Recall and Preparation's Impact on Confidence Before Examinations

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Abstract

We presented participants with a survey asking them a few questions about the most recent exam they had taken. The goal was to test whether feelings of confidence when entering an exam were increased if participants had reviewed old concepts before the exam or not. We also wanted to see if the amount of days spent preparing for the exam impacted these feelings of confidence. Our survey asked how many days participants had spent preparing for their most recent exam and how likely they would be to go back and review old concepts. Our outcome variable asked how confident they felt when entering the exam. Our results provided no evidence to show that preparation days in advance, or the reviewing of older concepts aided in one's confidence for a test. There were many reasons these results may have turned out the way they did, with the most prevalent being that we tested feelings of confidence rather than actual recorded test scores.

Recall and Preparation's Impact on Confidence Before Examinations

When studying for an exam one always hears about how they should not wait until the last minute to begin reviewing their notes. Alas, almost all students are far too familiar with the world of procrastination. After a rare success on a test a student crammed for they may find themselves believing that cramming truly does work. While there may be one-off successes from this method, a far more consistent method to follow when preparing for an exam is successive relearning. Successive relearning is the process of practicing a task until it is correct, then in other spaced sessions going back and practicing the same task again until it is correct (Rawson & Dunlosky, 2022).

This concept can be illustrated through the method of reviewing for an exam. This idea was studied in a notable 2022 study where participants were asked to retrieve from memory information that they had just reviewed. The information was presented both digitally and printed, covering foreign language vocabulary and Chinese characters, both previously unknown by participants. Following each question researchers immediately reviewed feedback with each participant and once they reached a determined success point for understanding the material the session ended. Participants later return and try to relearn the content in more spaced practice sessions. After one week they were given a retention test to see what information they were able to recall from the original material. The results showed that not only did participants perform better on the exam if they came back for several study sessions, but also their retention of the content lasted far beyond just the days after the exam. The control group only underwent the initial encoding and did not get the chance for successive relearning. Comparing these two groups you see that the experimental group was able to recall the information with surprising accuracy significantly past the date of the original test. (Rawson & Dunlosky, 2022). Taken as

inspiration for this study, the 2022 study on successive relearning proves the pattern of going back and reviewing information in several sessions before an exam results in slightly increased scoring and significantly increased retention.

This concept was also examined in studying using flashcards. A 2009 study examined the relationship between studying one large stack of flashcards (studied in a spacing manner) as opposed to studying smaller groupings of cards (displayed decreased spacing time between study sessions). These flashcards had synonym word pairs on them that could be matched up by participants. The example they gave was a card with the words “effulgent” and “brilliant” on either side. After going through their flashcards participants were then given an examination. The results showed that accuracy spacing was far more effective than cramming, even though participants believed that they were going to perform higher with the massed studying method. (Kornell, 2009).

This was also tested via weekly quizzes in an introductory psychology class. There was a study where researchers gave half of the participants a weekly fill-in-the-blank quiz with corrective feedback (massed condition) and the other half was a successive relearning condition. The massed condition studied the same concepts as the successive relearning group, however, the relearning group was given quizzes twice per class session with corrective feedback. They alternated students between the two tasks each week for ten weeks. Their results showed that increased relearning techniques resulted in better content retention, increased self-reported sense of content mastery, increased attention, reduced anxiety, and improved metacognition. (Higham et al., 2022). This link to increased self-reported sense of content mastery is one thing our study attempted to replicate by looking at feelings of confidence when entering the exam.

The final inspiration for the study came from a longitudinal study that examined the long-term retention of successive relearning with recall and recognition. In the study, participants learned and relearned English-Spanish word pairs over a span of eight years. Initially, all participants saw the pairs at a five-second rate visually through presentation format, as well as heard its auditory pronunciation. Immediately after participants entered a test trial where an English word was shown on screen and they would have to say the corresponding Spanish word. Participants were brought back in later for relearning sessions where they interleaved presentation and test trial examples. Then, the participants in the study returned they were randomly assigned when to revisit the material. This could be zero days (restudying right after the initial test), one day, or 30 days. After 5-7 sessions in their group, the intervals were adjusted and participants came in another 1-4 times. After the initial 14 months of this part of the study, there was an average of an eight-year gap. The majority of participants then returned and were administered a recall test with the same original 50 words. Results showed that recall rates improved as the interval between sessions increased. This means the average recall for those who returned after 30 days was 15% as compared to those in the zero-day group whose average recall score was 6%. (Bahrick & Phelphs, 1987). This fascinating study delves more into the long-term connection between relearning techniques and recall. Some inspiration we took from this study was focusing on how many days ahead of the exam students began this preparation and how that correlated to their feelings of preparedness.

