Chapter 10
Motivated Forgetting
60 Minutes Show on Superior Autobiographical Memory

- http://www.cbsnews.com/video/watch/?id=7166313n&tag=contentMain;contentBody
Positivity Bias

- Positivity Bias
  - The tendency, increasing over the lifespan, to recall more pleasant memories than either neutral or unpleasant ones.

  - Task:
    - Younger and older adults viewed pictures of pleasant, neutral, and unpleasant scenes.
    - After a 15-minute delay, tried to recall the pictures.
**Positivity Bias**

Charles, Mather, and Carstensen (2003)

- **Results:**
  - Emotional pictures were recalled better than neutral pictures.
  - Younger adults recalled equal numbers of positive and negative images.
  - Older adults recalled fewer pictures overall
  - Older adults recalled about twice as many positive as negative images.
  - **Recognition**, however, was equal for positive and negative images.

Why the Positivity Bias?

- As we get older, our focus:
  - Shifts away from goals concerning knowledge and the future.
  - Moves toward maintaining a sense of wellbeing.

- Thus, older people become more skilled in emotion regulation:
  - Goal-driven monitoring, evaluating, altering, and gating (letting in or out) one’s emotional reactions and memories about emotional experiences.
Motivated Forgetting

Terminology

- **Freud’s Repression:**
  - A psychological defense mechanism aimed at rejecting and keeping something out of consciousness
  - Sometimes the repressed concepts pop up again later (i.e. a return of the repressed)

- **Repression vs. Suppression—a false distinction?**
  - In the modern psychoanalytic tradition, the terms refer to slightly different things:
    - **Repression**
      - An unconscious process
      - Automatic
    - **Suppression**
      - A conscious process
      - Intentional, goal-directed
  - However, Freud used these two terms interchangeably.
    - The distinction between the two was first introduced by Freud’s daughter, Anna Freud.
**Motivated Forgetting**

**Terminology**

- **Motivated Forgetting** encompasses 3 kinds of forgetting:
  - **Intentional Forgetting**:
    - Forgetting arising from processes initiated by a conscious goal to forget.
      - Conscious suppression
      - Intentional contextual shifts
  - **Psychogenic Amnesia**:
    - Profound forgetting that is psychological in origin for major periods of one’s life or otherwise significant events.
  - **Other Forgetting**: not accidental but also not consciously intended, such as simply attempting to think about something else when confronted with an unpleasant reminder, without necessarily trying to forget it.
Methods of Controlling Unwanted Thoughts

- **Limit encoding**:  
  - Look away from the stimulus  
  - Focus on the stimulus’s pleasant aspects  
  - Cease elaborative thoughts

- **Prevent retrieval**, if it’s too late to stop encoding:  
  - Intentionally shift to a new line of thought  
  - Avoid cues/reminders, which facilitates forgetting by:  
    - Reducing retrieval attempts that strengthen and preserve memories  
    - Encouraging decay processes  
    - Changing the environmental context

- **Stop retrieval** in the face of a reminder:  
  - Suppress the unwanted memory
# Directed Forgetting Methods

## Item-method directed forgetting task

1. **Memorize items:**
   - DOG
   - [remember]
   - SHOE
   - [forget]
   - ROCK
   - [forget]
   - BEEF
   - [remember]
   - SKY
   - [forget]
   - ...  

2. **Recall all items:**
   - ???

## List-method directed forgetting task

### 1. Memorize List One

<table>
<thead>
<tr>
<th>Forget condition</th>
<th>Remember condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOG</td>
<td>DOG</td>
</tr>
<tr>
<td>SKY</td>
<td>SKY</td>
</tr>
<tr>
<td>BEEF</td>
<td>BEEF</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

### 2. Remember/forget instructions

Whoops! That was the wrong list. You can forget those words. Here's the right list:

Great! Continue to remember those items. Also remember this new list:

### 3. Memorize List Two

<table>
<thead>
<tr>
<th>ROCK</th>
<th>ROCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOOK</td>
<td>BOOK</td>
</tr>
<tr>
<td>SHOE</td>
<td>SHOE</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

### 4. Recall both lists

| ???  | ???  |

## Results

**Cost**
- Subjects in the **forget condition** show a deficit in List One final recall compared to subjects in the **remember condition**

**Benefit**
- Subjects in the **forget condition** recall more List Two items than do subjects in the **remember condition**, thanks to reduced proactive interference
Item-Method Directed Forgetting
Basden and Basden (1996)

- Directed forgetting effects are observed on:
  - Recall tests (see graph)
  - Recognition tests

