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Is recitation an effective tool for adult learners?

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ABSTRACT

The effects of recitation on subsequent recall were examined in 4 experiments modeled after those of Gates (1917). Participants underwent a study phase, a recitation phase, and a test phase. During the recitation phase participants were to attempt to recall the previously studied material and then to restudy it when they could not recall any new information. They were encouraged to switch between recalling and restudying. The proportion of the total acquisition time that was spent in recitation was varied. Unlike the classic findings reported by Gates (1917) in schoolchildren, there was no consistent evidence that recitation enhanced learning in these adult learners.

Retrieval practice is well-established to be an effective strategy for learning (McDermott, Arnold, & Nelson, 2014; Roediger & Karpicke, 2006a). Indeed, many articles and reviews covering the benefits of retrieval practice begin with an historical overview highlighting the classic study of Gates (1917)—entitled *Recitation as a Factor in Memorizing*—as one of the foundational reports demonstrating how retrieval practice can benefit student learning.

By recitation, Gates was referring to a specific type of self-testing wherein a student had the to-be-learned information in front of them and tried to recall the information covertly, glancing back to the memoranda whenever retrieval began to fail and then returning to covert recall. Gates was motivated to empirically test the claim of Francis Bacon (1620/2000), who had asserted that "If you read anything over twenty times you will not learn it by heart so easily as if you were to read it only ten, trying to repeat it between whiles, and when memory failed looking at the book." Gates was also interested in knowing when in the learning process recitation should be introduced; that is, perhaps only after significant study would such self-testing be beneficial.

Gates reviewed the sparse literature to date, noting that Katzaroff (1908) had shown that adults learning nonsense syllable pairs recalled more when they spent time in recitation in addition to reading (relative to spending all the acquisition time in the reading phase). A more careful look at this procedure suggests that the study actually employed overt cued recall during this "recitation" phase and is not, therefore, recitation, at least as defined by Gates and in the present report.

Thorndike (1914) gave 28 adults 4 sets of vocabulary words to learn and demonstrated no benefit of recitation. That is, for the sets learned only by reading and re-reading, people later recalled 82%; for those learned by reading and self-testing, people later recalled 72%. Thorndike did not draw strong conclusions from this null effect, however. He concluded "The experiment was too crude and too slight to give numerical results worth presenting in detail."

The one study cited by Gates that seems most promising in setting up his own study was one reported by Kuhn, 1914, who showed that adults learning verses, words, or nonsense syllables learned better when they were able to engage in recitation (relative to just reading and re-reading). Exactly how to interpret these results is in question, however, in that the dependent variable was the number of repetitions engaged by the subject "until he was confident of his mastery of the material" (Gates, 1917, p. 6). That is, recitation's effects on objective recall probability are still in question.

Gates's (1917) results were more robust, although even here one can see limitations to the generalizability of the results. Depicted in Fig. 1 are a subset of his findings, on an immediate test with nonsense materials (nonsense syllables) and meaningful materials (biographies). All children were given 9 min to learn a set of materials. What differed was how that time was spent. In the 5 conditions depicted in Fig. 1, students spent the entire time studying (the 100:0 condition) or varying amounts of time reciting after initial study (with the ratio of percent study time to percent recitation time varying from 80:20, 60:40, 40:60, and 20:80). Gates observed that more recitation led to greater recall, both immediately (shown in Fig. 1) and after a delay (not shown). A second empirical finding can be seen from this figure, as well: The recitation effect was much greater for nonsense syllables than for biographies.

The motivation behind the present studies was to explore the optimal configurations of study and recitation within adult

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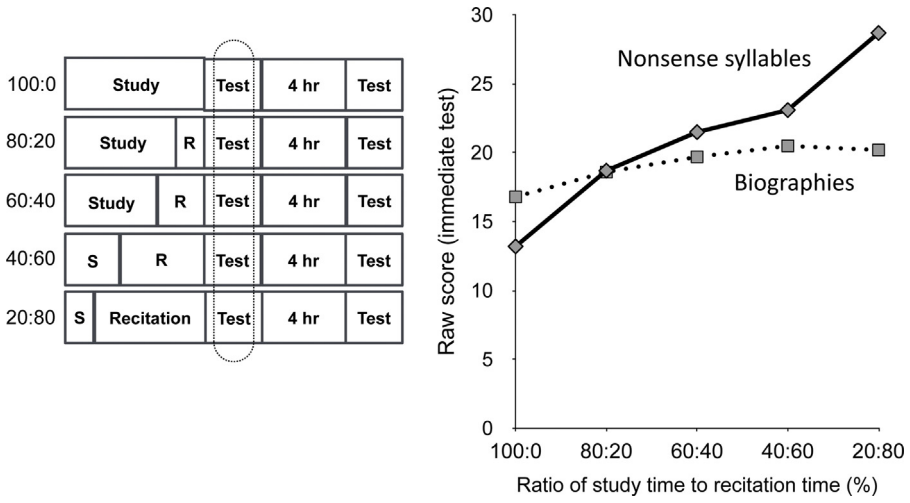

