

Individual Differences in Executive Control and L2 Age of Acquisition Modulate Bilingual Homonym Processing



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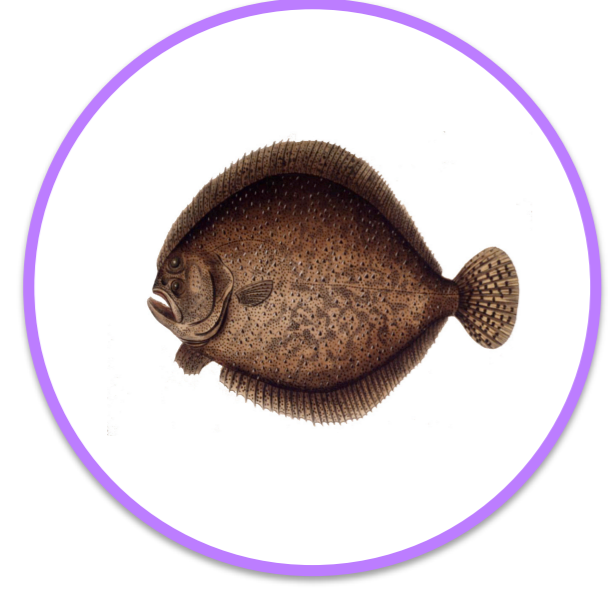
INTRODUCTION

WITHIN-LANGUAGE LEXICAL AMBIGUITY & THE SUBORDINATE BIAS EFFECT

- Meanings of *sole* (English monolingual)



Dominant



Subordinate

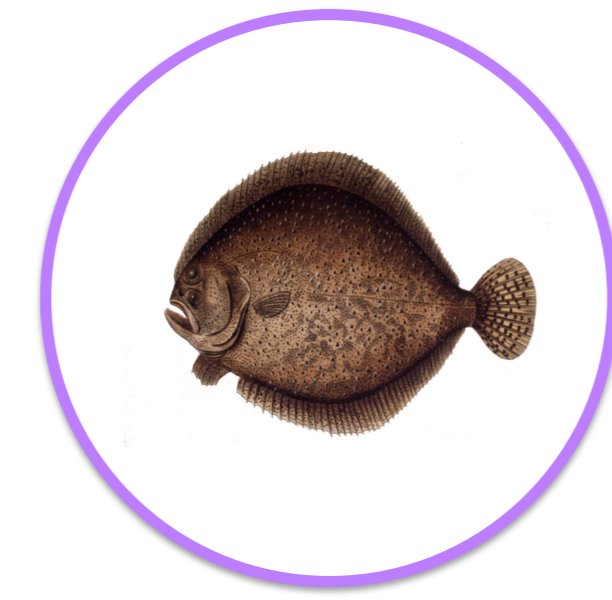
- **Subordinate Bias Effect (SBE):** processing cost when homonyms are embedded in sentences biased toward the subordinate meaning (e.g., Duffy et al., 1988; Rayner & Frazier, 1989)
- **Cross-language Lexical Ambiguity:** interlingual homographs (e.g., *chat* in English and French) cognates (e.g., *piano* in English and French) (Libben & Titone, 2009; Pivneva et al., 2014)
- **Executive control** modulates lexical ambiguity processing -> suppression of the irrelevant meanings (Gunter et al., 2003; Miyake et al., 1994; Pivneva et al., 2014)

WITHIN-LANGUAGE LEXICAL AMBIGUITY & CROSS-LANGUAGE ACTIVATION

- Meanings of *sole* (French-English bilingual)



English dominant



English subordinate + French dominant

- Schwartz, Yeh, and Shaw (2008): SBE differs for uniquely-L2 homonyms vs. **cognate homonyms**, depending on which meaning overlaps with L1

