

Memory for Textbook Covers: When and Why We Remember a Book by Its Cover

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Summary: There is an important distinction between seeing something and paying attention to it, and this can influence memory. The current study examined incidental memory for the covers and authors of textbooks used in undergraduate psychology courses. Students in several courses were asked to recall the textbook cover design (Studies 1 and 2) and the name of the author of their textbook (Study 2). When the cover design was explicitly connected to a course concept, memory accuracy was positively related to performance in the course. While people may judge a book by its cover, remembering that cover may depend on how well it reflects a key concept of the book. The findings provide novel insight regarding how students attend to book covers and author information and when and why some students remember information that is not anticipated to appear on real-world course assessments. Copyright © 2017 John Wiley & Sons, Ltd.

Attention plays an important role in what is later remembered, as simply seeing something many times does not necessarily lead to accurate memory for that item. For example, inaccurate incidental memory for commonly seen items has been demonstrated in such contexts as the recall and production of an American penny (Nickerson & Adams, 1979) and the Apple Computer logo (Blake, Nazarian, & Castel, 2015). People also fail to recall the location of a fire extinguisher that they have seen many times, although knowing its location may become important in the future (Castel, Vendetti, & Holyoak, 2012). Even memory for items one uses every workday—such as the buttons on the elevator in one's office building—can be incorrect or incomplete (Vendetti, Castel, & Holyoak, 2013).

Although these items are frequently encountered, they are often inaccurately remembered. This does not appear to be due to capacity limitations, as recent work has shown long-term memory capacity for details of over 2000 images (Brady, Konkle, Alvarez, & Oliva, 2008). Instead, this may be related to a lack of encoding of items one encounters frequently, or perhaps a lack of motivation to pay attention to such items. Indeed, after brief amount of time to study an item like a penny, memory is significantly improved for its features (Marmie & Healy, 2004), suggesting that when participants are motivated to pay attention to and encode items that they encounter incidentally—such as in an educational setting, in which motivation to remember information is high—they are able to remember features of those items later.

Students may spend large amounts of time studying the content of their textbooks but devote little attention to features of the textbook they do not expect to be tested, such as the design of the cover or the names of the authors. The covers of magazines or newspapers may contain important information, but textbook covers do not always have an obvious or direct connection to course material. How students remember the design of their textbooks, and whether this memory is correlated with their performance in the course,

may have important implications for how covers are designed, not only as eye-catching images to attract consumers but also as opportunities to reinforce critical concepts in students' memories. Therefore, it would be beneficial to better understand how attention and memory interact to inform models that address real-world attentional issues (cf. Kingstone, Smilek, Ristic, Friesen, & Eastwood, 2003).

Goldstein, Bailis, and Chance (1983) found that students recognized pictures inside psychology textbooks at above-chance levels, even though it was difficult to control for how many times the students had seen the pictures. Goldstein et al. (1983) suggested that pictures that are well integrated into the text should be remembered more accurately than those that are simply 'there' (p. 25) and that this could promote memory by calling more attention to the picture and reinforcing its significance (cf. Hemmings & Battersby, 1989; Terry & Howe, 1988). Similarly, when students are directed to study textbook information that is otherwise not attended to, such as information in text boxes, they recall this information more accurately than students who were not instructed to study that information (Miller & Davis, 1993). The present research examined a stimulus that is thought to be seen often by many students: the cover of their course textbook. In the current studies, we examined memory for the picture on the covers of three different textbooks, some of which were incorporated into the text itself (Studies 1 and 2), as well as the name of one book's author (Study 2), to assess the extent to which frequently viewed (but incidental) features are remembered and whether overall course performance is related to memory for these items.

It may be that the students who perform well on assessments also accurately recall incidental information associated with their textbooks, as prior work suggests a positive relationship between undergraduate academic achievement and the number of attempts to understand textbook material (Wandersee, 1988). In this case, we consider incidental textbook information as that which is not expected to be tested but may be indicative of increased exposure to the textbook and related to deeper encoding of textbook-related information. This may also relate to levels of processing theory (Craik & Lockhart, 1972), such that students who encode the content of a textbook at a deep level (through frequent

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and/or effortful studying) may also remember more peripheral features of that textbook. This relationship would provide an additional variable of interest to measure students' knowledge.¹

