Retrieval practice based on recognition memory: testing the retrieval effort hypothesis

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Background

The finding that taking memory tests improves long-term memory and overcomes repeated studying is called retrieval practice effect or a testing effect (1,2). While it has been much replicated within recall paradigms, a mechanistic account is still lacking. One way to move forward is to test predictions derived from current accounts.

The « Retrieval Effort Hypothesis » states that controlled (effortful) retrieval (e.g. recall) supports more elaborate and integrative processing than passive restudying, thus increasing the available retrieval cues (3,4).

Since recognition memory involves much less controlled retrieval than recall, repeated recognition should not yield a retrieval practice effect, especially if familiarity alone supports recognition.

1. Experiment 1: recognition memory vs. restudying

- Between-subjects design, N = 76
- Recognition memory= typical Old/New task
- Matching for Age, Education, FSIQ, Verbal Memory
- Manipulation of the intervening tasks: 2 successive study-test trials=
<table>
<thead>
<tr>
<th>Group</th>
<th>Number of test trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal</td>
<td>2</td>
</tr>
<tr>
<td>Normal</td>
<td>2</td>
</tr>
<tr>
<td>Test</td>
<td>2</td>
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</tbody>
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- Main outcome: Performance at final test (25 min. delay)

2. Results 1

- Before final test, study duration was on average 11 minutes in the « Study-Test » group, 7.4 minutes in the « Study » group and only 6.3 minutes in the « Test » group.

- Still, « Study-Test » & « Test » conditions yielded better long-term memory (A,B), without increase in False Alarms (C), and « Test » condition led to better 25 minutes – retention (D).

3. Experiment 2: familiarity practice vs. restudying

- Probing familiarity-based recognition memory: The « Speed and Accuracy Boosting procedure » (SAB) is a speeded Old/New memory test providing a direct estimate of familiarity-based recognition memory (5).
- Use of the SAB procedure for all test phases

- Between-subjects design, N = 30
- Manipulation of the learning schedules: 1, 2 or 3 repetitions of study trials=
<table>
<thead>
<tr>
<th>study</th>
<th>group</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>GROUP</td>
</tr>
<tr>
<td>B</td>
<td>GROUP</td>
</tr>
</tbody>
</table>
- Matching for Age, Education, FSIQ, Verbal Memory

- Main outcomes: Performance at short- and long-term final tests

4. Results 2

- Subjects in the « Study » group spent twice as much time studying AND had up to three times more opportunities to encode the stimuli.

- Similar minimal reaction times (minRTs) were achieved in both groups, well below 400ms, strongly constraining responses to familiarity-based recognition memory (5).

- Repeated retrieval was therefore based on automatic & fast processing, rather than slow, effortful, recollection.

- This did not came with an extra false alarms cost (C&D).

- Time spent studying does not drive learning efficiency. Instead, Experiment 2 provides unique evidence that learning occurs through repeated familiarity-based retrieval, i.e. even when retrieval is automatic.

Discussion

- Experiment 1 shows that the retrieval practice effect can be observed when retrieval is based on recognition memory rather than recall. Thus, learning does occur during recognition testing.

- Importantly, both experiments show that the benefits of memory retrieval based on recognition memory are immune to negative side effects like extra false alarms.

- When retrieval is constrained to fast and automatic processes (around 320 ms), thus being mostly familiarity-based, the generation of elaborative retrieval cues and/or effortful (controlled) processing are quite unlikely. Even then, extensive restudying does not outreach retrieval practice.

- Repeated automatic retrieval yields similar learning levels than extensive restudying, up to a 6 months delay.

- Familiarity-based recognition memory can support a retrieval practice effect, and resists to a 6 months delay similar to restudying, thus challenging a core prediction of the « Retrieval Effort Hypothesis ».

References

(3) Pyk & Besson (2000) Testing the retrieval effort hypothesis: Does greater difficulty correctly recalling information lead to higher levels of memory? Journal of Memory and Language, 42, 437-447