Memory

Memory is the mental processes that enable us to retain and use information over time that involve three fundamental processes: encoding, storage and retrieval.

- **Encoding**: The processing of information so that it can be stored (page 269).
- **Storage**: The retention of encoded representations over time (page 269).
- **Retrieval**: The act of recalling or remembering stored information when it is needed (page 270).
Forgetting

Reasons why we forget things may have nothing to do with “a bad memory”. Some reasons why we might forget may be due to the following:

- Encoding failure
- Decay Theory
- Interference Theory
- Motivated Forgetting

- Multitasking (not included in this chapter)
- Sleep deprivation (not included in this chapter)
Encoding Failure

Which coin portrays a real penny?
The reason why most people can’t pick out the correct penny is due to encoding failure—the tendency to not encode ALL the features of the penny.

We might not be paying attention to all the details for a variety of reasons. We may not care about the specific details, we may be anxious, tired, unable to concentrate or distracted (e.g. texting).
Many people aren’t sure which one is the correct penny, so they decide based on what looks familiar.

If we know in advance what details we are expected to pay attention to, we are more likely to pay attention to it, encode it, and remember it. When we don’t encode the information, we tend to reconstruct a memory with what is typically there and what we are familiar with. We fill it in with our schema.
Decay Theory

Decay Theory: The view that forgetting is due to normal metabolic processes that occur in the brain over time (page 227). Some texts discuss this as transience.

Our memories are not exact replicas of what we experienced. Transience affects all of our memories to some degree. Most forgetting occurs soon after an event. Details were crisp minutes and hours after the event. However, as days, weeks and months pass, details are forgotten. What we remember generally what occurred and reconstruct the details.

One piece of information that tends to be lost is the source of information (whether it was bad or good).
Interference Theory

The theory that forgetting is caused by one memory competing with or replacing another (page 227). The details of our memories fade as time passes. As our lives move forward, new memories can interfere with old ones.

- **Retroactive Interference**: Forgetting in which a new memory interferes with remembering an old memory; backward acting interference (page 227).

<table>
<thead>
<tr>
<th>Information yesterday</th>
<th>Information today</th>
<th>Information tomorrow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology of Learning</td>
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- **Proactive Interference**: Forgetting in which an old memory interferes with remembering a new memory; forward acting interference (page 227).

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Proactive or Retroactive Interference?

A person you meet casually for baseball introduces himself to you as Bruce. After getting to know you, Bruce tells you that he really identifies as a woman and calls herself Caitlyn. Every time you meet Caitlyn, you incorrectly refer to her as a him and call her Bruce.

Is this proactive or retroactive interference?

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Why would learning about interference important in explaining this error?
Proactive or Retroactive Interference?

<table>
<thead>
<tr>
<th>Season 1</th>
<th>Skye, Jemma, Leo, Phil, Melinda, Ward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Season 2</td>
<td>Skye (Daisy is her real name), Jemma, Leo, Phil, Melinda, Ward</td>
</tr>
<tr>
<td>Season 3</td>
<td>Skye (Daisy is her real name), Jemma, Leo, Phil, Melinda, Ward</td>
</tr>
<tr>
<td>Season 4</td>
<td>Daisy, Jemma, Leo, Phil, Melinda, Ward</td>
</tr>
</tbody>
</table>

In Season 1 and 2, the character on the left, her name is Skye. In Season 3, she finds out that her real name is Daisy.

In Season 3, Phil keeps on calling Skye, Skye and not what she wants to be called, Daisy.
Motivated Forgetting
How Does Attention Determine What We Remember?

Many students say they have memory problems. Specifically, they have trouble remembering the material covered in class and in their textbooks. Their problems may have nothing to do with the way their brains work, however, instead they simply do not pay attention when they are suppose to be learning (page 273). Conscious attention is limited. It is difficult to divide our attention. Magicians know how to redirect attention.

In one study, research participants pressed a button when two people played a game when a person slapped the other person’s hands (panel a). Next participants pressed a button when the ball was passed to another person (panel b). They did each of these tasks easily.

Image source: Schacter et. al.
However, when they did these tasks simultaneously, their error rate was eight times greater while “multi-tasking”
Attention

Attention is difficult to divide. Your ability to do each task effectively is greatly reduced.

Implications

• Don’t text, talk on phone while driving. There was that train commuter train crash while the engineer was texting.

[Image source: NPR]

• Don’t text, talk on phone while in class or a meeting, you can miss something subtle. Sure, you can catch it if it is something you might be expecting, but if it isn’t, you will miss it.

