

Spaced Repetition: Remembering What You Learn

What is spaced repetition?

Spaced repetition is a method of reviewing material at systematic intervals. At the beginning of the learning process, the intervals are spaced closely together (for example, one hour; four hours; one day). As the material is reviewed, the intervals become systematically longer (four days; one week; two weeks). An ideal system of spaced repetition allows you to review the material before it is forgotten, helping you to retain it in your long term memory.

Spaced repetition is in many ways the opposite of "cramming". Rather than learning information in a short time period, which can lead to quick forgetting, spaced repetition focuses on long-term retention of new information. For example, if you learned material from a textbook chapter in the first week of the semester, you would want to review it on a regular schedule – perhaps the second, fourth, eighth, and last weeks of the semester in order to retain the information in your long-term memory.

How is spaced repetition effective?

- Repeatedly encountering material at a spaced interval is more effective than reviewing the material multiple times in the same study session.
- Spaced repetition reduces the forgetting that occurs when material is not encountered for a significant time period.
- Spaced repetition involves actively recalling learned material, which supports learning. Also, if an item is forgotten, you are prompted to use a more effective learning strategy to retain the information for later reviews.

How can I use spaced repetition in my study?

Spaced repetition is especially effective for courses where you are required to memorize a significant amount of new information – for example, vocabulary for a language course, or definitions for a psychology or biology course. Flashcards, paper or electronic, can be a particularly useful tool as part of a spaced repetition system using one of the following methods.

1. **The "Box Method"**: When you create a new flashcard, place it in the first box. At your next review session, if you correctly recall the information, move the card to the second box, which is reviewed less frequently. Cards in the second box which are correctly recalled after a longer time period are moved into a third box, and so forth. If a card in a later box is forgotten, move it back to an earlier box for more frequent review or relearning.

2. **Spaced repetition software**: Computer and smartphone applications can be a helpful tool for developing digital flashcard sets. One advantage is that the software can help to take care of the spacing interval for each flashcard, presenting you with the items you need to learn and review each day. There are several spaced repetition programs available: Anki (<http://ankisrs.net>) and Quizlet (<https://quizlet.com/>) are both good choices. You may find other apps online and can make your choice depending on your device.

Adapted from: Thalheimer, W. (2006, February). Spacing learning events over time: What the research says. Retrieved from: http://www.phase-6.de/system/galleries/download/lernsoftware/Spacing_Learning_Over_Time_March2009v1_.pdf

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Comparison of Two Spaced Repetition Apps

	Advantages	Disadvantages
Anki https://apps.ankiweb.net/	<ul style="list-style-type: none"> Simple to learn and use Available as a desktop application, smartphone app, or online; easy to synchronize between your phone and computer 	<ul style="list-style-type: none"> If reviews are not regular, the amount of cards to be reviewed can be overwhelming The iOS application is not free (though all other applications are)
Quizlet https://quizlet.com/	<ul style="list-style-type: none"> Available on a variety of platforms: online and smartphone apps Provides a variety of quizzing formats and games 	<ul style="list-style-type: none"> Some time investment is needed to learn the card creation format that works best for studying and quizzing

Steps to get started:

1. Start early in the semester. This will allow you to gain the most benefit from regular spaced review.
2. Set up an account on Anki, Quizlet, or another tool of your choice (this is done on the particular App's website).
3. Create one deck for each course or major topic you are studying. Depending on the content you are studying, you may wish to include the following card types:
 - a. Word definition: e.g. what is a hormone? A chemical substance that is released by an endocrine gland and that has effects on other target cells in other organs.
 - b. Reverse word definition: Presents the definition on the front of the card, requiring you to identify the key term.
 - c. Fill in the blanks: e.g. The three major parts of the brain are the _____, midbrain, and hindbrain (answer: forebrain)
4. Add images to flashcards where appropriate to help you retain information.
5. Use small periods throughout the day to study and review – for example, time between classes, or time spent in transit. By using your flashcard program daily, you will review your cards on the schedule that will lead to the best possible remembering.

Keep up with new definitions and concepts as the semester progresses and you will have a solid set of study notes for the whole course.