However, frequently viewing the textbook could also lead to attention saturation (Bekerian & Baddeley, 1980) and/or a form of inattentional amnesia, in which students see the cover so often that it is not remembered (Wolfe, 1998, 1999). In addition, prior work suggests that undergraduate students tend to study what they view as important, particularly in relation to what they expect to encounter on a test (Benjamin, 2008; Balota & Neely, 1980). In the current study, students were not told that they would be tested on any details of the textbook cover or authors, but they were told that the content of the textbook would be included on examinations. Students may therefore not deeply encode information that is unimportant to them (e.g., the design of the textbook), focusing instead on important information within the textbook itself (e.g., terms and concepts in specific chapters that could be tested), as is suggested by prior work examining value-directed remembering (Castel, 2008).

To test these hypotheses, Study 1 examined students' memory for the design of the textbook cover and the relationship this had to overall performance in a course. In one class in which performance was assessed using weekly quizzes, the textbook featured a photograph on its cover, which was explained within the book. In a similar class (using an updated edition of the same textbook), the cover photograph did not have any explicit connection to the course material, and this photo was not present in the book, although the image could be connected to course concepts by the student independently. Study 2 examined how textbook information (both cover design and author information) is remembered by students in a large lecture course using multiple-choice questions, as well as the possible relationship between incidental memory and students' course performance. In Study 2, students used a textbook with a cover that was neither recreated in the text nor obviously connected to course concepts, as is often the case with psychology textbooks (see the Appendix for examples).

STUDY 1

Study 1 examined undergraduate students' recall of the photograph on the cover of their course textbook, whether that recall differed based on the meaning of the cover stimuli as referenced or not referenced in the textbook and how that recall related to students' overall performance in the course. The first edition of the textbook *Memory* by Baddeley, Eysenck, and Anderson (2009) featured an image of

¹ Anthony Greenwald, cocreator of the implicit association task (Greenwald, McGhee, & Schwartz, 1998), stated in an email message (personal communication, March 19, 2016) regarding this issue: 'I have given PhD students at Ohio State and the University of Washington various implicit memory questions (which couldn't be studied for) as part of their General Exams. The students who were strong performers on other (more standard) criteria generally did quite well on these, so I was persuaded to believe that these implicit memory questions were testing acquisition of useful professional knowledge. One of the more obscure things that we occasionally asked for is to produce middle initials, given first and last name, or the color of the cover of the Journal of Experimental Psychology'.

telephone poles at sunset on its cover (Figure 1), and this image was described inside the textbook as an analogy to memory (from Crowder, 1976). The second edition of the same textbook featured an image of a wooden dock, which was not explicitly mentioned inside the textbook. We expected that if the only significant encoding that took place was directed towards information that students expected to see on a later test, the accuracy in recall of the cover image would be relatively low and not correlated with course performance; on the other hand, if students studied more for the course assessments by using the textbook more (thereby gaining more exposure to the cover image) and their incidental encoding of the image was sufficient, we expected there to be a positive relationship between image recall and course performance.

Method

Participants

Participants in Study 1 were students in an undergraduate course at the University of California, Los Angeles (UCLA), in the winter quarter of 2012, the fall quarter of 2012, or the winter quarter of 2016. The class was an upper-division course entitled 'Human Memory' and consisted mainly of psychology majors of junior-level and senior-level standing. Only data collected from students who were present for the quiz that included the relevant question ($n = 127$ total, $n = 89$ using the first edition of the textbook in winter 2012 and fall 2012 and $n = 38$ using the second edition in winter 2016) were considered. Approval from the UCLA Institutional Review Board was obtained to analyze these data and publish the results.

Materials and procedure

Students in this course completed weekly quizzes testing their knowledge of the course content, which they were told would contain questions that tested information presented in lecture and in the textbook. Students were encouraged by the instructor to pay attention in lecture and read their textbook in order to perform well on these weekly quizzes, which constituted a major portion of their course grade (seven quizzes contributed to 50% of the final grade). In the different academic quarters of the course, two consecutive editions of the same textbook were used: students in winter and fall 2012 used the textbook *Memory* (first edition) by Baddeley *et al.* (2009), and students in winter 2016 used the second edition of the same textbook by the same authors (Baddeley, Eysenck, & Anderson, 2014). The cover design of the first edition textbook was a photograph of telephone posts at sunset, and the cover design of the second edition textbook was of a wooden dock on a body of water (Figure 1). The visual complexity of both covers was comparable. The authors' names and the title were in white text on both textbooks. In the first lecture of the course, the instructor (Alan Castel) explicitly mentioned the importance of the textbook to the course, and the book was listed as required reading on the syllabus. An image of its cover was also presented in the class lecture slides (which were posted on the course website) as a reminder to students to acquire the textbook. However, students were never explicitly told they would be tested on the textbook cover.