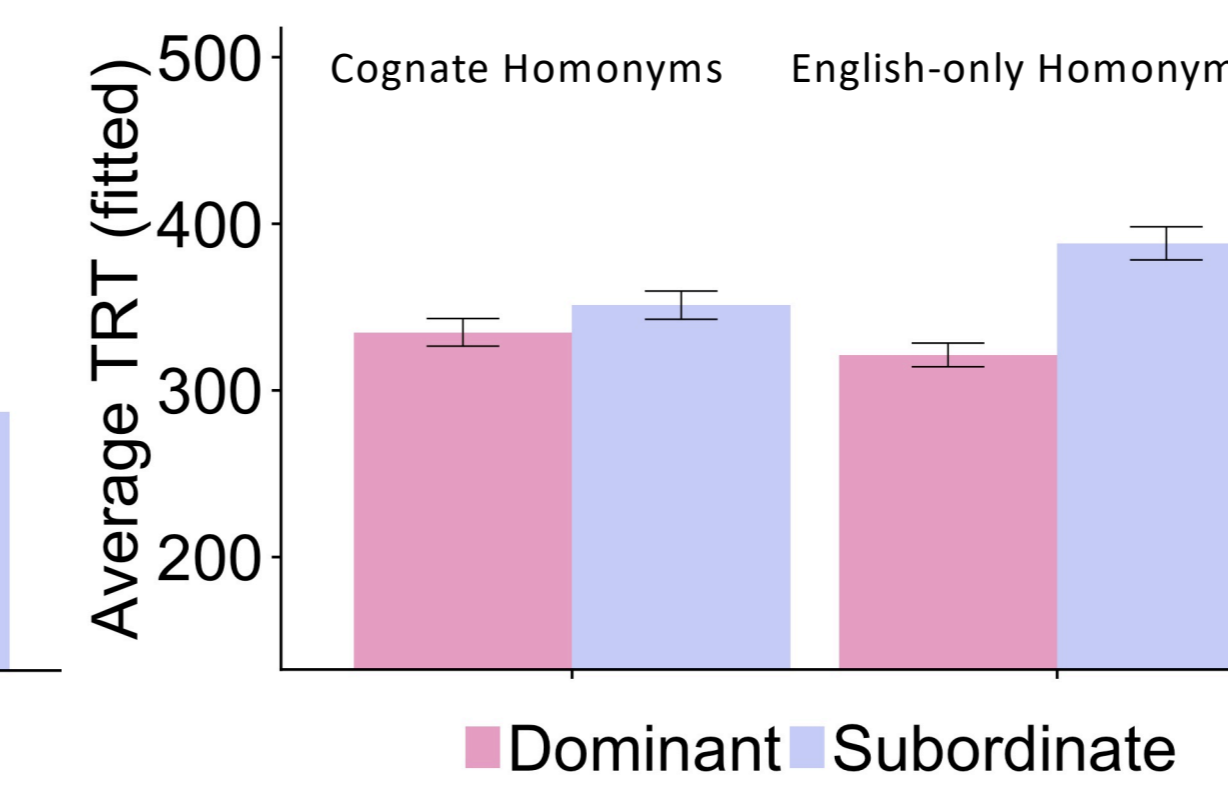
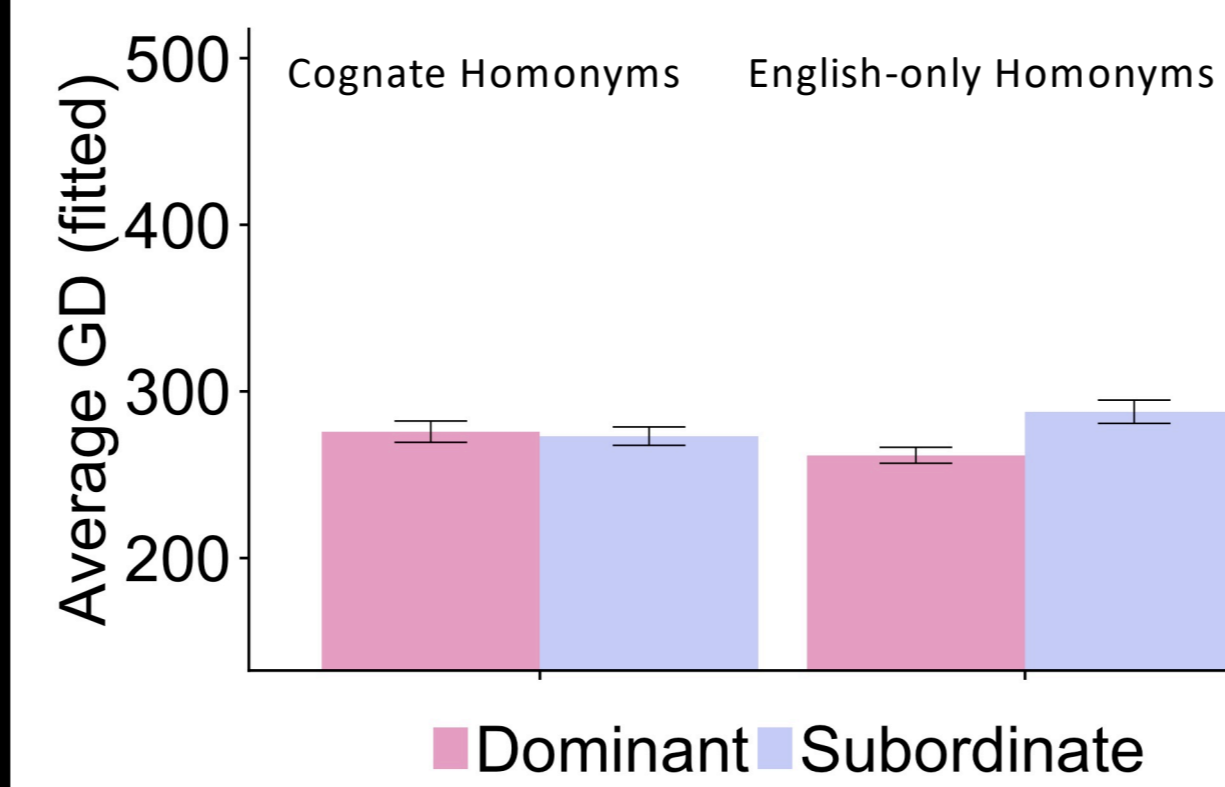
RESEARCH QUESTIONS

