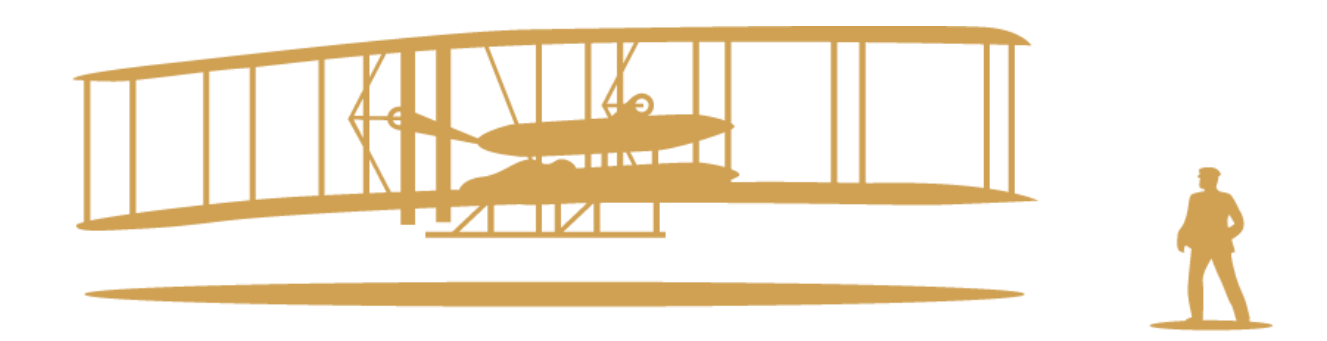


The effects of varying intra-letter spacing on word identification capacity

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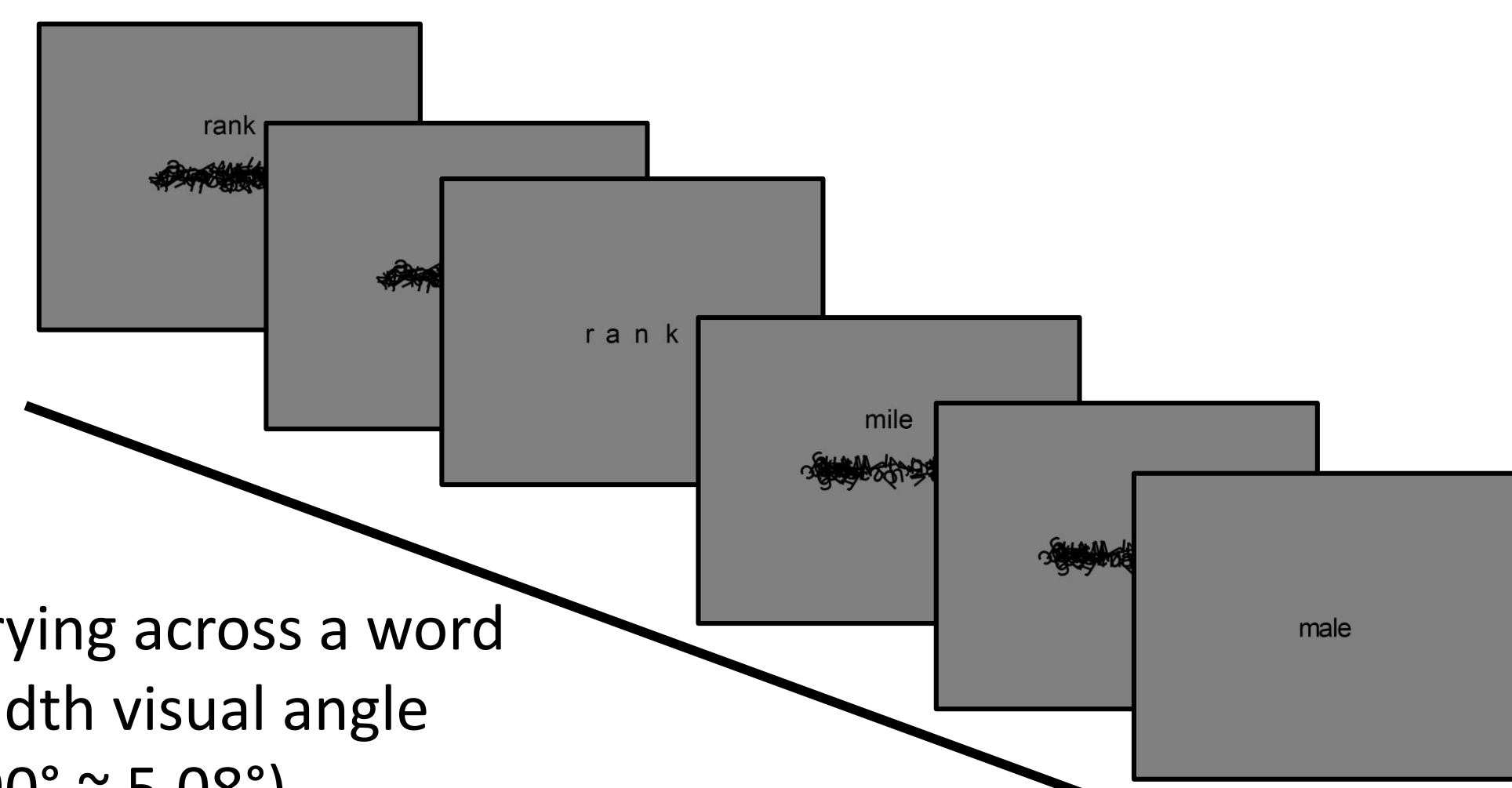
Introduction

