Applying Cognitive Psychology Methods Activity 3: Long-Term Memory (A)

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In our experiment, we aimed to study the effects of two conditions on exam scores: cramming, where participants studied German vocabulary the night before the exam, and distributive practice, where they studied over multiple days. Specifically, the exam consisted of recalling German words (e.g., waschbär), the literal English translations (e.g., wash bear), and the corresponding English names (e.g., raccoon). To begin, the class was split into two separate groups. The left half of the classroom was the cramming group, and the right half was the distributive practice group.

After we had our assignments, each group was to study for their amount, which was specified on the vocabulary handout. For the cramming group, they were to study for one hour on the night before the exam. For the distributive practice group, they were to study for a total of one hour as well, but broken up into four 15-minute intervals over a span of four days. After seven days, we took the initial exam, and recorded the total time spent studying. Then, two days later we took the same exam, but were barred from studying during the intermission. For both exams, we self-graded our tests and reported the score.

To control for confounding variables (unwanted interactions from unknown sources), we utilized randomization for groups selection (no one self-selected to be in a group), we kept the sample consistent—in each group, we had an even distribution of varying demographics such as age, socioeconomic status, and past education—then, we ensured that no one that participated in the present study knew how to speak German, or had taken a German class in the past.

Procedure

Learning

Regardless of what group I was in, I would have studied the same way for both. In that, I initially studied by using *maintenance rehearsal*—little to no *encoding* (acquiring and transferring information to long term memory)—to gain a sense of familiarity with the German words.[1] This

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[1] See the Consolidation section for why this was not a good strategy.

rehearsal was brief, and only lasted for a couple of minutes. After I became comfortable with the words, I started to make connections between the German words and the English translations.

For example, the German word "Seekuh" literally translates to "sea cow." Because of the visual similarity between the words (e.g., "see" with "sea") and the phonetic similarity for the others (e.g., "kuh" with "cow") I was able to create *retrieval cues*—words or other stimulus that helps a person remember information stored in memory—that would help me when I needed to retrieve the word while studying note cards.

Retrieval

When I am studying note cards I am utilizing the *generation effect*—the act of generating material yourself, rather than passively receiving it. Essentially, I was *generating material* by looking at the front of the card, *retrieving* the cues that I had previously established during the learning phase, and then used it to remember the English translation. For the words that I was unable to associate meaning to while studying, they were much more difficult during my recall. One of these words was Eichehörnchen (literally translates to "oak croissant," which means "squirrel"). While there is some associations I can make (e.g., Eichehörnchen sounds like the English word "acorn," and squirrels bury acorns), retrieval in general is much more difficult for this word because I cannot break it up into *chunks*—smaller units (like words) can be combined into larger, meaningful units—for easier encoding. Thus, it is more difficult to *consolidate* the memory.

Consolidation

Consolidation is the process that transforms new memories from a fragile state, in which they can be disrupted, to a more permanent state, in which they are resistant to disruption. This is where the difference between cramming and distributed practicing can be seen. We have two different kinds of consolidation: *synaptic consolidation*—takes minutes or hours, and involves structural changes at synapses—and *systems consolidation*—takes months or years, and involves

the gradual reorganization of neural circuits within the brain.[2] When someone uses distributive practices to study, they engage in fresh synaptic consolidation each day they study (a process known as *reconsolidation*—after retrieving a fragile memory, you can either modify eliminate the memory). Whereas, for cramming, all the synaptic consolidation occurs within a tight window.

What makes reconsolidation important lies in the significance of learning (specifically) *novel* information. Remember back to when I first explained my learning experience. I used maintenance rehearsal which required little to no encoding. This could explain why, when I realized that a lot of the words contain similar roots, I was initially unable to dissociate the roots from the words because I had already encoded them as a *whole word*. For example, a lot of words included the root "schwein" and the root "tier." I knew the meaning of these words individually (pig and animal), but when I tried to retrieve them, I was unable to "forget" the whole word from when I first encoded it. However, when I stopped studying after 15 minutes, when I revisited the words, I was able to apply that new knowledge of the roots to the words, and re-encode them using the new chunking strategy.

Discussion

While we controlled many confounding variables, this experiment is far from being empirical. One possible confounding variable could be that the students were distracted while studying the words. For example, while they are studying, they could be listening to music, talking on the phone, and so on. We have seen from previous chapters that multitasking always results in worse performance for both tasks.

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[2] After this point, the rest of this paragraph and the next paragraph is mostly speculating the function of reconsolidation.