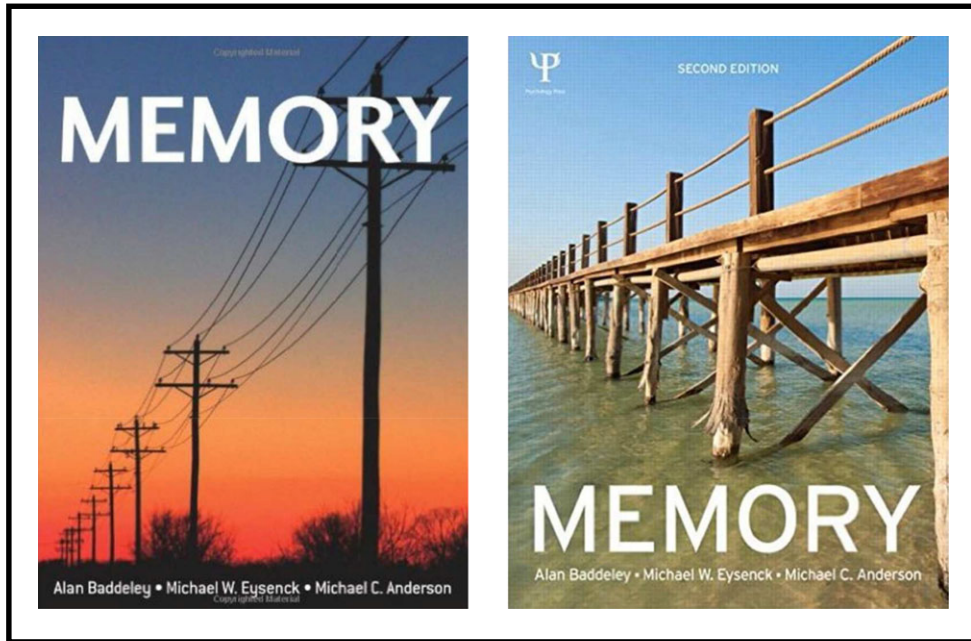


Figure 1. The covers of the first and second editions of the textbook *Memory* by Alan Baddeley, Michael Eysenck, and Michael Anderson, which were used in Study 1. [Colour figure can be viewed at wileyonlinelibrary.com]

Participants' weekly quizzes were given at the beginning of the class period and were worth 10 points each. Quizzes were distributed to each student present in the class, and students were given 25 minutes to complete the quiz. The question of interest for the present study was the final question on the quiz during the fifth week of the course (the course was 10 weeks long), and it stated the following: 'BONUS: Describe the picture on the front cover of the course textbook, and state its significance/relevance to memory'. Participants were given a blank space to answer and were told they would not be penalized for leaving the question blank or for incorrectly guessing the answer.

Results

Students were given 1 point for a correct answer to the bonus question, which was scored as correct if the gist or general concept of the cover design was recalled (e.g., 'dock on the ocean' and 'wooden pier' would both be counted as correct for those whose textbook covers featured a wooden dock in a body of water; incorrect responses included 'grayish brain' and 'hand bubbling a Scantron [answer sheet]'). The explanation portion of the question was not scored for precise accuracy for this study, as participants only had to provide some insight consistent with the photo to receive a bonus point (example responses include 'our memories can deteriorate over time like a dock in the ocean' and 'although the information is not relevant, the act of trying to remember what the book looks like is significant, because we are testing our implicit memory').

In the analyses presented in the succeeding texts, the course grades were considered without extra credit; that is, performance on the extra credit question was excluded from the student's percentage grade to avoid autocorrelation. Across the three classes, students received an average final grade of 89.65% ($SD = 6.03$), and the final grade consisted

of performance on the quizzes, class participation, a written assignment, a term paper, and a class presentation. The mean performance on the Week 5 quizzes was 8.56 out of 10 points ($SD = 1.40$). Across the three terms, 59.84% of students recalled the textbook cover correctly.