Our research question for the study was, does spaced learning for an exam result in increased feelings of confidence going into the test? In this study, participants were surveyed on various factors that led up to their feeling of confidence going into their most recent test. There was a focus on two measured variables to see how they might impact the outcome. We wanted to

tie this concept of spacing described above into our data, so we had one predictor variable survey how many days the participants had studied for their most recent exam. We also wanted to tie in successive relearning to our predictor so we decided to look at the frequency of reviewing concepts. This had the second predictor variable zoom in on how often participants go back and revisit old concepts while studying. Their responses were then recorded and analyzed. We hypothesized, 1) As the amount of days spent preparing increases, feelings of preparation going into an exam also increases, and 2) More frequent review of well-understood concepts results in increased feelings of preparation going into an exam. This would allow for a holistic view of the impacts of both successive relearning and spacing as described in the literature.

Method

Participants

The participants were Loyola University Chicago undergraduate students who had opted to fill out an optional survey. 25 responses were analyzed. Participants ranged in age from 18 to 22 (the average age being 19.8 years) and came from seven different Loyola subcolleges. These colleges include the College of Arts and Sciences, the School of Communication, Parkinson School of Health Sciences and Public Health, the School of Education, Quinlan School of Business, the School of Environmental Sustainability, and the Marcella Niehoff School of Nursing.

Materials

All participants were provided with an online Google Forms survey. Upon opening the survey the participants could read the following instructions placed at the top stating, “Please fill out this form regarding your most recent assessment (tests, quizzes) and how you studied for it.

If you don't know the exact answer, estimate to the best of your ability. All answers are anonymous." They were first asked to type how old they were and answer a multiple choice as to which Loyola school they fall into. The first predictor variable question was, "How many days did it take you to prepare for your most recent assessment?" The multiple-choice options were, less than one day, one day, two to three days, four to five days, six to seven days, and over seven days. It is noted that they should look at their most recent assessment, this keeps them from selecting any assessment they did well on, or one they remember doing particularly poorly on. The second predictor question was, "In general, how often do you feel you go back and revisit well-known concepts while studying? Ex. You have a psychology exam coming up and you feel you grasp the concept of classical conditioning well, how often do you go back and review that material?" The responses to this were given in Likert-scale format, with 1 being never and 5 being always. The final question was the outcome variable question. Again all of these questions zoom in on the most recent exam, "On a scale from 1-7 how prepared did you feel going into that most recent assessment?" Also a Likert scale, this time they were given seven options with one being not prepared at all and seven being fully prepared.

Procedure

The survey was short, likely taking participants less than three minutes to complete. Random Loyola students took the survey and the first 25 responses were analyzed. We ended up having to remove two data points when doing the math for the results section, leaving us with 23 responses. We had the Google form set to randomize the order in which the questions were presented.

Results

In contrast to our predictions, there did not seem to be a significant correlation in our data between study timeline and confidence or reviewing older concepts and confidence like we presumed there would be. Focusing in on Figure 1, there is no link between how many days the participants studied for (spacing) and their confidence going into the exam. This proved that the timeline seemed to be insignificant $F(3,19) = 0.125$, $p = 0.944$. To calculate the ANOVA we had to delete two data points as there was a lack of information within them, leaving us with only 23 responses to examine. There also seemed to be a lack of correlation between how often old concepts were reviewed (successive relearning) and confidence going into the exam (Figure 2). This was evident through the correlational findings, $r(23) = -0.238$, $p = 0.274$.

