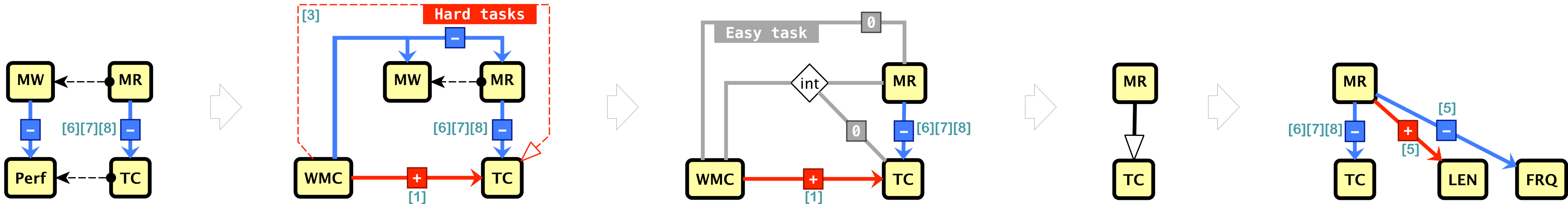


The effects of mind-wandering and working memory capacity on text comprehension



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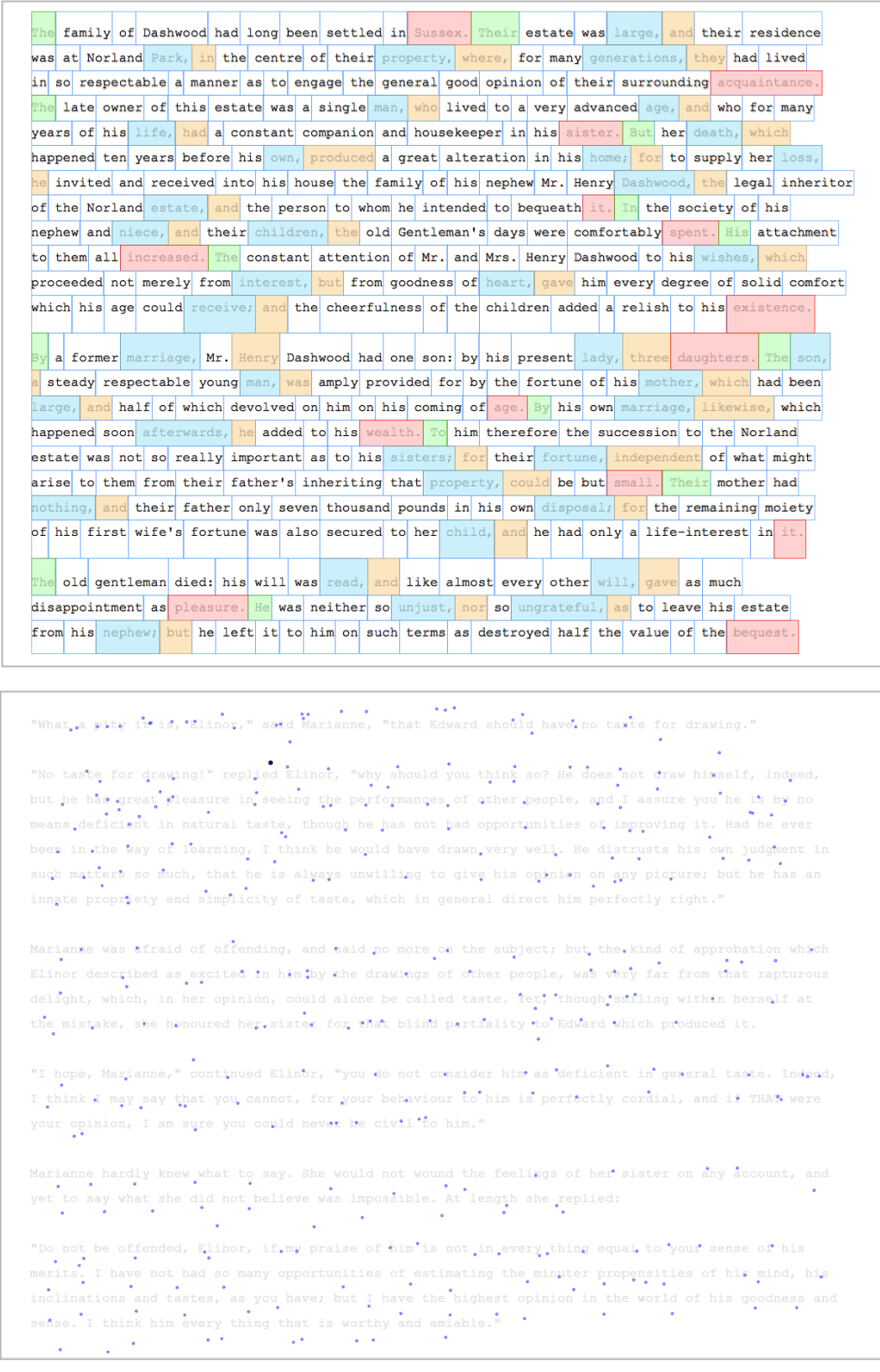
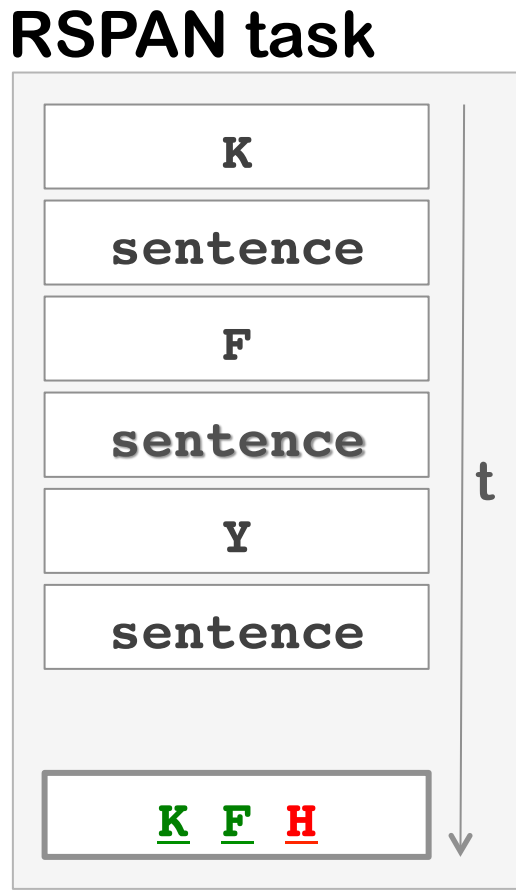