- Effect reflects differences in episodic encoding:
  - **Remember instructions** lead to elaborative semantic encoding for that item
  - **Forget instructions** stop rehearsal of that item
List-Method Directed Forgetting (Geiselman, Bjork, & Fishman, 1983)

- Costs and benefits of the instruction to forget:
  - Cost:
    - Forget instructions impair recall of the items from the first list
  - Benefit:
    - Forget instructions reduce proactive interference expected on the second list
- Effects represent a difference in retrieval not encoding:
  - Unlike forgetting in the item method, instruction-related differences:
    - Don’t appear on recognition tests
    - Do appear on implicit tests (e.g. fame judgments)
  - i.e. intentionally forgotten materials can influence unconscious behaviors

Data from Geiselman, Bjork, and Fishman (1983).
Naturalistic, Diary Study Using List-Method Directed Forgetting

Joslyn and Oakes (2005)

Task:
- Students recorded two events/day in a diary for 1 week
  - Forget Group:
    - Asked to “forget” the previous week’s entries and to focus on remembering new events for a second week
  - Remember Group:
    - Asked to “remember” the events from the first week as well as the new ones from the second week
- Recall events from both weeks

Results:
- The Forget Group (compared to Remember Group) had poorer memory for:
  - First week events
  - Example items that neither group thought they would have to recall
  - Both negative and positive mood events
Mechanisms Underlying List-Method Directed Forgetting

<table>
<thead>
<tr>
<th>Retrieval Inhibition Hypothesis</th>
<th>Context Shift Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ Forget instructions inhibit List One items</td>
<td>■ Forget instructions mentally separate List One from List Two items</td>
</tr>
<tr>
<td>■ Reduces the activation of unwanted memories</td>
<td>■ The mental context (frame of mind) shifts between the lists</td>
</tr>
<tr>
<td>■ However, they remain available</td>
<td>■ List Two context lingers into the final test</td>
</tr>
<tr>
<td>■ Re-presenting forgotten items restores their activation levels</td>
<td>■ The new context is a poor retrieval cue for List One items</td>
</tr>
<tr>
<td>■ Explains why items can be recognized but not recalled</td>
<td>■ May involve <em>inhibition</em> of the unwanted context</td>
</tr>
</tbody>
</table>
Testing the Context Shift Hypothesis

Sahakyan and Kelley (2002)

- **Task:**
  - Encode List One
  - Ask participants in the context shift condition to perform a bizarre task designed to change participants’ frame of mind -- “Imagine being invisible …”
  - No “forget” instructions were provided to either group
  - Encode List Two

- **Results:**
  - Even without any instruction to forget, participants in the context shift condition had worse recall of List One

- **Conclusion:**
  - Part of the directed-forgetting effect arises from a shift in mental context
  - Not necessarily incompatible with the inhibition hypothesis
Motivated Context Shifts

- People understand intuitively that one way to forget a traumatic event is to remove environmental cues:
  - Move to a new town
  - Change the environment – tear down the Columbine library building.
  - Change the meaning of an event – build a memorial.

- Avoiding reminders prevents retrieval practice and hinders retrieval.
# Inhibitory Control

## Behavioral Control
- The ability to initiate, discontinue, or prevent motor actions based on goals – avoid the cactus.

- Go/No-Go Task:
  - Measures inhibitory control over action
  - **Task:**
    - Press a button whenever a letter appears on the screen
    - If the letter is an “X,” however, withhold the response

## Cognitive Control
- The ability to flexibly control thoughts in accordance with our goals.
  - This includes our ability to stop unwanted thoughts from rising to consciousness

- Think/No-Think Task:
  - Measures inhibitory control over memory
The Think/No-Think Paradigm

Anderson and Green (2001)

**Total Control Effect:**
- Think > No-think
- Intentional control over memory yields lasting retrieval consequences

**Positive Control Effect:**
- Think > Baseline
- Reminders without an intention to suppress facilitate memories

**Negative Control Effect:**
- No-Think < Baseline
- Reminders with an intention to suppress inhibit memories
Intentional Retrieval Suppression

Neuroimaging the Think/No-Think Experiment

- Anderson et al. (2004)
  - Suppressing retrieval is related to:
    - Increased activity in control regions:
      - The left and right lateral prefrontal cortex and the anterior cingulate cortex
      - These regions are also involved in motor inhibition
    - Decreased activity in the episodic memory area:
      - The hippocampus
      - Suggests that people can intentionally regulate hippocampal activity to disengage recollection

- Others have also found significant suppression for:
  - Negative memories (Depue et al., 2006; 2007)
    - Faces paired with unpleasant scenes
      - Replicated previous neuroimaging results of Anderson et al. (2004)
  - Positive memories (Joormann et al., 2005)
Psychogenic Amnesia