- The efficiency that processing letters in words may be derived from low-level structural features such as spacing.
- Previous research demonstrated the word superiority effect with capacity analysis that is more robust than the traditional threshold-based approach.

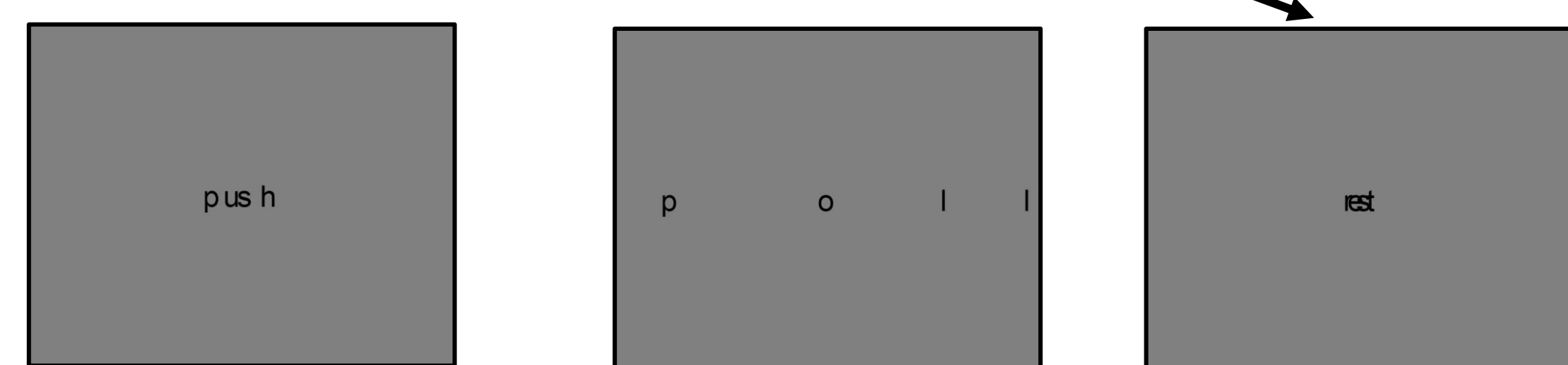
$$C(t) = \frac{[\sum_{i=1}^4 K_{ci}]}{K_s} \begin{cases} > 1 \text{ super capacity} \\ = 1 \text{ unlimited capacity} \\ < 1 \text{ limited capacity} \end{cases}$$

- This includes findings of super capacity (i.e., word superiority over letters alone) even with irregular letter spacing.
- In our current study, we examined different types of intra-letter spacing variability would nullify the capacity word superiority effect.

