



The Effect of Paraphrasing on Memory

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Abstract

The extent to which information is encoded influences how well learners remember (Craik & Lockhart, 1972). Therefore, the purpose of this study is to examine the mnemonic benefits of paraphrasing on memory. Participants were randomly assigned either to take notes verbatim from a historical text or to paraphrase the information as they took notes. After finishing the note-taking task, participants completed a short math test, which functioned as a distractor. Finally, participants completed a 15-question multiple-choice quiz that measured their recall of the text. The paraphrasing group scored significantly higher on both the factual-recognition and critical-thinking questions, resulting in a higher overall score on the recall test as compared to the verbatim note-taking group. Results show that paraphrasing while reading can enhance learners' memories, as participants who paraphrased remembered more of the information from the reading, and they were more likely to draw accurate logical conclusions from their reading. By paraphrasing, learners pay more attention to the text because they need to understand and correctly evaluate its meaning. When learners obtain a thorough grasp of the reading material, they retain information better (Craik & Lockhart, 1972). As a result, paraphrasers have longer-lasting memory traces than the verbatim note-takers.

Memory is a vast term that reflects the human brain's various abilities to retain information. It is the ability not only to transmit information to the brain and actively maintain it, but also to retrieve the information when needed. Specifically, encoding is the first stage in the production of memory and is responsible for converting a sensory stimulus into a format that can be kept inside the brain (Nairne, 2014). Notably, due to learners' encoding strategies rather than the inherent capacity of their own memory, some learners might yield better recall of information than others (Benjamin, 2007). Therefore, the decision that one makes to study novel information may influence one's ability to recall. For example, learners who are actively engaged in the course content during their learning phase remember better than those who passively read or skim through the material (Storm, Hickman, & Bjork, 2016). In a study conducted by Rogers, Kuiper, and Kirker (1977), participants who examined the meaning of words (semantic) recalled significantly better than those who evaluated the surface characteristic of words in a recall test, either by focusing on whether the word was capitalized (structural) or whether it sounded similar to another word (phonemic). This shows that the assessing words' meaning helped participants learn better than assessment of words' surface characteristics.

Because the decision that learners make has an overall effect on their memories, it is necessary for them to consider appropriate learning techniques that strengthen their memories during the memory formation process. According to Benjamin (2007), the strategy by which learners encode new information affects how well they remember later. This has been introduced and tested in the depth of processing framework by Craik and Lockhart (1972). These researchers argue that memory traces depend on how carefully learners examine a sensory stimulus. In their experiment, they randomly assigned participants to three processing-of-information conditions: structural, phonemic, and semantic. In the structural condition, participants indicated how a word looks, while in the phonemic condition, participants examined how it sounds. The third group, which was the semantic condition, evaluated the meaning of a word by categorizing it into a sentence. Results showed that participants in the semantic condition retained more information than those in the structural and phonemic condition. Therefore, semantic processing is deep processing because learners analyze carefully and pay more attention to the sensory stimulus to understand a word's meaning (Craik & Lockhart, 1972). By contrast, examining the structural or the phonemic condition of words does not have an effect on memory, because learners solely focus on the surface characteristics of words. Hence, they are involved in shallow processing. According to Craik and Lockhart (1972), deep processing promotes the recall of information better than shallow processing.

However, the level of processing framework also faces criticism from other cognitive psychologists. For example, Eysenck (1978) indicated that this framework has not fully showed why deep processing, or specifically semantic encoding enhances memory. Later, Bransford and his colleagues (1979) found

that deep processing improves memory because it encourages learners to elaborate on the content. Specifically, when learners evaluate the meaning of a novel information, they might link their prior knowledge to that information to make it meaningful for their understanding (Bradshaw & Anderson, 1982; Bransford et al., 1979). And because learners use their own knowledge to decode the meaning of new information, that might be more discernible to the learners' brains and thus is easily recalled (Bransford et al., 1979). This functions in a similar way to how distinctive objects are recognizable to our eyes (Craik, 2002). Second, it could be that elaborate information is integrated with a person's organized mental structure of knowledge. This well-built integration could effectively aid learners in the information retrieval process (Moscovitch & Craik, 1976). Overall, semantic processing is an elaborative encoding strategy and facilitates memory formation.