- 1) Do these effects occur in natural reading situations?
- 2) Do these effects occur during both L1 and L2 reading?
- 3) How do individual differences in bilingual experience and executive control modulate these effects?

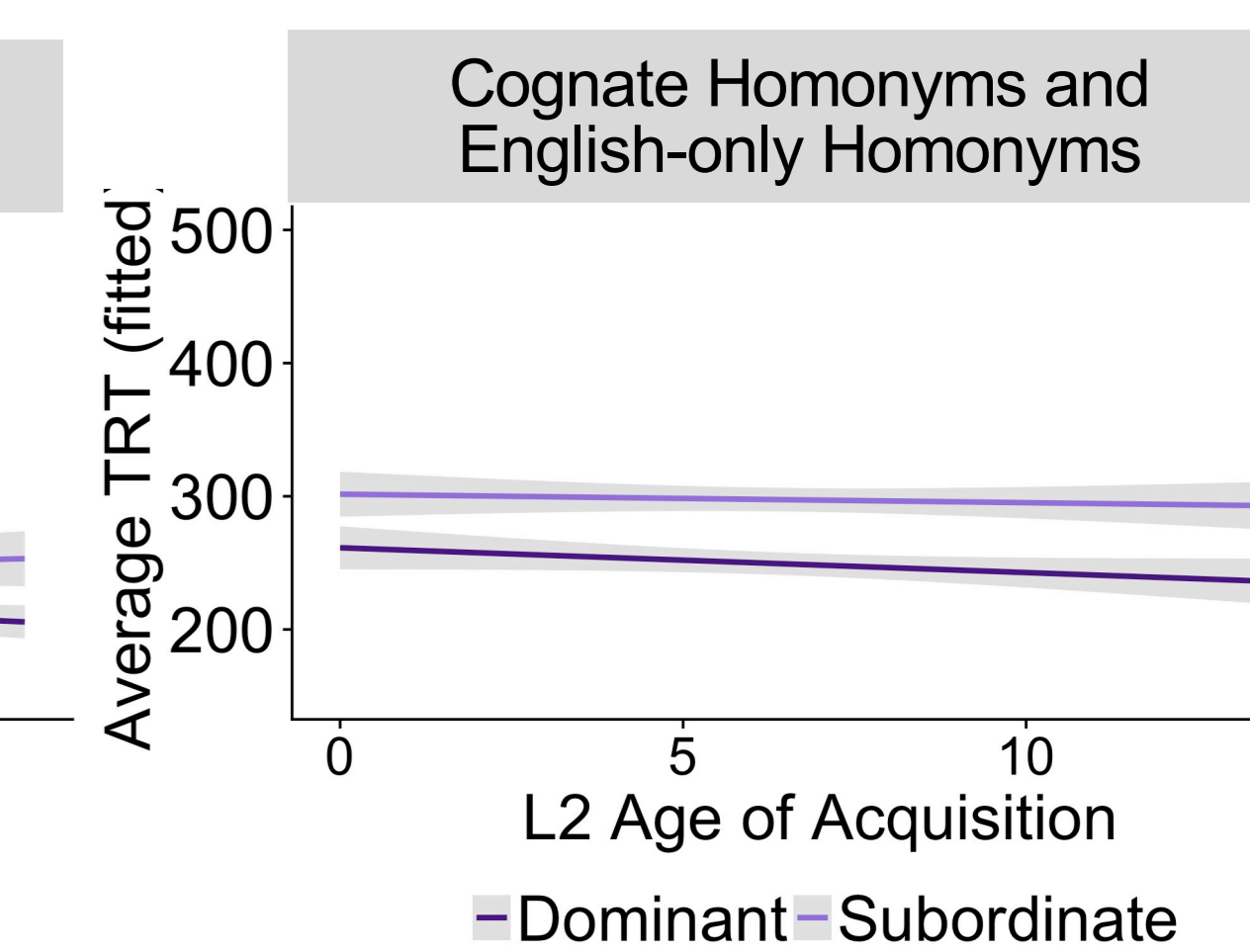