Experiment Design



varying across a word
(width visual angle 1.90° ~ 5.08°)



varying within a word
(width visual angle 1.90° ~ 5.08°)

800% spacing
(width visual angle 12.5°)

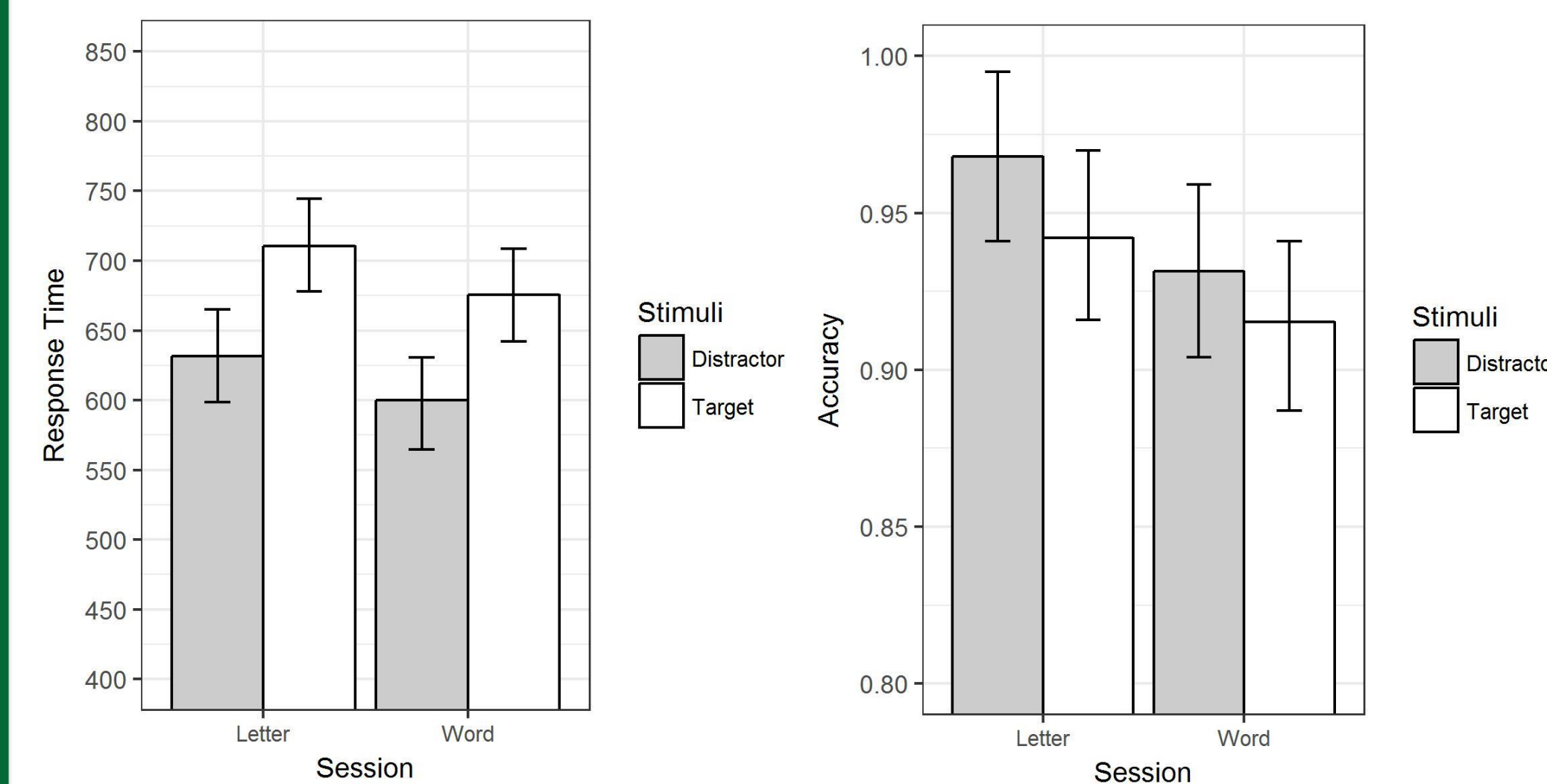
50% spacing
(width visual angle 1.27°)

