Mind Wandering in and out of the Region of Proximal Learning

Judy Xu & Janet Metcalfe
Department of Psychology, Columbia University

Correspondence: jxu@psych.columbia.edu

Mind wandering is characterized by task-unrelated thought and is associated with deficits in learning and memory. Studies have found that learning is most efficacious when one studies materials in their own region of proximal learning (RPL), which is comprised of materials just beyond one’s current grasp – i.e., the easiest unlearned items. We hypothesized that studying materials in one’s own RPL, should elicit curiosity and attention. This would lead to decreased mind wandering and would improve learning.

Experiments 1 & 2: Does studying in RPL reduce mind wandering?

**Design**

**Pretest:** to sort items into easy/learned, RPL, and difficult

**Study:** examine the impact of studying in RPL on mind wandering
- Word pairs blocked by condition (easy/learned, RPL, difficult)

**Test:** examine how learning changes when mind wandering during study

**Materials:**
- Expt 1: 144 Spanish-English pairs + 10 perfect conjugates
- Expt 2: 144 Spanish-English pairs + 35 perfect conjugates

**Proportion of Mind Wandering**

![Graph showing proportion of mind wandering](image)

**Criteria:**
- Easy/Learned: 15 highest EOLs
- RPL: 15 middle EOLs
- Difficult: 15 lowest EOLs

**Learning based on attentional state**

![Graph showing learning based on attentional state](image)

**Experiment 1**
- Experiment 1 (n=23): \(F(2,42) = 4.33, p = .020\)
- Experiment 2 (n=28): \(F(2,50) = 9.23, p < .001\)

**Experiment 2**
- Experiment 1: \(F(1,10) = 2.21, p = .138; \alpha = 0.47\)
- Experiment 2: \(F(1,10) = 2.86, p = .06; \alpha = 0.66\)

Degrees of freedom differ since some subjects did not report any mind wandering.

Experiments 3: How does mind wandering change over time and among individuals?

**Design**

The following changes were made to the experiment:

**Paradigm**

PRETEST → STUDY → TEST → STUDY → TEST

**Pretest:** Items sorted into easy, medium, and difficult
- No initial response required
- JOLs replaced with ease of learning judgments (EOLs)

**Study:** Timing changed to 1400ms per word pair with 100ms ISI

**Test:** Categorize subjects as high or low performers based on mean test 1 performance

**Materials:** 45 Spanish-English word pairs
- No perfect conjugates

**Mind Wandering over Time**

![Graph showing mind wandering over time](image)

**Criteria:**
- Easy
- Medium
- Difficult

**Mind Wandering based on Test 1 Performance**

![Graph showing mind wandering based on test performance](image)

**Low Performers**
- Low Performers (n=24): n.s.
- High Performers (n=23): \(F(2,44) = 9.56, p < .001\)

**Conclusion:**
1. Learning was worse during episodes of mind wandering
2. Studying materials in RPL diminished the rate of mind wandering
3. Mind wandering increased over time, but the specific items eliciting an individual to mind wander differs based on expertise

References:


Acknowledgements

Thank you to everyone in the Memory & Metacognition Lab at Columbia for your input and support. This research is supported by the James S. McDonnell Foundation.