

Primacy/Recency Effect

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Retention During a Learning Episode

When an individual is processing new information, the amount of information retained depends, among other things, on what it is presented during the learning episode. At certain time intervals during the learning we will remember more than at other intervals. Try a simple activity that Madeline Hunter devised to illustrate this point. You will need a pencil and a timer. Set the timer to go off in 12 seconds. When you start the time, look at the list of 10 words below. When the timer sounds, cover the list and write as many of the 10 words as you remember on the lines to the right of the list. Write each word on the line that represents its position on the list, i.e., the first word on line one, etc. Thus, if you cannot remember the eighth word, but you remember the ninth, write it on line number nine.

Read? Start the time and stare at the word list for 12 seconds. Now cover the list and write the words you remember on the lines to the right. Don't worry if you did not remember all the words. Turn to your list again and circle the words that were correct. To be correct, they must be spelled correctly and be in the proper position on the list. Look at the circled words. Chances are you remember the first 3-5 words (lines 1 through 5) and the last 1-2 words (lines 9 and 10), but had difficulty with the middle words (lines 6-8).

- | | |
|-----|-----------|
| KEF | 1. _____ |
| LAK | 2. _____ |
| MIL | 3. _____ |
| NIR | 4. _____ |
| VEK | 5. _____ |
| LUN | 6. _____ |
| NEM | 7. _____ |
| BEB | 8. _____ |
| SAR | 9. _____ |
| FIF | 10. _____ |

Primacy-Recency Effect

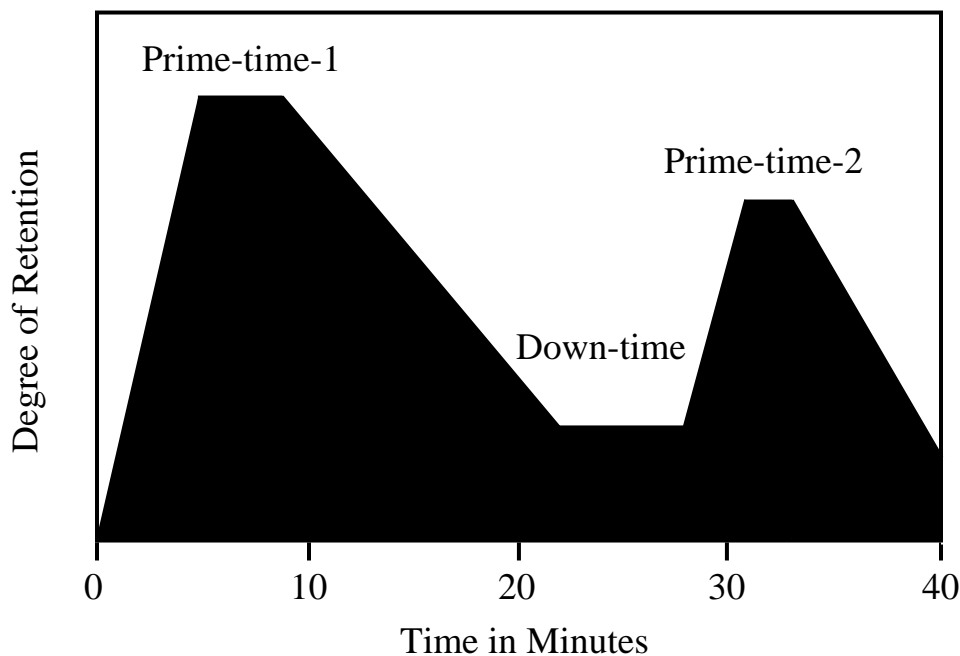
Your pattern in remembering the word list is a common phenomenon and is referred to as the primacy-recency effect. In a learning episode, we tend to remember best that which comes first, and remember second best that which comes last. We tend to remember least that which comes just past the middle of the episode. This is not a new discovery. Ebbinghaus published the first studies on this phenomenon in the 1880s.

During a learning episode, we remember best that which comes first, second best that which comes last, and least that which comes just past the middle.

Later studies help to explain why this is so. The first items of new information are within the working memory's functional capacity so they command out attention, and are likely to be retained in semantic memory. The later information, however, exceeds the capacity and is lost. As the learning episode concludes, items in working memory are sorted or chunked to allow for addition processing of the arriving final items, which are likely held in immediate memory unless further rehearsed.

The figure below shows how the primacy-recency effect influences retention during a 40-minute learning episode. The times are approximate and averages. Note that it is a bimodal curve, each mode representing the degree of greatest retention during that time period. For future reference, I will label the first or primary mode *prime-time-1*, and the second or recency mode *prime-time-2*. Between these two modes is the time period in which retention during the lesson is least. I will refer to that area as the *down-time*. This is not a time when no retention takes place, but a time when it is more difficult for retention to occur.