A point-biserial correlation revealed a significant relationship between final percentage grade in the course and responding correctly to the extra credit question, $r_{pb} = .18$, $p = .04$ (Figure 2). This indicates a positive relationship between a student's ultimate performance in the course and his or her likelihood of correctly naming the image on the textbook cover. There was no significant difference in memory accuracy for the cover design between the first edition and the second edition of the textbook, $t(125) = 0.50$, $p = .62$, such that those who were instructed using the first

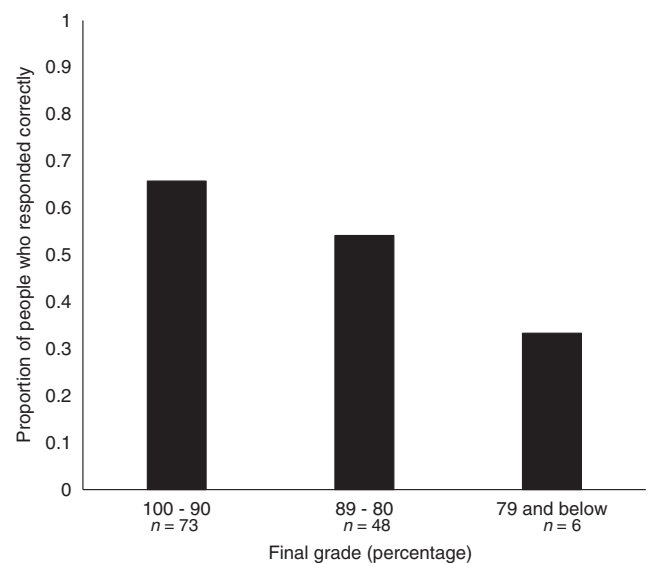


Figure 2. The proportion of students in each grade range who correctly recalled the image on the cover of the textbooks in Study 1

edition recalled the cover equally as accurately as those who were instructed using the second edition, with averages of 58.43% and 63.16% students responding correctly for the first and second editions, respectively.

To examine whether the relationship between recalling the cover design and course grade changed as a function of whether or not the textbook design was explicitly explained within the textbook itself, we conducted separate point-biserial correlations for students who used the first edition and the second edition textbooks. The correlation between recall of the first edition textbook cover and the final grades of students who used that textbook was significantly positive, $r_{pb} = .28$, $p = .01$. In contrast, the correlation between recall of the second edition textbook cover and the winter 2016 students' final grades was not significant, $r_{pb} = -.06$, $p = .74$. A Fisher r -to- z transformation did not reveal a significant difference between these two correlation coefficients, $z = 1.72$, $p = .09$, such that the correlation coefficient associated with the first edition textbook recall accuracy and final grade was not significantly different from that associated with the second edition textbook recall accuracy and final grade.

Discussion

In Study 1, we examined students' memory for the picture on the cover of their assigned textbook. Approximately 60% of students recalled what was on the cover of their textbook, and memory for the cover (as measured by responses on a free recall bonus question) was correlated with overall performance in the course combined across several samplings of students and at different points in time (consistent with the observation made by Greenwald, see footnote 1). Memory for everyday items that we often see, but do not necessarily direct attention towards encoding, is imperfect—even if we expect to remember these items (Blake *et al.*, 2015). However, findings from Study 1 suggest that high-performing students remember information about their textbooks on which they do not expect to be tested (if that information is explicitly connected to course concepts), although given the design of the study, we did not seek to directly control for time spent studying and other individual characteristics that might influence whether students look at the cover of the book.

It is worth explaining an important difference between the first and second edition textbooks and how their content relates—or does not relate—to their cover design. The first edition of the textbook, which features a cover design of telephone posts at sunset, does recreate a smaller version of this picture within the textbook (p. 26), along with a short caption explaining its relevance to memory: according to Crowder (1976), free recall of items can be compared with telephone posts in that the farther away the posts are, the more difficult it is to distinguish them from each other. In the second edition of the textbook, this image and caption remain in the book on p. 52, although they are no longer connected to its cover; the second edition cover design (a dock in an ocean) is not referenced within the text. By the time students in this course answered the question about the textbook cover itself, they had been assigned to read the chapter

in which the cover image was mentioned, which may explain why students who were assigned the first edition textbook had a significantly positive relationship between course performance and memory for the cover of the textbook (or perhaps this was simply due to seeing the picture more frequently, rather than its connection to course concepts). For the second edition textbook, the general analogy of the telephone poles as related to free recall could be applied to the dock, which has a similar structure and trails off into the distance. This was not explicitly mentioned in the text; therefore, a theoretical understanding of the image of the dock required a transfer of knowledge from the telephone pole analogy to a dock, a connection that would likely require some effort on the student's part. The lack of a positive relationship between students' grades and their recall of the dock may be related to students' inability or unlikeliness to extend such analogies without being prompted to, as has been shown in other work regarding analogical reasoning (Gick & Holyoak, 1980).