Several research studies on writing across the curriculum have shown that writing functions as an effective way to aid the recall of information (Boyles, Killian, and Rileigh, 1994; Nevid, Pastva, & McClelland, 2012). For example, students who completed in-class writing assignments scored better on the final exam than those who did not (Boyles, Killian, and Rileigh, 1994). Similarly, students who wrote journal reflections and generic writing assignments remembered more key ideas for the final exam than those who did not (Nevid, Pastva, & McClelland, 2012). When students are introduced to new information, they might not understand it immediately (Nevid et al., 2012). Hence, writing is a great way to bridge the gap between learners and learning novel content, because it expects learners to retrieve knowledge from their long-term memories to interpret the new data in a meaningful way (Nevid et al., 2012). This also means that as learners write about a topic, they are involved in an elaborative encoding process (Kiewra et al., 1993). As a result, writing promotes the positive effect of elaborative encoding on memory and helps students remember more about the topic on which they wrote.

In contrast to the formal writing assignment, note-taking is a type of informal writing. Students use this technique to jot down important ideas while reading a text or listening to a lecture. Past research has been mixed regarding the effect of note-taking on memory during the encoding process. For example, Kiewra and colleagues (1993) proposed that note-taking helps learners actively engage in the text, rather than passively reading it. However, some research shows that note-taking does not facilitate memory or even hinders students from learning main ideas during lecture time (Ash & Carlton, 1953; McClendon, 1956). Researchers who found no beneficial effect of note-taking on memory imply that note-takers might not know how to capture key ideas from the material to their notes (McClendon, 1956). In order for the notes to be effective, learners need to be instructed on how to take notes or obtain an appropriate note-taking strategy (Jansen, Lakens, & Ijsselsteijn, 2017).

Researchers have examined the effect of note-taking strategies on learners' abilities to recall by directly giving participants a specific note-taking

guideline (Jansen, Lakens, & Ijsselsteijn, 2017). For example, participants in one group were required to take organized notes from the lecture on computers by paraphrasing and organizing the information, instead of typing the note verbatim. The result in this study shows that when laptop users took notes, those who had organized notes outperformed those who transcribed notes in a 48-hour delayed test (Bui, Myerson, & Hale, 2013). Likewise, Mueller and Openheimer (2014) conducted a research study on the use of laptops compared to handwriting notes during a lecture. These researchers found that without the opportunity to review notes, handwriting note-takers outperformed laptop note-takers in a 48-hour delayed recall test (Mueller & Openheimer, 2014). The difference in test performance between the two groups is due to the note-taking styles: handwriting note-takers paraphrased the information from the audio lecture, while laptop note-takers took verbatim notes (Mueller & Openheimer, 2014). Overall, both empirical studies have shown that regardless of the note-taking method, the quality of learners' notes, or specifically, how learners take notes, may influence their power of recall. Particularly, this research also suggests that paraphrasing might be a beneficial note-taking strategy.

Paraphrasing is a writing and note-taking technique that requires learners to restate a sentence or a paragraph in their own words. Learners successfully paraphrase when they change the vocabulary and grammatical structure in a sentence; however, the meaning of the new sentence should remain the same as the original one (McCarthy, Guess, & McNamara, 2009). Before learners paraphrase the information from a learning material, they have to ensure that their understanding of it is accurate (Glover et al., 1981). Thus, paraphraser try to grasp the material thoroughly before writing, instead of transcribing what they hear or read. Bretzing and Kulhavy (1979) conducted research on note-taking strategies by assigning participants to summarize, paraphrase, or take verbatim notes from the text. Later, they found that students who paraphrased or summarized their notes outperformed those who took verbatim notes in both the 48-hour delayed and immediate test (Bretzing & Kulhavy, 1979). This research study is consistent with the result from the level of processing framework by showing that participants who paraphrased their notes recalled more information than verbatim note-takers. When paraphrasing, participants must have engaged in the elaborative encoding process and thus remembered more important details.