Retention During a Learning Episode



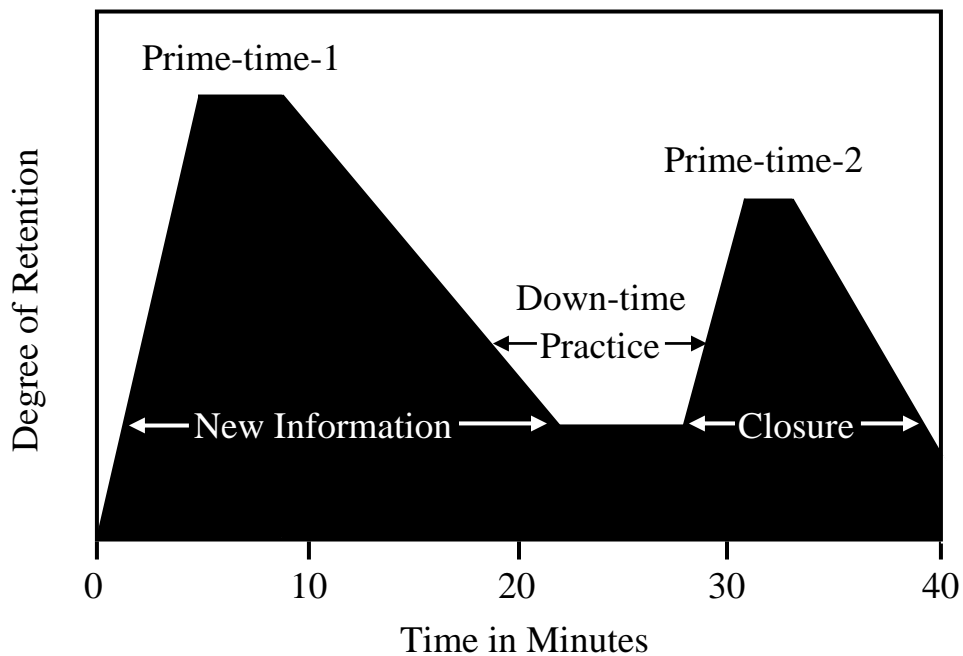
Implications for Teaching

When you have the students' focus, teach the new information. Don't let prime-time get contaminated with wrong information.

There are important implications of the primacy-recency effect for teaching a lesson. The learning episode begins when the learner focuses on the teacher with the intent to learn. New information or skills should be taught first, during prime-time-1,

since it is most likely to be remembered. Keep in mind that the students will remember almost any information coming forth at this time. It is important, then, that only *correct* information be presented. This is not the time to be searching for what students may know about something. I remember a teacher of English start a class with, "Today, we are going to learn about a new literary form called *onomatopoeia*. Does anyone have any idea what that is?" After several wrong guesses, the teacher finally defined it. Regrettably, those same wrong guesses appeared in the follow-up test. And why not? They were mentioned during the most powerful retention position, prime-time-1. The new material being taught should be followed by practice or review during the down-time. At this point, the information is no longer new, and the practice helps the learner organize it for further processing. Closure should take place during prime-time-2, since this is the second most powerful learning position and an important opportunity for the learner to determine sense and meaning. Adding these activities to the following graph shows how we can take advantage of research on retention to design a more effective lesson.

