Learning Better, Learning More: The Benefits of Expanding Retrieval Practice

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### Optimizing Learning

**DISTRIBUTED LEARNING**

Spacing > Massing

(e.g., Dempster, 1958; Ebbinghaus, 1885/1964)

Why? Spaced repetitions engage more effective retrieval than do massed repetitions
- Retrieval is a memory-modifier
- The power of reminding (Benjamin & Tulis, 2010)

**EXPANDING RETRIEVAL**

As information is better learned, we should be able to afford to wait longer and longer before revisiting it—thus, an optimal schedule should involve expanding intervals.

- **Uniform:**
  - S → S → S → S

- **Expanding:**
  - S → S → S → S

But results have often been mixed:
- Uniform < Expanding
  - Carpenter & Dunlop, 2002; Cull, Shaughnessy, & Zechmeister, 1996; Landauer & Bjork, 1975
  - Especially when forgetting rate is fast

- Uniform > Expanding
  - (Bailes, Ducheck, Sergeant-Marshall, & Roediger, 2006; Karpicke & Roediger, 2007; Logan & Blakes, 2008)
  - Only spacing of the first interval is critical?

Prior studies equate (a) number of repetitions and (b) number of items, but these controls may miss some of the major benefits of expanding schedules...

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### Study Phase

**GRE-synonym word pairs (e.g., aplomb: poise)**

Test (8s), with feedback (3s) trials
- Initial trial: One letter stem cue (e.g., aplomb: p____)
- Subsequent trials: No letter stem cues

**Uniform vs. Expanding schedule (between-subjects)**

**Final Cued Recall Test**

GRE word-cued recall test

Link to test emailed out at a 24-hour delay

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### General Method

**Experiment 1**

**Uniform condition:** 30 pairs repeated 6x (10-10-10-10-10-10)

**Expanding condition:** 30 pairs repeated 4x (5-10-15-20-25-30)

- + 20 “bonus” pairs repeated 3x (59-59)

**Experiment 2**

**Uniform condition:** 50 pairs repeated 4x (10-10-10-10)

**Expanding condition:** 30 pairs repeated 4x (5-10-15-20-25-30)

- + 20 “bonus” pairs repeated 4x (51-51-51-51)

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### Conclusion

- Expanding schedules (vs. uniform schedules) led to...
  - **Equal** (Exp 1) or better (Exp 2) retention of GRE-synonym word pairs

- More efficient learning
  - In Exp 1, pairs on an expanding schedule were repeated 4 times; pairs on a uniform schedule were repeated 6 times

- Greater total number of words learned

- Ongoing: Tests, without feedback

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### References


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Contact Veronica Yan at vyan@ucla.edu with questions.