1. Motivation

- Several studies found a negative correlation between *mind wandering* (MW) and performance.
- Some of those studies involved reading as a task and *text comprehension* (TC) as a measure of performance [6][7][8].
- Consistently with those earlier reports, in our study, we have recorded a decrease in TC associated with an increase in MW.
- Although it is possible that mind wandering causes degraded text comprehension, the reverse relationship is also plausible: Less skilled readers experience more comprehension difficulty and thus mind-wander more.
- In this research, we attempt to understand the cause-effect relationship between MW and TC.

2. Experiment

- 112 subjects • Age: 18.73 (1.23) • 39% males • 2h
- Reading span task [1]
 - Secondary task accuracy: 0.88 (0.08)
 - Full-load composite score: 0.42 (0.20)
- Reading task
 - EyeLink 1000
 - *Sense and Sensibility* by Jane Austin
 - Time: 72m 0s (9m 41s)
 - Amount
 - 50.5 (14.1) pages
 - 15,607 (3,791) words
 - Speed: 219.86 (61.15) wpm
 - Text comprehension (TC)
 - Method: Forced-choice, 1 out of 4
 - Score: 0.68 (0.17)
- *Mindless reading* (MR)
 - Sampling method [7][5]
 - Probes
 - Self-reports
 - Outcome
 - Probes: 13.25 (6.43)
 - Self-reports: 14.62 (13.01)
 - Probes + self-reports: 18.01 (13.10)
 - Probe-caught ratio: 0.24 (0.21)