Discussion

- Subjects maintained high performance in capacity coefficient regardless of varied spacing across/within a word.
- With extremely close spacing, super capacity was preserved, however there was equivocal evidence with wide spacing and assessment functions indicated approximately UCIP performance.
- Instead of low-level structural feature such as spacing that was assumed to contribute to the word superiority effect, the efficiency more likely came from the high-level cognitive processing.

Result 1: Within/Between word variability

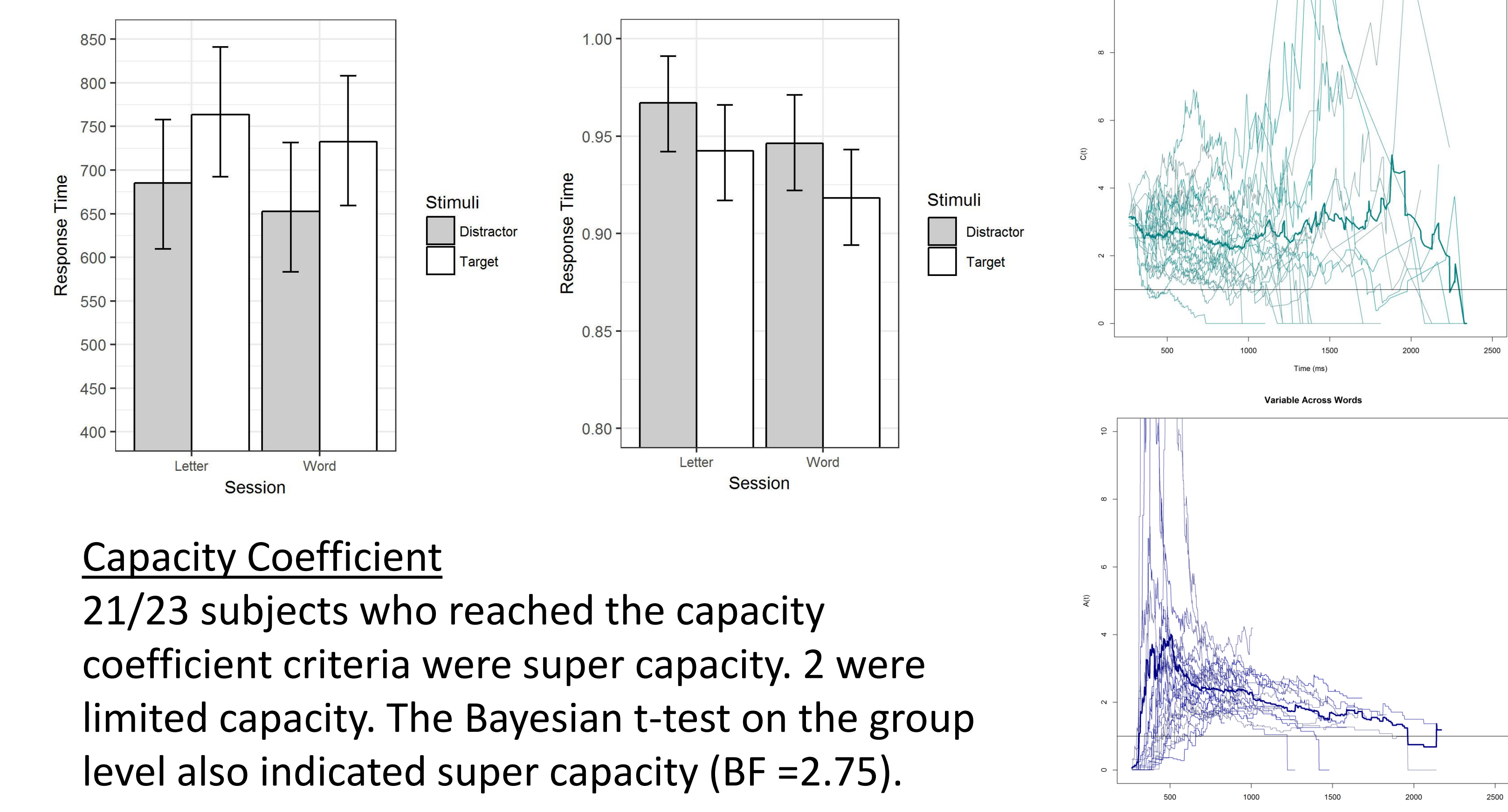
within word



Capacity Coefficient

All 20 subjects who reached the capacity coefficient criteria as well as the group level were super capacity (BF > 3.6 × 10⁹)

