an explanation of the results in terms of interference.
Explanation should refer to the possibility of interference during the normal waking time activity by Group B, e.g. retroactive interference whereby new information processed during the 30-minute normal waking time interferes with the ability to remember old information, i.e. the learned nonsense syllables. (But note the dissimilarity of nonsense syllables to information processed during ‘usual activities’ in the 30-waking period).

3 Construct a research hypothesis for the experiment.
Example:
First-year psychology students who go to sleep immediately after learning a list of nonsense syllables will score higher on a test of recall of the nonsense syllables at different times after awakening than first-year psychology students who continue with their usual activities for 30 minutes before going to sleep.

4 Identify the operationalised variables.

IV: Sleep Condition- immediate or delayed.
DV: % recall of nonsense syllables.

5 Suggest two extraneous or confounding variables that may not have been adequately controlled and explain your choice of each variable.

Group A (who were required to go to sleep immediately after learning the nonsense syllables) may have used the ‘falling asleep’ period for rehearsal of the nonsense syllables, whereas Group B (who were required to continue with their normal activities) may not have had the opportunity for rehearsal or were less likely to have engaged in rehearsal, particularly if they socially engaged with other Group B members during the waking period. Therefore, rehearsal or the amount of rehearsal rather than ‘immediately going to sleep after learning’ may be a confounding variable that provides an alternative explanation of the results.

The other possible confounding variable is that more sleep leads to improved recall, rather than immediate sleep.

6 Write a possible conclusion for the experiment, ensuring you refer to your answers above.

Example:

The results showed that students who slept immediately after learning a list of nonsense syllables scored higher on a test of recall of the syllables at all times after awakening than students who continued with their usual activities for 30 minutes before going to sleep. These results support the research hypothesis. However, it is possible that the better recall of students who were required to sleep immediately after learning a list of nonsense syllables may be due to their using the falling asleep period to mentally rehearse the nonsense syllables.

7 Explain whether the results can be generalised

Answers should demonstrate understanding of the concept of external validity (i.e. the extent to which research findings can be generalised or applied beyond the specific setting and participants of the study) and that for an experiment to be considered externally valid it must considered to be internally valid.

Given that the potential confound proposed in Q4 raises a query about internal validity (i.e. the soundness of the research design and the procedures used to conduct the study), it is possible that the experiment does not have external validity (unless it was replicated in further studies by other researchers).

Learning Activity 8.9 (p. 334)

1 a According to motivated forgetting theory, why are we sometimes motivated to forget?

Explain with reference to an example not used in the text.
Explanation should refer to the potential for a disturbing, distressing, traumatic etc. experience to consciously or unconsciously create a motive or desire to forget or to avoid retrieving to conscious awareness (or STM/working memory), because that experience may be too disturbing, distressing, traumatic etc. to bring to conscious awareness.

Example: Any experience perceived by an individual to be disturbing, distressing, traumatic etc.

b Explain the suggested roles of repression and suppression in forgetting.

Repression is unconsciously blocking a memory of an event or experience from entering conscious awareness.

Suppression is consciously blocking a memory of an event or experience from entering conscious awareness by making a deliberate attempt to do so.

c What is the key difference between repression and suppression?

Whether the motivated forgetting is intentional and occurring at a conscious level of awareness (suppression) or is an unconscious process, i.e. occurring beneath the conscious level of awareness (repression).

2 Outline the strengths and limitations of motivated forgetting theory.

Strengths include:

• explanation that some forgetting occurs due to an individual’s conscious or unconscious needs, fears, anxieties and desires

• some empirical evidence (primarily for suppression)

Limitations include:

• relatively limited empirical evidence e.g. very difficult, if not impossible, to experimentally investigate the existence of repressed memories

• investigating repressed memories raises ethical issues about the psychological wellbeing of research participants

• When repressed memories are presumably recovered using a technique such as hypnosis, the accuracy of the information recalled is often questionable given factors that can influence our ‘reconstruction’ of memory

• not accounting for forgetting due to our use of inappropriate or faulty retrieval cues, due to interference, due to failure to access memories that are disrupted or lost due to brain trauma or neurodegenerative disease.

3 a Briefly describe the decay theory of forgetting.