Figure 1

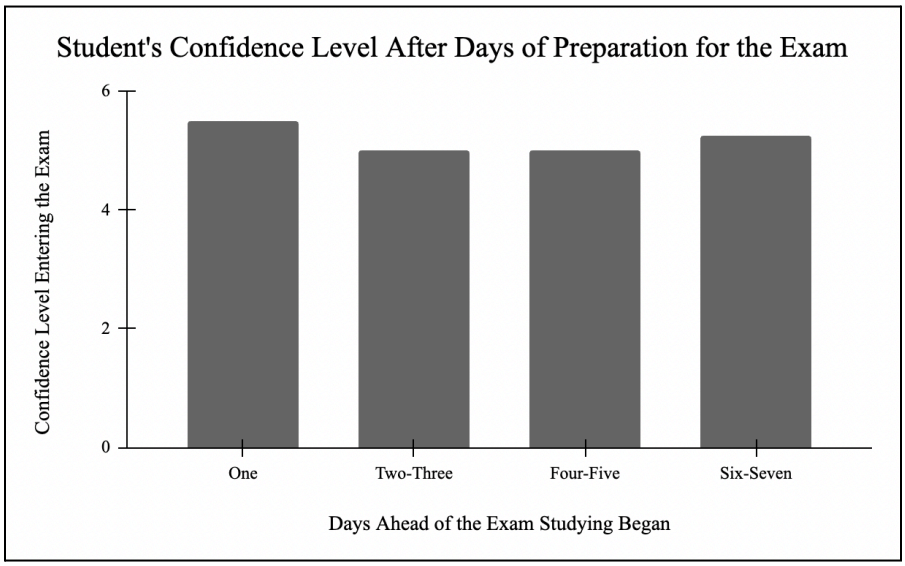
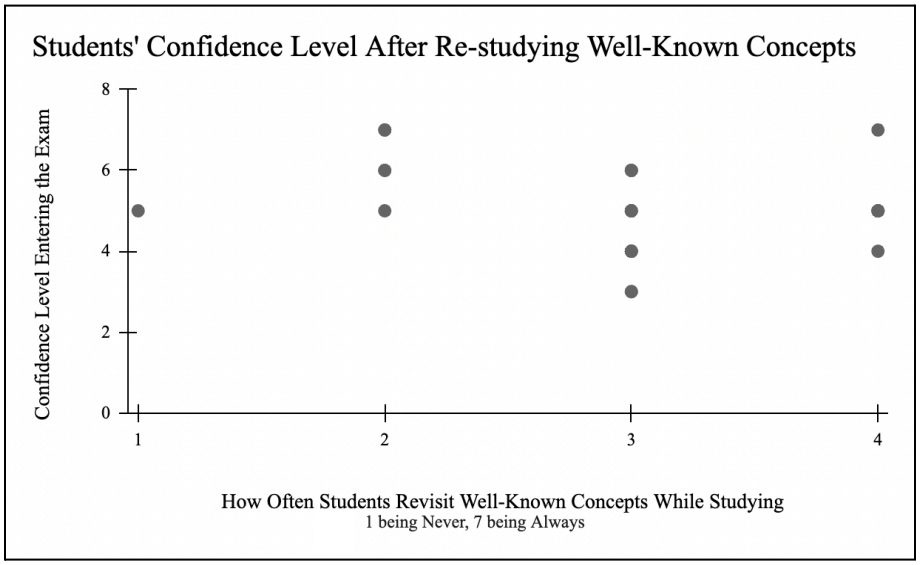


Figure 2



Discussion

As a result of our study, neither hypothesis was supported. The data we collected did not support our first hypothesis, that as the number of days spent preparing increases, feelings of preparation going into an exam will also increase. The data also did not support our second hypothesis, that more frequent review of well-understood concepts results in increased feelings of preparation going into an exam.

