Is Latency to Test Deadline a Predictor of Student Test Performance?

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When students are given a period or window of time to take an exam, is taking an exam earlier in the window (high latency to deadline) related to test scores? In Study 1, students \((n = 236)\) were given windows of time to take online each of 13 quizzes and 4 exams. In Study 2, students \((n = 251)\) similarly took 4 exams online within a test window. In both studies, latency to deadline was significantly correlated to exam score. Higher scoring students took the exam earlier in the test window. We explore possible explanations of these relationships and map out directions for further study.

The extant literature is equivocal at best about the relationship between study time and course performance. Previous researchers sometimes report no statistically significant relationship between study time and exam scores (e.g., Dickinson & O’Connell, 1990; Gurung, Weidert, & Jeske, 2010). In contrast, Crede and Kuncel (2008), using a meta-analysis, suggested there may be a positive correlation between time studied and exam grades. Our approach to examining the relationship between study time and performance is to measure the time a student selects to take an exam within a span of available time, and how that choice may relate to test scores.

A number of factors could predict the relationship between the latency to test deadline (LTD) and performance on that test. When a student takes an exam at a fixed time, they can study up to the exam time and then, whether they are ready or not, they take the exam. When a student is given a window of time to take an exam, they decide when to terminate study. When students believe they are the most awake and when they believe they will have uninterrupted blocks of time are conditions that students may consider in selecting a test start time; we focused on that selected start time in the window in which instructors allowed the test to be taken. Two key factors are the student’s inherent ability and the quality and types of study strategies used (Gurung et al., 2010; Landrum, Turrisi, & Brandel, 2006; Plant, Ericsson, Hill, & Asberg, 2005). In fact, Plant et al. reported that when Scholastic Aptitude Test (SAT) scores are controlled for, any relationship between study time and test performance disappeared; thus, including key ability, variables such as SAT and high school grade point average (GPA) are vital. In one example, more time did lead to higher test scores for students enrolled in a microeconomics class, but those results only held true for those students with less aptitude for economics based on pre-requisite course performance (Feinberg, 2004).

A related yet perhaps more critical determinant of LTD may be metacognitive control (Thiede, Anderson, & Therriault, 2003; Winne & Nesbit, 2010), which ‘pertains to regulating an ongoing cognitive activity, such as stopping the activity, deciding to continue it, or changing it in midstream’ (Dunlosky & Metcalfe, 2009, p. 3). Unfortunately, people are not always accurate judges of what they know and do not know. Judgments of learning (JOLs) are only moderately accurate (Mueller, Tauber, & Dunlosky, 2013). Inaccurate JOLs then lead to illusions of
competence (Koriat & Bjork, 2005) that could motivate students to take tests earlier than they should.

Work on JOLs and the illusion of competence are only the tip of the iceberg as far as studies within the field of metacognition. Relevant to our purposes, the relationship between metacognition and learning has been studied extensively in the context of how people allocate study time to the material they are trying to master. Most researchers agree that students monitor their own level of understanding and knowledge and modify their study time accordingly (Karpicke, 2009). The underlying explanations as to how this takes place vary. In the discrepancy reduction model, learners set a personal goal related to how much they want to learn or how comfortable they want to feel with their understanding, and then they work to reduce the discrepancy between how well they know content and the goal level (Dunlosky & Hertzog, 1997). In contrast, the region of proximal learning model suggests students spend more time studying what they perceive to be easy among those that are not yet fully learned (Metcalfe & Kornell, 2003). The easy content is in the student’s region of proximal learning. According to the agenda-based regulation model, studying is assumed to be goal-oriented (Ariel, Dunlosky, & Bailey, 2009). Students allocate study time in a way that will efficiently maximize the attainment of task goals. How items are prioritized for study by a learner’s agenda will depend on a variety of factors, among them item difficulty, constraints on learning time, and the reward structure of the task. Of note is that studies in this vein also show that students often fall prey to a metacognitive illusion that occurs during self-regulated learning: once students can recall an item, they tend to believe they have ‘learned’ it. This may lead students to terminate practice rather than to continue practicing retrieval, a strategy choice that ultimately results in poor retention (Karpicke, 2009).