Explanation of decay theory should refer to forgetting due to a memory (or a memory trace) fading through disuse as time passes.

b What evidence or experiences suggests that ‘information’ in LTM may decay through disuse?

i Anderson (1995): when a pattern of rapid and then more gradual deactivation of neural pathways in the hippocampus was observed, it was proposed as a possible
physiological base for decay in sensory memory, in STM and in LTM, due to the passage of time passing (but not just due to time alone).

ii does not necessarily fade through disuse?
Many people have vivid memories of things that they have not thought about/brought to conscious awareness for years.

c To which other memory system(s) is decay theory more relevant?
• Sensory memory, e.g. decay or loss following lack of attention
• STM/working memory, e.g. decay or loss through lack of rehearsal

4 Suppose you were designing an experiment to test decay theory. The conditions for one of your experimental groups would have to be such that nothing affected the memory trace except the passage of time. Is it possible to set up the conditions for this group, controlling the influence of extraneous variables that could affect the results, such as retrieval failure, interference and motivated forgetting? Explain your answer.

The question is designed to promote discussion of the difficulties in conducting an ethical, strictly controlled psychological experiment to test decay theory.

It is unlikely that all other possible causes of forgetting could be strictly controlled.

5 Outline the strengths and limitations of decay theory.
Strengths include:
• explains some forgetting
Limitations include:
• little empirical evidence in support of LTM forgetting due to the mere passing of time and/or disuse e.g. when cues are provided, ‘decayed’ memories can be recovered.
• not being able to account for failure to access certain anxiety-laden memories, lack of inappropriate retrieval cues
• disrupted or lost memories due to interference or as a consequence of brain trauma (e.g. brain injury) or a neurodegenerative disease (e.g. Alzheimer’s disease)
• not particularly relevant to LTM (and more relevant to sensory memory and STM/working memory)

6 Read box 8.6 on comparing theories of forgetting and suggest a relevant example for retrieval failure theory.
• Example could refer to ‘misfiling’ a memory or using the wrong cue ‘file heading’ to try and retrieve it from memory

7 Construct a table that summarises in dot-point form each theory of forgetting. Ensure that your table enables the theories to be compared in terms of strengths and limitations.

<table>
<thead>
<tr>
<th>Name of Theory</th>
<th>Main Features</th>
<th>Strengths of Theory</th>
<th>Limitations of Theory</th>
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<tr>
<td>retrieval failure theory</td>
<td>Forgetting due to the lack of or failure to use the right cues to retrieve information</td>
<td>• supported by considerable empirical</td>
<td>Not accounting for:</td>
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<td></td>
<td>• failure to access certain anxiety-</td>
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<td>Laden memories</td>
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<tr>
<td>interference theory</td>
<td>stored in LTM.</td>
<td>evidence</td>
<td>laden memories</td>
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### Motivated Forgetting

- **LTM Forgetting**
  - due to strong motive/desire to forget, usually due to an even being too disturbing, distressing to bring into conscious awareness
- **Repression**:
  - *unconsciously* blocking a memory from entering conscious awareness.
- **Suppression**:
  - *consciously* blocking a memory from entering conscious awareness by making a deliberate attempt to do so.

### Unmotivated Forgetting

- explanation that some forgetting occurs due to an individual’s conscious or unconscious needs, fears, anxieties and desires
- some empirical evidence (primarily for suppression)

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| • relatively limited empirical evidence e.g. very difficult, if not impossible, to experimentally investigate the existence of repressed memories
| • Investigating repressed memories raises ethical issues about the psychological wellbeing of research participants
| • When repressed memories are presumably recovered using a technique such as hypnosis, the accuracy of the information recalled is often questionable given factors that can influence our ‘reconstruction’ of memory,
<p>| • not accounting for forgetting due to our use of inappropriate or faulty retrieval cues, due to interference, due to failure to access memories that are disrupted or lost |</p>
<table>
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<tr>
<th>Decay Theory</th>
<th>LTM Forgetting due to the fading of a memory trace through disuse over time</th>
<th>Widely circulated &amp; one of the oldest theories of forgetting</th>
<th>Due to brain trauma or neurodegenerative disease.</th>
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<tbody>
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