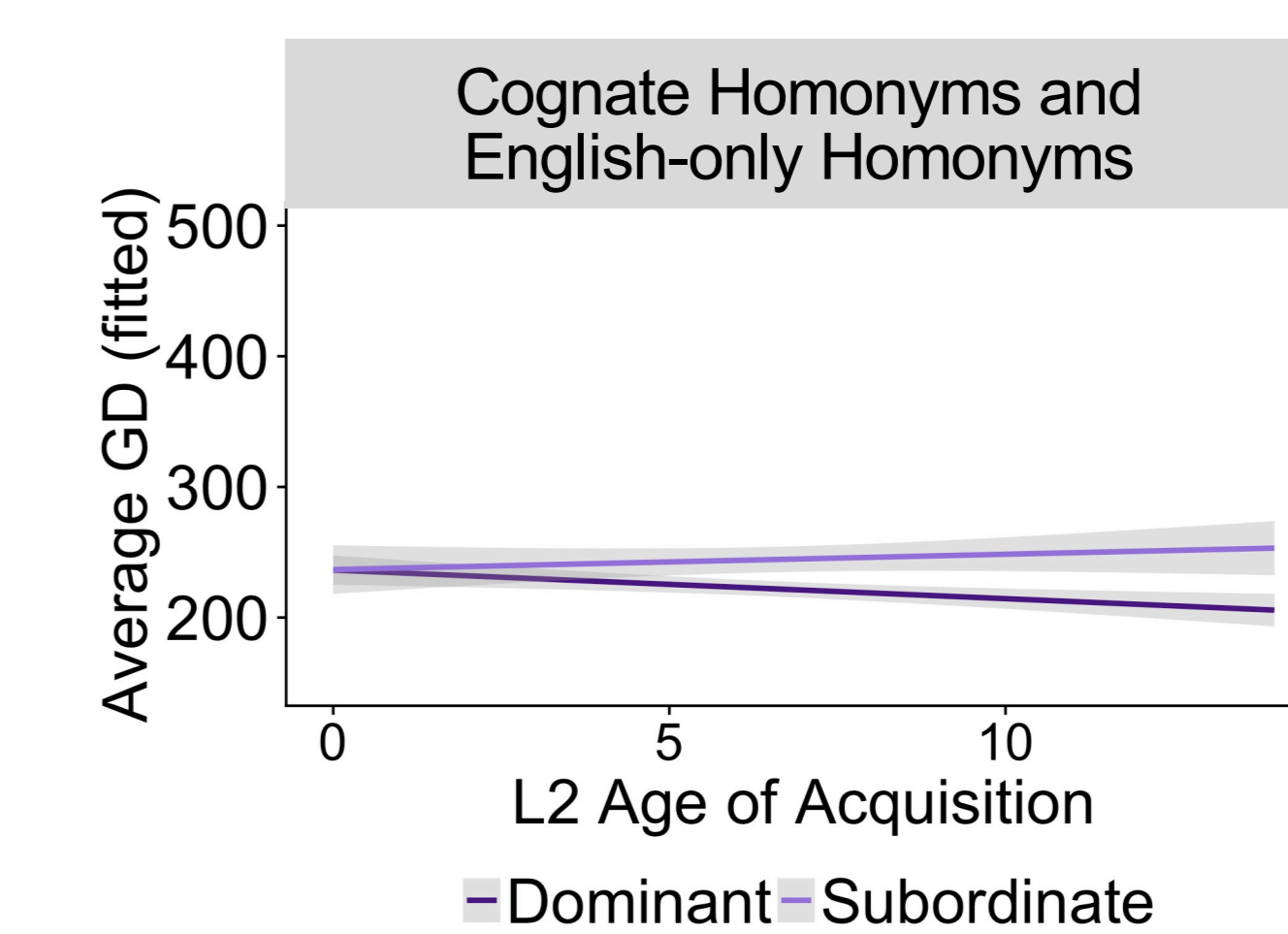
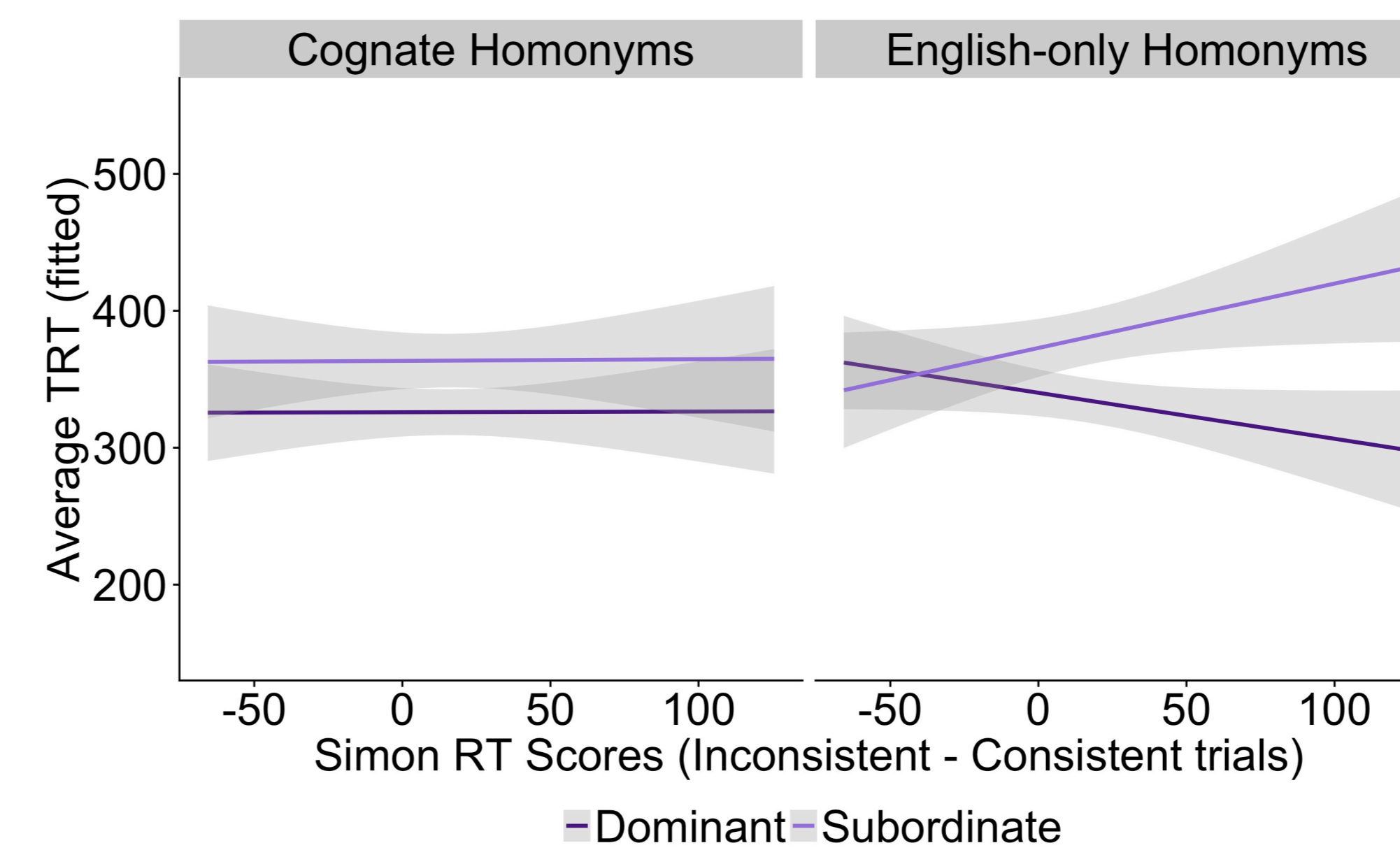