The metacognitive literature includes two other categories of concepts (in addition to metacognitive control); metacognitive knowledge and metacognitive monitoring. Metacognitive knowledge concerns what a person knows that they know, and metacognitive monitoring involves a self-analysis of one’s current state of thinking, cognitive processes, and knowledge (Dunlosky & Metcalfe, 2009). Although we tend to focus on an approximation of metacognitive control (a decision to regulate current cognitive activity), clearly metacognitive knowledge and metacognitive monitoring are ongoing processes that cannot be purely separated from metacognitive control. Metacognitive monitoring is seen to guide metacognitive control and many studies examine the link between monitoring and regulation (Nelson & Narens, 1990). For example, Koriat, Ackerman, Adiv, Lockl, and Schneider (2013) compared when self-regulation of studying is goal-driven and monitoring affects control so that increased study time enhances JOLs but when regulation is data-driven, JOLs are based on feedback from control and JOLs decrease with study time. Both types of links influence making metacognitive judgments (Koriat et al., 2013).

As an example regarding metacognitive control, Silverstein and Owens (1982) reported that students who performed well on a test also accurately estimated the amount of time taken to complete the test, whereas students performing poorly were also inaccurate in their estimation of time to test completion. In particular, our emphasis here regards the metacognitive control process ‘termination of study’, which involves the decision-making process of when to stop studying a particular item (Dunlosky & Metcalfe, 2009). Rather than examine the issue at the item or concept level – such as when to stop studying a specific concept, such as positive reinforcement – we broaden the approach to an entire unit exam – such as when to stop studying to take the test on the ‘Learning’ chapter. We defined ‘termination of study’ to be when a student chose to complete a quiz or test during a fixed time window in which the assessment was to be completed, as specified by the instructor. That is, what psychological variables might be related to when a student decides to ‘stop studying’ and take their exam when given a window of opportunity to make such a decision? It is fair to note that just because a student elects to take a quiz or test, that is not necessarily the end of student studying. A poor test result might encourage some students to return to the study materials in order to satisfy a curiosity. Other students in a course with a cumulative final exam, for example, may continue to study after the quiz or test in anticipation of the cumulative final.

It is also possible that other factors such as procrastination may delay the taking of the exam regardless of whether a student feels ready to take it or not. In two studies examining the link between procrastination and self-regulation of study, Wolters (2003) demonstrated that
procrastination was related to college students' self-efficacy and work-avoidant goal orientation and, to a lesser extent, their use of metacognitive strategies. Other researchers have reported the link between procrastination and metacognition (Fernie, Spada, Nikčević, Georgiou, & Moneta, 2009; Spada, Hiou, & Nikčević, 2006) though not in the realm of learning. Although an intensive study of possible metacognitive mechanisms and characteristic such as procrastination would be desirable, in our opinion reviewing the study time literature raises the basic question of whether LTD is predictive of course performance in the first place. The previously reviewed literature on metacognitive control presented the link between length of studying and confidence in knowledge, and thus is linked to making a decision to stop studying. We can extrapolate to suggest that exercising metacognitive control by stopping studying could also link to taking a test early in a window. A student metacognitively aware enough to know when she knows the material and hence stops studying and takes the test is likely to score higher than the student not aware enough and who hence keeps studying taking the test later in the window or at the last minute (perhaps hoping that a cramming strategy will suffice). Consequently, our key research question was this: Is the time a student selects within a window of opportunity to complete a quiz or test predictive of performance on that quiz or test? We hypothesized that there would be a strong positive correlation between time in window (i.e., a student taking the test early) and exam grades (i.e., high scores), given that having metacognitive control would be a function of higher scoring students (Karpicke, 2009; Thiede et al., 2003).

We designed two studies to begin to answer our question. In Study 1, students were quizzed weekly in an introductory psychology course using online course management software. Students were provided a 72-hour window to complete the weekly quiz. We focused on the metacognitive control process of termination of study by measuring the amount of time into the test window (i.e., LTD) the student waited until starting the quiz. A high LTD score indicates that the student started the quiz or exam early in the window, that is, with much time before the deadline, whereas a low LTD score indicates a smaller latency to the end of the test window. We then retrospectively ‘connected’ LTD with course performance outcomes, attitude measures gathered during the course, and relevant subject variables, such as prior semester GPA, high school GPA, and SAT scores. In Study 2, we correlated LTD with exam scores on four multiple-choice exams in a separate introductory psychology course. Our main goal was to test for the link between LTD and performance. In both studies, we attempted to identify factors associated with a predicted positive correlation between LTD scores and course performance.