The purpose of the current study is to examine whether different note-taking strategies, such as paraphrasing or writing verbatim, improve memory formation. The current study expands on the research of Bretzing and Kulhavy (1979), who found that summarizing and paraphrasing improved recall rates compared to verbatim note-taking. In this research, learners were asked to complete only lower-order thinking (factual-recognition and basic comprehension) questions. However, today's college students are not only tested on their memorization of factual information but also on their abilities to think critically, such as recognizing and evaluating an evidence. Hence, in the present

research study participants are expected to complete both lower-order and higher-order (critical thinking) questions. Finally, because this study focuses more on the effect that note-taking styles have on memory during the encoding process, participants are not given a review session to study their notes. This helps rule out any potential effect of repetitive learning on memory. I hypothesize that participants who paraphrase the assigned text while taking notes will perform better on the delayed test than those who only write their notes verbatim, because the former group will understand the overall meaning of the passage before they write in their own words.

Methods

Participants

Thirty undergraduate students at a private liberal arts college in Central Pennsylvania participated in this study. Participants consisted of 24 females and six males ranging in ages from 18 to 22 years ($M = 19.43$, $SD = 1.33$). No participants had learning disabilities. Participants were informed about the study in their Introductory Psychology class and in casual conversations. In addition to a verbal announcement, participants were recruited through flyers hung around the campus. Participants received course credit or extra credit, at their professors' discretion, in compensation for their participation in this study.

Design

The current study was a between-subjects, posttest-only design. In this study, the independent variable was a note-taking strategy, and it was defined as different ways and techniques to record selectively key ideas and the significant information by handwriting while reading. Participants in both groups were randomly assigned to one of the two levels of the independent variable through block randomization. In group 1, participants took verbatim notes by selectively copying key phrases verbatim or sentences from the reading that they considered important. In group 2, participants paraphrased the critical information by rewriting sentences and ideas in their own words. There were three dependent variables in this study. The first dependent variable was the participants' overall scores on the 15-item comprehension test. The second and the third were participants' scores on the lower-order thinking and higher-order thinking questions.

Materials

The necessary materials in this study consisted of an undergraduate-level reading passage, a 15-item comprehension test, a math test, and a demographic survey.

Reading material. The assigned text was comprised of two different

historical passages, but both described the unjustness of the American-Vietnam war. The total length of the reading material was 970 words. The first passage (Southey, 2018) discussed reasons why Muhammad Ali, a famous heavyweight boxing champion, refused to take part in the American-Vietnam war. The second passage (Southey, 2018) was a brief report by John Kerry, a former US Navy Lieutenant and a spokesperson for Vietnam Veterans Against the War. His testimony presented before the Senate Foreign Relations Committee explained the unrighteousness of the American-Vietnam war. The two passages were typed double space on the same paper. Each had the word “Passage 1” or “Passage 2” for participants to differentiate the two texts.

Prior to the experiment, four pilot participants were asked to read and take notes on three texts in different fields: History, Economics, and Environmental Studies. Each text had a pair of dual passages, which were written by two different authors but illustrated the same topic. This decision was made because people need to gather and critically understand the diverse information that they were working with when a single source of information was not sufficient for comprehension; furthermore, even adult readers found that reading and integrating information across multiple sources challenging (Bråten et al., 2014; Tarchi & Mason, 2019). Finally, they completed a short quiz that tested their text comprehension.

Results from the pilot test showed that participants had little prior knowledge in History, and most participants wrote an average of six words per line. Therefore, six words were chosen to be the minimal amount of words that participants needed to write in a line, and History was selected to be the reading material’s topic in the official research study. This helped minimize potential effects of prior knowledge on participant performance.