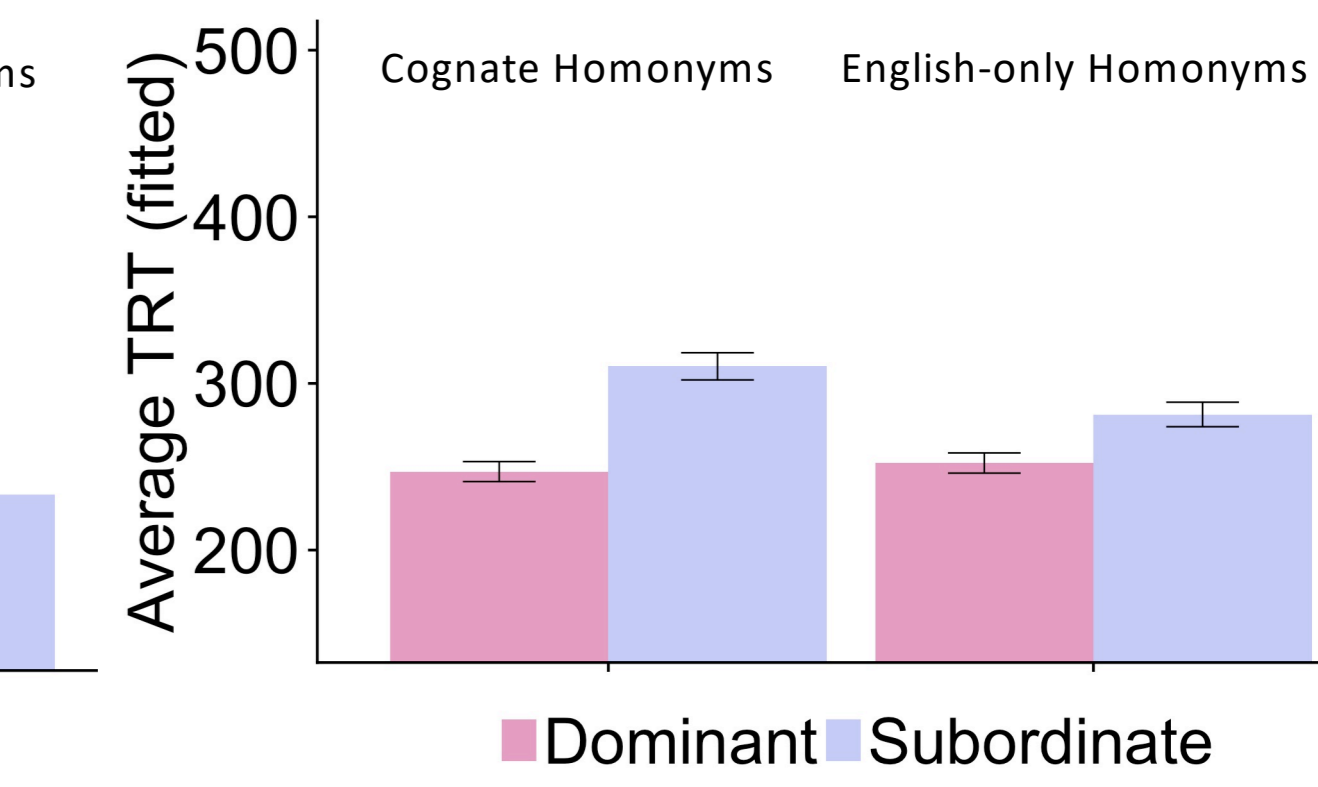
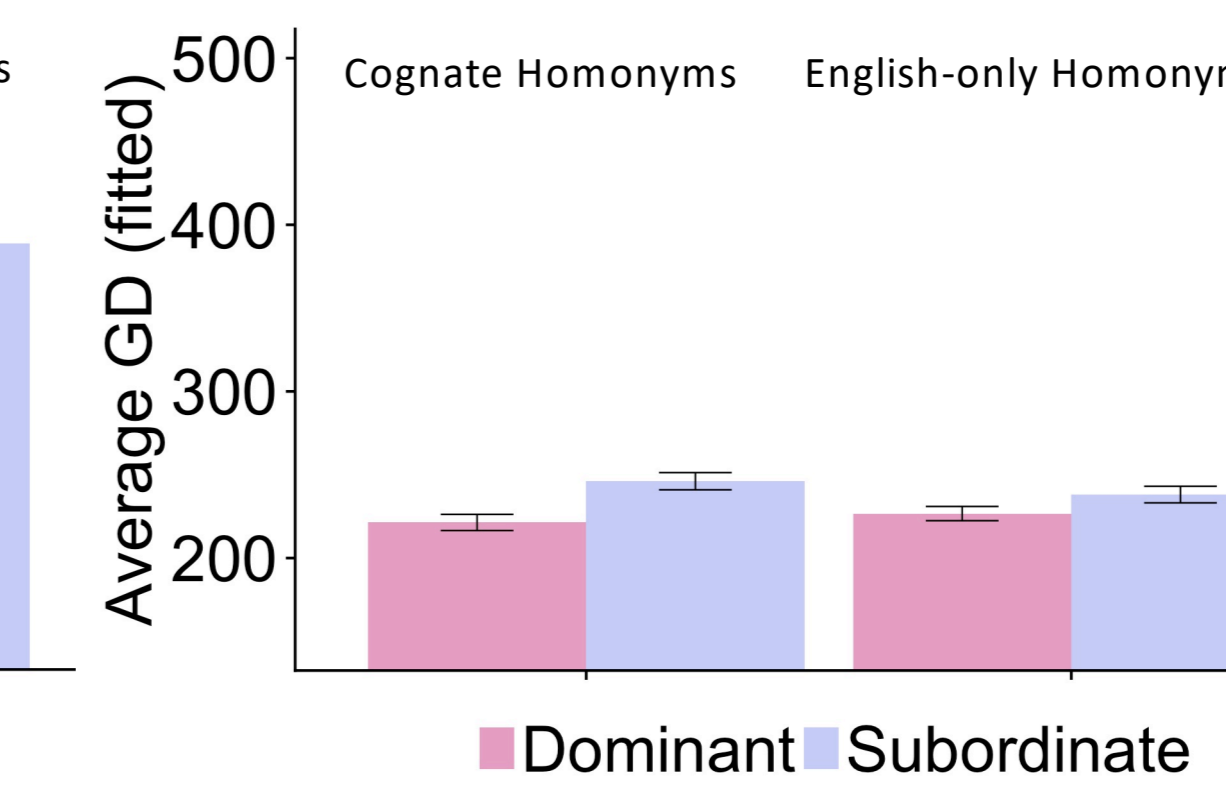
RESULTS