These results suggest that students' memory for a textbook's cover may be related to their final grade in that course but only when the cover image is explicitly connected to course concepts within the book itself. Study 1 was conducted in a smaller course with upper-division students who were assessed using weekly quizzes, which may not be reflective of textbook use in all course environments; therefore, we sought to examine memory for textbook information in a different context. What will students in a large lecture course remember about a textbook design without an explicit connection to the course content, either on its own or as discussed in the textbook? Will the author's name be encoded (as a way of referring to the textbook, perhaps) while the photograph on the cover is not? To address these questions, we conducted Study 2.

STUDY 2

In Study 1, the relationship between incidental memory for non-tested textbook details and students' grades in a relatively small course was examined. Results suggested a positive relationship between memory for the cover of the course textbook and performance in the course, but this depended upon on the whether the textbook cover was explicitly connected to course concepts in the text. In Study 2, the textbook cover was not obviously related to the topic of cognition (Figure 3), and it also was not explained in the textbook itself. We sought to examine how students would remember this cover design and other incidental information about the textbook (i.e., the name of the author), by examining performance in a large lecture course using multiple-choice questions on a midterm exam.

Method

Participants

Participants in Study 2 were undergraduate students enrolled in a large 'Introduction to Cognitive Psychology' course at UCLA in the spring quarter of 2016. The class was an upper-division lecture course and consisted mainly of psychology majors. A total of 264 students completed the

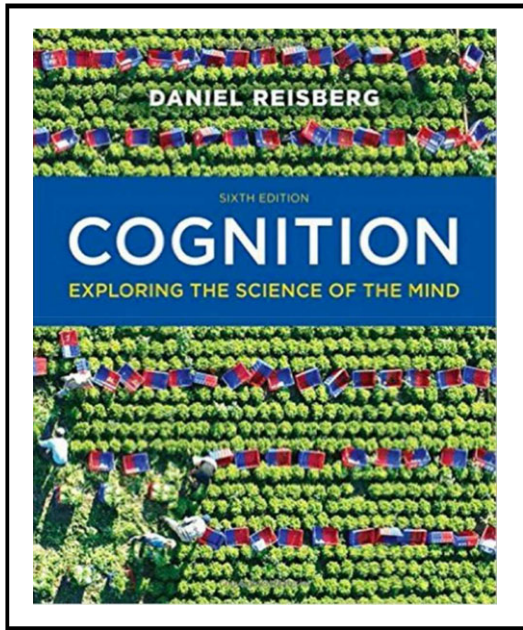


Figure 3. The cover of the textbook *Cognition: Exploring the Science of the Mind*, sixth edition, by Daniel Reisberg, which was used in Study 2. [Colour figure can be viewed at wileyonlinelibrary.com]

midterm examination on which the question of interest appeared. Approval from the UCLA Institutional Review Board was obtained to analyze these data and publish the results.

Materials and procedure

Students in this course completed a multiple-choice midterm exam halfway through the course, which consisted of 62 questions in total, the final two of which were bonus questions. The textbook used in this course was *Cognition: Exploring the Science of the Mind* by Daniel Reisberg (Reisberg, 2015; see the cover design in Figure 3). As in Study 1, the textbook was explicitly mentioned in the course syllabus and in the first lecture of the course by the instructor, Alan Castel, and an image of the cover was also presented in the class lecture slides (which were posted on the course website) as a reminder to students to acquire the textbook for the course. Students were never told that their memory for the cover or author would be tested.

When taking the first examination, students were instructed that the final two questions would be for extra credit and that guessing incorrectly or leaving them blank would not be penalized. Students were given the entire class period (80 minutes) to complete this examination. The questions of interest were the final two questions of the exam and consisted of the following: 'Which of the following descriptions best describes the cover of the current textbook used in this class?' (answer choices: 'People picking vegetables', 'Picture of a brain and neurons', 'Wooden docks in water', and 'Pastel impressionist artwork', with the correct answer being 'People picking vegetables') and 'Who is the author of your textbook in this class?' (answer choices: 'Daniel Gilbert', 'Daniel Reisberg', 'Daniel Solomon', and 'Daniel Schacter', with the correct answer being 'Daniel Reisberg').