Math test. This test functioned as a distraction task. The math test included eight questions, which were basic mathematical formulas. There were two free-response and six multiple-choice questions, in which four choices were provided for participants.

Comprehension test. The comprehension test consisted of 15 multiple-choice questions, and each question had four choices. This test examined participants’ understanding and recall of the reading on which they had just taken notes. The type of questions was categorized into lower-order thinking (recall and comprehension) and higher-order thinking (critical thinking) questions. There were 10 lower-order thinking questions, which varied from factual-recognition to reading comprehension. These items tested participants’ abilities to recall events from the text correctly and to understand the message of some specific sentence. Five higher-order thinking questions measured students’ critical thinking skills. These asked participants to draw a logical conclusion based on the context or to evaluate the relationship between two passages. The potential scores on this test varied from 0 to 15, with a higher overall score on the test indicating that participants recalled important details and had a thorough grasp of both passages. Independent scores for both higher-order and lower-order thinking items were

recorded. A higher score on lower-order thinking questions meant that participants could accurately remember main ideas. Finally, a higher score on higher-order thinking questions suggested that participants could form rational and reasonable judgments based on textual evidence.

Demographic survey. The survey asked participants to report their age, sex, and class year.

Procedure

Participants read the informed consent and then were randomly assigned to the Writing verbatim or the Paraphrasing group through block randomization. Prior to the note-taking task, the experimenter reminded participants to carefully read and follow the instructions provided in their guidelines. Participants had 15 minutes to read the text and take note of important details. In the Writing verbatim group, participants were instructed to take notes by copying some original sentences that they considered important to their notes. In the Paraphrasing group, participants were required to rewrite key ideas and sentences that they believed helpful for the test in their own words. A clear definition and specific examples of how to write verbatim or paraphrase were clarified in the guidelines. Participants were also encouraged to review and compare their notes with the original text if they finished writing before the 15-minute time period elapsed. As long as participants in both groups wrote six words in a line and complied with the provided instruction, there would be no restriction for the length of their notes. Additionally, because the format of writing was not limited participants could either use abbreviation or symbols to express their ideas. As participants finished the note-taking task, their reading materials and notes were collected. Next, they were asked to complete a simple math test for 10 minutes. This was placed immediately after the note-taking task and just before the 15-item comprehension test to create a delayed condition and prevent participants from studying for the test. Afterward, participants were given the 15-item comprehension test, and they had 15 minutes to complete their test. Finally, the experimenter debriefed participants. Both participant assignment sheets and notes were numerically coded by numbering one or two. The former number indicated paraphrasing condition while the latter indicated writing verbatim condition.

Data were quantified as the proportion of questions correctly answered overall on the 15-item comprehension test. Specifically, data were quantified as the proportion of accurate answers on both lower-order and higher-order thinking questions. The compliance of participants was evaluated based on two criteria. The first criterion was whether they wrote 6 words per line. The second criterion was whether participants paraphrased 50 percent of their notes (for the Paraphrasing group). Paraphrasers were previously instructed that they could use original words from the text only if they could not find any alternative words to change. Notably, specific terms, personal names, place-name, and vocabularies that were central to the text were not counted as verbatim writing. Repeated use

of words, for examples, “Vietnam”, “American”, “die” or “body” was allowed in this case.

Results

Data from two participants in the Paraphrasing group were removed from the analysis because they did not paraphrase 50% of their notes. Thus, the Paraphrasing and the Writing verbatim group had 15 participants in each group. As hypothesized, the results of an independent sample t-test revealed that the mean overall score of participants who paraphrased ($M = 76.88$, $SD = 14.87$) was significantly higher than the mean overall score of participants who wrote their notes verbatim from the text ($M = 57.33$, $SD = 12.79$), $t(28) = -3.85$, $p = .001$.