Study 1

Method

Participants. The participants were 263 students enrolled in the first author’s introductory psychology course. From the valid responses regarding sex, 57.8% were female, 41.1% were male, and the remaining 1.1% did not respond. There were 79.8% first-years, 12.9% sophomores, 4.2% juniors, 0.8% seniors, and 1.1% post-baccalaureate students enrolled. Regarding ethnicity, 79.5% were White, 6.8% Hispanic/Latino, 4.9% Black/African-American, 2.3% Asian American/Pacific Islander, 1.5% American Indian/Alaska Native, and 3.8% not specified.

Materials. During the semester, students completed 13 weekly quizzes via Blackboard; each quiz was comprised of 20 multiple-choice items worth 2 points each (a student’s 3 lowest quiz scores were automatically dropped from gradebook calculations). Students also completed a 4-part cumulative final exam. For each of these outcome measures, we extracted the latency to deadline variable, since all course performance measures were administered online – LTD measures were available for each measure (see Table 1), and an average LTD for quizzes was calculated for each student. Students were provided a 72-hour window, Thursday 6.00pm to Sunday 6.00pm, to complete the weekly quiz. Using the Thursday-Sunday example, a student scoring 100 had only 100 minutes left in the test window, or started their test on Sunday afternoon at 4.20pm. A student scoring 2040 started their quiz on Saturday morning at 8.00am. The numerical score represents the latency to test deadline, in minutes, from when the test window was first available to when the student started their quiz or exam – the highest possible score is 4320 and the lowest possible score.
is 1. End of semester gradebook data included total quiz points earned (total possible = 400), total course points (total possible = 630), and course letter grade (A, B, C, D, F) expressed numerically as grade points (4, 3, 2, 1, 0).

Table 1. Course topics organized by descriptive outcomes, correlation with latency to test deadline (Study 1).

<table>
<thead>
<tr>
<th>Quiz / Exam</th>
<th>Topic</th>
<th>M</th>
<th>SD</th>
<th>LTD</th>
<th>df</th>
<th>r</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Research Methods</td>
<td>30.7</td>
<td>5.5</td>
<td>1438.3</td>
<td>213</td>
<td>.09</td>
<td>.206</td>
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<tr>
<td>2</td>
<td>Learning</td>
<td>31.1</td>
<td>5.1</td>
<td>1348.7</td>
<td>225</td>
<td>.14</td>
<td>.032</td>
</tr>
<tr>
<td>3</td>
<td>Memory</td>
<td>32.4</td>
<td>5.3</td>
<td>1307.4</td>
<td>224</td>
<td>.17</td>
<td>.013</td>
</tr>
<tr>
<td>4</td>
<td>Cognition, Language, Intelligence</td>
<td>29.1</td>
<td>5.5</td>
<td>1246.8</td>
<td>220</td>
<td>.23</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>5</td>
<td>Biological Foundations of Behavior</td>
<td>31.0</td>
<td>5.2</td>
<td>1034.1</td>
<td>225</td>
<td>.16</td>
<td>.015</td>
</tr>
<tr>
<td>6</td>
<td>States of Consciousness</td>
<td>31.1</td>
<td>5.9</td>
<td>1217.5</td>
<td>189</td>
<td>.07</td>
<td>.361</td>
</tr>
<tr>
<td>7</td>
<td>Sensation and Perception</td>
<td>32.3</td>
<td>5.1</td>
<td>1213.4</td>
<td>213</td>
<td>.12</td>
<td>.083</td>
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<tr>
<td>8</td>
<td>Developmental Psychology</td>
<td>31.4</td>
<td>5.3</td>
<td>980.1</td>
<td>222</td>
<td>.25</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>9</td>
<td>Personality</td>
<td>32.2</td>
<td>6.0</td>
<td>920.3</td>
<td>210</td>
<td>.22</td>
<td>.001</td>
</tr>
<tr>
<td>10</td>
<td>Stress and Health</td>
<td>33.4</td>
<td>4.0</td>
<td>1131.2</td>
<td>222</td>
<td>.25</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>11</td>
<td>Abnormal Behavior</td>
<td>32.4</td>
<td>5.0</td>
<td>1098.4</td>
<td>222</td>
<td>.24</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>12</td>
<td>Therapies</td>
<td>32.2</td>
<td>5.1</td>
<td>1297.6</td>
<td>187</td>
<td>.14</td>
<td>.052</td>
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<td>13</td>
<td>Social Psychology</td>
<td>30.6</td>
<td>5.4</td>
<td>1090.3</td>
<td>200</td>
<td>.29</td>
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</tr>
<tr>
<td>FE 1</td>
<td>Cumulative Final Exam, Part 1</td>
<td>31.1</td>
<td>5.3</td>
<td>2755.5</td>
<td>241</td>
<td>.30</td>
<td>&lt; .001</td>
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<tr>
<td>FE 2</td>
<td>Cumulative Final Exam, Part 2</td>
<td>23.7</td>
<td>3.9</td>
<td>2433.1</td>
<td>241</td>
<td>.33</td>
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<td>FE 3</td>
<td>Cumulative Final Exam, Part 3</td>
<td>23.9</td>
<td>3.8</td>
<td>2277.7</td>
<td>242</td>
<td>.21</td>
<td>&lt; .001</td>
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<td>FE 4</td>
<td>Cumulative Final Exam, Part 4</td>
<td>23.3</td>
<td>3.6</td>
<td>2189.1</td>
<td>239</td>
<td>.40</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