- **AMN: A Case Study**
  - 23 years old
  - Involved in a house fire, which reminded him of an awful car crash/fire from his childhood
  - After the fire, he couldn’t remember anything that occurred after age 17
  - His amnesia continues to be a problem, 8 months later

- **Psychogenic Amnesia:**
  - Often triggered by a trauma
  - Lacks an observable neurobiological basis
  - Memory for public events and general knowledge often remain intact
  - Ability to form new memories is intact.
  - Can be:
    - **Global** (affecting the patient’s entire history)
      - e.g. fugue states
    - **Situation specific** (affecting only memory for the traumatic event)
    - Or something in between
      - Like AMN’s case
Psychogenic Amnesia

Recovering Memories

- Only two out of ten patients with psychogenic amnesia fully recovered after 14 months (Kritchevsky, Chang, & Squire, 2004)
- Deliberate attempts to remind the patient of their past and identity rarely work
- Some patients appear to recover:
  - Spontaneously, when given the right cues
  - With the help of supportive therapy
Factors Predicting Memory Recovery

Spontaneous Recovery

- The simple passage of time can bring back memories, even with no effort to retrieve them.

- **Spontaneous Recovery** (Pavlov, 1927):
  - The re-emergence of a previously extinguished conditioned response after a delay in classical conditioning
  - Increases with time, though rarely returns to full strength
  - Suffers diminishing returns with repeated recovery/extinction cycles
  - Also occurs in conditioned emotional responding
  - The stronger the initial memory, the more likely to recover
Factors Predicting Memory Recovery

Spontaneous Recovery

- Forgotten *episodic* memories also can recover over time
  - Retroactive interference studies
    - Underwood (1948)
  - *Task*:
    - Study list number 1 (whoops … just “practice”)
    - Study two other lists, with free recall test after each
    - After a third study list, tested on first (“practice”) list
Spontaneous Recovery
Wheeler (1995)

Results:
- List number 1 initially suffers from retroactive interference, compared to control.
- After around 30 minutes, recall for list number 1 improves.
- Same results for study lists of pictures, categorized words, and word pairs.

Why Do Memories Spontaneously Recover?

- If retroactive interference reflects inhibition of responses that had previously been relevant:
  - Forgotten memories recover when inhibition is gradually released
  - MacLeod and Macrae (2001) found that inhibition appears to decrease over time
  - Retrieval-induced forgetting is significantly reduced after a 24-hour delay
Factors Predicting Memory Recovery

Repeated Retrieval Attempts

- Ballard (1913)
  - Task:
    - Asked children to memorize poems
  - Results:
    - Over successive recalls, recalled previously forgotten lines
  - Conclusion:
    - People often display **reminiscence** -- the remembering again of the forgotten without relearning:
      - Gradually being able to remember the once forgotten

- **Hypermnesia:**
  - Improvement in recall performance arising from repeated testing sessions on the same material.
  - Increases with more recall tests.
  - Largest effects on free recall, but also appears for cued recall and recognition.
Factors Predicting Memory Recovery

Hypermnesia

- Erdelyi and Kleinbard (1978)
  - Task:
    - Studied 40 pictures or words
    - Repeatedly tried recalling items (and guessing for difficult ones) over a week
  - Results:
    - Recall improved over testing days
    - Essentially reversed Ebbinghaus’s forgetting curve
    - Larger effects for pictures than for less-imageable words
  - Conclusion:
    - Hypermnesia arises through visualization and reconstruction
Hypermnesia in Everyday Life

Repeated Retrieval Attempts

- Bluck, Levine, and Laulhere (1999)
  - Task:
    - Asked people who had viewed the televised OJ Simpson verdict 8 months prior to recall details about the event.
    - Participants were interviewed three times in a row
  - Results:
    - The number of verifiable details remembered increased over the interviews, revealing hypermnesia.
    - Verifiable details went from 27% to 52% with no notable increase in % of false alarms.
Hypermnesia in Everyday Life

Repeated Retrieval Attempts

- Hypermnesia also occurs for intentionally forgotten items in the directed-forgetting paradigm.
  - Goernert and Wolfe, 1997; Goenert, 2005

- Repeated retrievals using visualization may increase source misattribution errors.
  - Henkel (2004) showed that people falsely claimed that they had seen images they had only imagined.

- However, the overall rate of memory errors remains surprisingly low in studies of autobiographical memory or emotional eyewitness events.
Factors Predicting Memory Recovery

Cue Reinstatement

- Biasing attention away from certain aspects of experiences can lead to forgetting of the unattended elements.
- But encountering the *right cue* can lead to memory recovery!