In addition, the specific score for each type of question (factual-recognition and critical thinking) was also recorded. As hypothesized, the mean factual-recognition score of participants who paraphrased ($M = 74.00$, $SD = 17.64$) was significantly higher than the mean factual-recognition score of participants who wrote their notes verbatim from the text ($M = 54.66$, $SD = 19.95$), $t(28) = -2.81$, $p = .009$. Finally, participants who paraphrased ($M = 82.66$, $SD = 16.67$) also had significantly higher mean critical-thinking scores than participants who wrote their notes verbatim from the text ($M = 62.66$, $SD = 14.86$), $t(28) = -3.46$, $p = .002$.

Discussion

All things considered, the paraphrasing note-taking strategy significantly enhanced test performance, with the Paraphrasing group showing higher overall scores on the 15-item comprehension test than those in the Verbatim group. Specifically, participants who paraphrased the information from the text scored higher on both factual-recognition and critical thinking questions than those who wrote verbatim notes. Overall, these results support the hypothesis that participants who paraphrase their notes yield superior recall of information and demonstrate better critical-thinking skills.

This result is in line with the research on level of processing framework, which states that greater involvement in the learning material produces long-lasting memory traces (Craik & Lockhart, 1972). When learners evaluate the meaning of information, they are involved in semantic processing, which means that they analyze the learning content at a deeper level. Hence, they remember it longer. By contrast, learners who solely focus on the exterior characteristics of a word, such as its structure and rhyme, are involved in the shallow processing of information (Craik & Lockhart, 1972). Unsurprisingly, they remember less information. In the current study, participants in the Paraphrasing group showed a higher overall score than those in the Writing verbatim group. This happened because participants in the Paraphrasing group were asked to take notes by restating the information from the assigned text in their own words. In order to

fulfill this requirement, they had to investigate main ideas in both of the passages and understand these thoroughly before rewriting. As a result, they engaged in a semantic analysis, which is also a deeper level of processing information. By contrast, those in the Writing verbatim group copied original sentences from the passage to their notes. Consequently, they might focus on whether the copied sentence looks identical the original one. This could mean that verbatim note-takers are more concerned about surface characteristics rather than the content of their notes. Based on the conclusion from the level of processing framework, it is not surprising that participants in the Paraphrasing group yielded better recall than those in the Writing verbatim group.

In addition, the Paraphrasing group also outperformed the Verbatim writing group on factual-recognition questions. This result is consistent with the past research on the distinctiveness of encoding, which states that information processed at a deeper level is more memorable (Glover et al., 1981). In this study, paraphrasers recalled better than verbatim note-takers because the former might be able to draw a clear distinction between important ideas and unrelated ideas from the text. In order to paraphrase successfully, participants need to read the text carefully and try to understand its overall meaning (Glover et al., 1981). This helps them focus on a specific set of information, instead of trying to remember every detail. Thus, paraphrasers might have more time to elaborate on the new reading content by using their prior knowledge to interpret it. According to Jacoby and Craik (1979), when an object or information is meticulously described, it becomes more distinctive and easily recognized among similar objects or information. In this study, paraphrasers' notes were written in their own words, meaning that these might contain meaningful ideas and more distinctive details. Thus, paraphrased notes bolster participants' abilities to retrieve the information from their long-term memories. Conversely, notes that include verbatim sentences might not present distinctive ideas. Therefore, learners who took verbatim notes might have higher chance of forgetting the reading content faster.

Finally, the paraphrasing note-taking strategy also improved participants' performance on critical thinking questions. In general, this research shows results similar to those in previous experimental and correlational studies on note-taking by confirming that verbatim, rather than non-verbatim note-taking is predictive of poorer test performance, when the test concerns conceptual-level, high-order thinking questions (Aiken, Thomas, & Shennum, 1976); Bretzing & Kullhavy, 1979; Slotte & Lonka, 1999). Also, the current finding supports the notion that higher-order thinking questions require extra attention to the reading content (Kiewra, 1987). To apply the paraphrasing strategy effectively, extra attention is indeed required and may thus account for the improved performance of participants in this group. In order to paraphrase, participants must have read the passage several times before restating the information in their own words. As they keep reading the text, they become more attentive to the reading material. Perhaps, this allows participants to extract important details from each of the