While the results of our study may not have been successful in alignment with the other studies we looked at, there are still things to note that can help us understand why the results appeared the way they did. The original inspiration study on successive relearning (Rawson & Dunlosky, 2022), focused more on increased retention than increased scoring. While the relearning group performed better on the test, the real strength lay in how long they could retain the information. This long-term retention was not focused on in our study so there may have been a correlation there if we had decided to look at it from a more longitudinal perspective. The

study using flashcards to test recall and retention (Kornell, 2009), also had results that differed from ours, but some results that may have aligned. The Kornell study resulted in increased scoring for those who spaced their learning (which was not supported in our study), however, it also noted that participants believed they would perform better with the massed learning. This is interesting because our final question was about how participants felt going into the exam (not how they actually ended up performing). Our lack of correlation may come from the fact that participants believed that the massed (cramming) study method made them feel more confident. This confidence was not necessarily backed up by their test results, which we did not record. The study on entry-level psychology students over a ten-week span did go against the findings of our study. Their study provided data concluding that longer-term spaced studying results in reduced anxiety and increased feelings of preparedness for exams (Higham et al., 2022). I think a primary reason for the differences between our results comes down to the fact that this was a ten-week study that alternated participants' study methods each week. At the level our study was conducted at, we were unable to watch participants over an extended timeline and we were unable to manipulate the participants into a within-subjects design. Their results follow the same people under the two different conditions, as ours only follow 23 individuals each experiencing their own condition for how they spaced their studying. Finally, the study on the recall of Spanish-English pairs over eight years (Bahrick & Phelphs, 1987). While this helped inspire looking at how many days ahead of the exam the student started preparing, our data does not directly link to theirs as this was not a longitudinal study. There is a slight possibility for there to be a correlation as time goes on, as this study focused on retention over the span of years instead of immediately after the test as we did. While many of our results differed from the original inspiration studies there are clear links and explanations for our results. The most notable thing

would be that our dependent variable measured confidence entering the exam instead of the participant's actual test scores, which was what most of these studies focused on.

Limitations

There are two large limitations that come to the forefront of why our test results did not align with those found in the inspiration articles. One of those two limitations was our sample size. Starting with a smaller sample size to begin with (25 participants) due to time constraints likely impacted the accuracy of our data. An issue we ran into when running our ANOVA test was that two of the participants had recorded study times that no other participants had. There had to be at least two participants in each category of study time (ie. two-three days) for the data to be able to be calculated. As a result, we had to delete those two data points and only look at 23 of the responses instead. Future researchers could collect a larger pool of data to avoid this limitation. With any sample of this size, it can be difficult to see the true effects the predictor variables may have on the outcome. This is not specific to our study but a general rule of thumb to follow when conducting any statistical analysis. This is also important for future researchers to make the study generalizable to improve its accuracy.

The second limitation, and arguably the most important to our results was our outcome variable question. We asked participants how confident they felt going into the exam on a scale of 1-7. The issue with this is that confidence when entering the exam does not necessarily result in better retention or scoring. If we had looked at specific test scores or grades, then it may have allowed us to create a conclusion more in line with the other research on successive relearning. This could be fixed by future researchers asking participants to record specific scores they received on exams after going through the steps of massed or spaced learning.

Future Directions

For researchers looking to replicate this study or similar studies in the future, there are a few things to take into consideration. Many of the studies that accurately show correlation between relearning material and increased scoring on tests are longitudinal studies. Given less time constraints one could follow a group of students over a longer period of time tracking study habits. Future researchers also have the opportunity to add in actual scoring on the exam to their study. From this, they could see if there was a link between confidence going into the exam and score on the exam given a massed or spaced condition. A final direction for aspiring researchers of this topic is to zoom in on one specific class test. Our data looked at students from seven different Loyola subcolleges, so the tests that students took likely ranged vastly in difficulty level and content. Researchers could follow one specific topic or class to see if on the same exam students with different study methods performed better or worse.

Conclusion

In the final analysis of our study we predicted that as preparation time increases, feelings of confidence entering the exam would also increase. We also predicted that frequently reviewing well-understood concepts would result in increased feelings of preparedness for an exam. The data was unable to show correlation within either of these hypotheses but there is still valuable data to be pulled from our study. For our participants, the feelings of preparedness were not specifically and solely dependent on either the days they spent preparing for the exam or their likelihood to review older concepts. Ultimately, the broad application of this still needs much more studying and future researchers have the opportunity to look more into the links between timeline of studying and confidence, as well as reviewing older concepts and confidence when entering exams.

References

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