Results

As in Study 1, the analyses reported in the succeeding texts use course grades from which performance on the extra credit questions have been excluded (i.e., a perfect score on the exam was 60/60). The average score on the exam (excluding the extra credit questions) was 79.29%, $SD = 10.83$. Overall, 39.16% of students chose the correct cover of the textbook (people picking vegetables; Figure 3), and 79.84% of students correctly named the author of the textbook (Daniel Reisberg). The cover design was correctly chosen significantly more accurately than chance (25%; $t(263) = 4.66, p < .001$), and the author was recalled significantly more accurately than the cover design, $t(263) = 11.28, p < .001$.

A point-biserial correlation was conducted to examine the relationship between midterm score and knowledge of the cover of the textbook and revealed no significant relationship, $r_{pb} = .08, p = .22$. Midterm score and knowledge of the textbook authors were also not significantly correlated, $r_{pb} = .04, p = .54$. Neither of these responses were correlated with students' final course performance, $r_{pb} = .11, p = .09$ and $r_{pb} = .06, p = .30$, respectively (Figure 4).

Discussion

In Study 2, the majority of students (79.84%) correctly chose the author of their textbook on the midterm exam, while fewer students (39.16%) chose the cover design. Overall, these results suggest that students' recognition memory for the author of their textbook is fairly accurate, perhaps due to other students, teaching assistants, or the professor referring to the textbook by the name of its author. However, the most perceptually salient part of the outside of the textbook, the photograph on the cover, was not remembered accurately by most students. This may be due to the lack of an explicit or implicit connection between the cover art and the topics of the course. Or perhaps this difference is due to the textbook design being more visually complex and/or less familiar to the student, such that it may be more difficult for someone to determine what exactly is in the photograph without directing significant attention towards it, while simpler images may lend themselves to faster and easier encoding (Eng, Chen, & Jiang, 2005). This may also explain the more accurate recognition memory for the author's name, as it is perhaps difficult or not necessary to deeply encode the complex picture (cf. Craik & Lockhart, 1972), while the name may be encoded with relatively more ease.

The nonsignificant relationship between course performance and recall of textbook information suggests that, unlike in Study 1, the highest-performing students in Study 2 did not remember incidental information about the textbook more accurately than lower-performing students (although we note there were apparent but nonsignificant differences between the correlations of those who received the first and second editions of the textbook in Study 1). This may also be related to the perceptual complexity of the textbook, or perhaps students in this course choose to study differently (or less frequently) for a large midterm exam than students in Study 1 who took weekly quizzes, which may have led to different and more frequent amounts of exposure to the

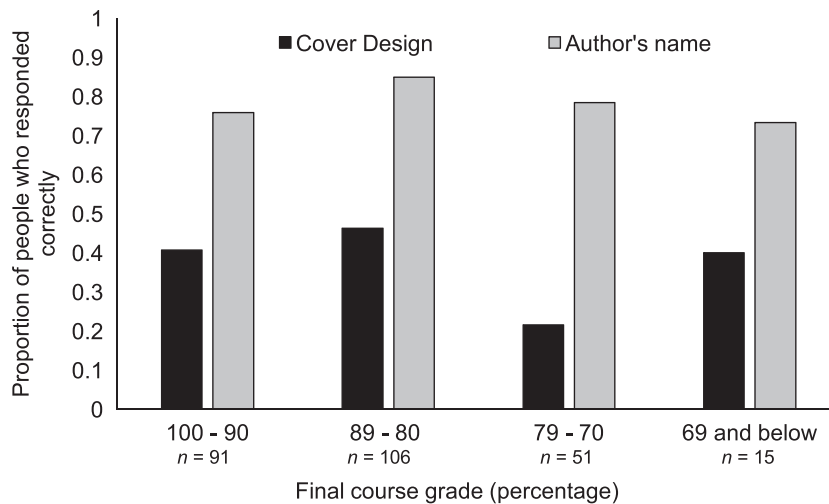


Figure 4. The proportion of students in each grade range who correctly recalled the image on the cover of the textbook and the author of the textbook in Study 2

textbook itself. If the highest-performing students in Study 2 studied the content they expected to be tested on, they may have paid little attention to the design of the textbook, as the content within the book was more important to study.