Fig. 1. Left panel. Procedures used by Gates (1917). Students worked with materials for 9 min, always beginning by reading the materials. Most groups then performed recitation for varying amounts of time, from 100% of the time (the 100:0 condition, referring to 100% studying and 0% recitation) to 20% of the time (the 20:80 condition). Right panel: Selected results reported by Gates (1917). As the ratio of study time to recitation decreased, subsequent recall increased; this pattern was more pronounced for nonsense syllables than for biographies. Data from Tables XVII, p. 36, and XXI, p. 40, average of grades 4, 6, and 8.

learners. As a starting point, we sought to establish the basic phenomenon, using conditions similar to some of Gates's more extreme conditions to establish the finding within a sample of adult subjects. We began with unrelated words in Experiment 1 and (as will be seen) failed to achieve any differences as a result of the proportion of time spent self-testing. In Experiments 2–4 we moved progressively closer to the procedures of Gates but consistently failed to find any benefits of recitation.

1. Experiment 1

All subjects were given a fixed amount of time (5 min) to learn a set of English words; the independent variable was how this time was spent. Specifically, some subjects spent 70% of their time studying, followed by 30% of the time in self-testing (the 70:30 condition). Other subjects spent 30% of their time studying, followed by a self-testing phase (70% of their time, the 30:70 condition). To the extent that this self-testing is effective, the group spending more time undergoing this process would be expected to recall more on the final test. Note that this procedure differs from that used by Gates in part because the cued recall phase was overt, not covert. As Gates defined recitation (a definition adopted here), recitation involves *covert*, self-testing with self-administered feedback. Experiments 2–4 will use recitation proper.

1.1. Method

1.1.1. Participants

Sixty-four participants were recruited from an online subject pool (Amazon Mechanical Turk) and compensated $1 for every 15 min of participation; the experiment took 13.2 min on average (range = 11.2–20.4). Fifty participants (mean age 37.0 years, range 18–60 years; 21 males) were included in the data analyses. The data from 14 subjects were excluded because they reported noting down the study words ($n = 9$) or not understanding the instructions ($n = 5$).

1.1.2. Design

Participants were randomly assigned to one of two learning groups. After applying the exclusion criteria, 24 participants remained in the 70:30 group and 26 participants in the 30:70 group. All participants went through the 4 phases in the experiment: study, self-testing with feedback, Tetris (a game used as a distractor to prevent rehearsal), and a final free recall test. The proportion of time spent in study and in self-testing was varied across conditions.

1.1.3. Materials

Thirty unrelated English words were selected from the norms of Nelson, McEvoy, and Schreiber (2004). The words had a mean concreteness rating of 6.15 (range 5–7) and mean word length of 6.20 (range 5–9).

1.1.4. Procedure

Participants were informed that the experiment would consist of 4 parts: study, self-testing, Tetris, and a memory test. Specifically, they were informed that they would attempt to learn 30 words and that they would then take a test on those words (looking back to the studied words as needed). They would then play Tetris for 3 min and take a final test on the 30 studied words.

The 30 unrelated English words were presented on the computer's display (simultaneously, with 3 columns of 10 words each). The instruction "STUDY" appeared at the top of the screen, as depicted in Fig. 2. Subjects were asked to encode the words in preparation for an upcoming memory test. This phase lasted 1.5 or 3.5 min, depending on condition, and was followed by the self-testing phase. For this phase and all phases, a countdown timer on the bottom right of the screen informed subjects how much time remained in the current phase.

Self-testing began with a blank screen, which prompted participants to type in as many of the words as they could recall (Fig. 2). Further, they were told "When you cannot recall any more words, click on the 'Study Words Again' button. . .to see all of the words again. Study all the words briefly, and then try recalling them again by clicking on the 'Practice Recalling the Words Again' button." They were to iteratively switch between recall and encoding until their time was up (3.5 or 1.5 min, depending upon condition). They were further informed that the "goal should be to learn as many words as you can for the final test. We encourage you to try to test yourself and restudy the words as often as possible during this time."

All participants then played Tetris for 3 min, after which they took the free recall test (2 min). Here, they were instructed to type in as many words as they could remember in any order they pleased.

In all experiments, participants received questionnaires after the primary tasks. These questionnaires asked demographic