Retention During a Learning Episode



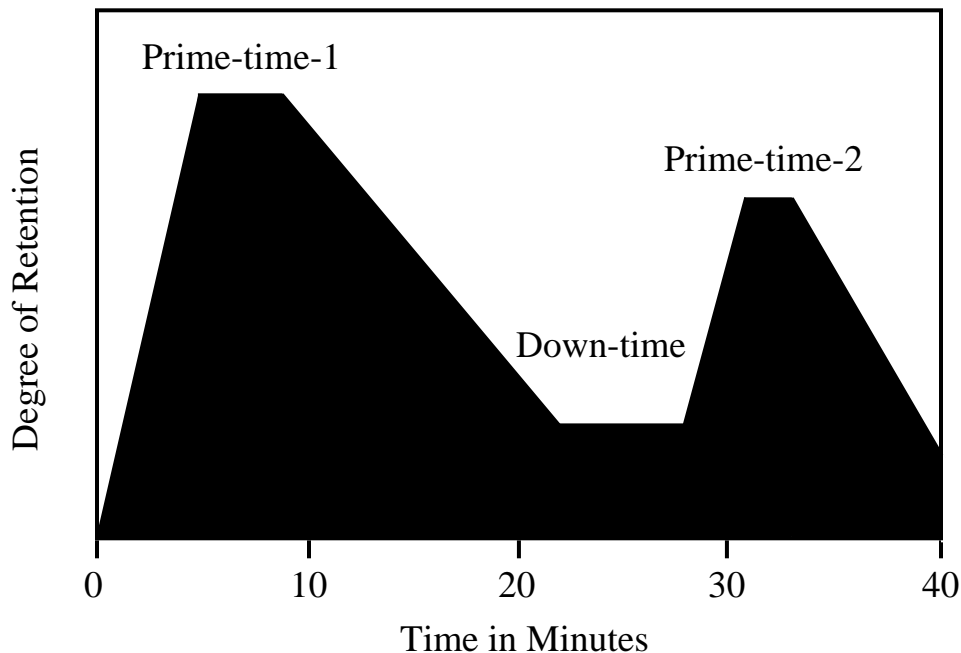
Misuse of Prime Time

Even with the best of intentions, teachers with little knowledge of the primacy-recency effect can do the following: After getting focus by telling the class the day's lesson objective, the teacher takes attendance, distributes the previous days homework, collects that days homework, requests notes from students who were absent, and reads an announcement about a club meeting after school. By the time the teacher gets to the new learning, the students are already at the down-time. As a finale, the teacher tells the students that they were so well-behaved during the lesson that they can do anything they want during the last five minutes of class (that is, during prime-time-2) as long as they are quiet. I have observed this scenario, and I can attest that the next day those students remembered who was absent and why, which club met after school, and what they did at the end of the period. The new learning, however, was difficult to remember because it was presented at the time of least retention.

Retention Varies with Length of teaching Episode

Another fascinating characteristic of the primacy-recency effect is that the proportion of prime-times to down-time changes with the length of the teaching episode. Look at the figure below. Note that during a 40-minute lesson, the two prime-times total about 30 minutes, or 75 percent of the teaching time. The down-time is about 10 minutes, or 25 percent of the time.

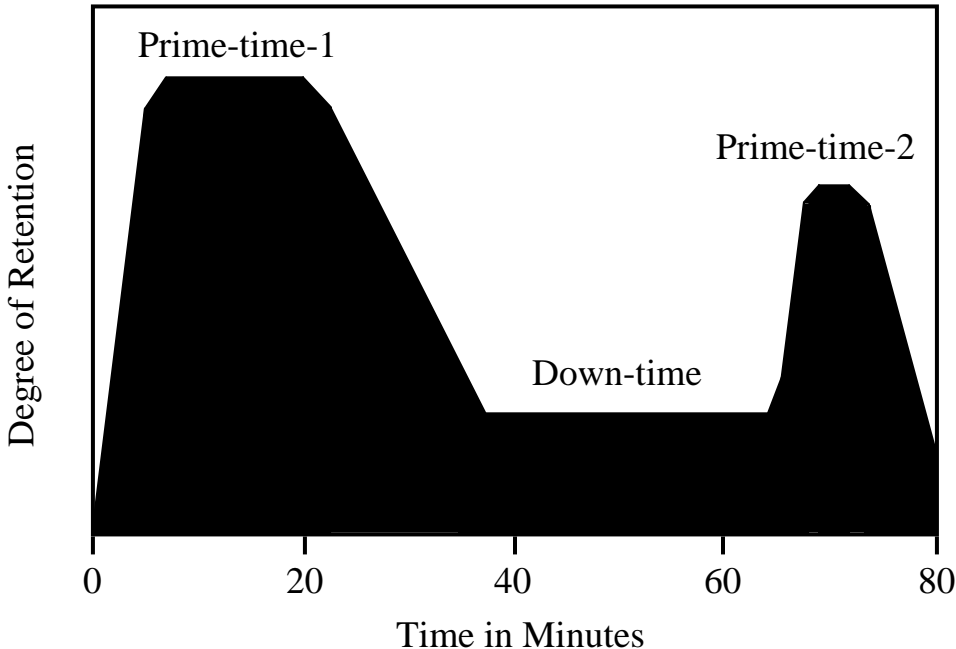
Retention in a 40-Minute Learning Episode



If we double the length of the learning episode to 80 minutes (see figure below), the down-time increased to 30 minutes or 38% of the total time period. As the lesson time lengthens, the