GENERAL DISCUSSION

The current studies examined incidental memory in a real-world classroom setting. Memory for everyday objects can often be inaccurate, even if one is exposed to the objects quite frequently (Castel, Nazarian, & Blake, 2015), although motivation may help to overcome this in an educational setting (Miller & Davis, 1993). In Study 1, undergraduate psychology students in a course on human memory were asked to recall the cover design of their textbook for the course in a free-recall bonus question. There was a positive relationship between recalling the textbook cover design and final course grade, although this was differentially impacted by the edition of the textbook. Students likely did not expect their memory for the textbook cover to be tested and therefore viewed the content inside the textbook as more important to remember, but the highest-performing students in the course remembered both types of information. This may have been related to more time spent studying the textbook, leading to more exposure to its cover (if the students indeed used a textbook with a visible cover, rather than an opaque protective cover or photocopied chapters). If students in Study 1 had no reason to believe that their textbook cover was relevant or important to their learning, they may have remembered that information with overall low accuracy and with no relationship to course performance, a pattern which occurred in Study 2. However, the fact that the textbook cover was connected to course concepts in Study 1 may have framed this information as relevant to the students' learning.

In Study 2, students' recognition memory for the author of their course textbook was significantly more accurate than memory for the textbook cover, even though the cover image was more perceptually salient than the author's name. This could be related to the textbook being referred to by students using the author's name, for example, 'in the Reisberg book,

chapter 2 ...' as opposed to its cover design, for example, 'in the book with the green field, chapter 2...', the connection between the cover design and the in-text reference to the cover, or the perceptual complexity of the textbook cover. This suggests that the relationship between performance in a course and recall of peripheral details is not present in all styles of courses, or with all types of textbook covers.

To examine possible differences between Studies 1 and 2 in accuracy of remembering the cover photograph, we conducted an independent-samples *t*-test, which revealed that students in Study 1 recalled the cover of their textbooks significantly more accurately than those in Study 2, 59.84% of students and 39.62% of students, respectively, $t(385) = 3.81, p < .001$. This may be due to differences in how the textbook covers were incorporated into the text itself: When the cover became part of an explanation of a course concept, as in the first edition textbook in Study 1, high-performing students tended to recall it more accurately. When the cover was not mentioned in the textbook, as in the second edition textbook in Study 1 and the textbook in Study 2, there was no relationship between recall or recognition of information about the textbook and how well a student performed (either locally, on that particular exam, or globally, in the course as a whole). This may be related to inattentive amnesia or attentional saturation for the cover picture (Bekerian & Baddeley, 1980; Wolfe, 1998, 1999). However, it may also be that participants in Study 1 simply studied the textbook on more occasions, because of the construction of the course. Although they were not directly measured, perhaps cognitive factors such as general intelligence, motivation for academic achievement, working memory capacity, and attentiveness in lecture may have also affected the relationship between recall of the textbook design and performance in the course (but see Brady *et al.*, 2008).

Although the studies were limited in some ways, including the necessary lack of experimenter-controlled exposure to the textbook, the possible individual differences in study habits, and the use of protective covers and/or prior editions or digital copies of the textbook, the findings do provide insight into students' incidental memory for course materials. As seen in the Appendix, psychology textbooks feature a

wide variety of cover designs, some more visually distinctive than others. Future research may relate distinctiveness of the cover to the recall of the design, as distinctive items are often recalled more accurately than common items (McDaniel & Einstein, 1986). Additionally, we expect that students who make highly confident errors in recall of peripheral details about course materials also perform lower in the course overall, as they believe they know information learned in the course but do not actually recall it on a later test (cf. Blake et al., 2015).

Overall, the findings suggest that the highest-performing students who are assigned textbooks that explain their cover photographs tend to remember them more accurately when given an unexpected question about the design. Further, names of textbook authors are remembered with relatively high accuracy, even if students do not expect to be tested on this information. While books may be judged by their covers, they may not always be remembered by them. However, textbook covers are not ignored by all students, which may have implications for the construction of textbook covers to benefit learning.

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APPENDIX A

Cover designs of six selected psychology textbooks, showing the diversity of cover art. [Colour figure can be viewed at wileyonlinelibrary.com]