passages to compare and evaluate. Consequently, participants in the Paraphrasing group have more integrative understanding of the relationship between the two passages. On the other hand, verbatim note-takers might have focused on whether or not they accurately copied the text to their notes. Compared to paraphrasing notetakers, verbatim note-takers process the information at a shallow level. And because these participants are not expected to comprehend the two passages as in the case of the Paraphrasing group, they are more likely to engage in a less cognitively demanding task. This means that their notes might have more redundant information and thus hinder them from synthesizing ideas from the two texts effectively. As a result, they are more likely to choose the wrong answer when being asked about the relationship between two passages or inferential questions.

Although the present study focuses on the effect of paraphrasing note-taking strategy at the encoding stage, it is difficult to say if the encoding strategy leads to the superior recall of participants in the Paraphrasing group. When learners successfully remember information, it means that all the three stages in the process of memory production occur (Nainre, 2014). According to Craik and Jacoby (1979), deep processing of information also provides distinctive features that help learners to remember information better. This means that well-encoded information might also function as an appropriate retrieval cue and that learners activate their schema of past learning and experiences to match the new test condition (Jacoby & Craik, 1979).

One limitation of the study is the number of participants. Even though all the current findings from this study provide insights into the relationship between cognitive efforts and note-taking strategies, it would be better if the data collection process occurred over the course of several sessions. In other words, a larger and more diverse sample of participants could increase the power of this research. Finally, although the results of the pilot testing show that participants seem to have little prior knowledge in History, it might be better to have a manipulation check, which could be an exit question at the end of the test. The purpose of this is to see whether or not participants knew 50% or more of the information in the assigned text, prior to the test. Thus, individual differences can be less detrimental to the present research study.

The current study has shown that the paraphrasing note-taking strategy significantly improves test performance on both higher-order and lower-order thinking questions. Still, it is unknown whether paraphrasing aids reading skills. Therefore, a future study might examine whether paraphrasing enhances reading comprehension skills, especially with learners whose reading abilities are low. Specifically, experimenters could design a within-subject pre-test-post-test experiment, with a pre-test section measuring participants' reading abilities. Next, the experimenter would choose readers with the lowest reading comprehension skill as participants. Finally, they would randomly assign these participants into two groups: Paraphrasing and Verbatim Writing. Participants in both groups

would be given the same text to read. However, one group would restate the factual information from the text in their notes while the other would write verbatim notes. To this end, a 2 (reading comprehension ability) x 2 (note-taking strategy) between-subjects factorial design should be conducted in the future. This experimental design helps better address the question regarding the effect of paraphrasing on learners whose reading comprehension skills are poor.

Another future study that might benefit both students and teachers could hinge on the note-taking strategy across lecture modalities. In the current study, paraphrasing may be advantageous as a note-taking strategy for students who learn through reading materials. However, this has not been tested under different learning conditions. For example, it is unknown whether Paraphrasing note-taking strategies influence learners' memories under auditory learning (audio lecture) differently from visual learning (visual lecture) conditions. Experimenters might conduct a 2 x 2 between-subject factorial design to examine the effect of paraphrasing on memory under different learning conditions. In this experiment, there would be four groups in total. The first two groups would consist of participants learning in the auditory condition, and both groups would listen to the lecture. However, one group would take notes verbatim from the lecture, while the other would paraphrase the information from it. Next, another two groups would be placed in the visual learning condition. Similarly, one group would take notes verbatim by copying the information from the text to their notes, whereas the second group in this condition would paraphrase the information from the text.

Overall, paraphrasing the information from the reading material facilitates memory formation, irrespective of the question types. Whether it is low-order thinking or high-order thinking questions, participants who paraphrase their notes achieve better test performance than those who take notes verbatim. This result is helpful in helping students focus on the quality of their notes rather than skimming the passage. It also encourages students to read the text more carefully to figure out central ideas in the passage and the communicative intention of the author. As a result, learners might be able to extract important details from the reading and thus recall the learning material better, instead of trying to remember every detail or unimportant information. In summary, the Paraphrasing note-taking strategy supports learners to integrate new information better into their own perception.