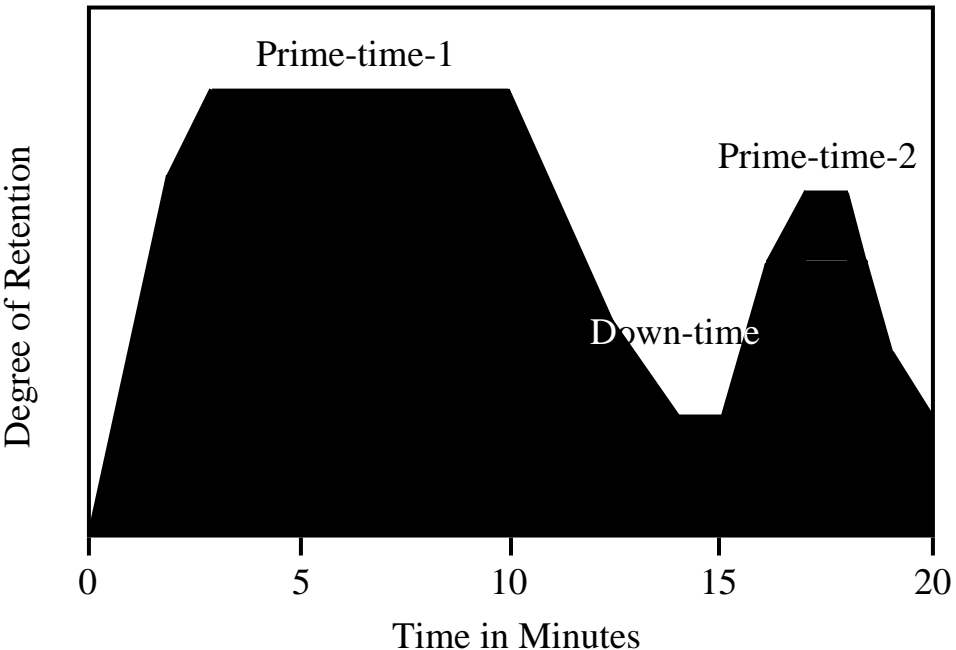
percentage of down-time increases faster than for prime-time. The information is entering working memory faster than it can be sorted or checked, and accumulates.

Retention in an 80-Minute Learning Episode



The figure below shows what happens when we shorten the learning time to 20 minutes. The down-time is about 2 minutes or 10 percent of the total lesson time.

Retention in a 20-Minute Learning Episode



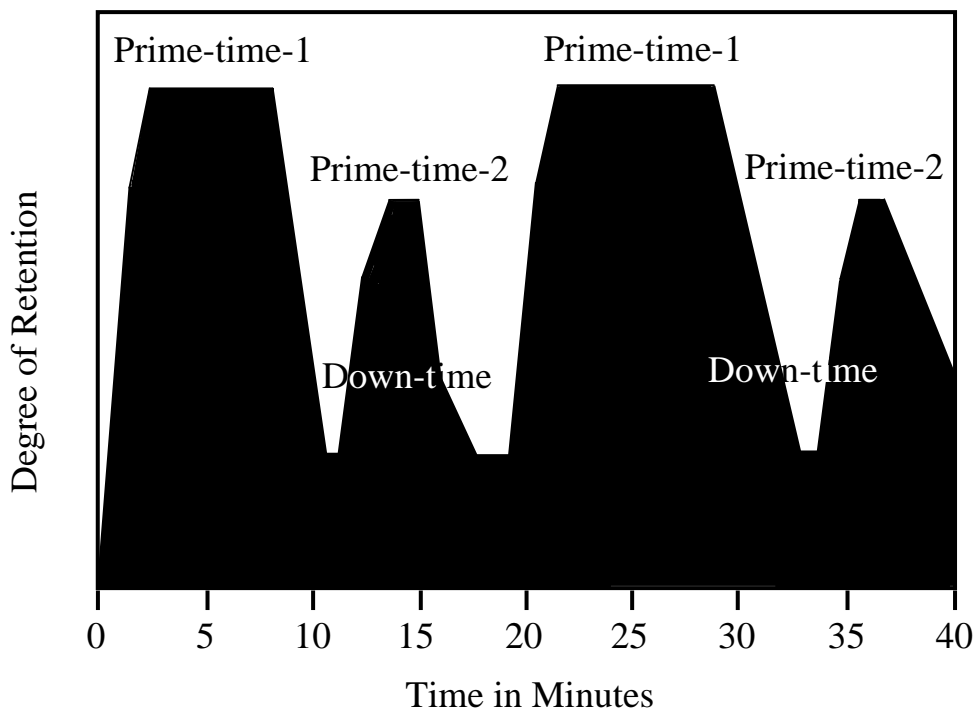
This research indicates that there is a higher probability of effective learning taking place if we can keep the learning episodes short and, of course, meaningful. Thus, teaching two 20-minute lessons provides 20 percent more prime-time (approximately 36 minutes) than one 40-minute lesson (approximately 30 minutes). Note, however, that a time period shorter than 20 minutes usually does not give the learner's brain sufficient time to determine the pattern and organization of the new learning, and is thus of little benefit.