between word

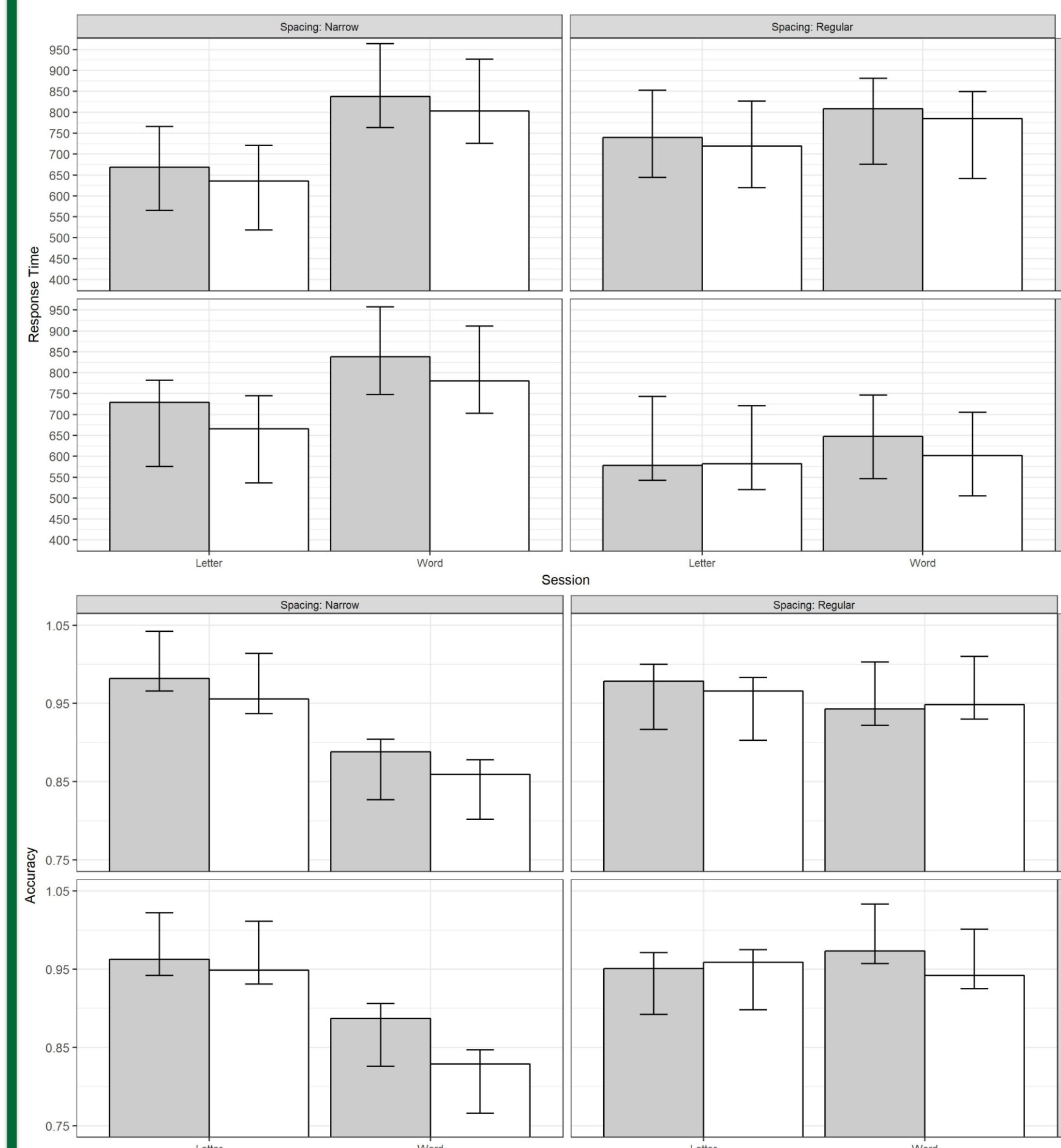


Capacity Coefficient

21/23 subjects who reached the capacity coefficient criteria were super capacity. 2 were limited capacity. The Bayesian t-test on the group level also indicated super capacity (BF = 2.75).

