Improving memory

How to improve your memory without spending $20.

Memory

- We seem to be unable to control our memories
  - learn things we don’t want to remember
  - unable to learn things we want to remember
- Is there any reliable cue that something will be remembered?
  - no
  - but there are several tricks you can use to improve memory in certain situations

Encoding specificity

- We know that memory is best when study and test contexts are similar
  - For example, testing in the study classroom
- But variability in study promotes more general recall
  - Smith et al. (1978)
  - Subjects studied words twice: either in same context or different contexts (3 hour interval between contexts)

- Test subjects in a neutral context (after another 3 hour interval)
- Look at proportion correct recall
  - Highest with variable study contexts
- Advice: if you want to remember something in lots of contexts, study in lots of contexts

<table>
<thead>
<tr>
<th>Session 2 Context</th>
<th>Session 1 Learning context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom 1</td>
<td>0.41</td>
</tr>
<tr>
<td>Classroom 2</td>
<td>0.53</td>
</tr>
</tbody>
</table>

Study style

- Time spent studying is also “context” for memory retrieval
- Generally, more study leads to better memory
- Style of study matters too
  - distributed practice is better than massed practice
  - avoid cramming!
  - true for many skills

Level of processing

- Memory can be influenced by depth of processing at the time of study
  - Craik & Tulving (1975)
  - Subjects observe words with associated tasks

<table>
<thead>
<tr>
<th>question</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>In capital letters?</td>
<td>BOOK</td>
<td>book</td>
</tr>
<tr>
<td>Rhyme with thing?</td>
<td>spring</td>
<td>sprint</td>
</tr>
<tr>
<td>Synonym for heavy?</td>
<td>bulky</td>
<td>brown</td>
</tr>
</tbody>
</table>
**Level of processing**

- Recall is better as depth of processing increases
  - More distinctive memories are created, which helps subsequent recall
  - By varying depth of processing, you can construct memories that are more likely to be recalled

![Levels of Processing](image)

**Levels of Processing**

- Level of processing is more important than intent to learn (Hyde & Jenkins, 1973)
- 11 groups of subjects
  - 1 control group: told they will be tested to recall the words
    - not given any study task
  - 10 experimental groups split to perform a study task
    - Pleasant-unpleasant rating
    - Estimate frequency of word usage
    - E-G checking: does word contain an E or a G?
    - Identify part of speech: noun, verb, ...
    - Sentence framing: which sentence does word best fit in?
  - For all experimental groups, either
    - (a) Intentional learning: told they will be tested to recall the words
    - (b) Incidental learning: not told they will be tested

**Intention**

- Recall (out of 24 words) varies a lot with task
- Not much variation with intention to learn

![Intention](image)

**Implications**

- People do not know the best way to remember!
  - There was nothing stopping controls from making "pleasant-unpleasant" ratings
  - they apparently did not, or they would have done better!
- Advice: study interactively
  - read notes
  - rewrite notes
  - rephrase notes
  - teach someone else
- More generally, people are not usually good at estimating whether something will be remembered

**Judgments of Learning**

- Subjects study a pair of words (e.g., OCEAN – TREE)
- Estimate how likely they are to be able to remember one word if shown the other (JOL).
  - Given OCEAN, how likely to remember the associated item later?
  - This is the subject’s estimate of their ability to use LTM
- Make judgment either
  - Immediately after studying the pair
  - Delayed to later in the experimental trials
- Note: students studying for an exam often use the immediate approach for a JOL to decide if they need to continue studying

![Judgments of Learning](image)
Practicing recall

- A common approach to studying is to use flash cards (or something similar)
- Two steps to studying
  1) Read material on both sides (study)
  2) Practice test the material (given one side, try to recall the information on the other side)
- What should you do when you successfully recall the information during the practice test?
  - Continue to study?
  - Continue to test?
  - Set aside and focus on other cards?

Karpicke & Roediger (2008)

- Subjects study 40 Swahili - English word pairs
  - mashua – boat
  - kaka – brother
  - Test for English given Swahili:
    - mashua –???
- Four groups of subjects, that differ after an item is correctly recalled
  - ST (study-test): subject studies and continually tested over every pair
  - SnT (study non-recalled - test on all): when a subject recalls a pair, it is no longer studied, but it continues to be tested
  - STn (study all, test only on non-recalled): when a subject recalls a pair, it continues to be studied, but it is not tested
  - SnTn (study on non-recalled, test on non-recalled): when a subject recalls a pair, it is not studied or tested again
- A week later, everyone is tested

Practicing recall

- Standard advice is that once you learn something, study something else
- This is not good advice
- Performance is best when every pair is tested, even if you have already demonstrated it is memorized
- The amount of time spent studying the words does not matter so much
- Suggests that you learn how to recall the information
- Advice: Test yourself!

Learning styles

- A common approach in education is to identify a student’s learning style and then teach for that style
- Lots of tests to identify a student’s learning style
- There do seem to be real differences in what style people indicate they prefer

Unfortunately, there is absolutely no evidence that reported learning style preference has anything to do with learning

Pashler et al. (2009) observed that to demonstrate evidence that learning style influenced learning, you have to show a particular kind of interaction of effect

Pashler et al. (2009) then reviewed hundreds of studies purporting to show evidence for learning styles, but only ever found effects like these

But these only indicate an advantage for a type of learning or a method

**Acceptable Evidence**

In examples D through I, the same learning method optimizes the mean test score of both kinds of learners, thereby excluding the need for custom instruction
Learning styles

- Why is the idea popular?
  - It fits with the American ideal of everyone being capable of learning if given the chance (no child left behind)
  - It allows parents (and students) to blame the educational system for failure rather than lack of motivation or ability
  - It lends itself well to statistical quirks of finding “just the right method” for a given student
  - It’s a generalization of the experience that a given student benefits from a new explanation of material

Conclusions

- Lots of ways to improve memory
  - Encoding specificity
  - Level of processing
  - Judgments of Learning
  - Practice testing
  - Learning styles

Next time

- Mental imagery
- Sleep
- Brain training
- CogLab on Link Word due!
- Get a good night’s sleep!