References

- Aiken, E. G., Thomas, G. S., & Shennum, W. (1976). Memory for a lecture: Effect of notes, lecture rate, and information density. *Journal of Educational Psychology*, 67(3), 439–444. <http://dx.doi.org/10.1037/h0076613>
- Anderson, R. C. (1972). How to construct achievement tests to assess comprehension. *Review of Educational Research*, 42(2), 145–170. <http://dx.doi.org/10.2307/1170014>
- Ash, P., & Carlton, B. J. (1953). The value of note taking during film learning. *British Journal of Educational Psychology*, 25, 121–126. <https://doi.org/10.1111/j.2044-8279.1953.tb02848.x>
- Barnett, J. E., Di Vesta, F. J., & Rogozinski, J. T. (1981). What is learned in note taking? *Journal of Educational Psychology*, 73(2), 181–192. <http://dx.doi.org/10.1037/0022-0663.73.2.181>
- Benjamin, A. S. (2007). Memory is more than just remembering: Strategic control of encoding, accessing memory, and making decisions. *Psychology of Learning and Motivation*, 48, 175–223. [https://doi.org/10.1016/S0079-7421\(07\)48005-7](https://doi.org/10.1016/S0079-7421(07)48005-7)
- Boyles, M. P., Killian, P. W., & Rileigh, K. K. (1994). Learning by writing in introductory psychology. *Psychological Reports*, 75(1), 563–568. <https://doi.org/10.2466/pr0.1994.75.1.563>
- Bransford, J.D., Franks, J.J., Morris, C.D., & Stein, B.S. (1979). Some general constraints on learning and memory research. In L.S. Cermak & F.I.M. Craik (Eds.). *Levels of processing in human memory*. Lawrence Erlbaum Associates Inc.
- Bråten, I., Anmarkrud, Ø., Brandmo, C., & Strømsø, H. I. (2014). Developing and testing a model of direct and indirect relationships between individual differences, processing, and multiple-text comprehension. *Learning and Instruction*, 30, 9–24. <http://dx.doi.org/10.1016/j.learninstruc.2013.11.002>
- Bretzing, B. H., & Kulhavy, R. W. (1979). Notetaking and depth of processing. *Contemporary Educational Psychology*, 4(2), 145–153. [https://doi.org/10.1016/0361-476X\(79\)90069-9](https://doi.org/10.1016/0361-476X(79)90069-9)
- Bui, D. C., Myerson, J., & Hale, S. (2013). Note-taking with computers: Exploring alternative strategies for improved recall. *Journal of Educational Psychology*, 105(2), 299–309. <http://dx.doi.org/10.1037/a0030367>
- Craik, F. I., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior*, 11(6), 671–684. [http://dx.doi.org/10.1016/S0022-5371\(72\)80001-X](http://dx.doi.org/10.1016/S0022-5371(72)80001-X)