Result 2: Extremely spaced word

50% spacing

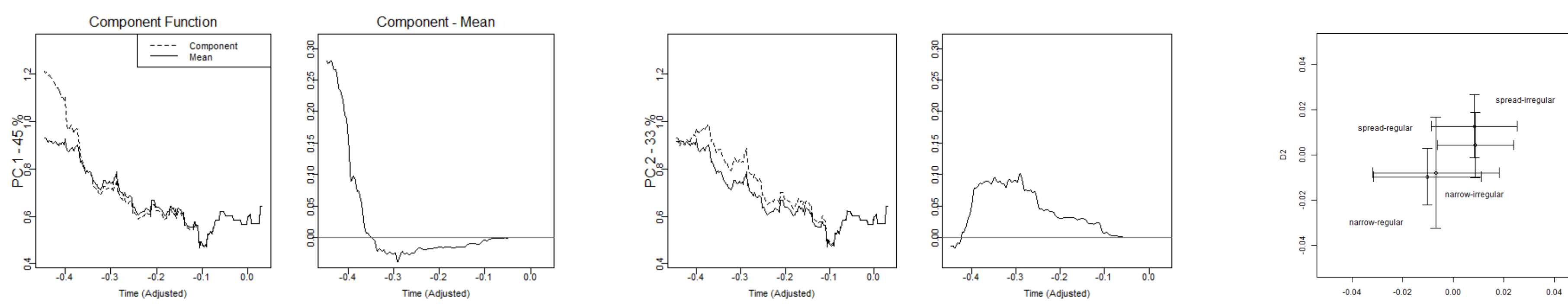


Capacity Coefficient

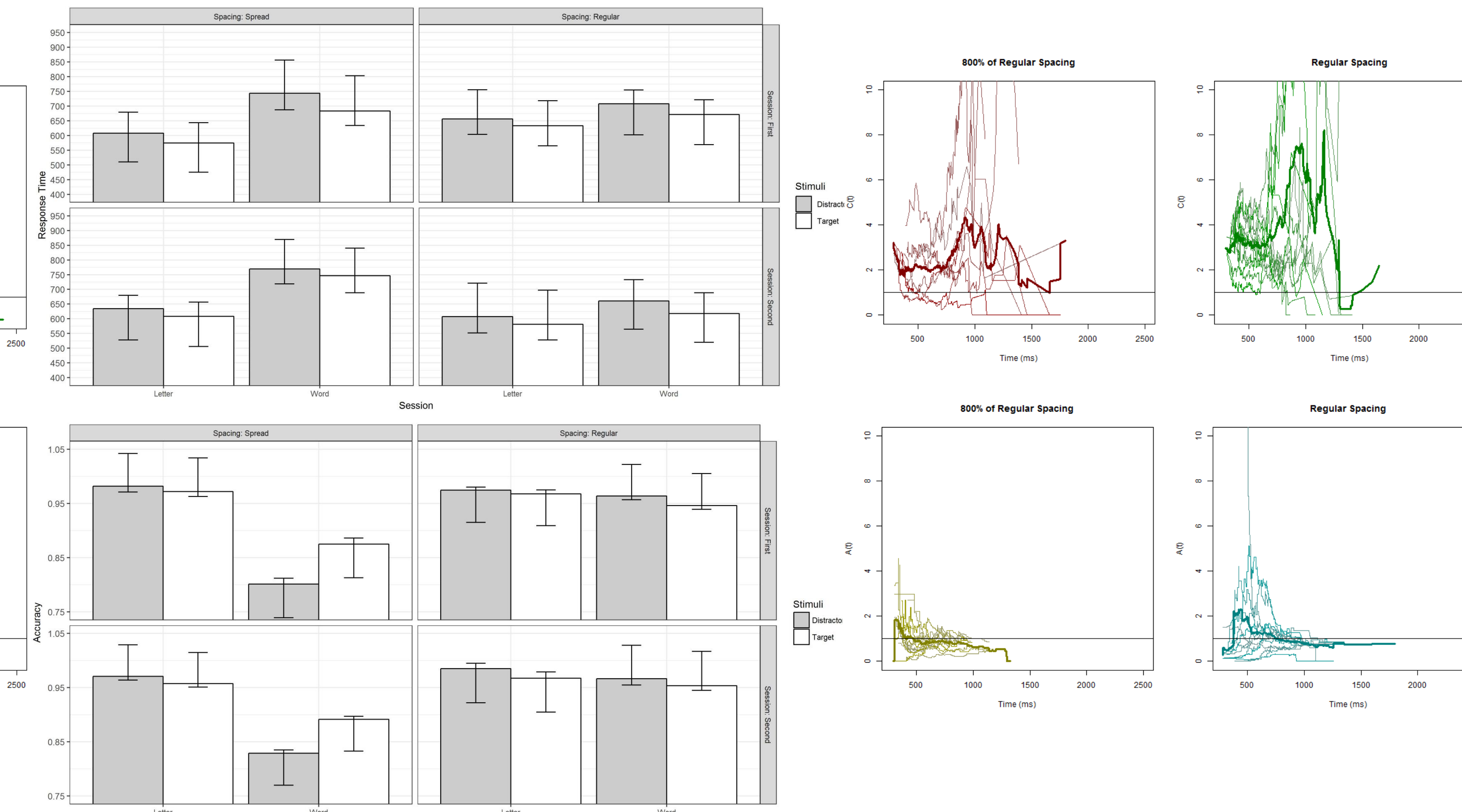
Irregular: 18 subjects reached criteria for capacity analysis: 12 – super; 4 – unlimited; 2 – limited; super capacity at group level (BF = 5.9)

Regular: 24 subjects reached criteria for capacity analysis: 23 – super; 1 – unlimited; super capacity at group level (BF = 3.4 × 10⁹)

2-way Bayesian ANOVA : Best model: Spacing; 2nd : Spacing + Ordering (BF = 1/1.90)



800% spacing



Capacity Coefficient

Irregular: 21 subjects reached criteria for capacity analysis: 10 – super; 8 – unlimited; 3 – limited; vague evidence for capacity at group level (BF = 0.96)

Regular: 24 subjects reached criteria for capacity analysis: 21 – super; 3 – unlimited; super capacity at group level (BF = 2.1 × 10⁹)

2-way Bayesian ANOVA : Best model: Spacing; 2nd : Spacing + Ordering (BF = 1/2.82)

Functional Principal Component Analysis

D1

Evidence against that spread type (BF = 3.87), spacing (BF = 2.31), or interaction (BF = 31.45) led to difference.

D2

Evidence against that spread type (BF = 4), spacing (BF = 2.02), or interaction (BF = 26.58) led to difference.