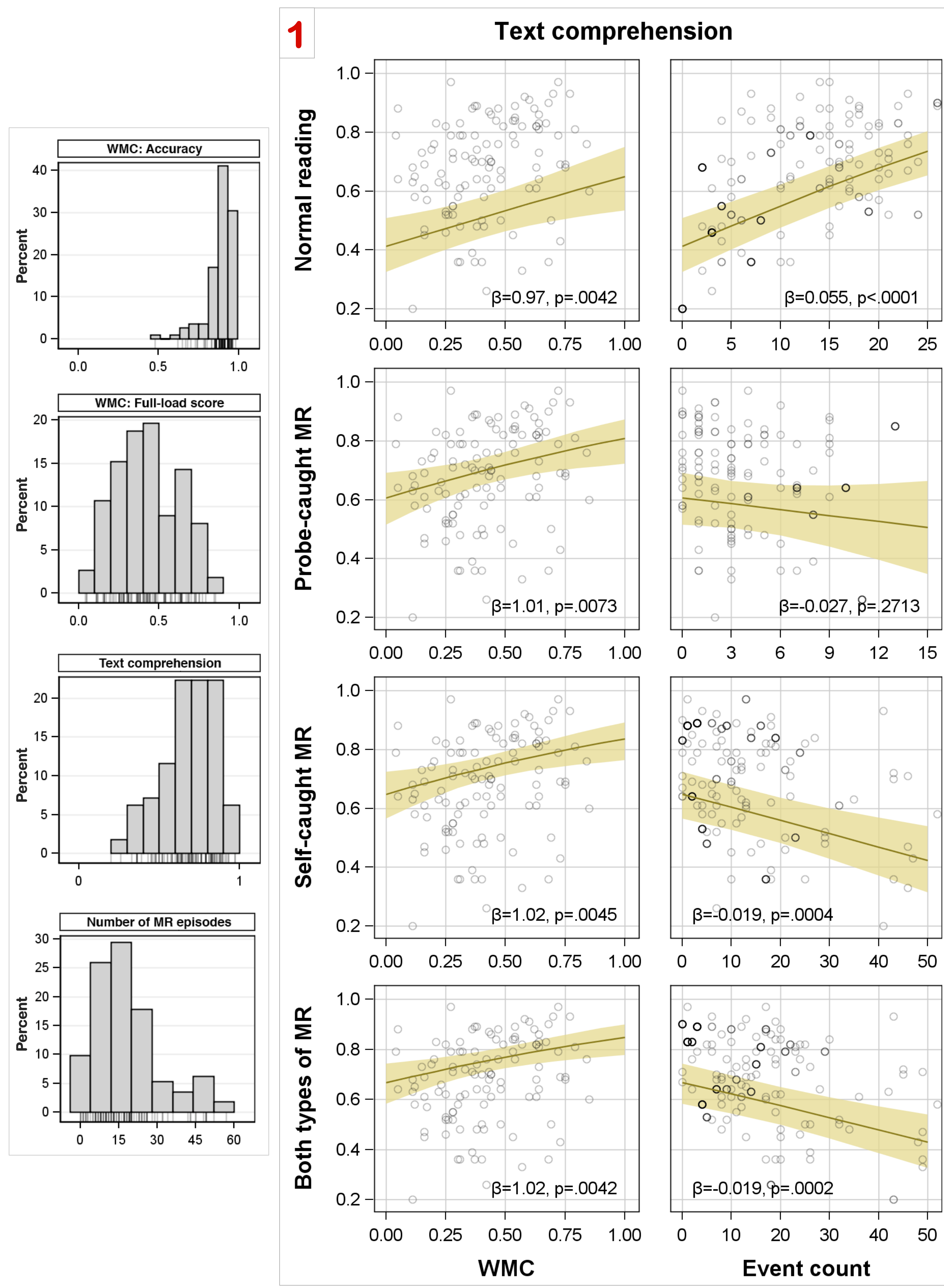
3. Results and argument (behavioral)

- *Working memory capacity* (WMC) is a direct [1] and indirect [2] [4] predictor of task performance, including reading [3]. WMC mediates via MW (i.e., WMC predicts MW, and via MW predicts performance).
- In our study, WMC correlated positively with text comprehension (Fig. 1).
- However, WMC did not predict MW or interact with MW to predict TC. Therefore, we have found no evidence that WMC affects comprehension via MW.
- An explanation for this discrepancy between previous and current results is that WMC has been found to play a mediating role in cognitively demanding tasks [2]; our text (*Sense and Sensibility*) was probability easy to understand, being rated 11.9 on the Flesch-Kincaid index (indicating that it should be easy to understand for 18 year olds).

