The Derring Effect: Deliberate Errors Enhance Learning

Sarah Shi Hui WONG & Stephen Wee Hun LIM
National University of Singapore

METHOD

Participants
- 120 undergraduate students (87 were female)

Design
- Learning Method (copy vs. concept-map vs. concept-error) as the primary between-subjects factor of interest
- Study Test (“volcanoes” vs. “food allergies”) as a control variable to insure that errors persisted across text topics

Materials
- Two scientific expository texts on “volcanoes” and “food allergies” (Griffith, Wiley, & Thiede, 2019)
- Two news article excerpts on actual historical events—the 1980 eruption of Mount St. Helens volcano vs. a local young boy who suffered a life-threatening allergic reaction

Procedure
- Study phase
  - Concept-map method: Learners drew a concept map that represented all key information in the text (Churatul & DeBalck, 2004; Forreiller & Mayer, 2016; Novak, 2005).
  - Concept-error method: Learners wrote down each sentence in the text such that it contained a plausible conceptual error, before striking out this error, and writing the actual concept (i.e., deliberate erring with correction).
  - Application test: Learners applied what they had learned to analyze the news event related to their studied text.

RESULTS

- Application test: Deliberate erring outperformed both copying and concept-mapping (p = .001 and .003, d = .77 and .70, 95% CI = [1.41, 5.09] and [0.94, 4.61]), respectively; both errors conditions did not differ, p > .05.
- Recall test: Deliberate erring produced superior recall than copying and concept-mapping (p = .001 and .02, d = .75 and .54, 95% CI = [2.43, 8.47] and [0.61, 6.64]), respectively; both errors conditions did not differ, p > .05.
- Metacognitive judgments: Yet, learners were largely unaware that deliberate erring had been helpful for them—for their JOLs did not differ across learning conditions, p > .05.

INTRODUCTION

- Learning from our errors is important, but often easier said than done
- Traditionally, errors have been avoided (Skinner, 1958)
- Failure hurts the ego (Eskreis-Winkler & Fishbach, 2019)
- Yet, errors can enhance learning when accompanied by corrective feedback (Kornell, Hay, & Bjork, 2009; Metcalfe, 2017; Potts & Shanks, 2014; Wong & Lim, 2019)

- How can errors be strategically positioned to optimize learning opportunities?
- Deliberately committing and correcting errors in low-stakes learning contexts as a counterintuitive strategy
  - Benefits of making errors oneself (Metcalfe & Xu, 2018)
  - More systematic than “naturalistic” errors
  - Ego concerns are minimized—errors can be attributed to the learning approach instead of low ability

- Hypothesis: Deliberately committing and correcting errors even when one knows the correct answers produces superior learning than avoiding errors—the derring effect
- Learning assessed as not only knowledge retention, but also higher order application of knowledge (Bloom, 1956)

METHOD

Participants
- 40 undergraduate students (32 were female)

Design
- Single-factor (Learning Method: concept-synonym vs. concept-error) within-subjects design

Materials and Procedure
- Identical to Experiment 1, except:
  - Concept-map method: Learners elaborated on the text by writing down each sentence such that it contained a conceptual synonym (i.e., an alternate word or phrase that was conceptually the same as the actual concept), underlined this synonym, then wrote the actual concept.

RESULTS

- Application test: Deliberate erring enhanced learners’ performance in applying the material to analyze a novel news event, relative to generating alternative correct elaborations, p = .006, d = .46, 95% CI = [0.55, 3.10].
- Recall test: Deliberate erring produced a recall advantage over the concept-synonym method, p = .002, d = .51, 95% CI = [1.13, 4.87].
- Metacognitive judgments: Yet, learners inaccurately predicted no difference in their learning across the concept-error and concept-synonym conditions, p > .05.

DISCUSSION

- Deliberately committing and correcting errors is an effective strategy to enhance not only knowledge retention, but also higher order application of learning.
- The benefits of deliberate erring surpassed those of popular errorless learning techniques (Experiment 1).
- The derring effect was not simply due to a generation or an elaboration advantage, but was specific to having first produced an error rather than any other novel (correct) response (Experiment 2).

Educational Implications
- Deliberately incorporating errors in learning is more potent than avoiding them entirely.
- Since learners are often unaware of the benefits of deliberate erring, teachers should explicitly guide students into intentionally committing and correcting conceptual errors (e.g., in class discussions, homework assignments, and self-regulated study) as part of the learning design.

REFERENCES


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