

## The Art of Retention

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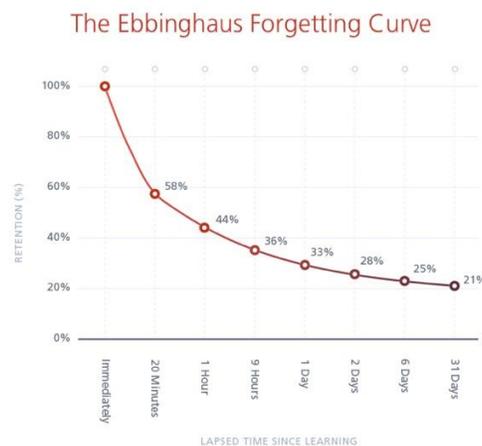
It's midnight the night before a final exam and you're sitting in front of a pile of notes that you half-heartedly studied while watching the entire series of Friends (again) during the past four weeks of your histology course. Driven by caffeine and an ingrained fear of failure, you realize it's time to cram every fact you can into your brain before your 8:00 am exam tomorrow morning. Flash forward to one week later when your test scores come out. You nervously open the grading portal, an 87! You think to yourself, "not bad, what was that exam on again?!"

Does this scenario sound at all familiar?

As medical knowledge expands, those in the medical field are tasked with working towards mastery of a vastly large amount of information. Unfortunately, with the nature of multiple choice tests and standardized board examinations, several mistakes can be made while attempting to "master" this content. Below are some tips to not only help with examination performance, but also with long-term retention and subsequent incorporation of learned content into clinical activities.

### Tip 1: We all forget things...and that's ok

- In 1880, Ebbinghaus set out to determine the relationship between learning and forgetting. Using a single-subject experimental design (i.e. using himself as the subject) he created a "forgetting curve" based on his retention of nonsense syllables over time. There have been several other attempts to classify the relationship between learning and forgetting which have produced similar, yet slightly variable forgetting curves. However, in 2015, the Ebbinghaus curve was successfully replicated by Murre and Dros, providing increased support for the validity of Ebbinghaus' original curve created in the 1880s.<sup>1,5</sup>
- The basic idea of the forgetting curve, whether you use Ebbinghaus' original curve or not, has been used as a reference for tools aimed at better structuring study habits to combat forgetting learned material. While at its core, the concept of the forgetting curve is not all that surprising, the fact that we do forget content throughout the learning process is a key component of learning and cannot be overlooked.



**Figure 1.** Ebbinghaus forgetting curve<sup>3</sup>

## Tip 2: Practice spaced learning instead of massed learning or “cramming”:

- Remember the scenario we discussed earlier – the stress inducing all nighter? Well, to be fair, cramming isn't *all* bad. If you find yourself ill-prepared for an examination with very little time to dedicate to studying, cramming will certainly be of benefit to your short-term retention of the material and likely your immediate performance on the examination. The downside comes from the fact that cramming gives you minimal long-term retention of material. This is why cramming isn't the ideal study method if you're hoping to be able to apply the course content to future experiences, especially clinical care. This is where spaced learning comes in!
- It has been shown in many studies that spaced learning (i.e. steady review of material over a period of time) with frequent repetitions of the material is much more beneficial for long-term retention.<sup>2,4</sup> The most effective way to manage your spaced learning schedule is often with software (e.g. [Anki](#)) that has specific algorithms in place to help you determine appropriate spacing intervals for studying based on your specific study patterns and ability to retain information.<sup>3</sup> However, if you are committed and your content is easily broken up into discrete chunks, you can in a sense create your own algorithm by breaking your content down into material that you study daily, every other day, weekly, immediately before the exam, etc.<sup>3</sup>
- When considering how to apply spaced learning to clinical practice, it is important that we take the knowledge that we have acquired or the new skill we have learned and consciously and deliberately practice it in our day to day clinical work. Practice doesn't always make perfect, but effortful and deliberate practice certainly makes you a better clinician. Spaced reminders of content as seen in the graph below will help to alter the projection of the forgetting curve and allow you to retain information longer.<sup>1,3</sup>

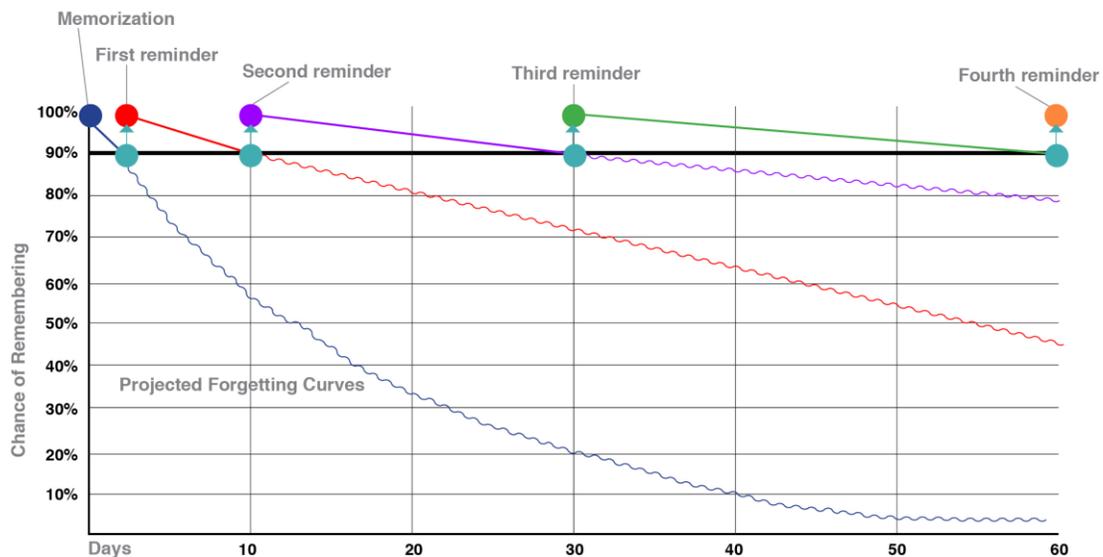


Figure 2. Examples of how spaced learning can affect the projection of the forgetting curve.<sup>1</sup>

## References:

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5. Murre, Jaap M. J., and Joeri Dros. "Replication and Analysis of Ebbinghaus Forgetting Curve." *Plos One*, vol. 10, no. 7, 6 July 2015, doi:10.1371/journal.pone.0120644.