Notes. LTD = Latency to Test Deadline. When the quiz/exam was completed, the number of minutes remaining until the test deadline (the higher the number, the earlier in the 72-hour window the quiz/exam was completed). FE = Final Exam. Each of the 13 quizzes contained 20 multiple-choice questions, worth 2 points each; students completed quizzes within 30 minutes. Final Exam Part 1 contained 40 multiple-choice items, each worth 1 point, and students completed FE Part 1 in 60 minutes. For Final Exam Parts 2-4, each contained 30 multiple-choice items, each worth 1 point, and students completed each part in 45 minutes.

During the course, students used student response systems (clickers), and we linked clicker responses to course performance data. The first author asked students clicker questions about (a) interest in the course and the textbook, (b) the extent course goals were met by the end of the semester, and (c) global questions about an overall course rating and overall instructor rating.

After the semester was complete, we obtained student demographic data (age, gender, ethnicity, year in school, full-time or part-time, first attempt at course, student status), and academic ability data (prior semester GPA, overall GPA, high school GPA, and SAT scores) (see Table 2) after retrospective Institutional Review Board (IRB) approval. For those students with ACT scores only, we used the ACT-SAT concordance tables described by ACT (2010) to convert the ACT composite score to an SAT combined score.

Table 2. Course component descriptive outcomes, correlation with latency to test deadline (Study 2).

<table>
<thead>
<tr>
<th>Class Component</th>
<th>M</th>
<th>SD</th>
<th>LTD</th>
<th>df</th>
<th>r</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Lecture Quizzes</td>
<td>12.88</td>
<td>1.71</td>
<td>-</td>
<td>251</td>
<td>.11</td>
<td>.072</td>
</tr>
<tr>
<td>Group Work</td>
<td>9.23</td>
<td>.69</td>
<td>-</td>
<td>251</td>
<td>.13</td>
<td>.037</td>
</tr>
<tr>
<td>LearnSmart</td>
<td>7.61</td>
<td>2.72</td>
<td>-</td>
<td>249</td>
<td>.01</td>
<td>.861</td>
</tr>
<tr>
<td>Exam 1</td>
<td>84.84</td>
<td>11.51</td>
<td>2359.1</td>
<td>251</td>
<td>.52</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Exam 2</td>
<td>79.44</td>
<td>12.73</td>
<td>2264.6</td>
<td>249</td>
<td>.18</td>
<td>.005</td>
</tr>
<tr>
<td>Exam 3</td>
<td>82.38</td>
<td>19.58</td>
<td>2302.2</td>
<td>243</td>
<td>.45</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Cumulative Exam 4</td>
<td>80.40</td>
<td>15.86</td>
<td>806.7</td>
<td>246</td>
<td>.16</td>
<td>.014</td>
</tr>
</tbody>
</table>

Notes. LTD = Latency to Test Deadline; when the exam was completed, the number of minutes remaining until the test deadline. For each of the first 3 exams, there were 65 multiple-choice questions. Exam 4 contained 80 multiple-choice items.
Latency to Test Deadline

Procedure. Over the course of the semester, quiz outcomes with LTD data were collected via Blackboard (www.blackboard.com). At the end of the semester, the first author administered a 4-part cumulative final exam, yielding 4 scores each with LTD data. Also during the semester, students answered questions using clickers, and these responses were linked to previously existing gradebook data. After the semester was complete, a retrospective IRB application was submitted and approved, which allowed us to acquire pre-existing student data, such as high school GPA and SAT scores. We deleted all student identifier information (name, student ID number) from the SPSS data file after all student data sources were linked.