- Smith and Moynan (2008)
  - *Task*:
    - Participants in the experimental group selectively reviewed a subset of categorized word lists.
    - First they were tested for all the words without any cues.
    - Again they were tested, this time given the category cues.
Factors Predicting Memory Recovery

Cue Reinstatement

- **Results:**
  - Without cues, memory for the nonreviewed categories was impaired in the experimental group.
  - Providing the category cues eliminated the forgetting effect.
  - True for negative as well as neutral memories.

- **Conclusion:**
  - Selectively avoiding reminiscing about memories (even unpleasant ones) can cause forgetting, which can be overcome given the right reminders.
Factors Predicting Memory Recovery

Cue Reinstatement in Motivated Forgetting

- Goernert and Larson (1994)
  - Directed forgetting can be released by presetting a subset of to-be-forgotten items as cues.

- Sahakyan and Kelley (2002)
  - Reinstating mental context (i.e. thinking back to the list 1 environment) before the final test substantially reduces the effects of list-method directed forgetting.
Recovered Memories of Trauma

Do They Exist?

- Recovered memories may not truly reflect real events:
  - Difficult to determine whether they were ever, in fact, truly forgotten
    - Corroborative evidence is often hard to find, especially when the event was supposed to have happened years ago
  - Reconstruction and interference can distort the original memories
  - Source misattribution errors are common
    - “Was it in a movie, did I dream it, or did it really happen?”
  - Hypnosis, guided imagery, and other suggestive therapy techniques can foster false memories.

- Equal weight, however, should be given to the possibility that recovered memories exist.
  - There are many cases of recovered memories for corroborated events.
Avenues of Memory Recovery

**Suggestive Therapy**
- Memories recovered through suggestive therapy may be:
  - More likely to reflect the therapist's suggestions, rather than reality
  - Therefore, more likely to lack corroborative evidence

**Spontaneous Recovery**
- Memories recovered without any outside suggestion may be:
  - More likely to be genuine
  - Therefore, more likely to be corroborated

**Results:**
- Geraerts et al. (2007)
  - **Methods:**
    - Assessed the level of corroboratory evidence from individuals with childhood memories of abuse that were:
      - Continuously accessible (i.e. never forgotten)
      - Recovered spontaneously
      - Recovered through suggestive therapy

- [Bar graph showing corroboratory evidence for memories of abuse]

**Conclusions:**
- Not all recovered memories are the same
- Discontinuous memories are just as verifiable as continuous
Are recovered memories completely inaccessible prior to recovery or do people just forget that they remembered them previously?

<table>
<thead>
<tr>
<th>Session No.</th>
<th>Task</th>
<th>Emotional Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cued recall for childhood memories</td>
<td>• Half recalled in a positive emotional frame</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Half recalled in a negative emotional frame</td>
</tr>
<tr>
<td>2 (+2 months)</td>
<td>Asked to retrieve same events</td>
<td>• Same-framing group: Recalled in the <em>same</em> emotional frame</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Other-framing group: Recalled in the <em>opposite</em> emotional frame</td>
</tr>
<tr>
<td>3 (+3 months)</td>
<td>• Asked to retrieve the same events</td>
<td>Both groups recalled in the <em>original</em> emotional frame</td>
</tr>
<tr>
<td></td>
<td>• After each, remember if they had recalled the same memory during Session no. 2</td>
<td></td>
</tr>
</tbody>
</table>
Recovered Memories and Prior Remembering
Geraerts et al. (2006)

- **Results:**
  - **Main Effect:**
    - The ability to recall prior remembrances is diminished if the retrieval perspective differed (i.e. other-framing condition)
    - A context dependency
  - **Interaction:**
    - This context dependency is worst for people with recovered memories

- **Conclusion:**
  - People may have a recovered memory experience because they simply forgot remembering it before

Data from Geraerts et al. (2006).
Recovered Memories and Prior Remembering

Geraerts et al. (under review)

<table>
<thead>
<tr>
<th>Memory Group</th>
<th>Level of Context-Dependency</th>
<th>Susceptibility to False Memory Formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Access</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Spontaneous Recovery</td>
<td>High</td>
<td>Normal</td>
</tr>
<tr>
<td>Supportive Therapy</td>
<td>Normal</td>
<td>High</td>
</tr>
</tbody>
</table>

**Conclusions and Related Findings:**

- Memories recovered in suggestive therapy likely have a different origin than those recovered spontaneously.
- The spontaneous recovery group’s heightened tendency to forget prior rememberings might be related to their use of inhibitory control processes to suppress intrusive thoughts.
- Geraerts et al. (2007) later found that the spontaneous recovery group is better at suppressing unwanted thoughts than either other group.