Experiment 1 – L2 Reading

Error bars are +/- 1 SEM



Experiment 2 – L1 Reading



METHODS

EXPERIMENT 1:

- L2 Reading of English sentences
- French L1 – English L2 bilingual adults ($n=48$)

EXPERIMENT 2:

- L1 reading of English sentences
- English L1 – French L2 bilingual adults ($n=40$)

TASKS:

- Natural eye-tracking reading task
- Non-linguistic Simon task (executive control)
- Language history questionnaire

EYE MOVEMENT MEASURES:

- Early measure: Gaze Duration (GD)
- Late measure: Total Reading Time (TRT)

EXPERIMENTAL CONDITIONS:

Type of item	Type of sentence	Target meaning	Exemple sentences
Cognate Homonym (sole)	Modifier	Dominant	Roger liked the rubber sole , because it made him feel stable running around the gym.
		Subordinate	Roger liked the grilled sole , because he was trying to include more fish in his diet.
	Bare	Dominant	Roger liked the sole , because it made him feel stable running around the gym.
		Subordinate	Roger liked the sole , because he was trying to include more fish in his diet.
English-only Homonym (plot)	Modifier	Dominant	Judy discussed the story plot , and decided that the ending needed to be rewritten.
		Subordinate	Judy discussed the burial plot , and decided to have her grave next to her husband's.
	Bare	Dominant	Judy discussed the plot , and decided that the ending needed to be rewritten.
		Subordinate	Judy discussed the plot , and decided to have her grave next to her husband's.

SUMMARY & CONCLUSIONS

EXPERIMENT 1:

- GD: No SBE
- TRT: SBE for **English-only homonyms** ($p<0.01^{**}$), reduced for cognate homonyms ($p<0.05^*$)
- Individual Differences: Low executive function capacity (higher Simon RT Scores) = larger SBE for **English-only homonyms** ($p<0.05^*$)

EXPERIMENT 2:

- GD: SBE for **all** homonyms ($p<0.05^*$)
- TRT: SBE for **all** homonyms ($p<0.001^{***}$)
- Individual Differences: Late L2 AoA = larger SBE for GD ($p<0.05^*$) and TRT ($p<0.01^{**}$) for **all** homonyms

1) Do these effects occur in natural reading situations?

- Yes, a SBE was found in both experiments, for both item types, and (generally) for both stages of processing.

2) Do these effects occur during both L1 and L2 reading?

- Yes, however we found a larger SBE during L1 vs. L2 reading. During L2 reading, we found no SBE for cognate homonyms, which reflects cross-language activation of L1 meanings. Thus, access to the subordinate meaning in the L2 was facilitated if it was cognate with the L1.

3) How do individual differences in bilingual experience and executive control modulate these effects?

- Increased executive control capacity, for French L1 bilinguals, led to more efficient suppression of the irrelevant meanings of English-only homonyms. However, it did not affect the processing of cognate homonyms, suggesting that executive control does not modulate cross-language activation during L2 reading.
- Increased executive control capacity, for English L1 bilinguals, did not modulate homonym processing. However, early L2 age of acquisition in English L1 bilinguals led to more efficient suppression of the irrelevant meanings of all homonyms during L1 reading.