Results

Descriptive outcomes. All of the quiz and cumulative final exam performance measures are reported in Table 1.

Predictive relationships. As presented in Table 1, LTD is significantly correlated with 10 of the 13 course quizzes, and all 4 parts of the cumulative final exam. For each student we calculated an average LTD across all 13 quizzes (a higher score indicates quizzes initiated earlier in the test window). LTD scores are significantly correlated with total points earned in the course, $r(258) = .31, p < .001$. LTD scores are significantly correlated with prior semester college GPA, $r(258) = .39, p < .001$, overall college GPA, $r(258) = .39, p < .001$, and high school GPA, $r(229) = .23, p < .001$, but are not significantly correlated with SAT scores, $r(216) = .11, p = .101$. Partial correlations, controlling for SAT scores, revealed 5 significant correlations out of 17.

A one-way ANCOVA was conducted examining how average LTD varied based on letter grade earned in the course (controlling for GPA). There was a significant between-subjects effect, $F(5, 260) = 12.24, p < .001$, and mean differences between students earning an A ($M = 1748.2, SD = 918.2$), B ($M = 1136.7, SD = 854.7$), C ($M = 926.8, SD = 677.2$), D ($M = 740.5, SD = 587.7$), and F ($M = 604.8, SD = 777.6$) on average LTD scores, $F(4, 255) = 12.81, p < .001$. These outcomes are graphically depicted in Figure 1.

Notes. Y-axis is latency to test deadline in minutes. X-axis is the earned course grade.

Figure 1. Course grade earned compared to average minutes LTD in Study 1.
Examining individual quiz and final exam results (Table 1), LTD is significantly positively correlated with 10 of 13 quizzes and all 4 parts of the cumulative final exam. In these instances, the earlier the test was taken in the test window, the better test performance exhibited. This relationship was attenuated by controlling for student ability (SAT scores) similar to findings by Plant et al. (2005).

Figure 1 is perhaps the most salient outcome of Study 1. There is a linear relationship between course grade earned and average LTD. Better performance (as evidenced by higher grades) is realized by students who take their tests earlier in the test window than students who take their tests closer to the deadline. Possible reasons for this outcome are that higher-performing students are more conscientious and complete studying sooner, and feel confident in their knowledge sooner. It could also be that students with poor metacognitive skills are not aware when they know the material well enough to take the quiz and so take it at the last moment possible. Given the occurrence of the test window from Thursday to Sunday, it could be that students with job responsibilities on the weekend take their test earlier, and that termination of study is not as related to exam performance as expected. There are multiple plausible explanations for this result, only one of which is that better prepared students terminate study earlier in a time window (thus having greater latencies to deadline). It is important to remember that LTD is not a causal variable, thus advising students to merely take the quiz or exam earlier in the test window will not necessarily lead to performance increases. From a metacognitive perspective, it could be fruitful to ask students to reflect on ‘what would it take for you to be prepared to take the test earlier in the window?’ This might lead students to think about study strategies different from their own, and how those different approaches might affect course performance outcomes.

Is this average LTD effect just an anomaly of one particular course using the ‘window’ structure inherently linked to one learning management system over a weekend, or does this effect occur in other situations? To answer this question, we conducted Study 2 on a different campus using a different course setup, but examining the same variables and relationships.

Study 2

Method

Participants. The participants were 248 (57.8% female and 41.1% male) students enrolled in the second author’s introductory psychology course. There were 52% first-years, 28% sophomores, 14% juniors, and 6% seniors enrolled.

Materials. During the semester, students completed 4 exams via Desire2Learn, a course management system. The first 3 exams were comprised of 65 multiple-choice items worth 1 point each. Students also completed an 80 multiple-choice item cumulative final exam. For each of these outcome measures, we extracted LTD scores similar to Study 1. Students were provided a 54-hour window (e.g., Sunday 6.00pm to Wednesday 12.00am) to complete each exam. Students also completed 10 quizzes online covering material from the chapters and designed to be taken before the material was covered in class (pre-lecture quizzes), and did applied exercises together in class (group work). In addition, students completed study exercises online using the publisher-designed software LearnSmart (learnsmart.prod.customer.mcgraw-hill.com).