- Eysenck, M. W. (1978). Levels of processing: A critique. *British Journal of Psychology*, 69, 157–169. <https://doi.org/10.1111/j.2044-8295.1978.tb01643.x>
- Glover, J. A., Plake, B. S., Roberts, B., Zimmer, J. W., & Palmere, M. (1981). Distinctiveness of encoding: The effects of paraphrasing and drawing inferences on memory from prose. *Journal of Educational Psychology*, 73(5), 736–744. <http://dx.doi.org/10.1037/0022-0663.73.5.736>
- Igo, L. B., & Kiewra, K. A. (2007). How do high-achieving students approach web-based, copy and paste note taking? Selective pasting and related learning outcomes. *Journal of Advanced Academics*, 18(4), 512–529. <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=psyh&AN=2008-02248-002&site=ehost-live&scope=site>
- Jacoby, L., & Craik, F. I. (1979). Effects of elaboration of processing at encoding and retrieval: Trace distinctiveness and recovery of initial context. In L. Cermak and F. Craik (Eds.), *Levels of Processing and Human Memory*, (pp. 1–21). Lawrence Erlbaum Associates.
- Jansen, R. S., Lakens, D., & Ijsselstein, W. A. (2017). An integrative review of the cognitive costs and benefits of note-taking. *Educational Research Review*, 22, 223–233. <https://doi.org/10.1016/j.edurev.2017.10.001>
- Kiewra, K. A., & Benton, S. L. (1987). Effects of notetaking, the instructor's notes, and higher-order practice questions on factual and higher-order learning. *Journal of Instructional Psychology*, 14(4), 186–194. <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=psyh&AN=1989-03193-001&site=ehost-live&scope=site>
- McCarthy, P. M., Guess, R. H., & McNamara, D. (2009). The components of paraphrase evaluations. *Behavior Research Methods*, 41(3), 682–690. <https://doi.org/10.3758/BRM.41.3.682>
- Moscovitch, M., & Craik, F.I.M. (1976). Depth of processing, retrieval cues, and uniqueness of encoding as factors in recall. *Journal of Verbal Learning and Verbal Behavior*, 15, 447–458. [http://dx.doi.org/10.1016/S0022-5371\(76\)90040-2](http://dx.doi.org/10.1016/S0022-5371(76)90040-2)
- Mueller, P.A., & Oppenheimer, D. M. (2014). The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological Science*, 25(6), 1159–1168. <http://dx.doi.org/10.1177/0956797614524581>
- Nairne J. S. (2014). Adaptive memory: Controversies and future directions. In B. L. Schwartz, M. L. Howe, M. P. Toglia, & H. Otgaar (Eds.), *What is adaptive about adaptive memory?* (pp. 308–321), Oxford University Press.

- Nevid, J. S., Pastva, A., & McClelland, N. (2012). Writing-to-learn assignments in introductory psychology. *Teaching of Psychology*, 39(4), 272–275. <http://dx.doi.org/10.1177/0098628312456622>
- Penrose, A. M. (1992). To write or not to write: Effects of task and task interpretation on learning through writing. *Written Communication*, 9(4), 465–500. <https://doi.org/10.1177/0741088392009004002>
- Peper, R. J., & Mayer, R. E. (1986). Generative effects of note-taking during science lectures. *Journal of Educational Psychology*, 78(1), 34–38. <http://dx.doi.org/10.1037/0022-0663.78.1.34>
- Rogers, T. B., Kuiper, N. A., & Kirker, W. S. (1977). Self-reference and the encoding of personal information. *Journal of Personality and Social Psychology*, 35(9), 677–688. <http://dx.doi.org/10.1037/0022-3514.35.9.677>
- Slotte, V., & Lonka, K. (1999). Review and process effects of spontaneous note-taking on text comprehension. *Contemporary Educational Psychology*, 24(1), 1–20. <http://dx.doi.org/10.1006/ceps.1998.0980>
- Southey, J. (2018). Muhammad Ali explains his refusal to fight in Vietnam (1967). <https://alphahistory.com/vietnamwar/muhammad-ali-refuses-to-fight-1967>
- Southey, J. (2018). An American draft dodger explains his actions. <https://alphahistory.com/vietnamwar/american-draft-dodger>
- Spirgel, A. S., & Delaney, P. F. (2014). Does writing summaries improve memory for text? *Educational Psychology Review*, 28(1), 171–196. <http://dx.doi.org/10.1007/s10648-014-9290-2>
- Storm, B.C., Hickman, M.L., & Bjork, E.L. (2016). Improving encoding strategies as a function of test knowledge and experience. *Memory & Cognition*, 44(4), 660–670. <https://doi.org/10.3758/s13421-016-0588-9>
- Tarchi, C., & Mason, L. (2019). Effects of critical thinking on multiple-document comprehension. *European Journal of Psychology of Education*, 34(138), 1–25. <https://doi.org/10.1007/s10212-019-00426-8>