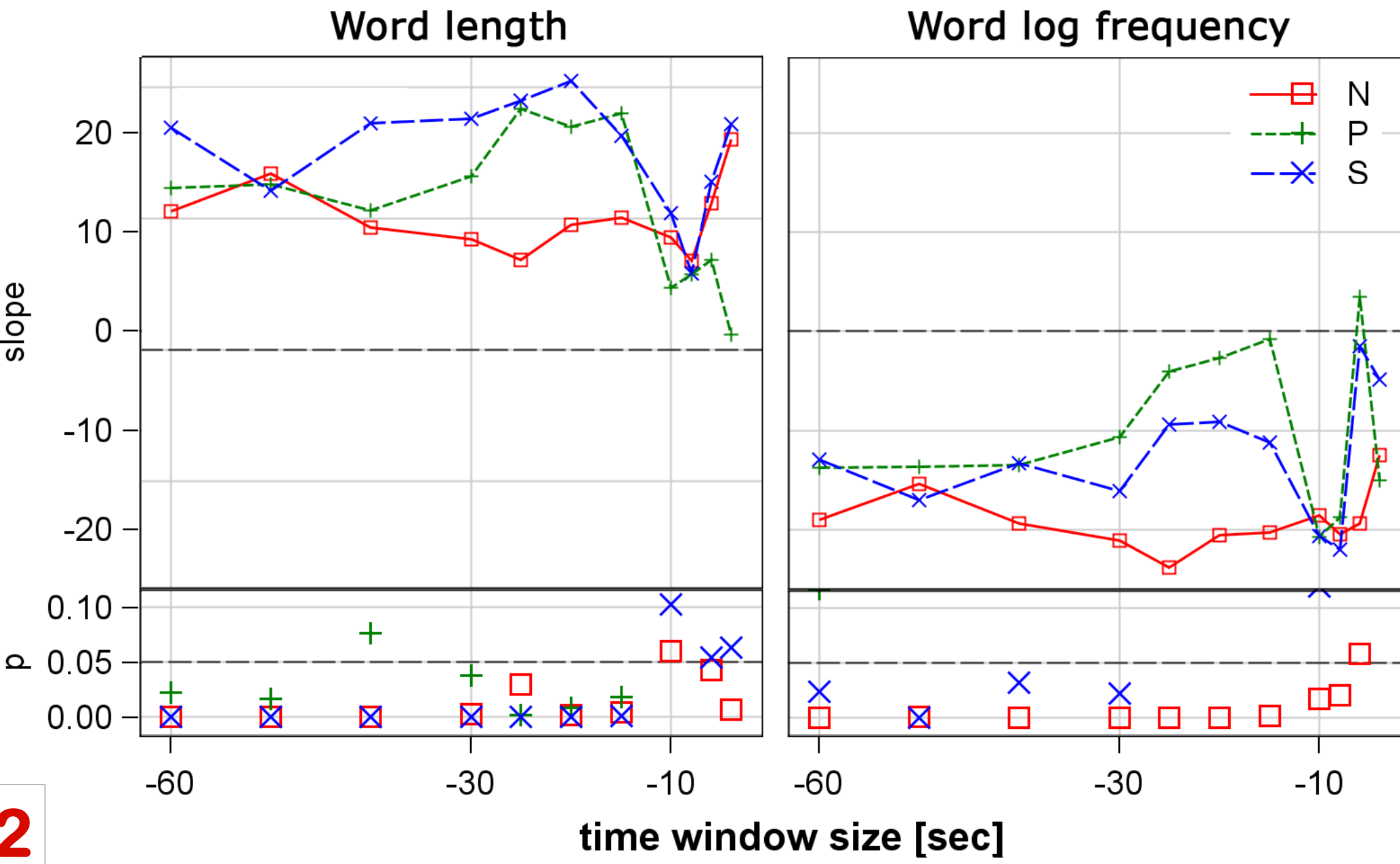
- Because text difficulty did not cause comprehension problems, MW is likely the cause of comprehension problems and not vice versa.

4. Results and argument (eye movements)

- To better understand the cognitive processes during MR, we investigated the effects of perceptual (*word length*) and lexical (*word frequency*) variables on fixation durations during both normal and mindless reading.
- The modulation of fixations durations by word frequency was attenuated during MR (Fig. 2).
- This suggests that readers encoded text more superficially during MR.
- This result corroborates earlier reports [5] and explains how MR impairs text comprehension.



Normal and mindless reading: Gaze duration on current word



References

1. Conway et al. (2005). *Psychonomic Bulletin & Review*, 12, 769-786.
2. Kane et al. (2007). *Psychological Science*, 18, 614-621.
3. McVay (2010). *PhD Dissertation*.
4. Mrazek et al. (2011). *Submitted for review*.
5. Reichle et al. (2010). *Psychological Science*, 20(1), 1-11.
6. Sayette et al. (2010). *Psychological Science*, 21(1), 26-30.
7. Schooler et al. (2005). In Levin (Ed.), *Thinking and seeing: Visual metacog. in adults and children* (pp. 203-226). Cambridge, MA: MIT Press.
8. Schooler et al. (2011). *Submitted for review*.