Procedure. Over the course of the semester, exam outcomes with LTD data were collected via Desire2Learn. At the end of the semester, the second author administered the 80-item cumulative final exam, yielding a score and corresponding LTD data. We also administered a survey that evaluated the course and students provided self-reported GPA.

Results

Means for all the different course components (e.g., exams, quiz scores) are reported in Table 2. The table also presents correlations between each exam with the LTD value from that exam, and
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correlations between LTD for cumulative Exam 4 with all non-exam course components. As shown, LTD is significantly correlated with all 4 exams. LTD scores for the cumulative exam are significantly correlated with total points earned in the course, $r(246) = .14$, $p = .029$. LTD scores are significantly correlated with group work, $r(245) = .13$, $p = .037$, but LTD scores are not significantly correlated with any other course components.

Discussion

Consistent with Study 1, LTD was significantly correlated with all test scores in Study 2. We believe these results support the consistent relationship between when a test is taken in a test window and student performance on that test. Student GPA was not available in this study and it is possible that, similar to Study 1, the relationship between LTD and exam score would be attenuated by student ability. High LTD-scoring students were not exclusively predictive to general student success. The LTD measure did not relate to student scores on pre-lecture quizzes or on LearnSmart scores. This discrimination provides some support for our hypothesis that the time a test is taken could be related to metacognitive control (specifically, termination of study) versus a generalized characteristic of a smart student. Furthermore, we believe this pattern of results demonstrates that performance on practice tests and quizzes may not be considered by students in a similar fashion to tests and quizzes where a student’s grade rests in the balance.

General Discussion

Latency to test deadline (LTD) appears to be a variable worthy of further study. Student LTD scores were significantly correlated with test scores in two studies with students from two different universities using different textbooks and with different instructors. A key finding from research on metacognitive control is that students monitor their own level of understanding and knowledge and modify their study time accordingly (Karpicke, 2009). Using the time students take an exam as an implicit indicator of students being metacognitively cognizant of sufficient knowledge, our results establish LTD as a new variable in the examination of metacognitive processes. Students who had longer LTDs, taking the exam early in the test window, scored higher. Their high scores can be taken to indicate their metacognitive control (they knew they were ready and so stopped studying and took the exam).

Given the replication of the LTD effect, there are additional questions to be answered. A fundamental question relates to determining the specific reasons underlying lower LTD scores. One hypothesis is that better-performing students have superior metacognitive knowledge and metacognitive monitoring, thus metacognitive control processes are initiated and students believe they know enough to terminate studying and take the quiz or exam. Although the pattern of results supports this explanation, there are multiple plausible alternative hypotheses. Some of the best candidates for additional variables underlying the relationship between LTD and test scores are conscientiousness, good time management, and other environmental conditions (e.g., employment or workplace commitments). Time management is critical to good study success (Gurung & McCann, 2012). Students who plan their studying often do better on exams. It is possible that a student with good time management skills will ensure they are ready for the exam sooner rather than later to allow for time for delays or perhaps not have the exam looming. On a related note, conscientious students may want to be sure to take the exam well in advance of deadlines as conscientious students tend to be better students (Heinström, 2005). As mentioned earlier, it may be prudent to measure procrastination given the links between conscientiousness and procrastination, and consequently with metacognition (Wolters, 2003).

It is also possible that none of the time during the LTD interval was used for the purposes of studying, and future work should better measure what students actually do prior to the exam when they think or say they are studying. This research would benefit from data indicating the onset, duration, and termination of study. Theoretically, different students could have terminated their studies at the same time, but decided to complete the assignments earlier or later, based on a host of potential factors (e.g., perception of readiness, personal schedule, tendency to procrastinate, fear of failure, need for closure, etc.).
There is a clear pattern linking LTDs to higher test scores. Whereas higher LTDs may be an artifact of the conscientious student, it is possible that by taking the exam earlier in a window, students reduce retroactive interference and decay of material to be remembered on a quiz or test. In most of our exams (except for the final cumulative exam), taking a test earlier in the window would place it closer to when the material was discussed in class. Whereas our results are not causal (i.e., do not tell students to take the test earlier in test windows), scientist-educators may wish to further examine the underlying metacognitive mechanisms operating and continue to illustrate the utility of focusing on the scholarship of teaching and learning to better understand and hopefully improve learning by students in psychology (and all) courses.

References


Latency to Test Deadline


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Manuscript received 25 February 2013
Revision accepted for publication 04 July 2013