• As the textbook suggests, it is hard to study while watching TV or any other task. (People who are multi-tasking are doing one task in parallel, not all at once, and some people can study with the TV on as background noise, but they aren’t watching it).
What is the Psychology of Multitasking?

When people are multitasking, you aren’t doing two things simultaneously, you are switching between tasks.

<table>
<thead>
<tr>
<th>What people commonly believe about multitasking</th>
<th>What is occurring while multitasking</th>
</tr>
</thead>
<tbody>
<tr>
<td>We believe we can do multiple tasks simultaneously</td>
<td>We are switching between tasks</td>
</tr>
</tbody>
</table>

![Diagram showing the misunderstanding of multitasking](image)
What is Psychologically Occurring While Multitasking

It takes your brain some time to switch between two tasks.

As a simple demonstration of the loss of efficiency of multitasking,
  • Recite the letters A through J as fast as possible
  • Recite the numbers 1 through 10 as fast as possible
Next, interweave the these two tasks as fast as you can
  • A, 1, B, 2, C, 3…
<table>
<thead>
<tr>
<th>First Set: Serial</th>
<th>Second Set: Task Switching</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>B</td>
<td>B \rightarrow 1</td>
</tr>
<tr>
<td>C</td>
<td>C \rightarrow 2</td>
</tr>
<tr>
<td>D</td>
<td>D \rightarrow 3</td>
</tr>
<tr>
<td>E</td>
<td>E \rightarrow 4</td>
</tr>
<tr>
<td>F</td>
<td>F \rightarrow 5</td>
</tr>
<tr>
<td>G</td>
<td>G \rightarrow 6</td>
</tr>
<tr>
<td>H</td>
<td>H \rightarrow 7</td>
</tr>
<tr>
<td>I</td>
<td>I \rightarrow 8</td>
</tr>
<tr>
<td>J</td>
<td>J \rightarrow 9</td>
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<tr>
<td>1</td>
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<td>10</td>
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</table>
Task Switching

(1) Ask your partner their first name

(2) Have them perform the task switching task (A, 1, B, 2, etc.) without visually reading it.

(3) When they are 25%-75% done, ask them one of the following questions

   (a) What is your last name?
   (b) What is today’s date?
   (c) What is your next class?
   (d) What was the last thing you ate?

(4) Have them continue where they left off.
**Task Switching**

(1) Ask your partner their first name

(2) Have them perform the task switching task (A, 1, B, 2, etc.) without visually reading it.

(3) When they are 25%-75% done, ask them one of the following questions

   (a) What is the color of your shirt?
   (b) What time does class start?
   (c) What is day of the week is it?
   (d) What was the last thing you drank?

(4) Have them continue where they left off.
Examples of Multitasking

You are switching between
• Driving while on the cell phone
• Walking while texting
• Calculating a bill and talking to a customer
• Having a conversation with your partner and surfing the internet
• Grading papers while watching The Daily Show

Potential consequences of multitasking
What is found about multitasking?

Heavy media multitaskers compared to low media multitaskers are found to have (Ophir, Nass and Wagner, 2009):

1. more difficulties in ignoring irrelevant and distracting information (which may be important for problem solving, expertise and metacognition) and focus on relevant information.
   - Multitasking reduces “analytical thinking” You are less likely to effectively evaluate information
   - The reduction in attention from multitasking reduces your ability to elaborate on what you are learning. Elaboration is important for encoding and retrieval of information.
   - Multitasking reduces the ability to detection subtle changes and nuances [see Mentalist clip].
2. more errors with working memory (familiar items interfered with memory retention)
3. spent more time switching between different task
   - When switching tasks, it is difficult to remember where you were, what you are doing and where you are going. Some of this contextual information is lost when you are multitasking and lead to more errors and less efficiency. [Yeung, 2009]
Attention

ZOMBIE APOCALYPSE

WHAT WE THINK IT LOOKS LIKE:  WHAT IT REALLY LOOKS LIKE:

If you don’t understand the nature of the problem, you are unlikely to recognize it, and unlikely to be able to solve the problem.
**Sleep and Memory**

REM sleep (short periods in which we dream) is thought to restore mental and brain functions.

- Both animal and human studies have shown that REM sleep increases after learning a novel task and
- deprivation of REM sleep following training disrupts learning when compared to those who are not deprived of REM sleep.

Being deprived of sleep can impair your ability to form new long-term memories.

Why is it important to know about the relation between sleep and memory?