The following table summarizes the approximate number of minutes in the prime-times and down-times of the learning cycle for episodes of 20, 40, and 80 minutes.

AVERAGE PRIME AND DOWN-TIMES IN LEARNING EPISODES				
	Prime-Times		Down-Time	
Episode Time	Total Number of Minutes	Percent of Total Time	Number of Minutes	Percent of Total Time
20 min.	18	90	2	10
40 min.	30	75	10	25
80 min.	50	62	30	38

The figure below shows the gain in prime time that results from teaching two 20-minute lessons over one 40-minute lesson. Remember that the times are averages over many episodes. Nonetheless, these data confirm what we may have suspected: More retention occurs when lessons are shorter.

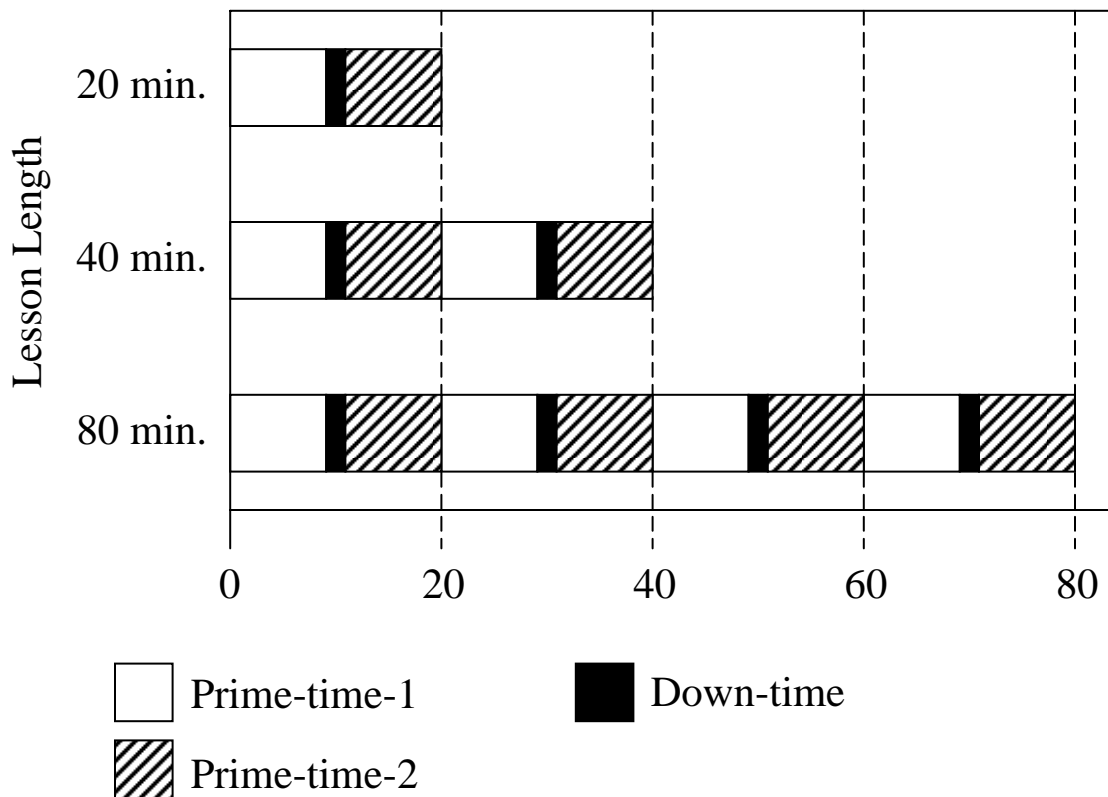
Retention in Two 20-Minute Learning Episodes



Shorter Is Better: Impact on Block Scheduling

Because today's students are accustomed to quick change and novelty in their environment, many find it difficult to concentrate on the same topic for long periods of time. They fidget, drift, or get into off-task conversations. This particularly true if the teacher is doing most of the work such as lecturing. The primacy-recency effect has a particularly important impact in block scheduling, in which an 80-minute period can be a blessing or a disaster, depending on how the time is used. The following figures shows that a block containing four 20-minute segments will often be much more productive than one continuous lesson. Further, only one or two of the four block segments should be teacher directed.

Approximate Ratio of Prime-Times to Down-Time During Lesson Episode



Approximate Ratio of Prime-Times to Down-Time During Lesson Episode

