

## Cognitive control in second- and third-language syntactic processing: A conflict adaptation study

Language processing requires frequent reinterpretations of structures that are temporarily ambiguous, until more input is received that helps the parser reach the correct interpretation (cf. Frazier & Clifton, 1998; MacDonald Pearlmuter, Seidenburg, 1994; Tanenhaus, Spivey-Knowlton, Eberhard & Sedivy, 1995). This informational conflict triggers cognitive control (or inhibitory control), which has been shown to be a major player in disambiguation (Botvinick, Braver, Barch, Carter & Cohen, 2001; January, Trueswell & Thompson-Schill, 2009). Cognitive control is also a variable of considerable interest during the acquisition of a second (L2) and third language (L3). For example, it has been shown that the prefrontal brain region associated with cognitive control plays a major role during the processing of a non-native, non-highly proficient language, a role which is less significant during proficient or native processing (Abutalebi, 2008). However, further research is needed to better understand the role that cognitive control plays in non-native language processing and, in particular, in processing ambiguous language.

To that end, the current ongoing study aims to investigate the role of cognitive control in L2 and L3 use, particularly during the processing of syntactic ambiguities. The participants of this study are Catalan-Spanish early bilinguals who learned English as an L3 during adolescence (N = 20). Following recent research in psycholinguistics, the current study uses the conflict adaptation paradigm to compare participants' processing at engaged vs. nonengaged states of cognitive control, which overcomes methodological limitations of prior research that tends to use correlations to draw between-subject comparisons (e.g., Hsu & Novick, 2016; Huang, Gerard, Hsu, Kowalski & Novick, 2016). This paradigm interleaves linguistic and non-linguistic stimuli to utilize the Stroop effect (a phenomenon of prolonged cognitive engagement following conflict) for research purposes. The critical comparisons for this study are self-paced reading times of sentences with reduced relative clauses, preceded by congruent or non-congruent flanker trials, in both the L2 and L3. The results inform research on the role of cognitive control during L2 and L3 processing, while the discussion will consider this research paradigm from L1 psycholinguistics and its potential contributions to L2/L3 research.

Summary: Dynamic engagement of cognitive control during language processing studies offers new insight into the relationship between cognitive variables and language acquisition. The current study considers L2 and L3 syntactic disambiguation within a conflict adaptation study, allowing within-subject comparisons of non-native processing during more- or less-engaged states of cognitive control.

## References

- Abutalebi, J. (2008). Neural aspects of second language representation and language control. *Acta Psychologica*, 128(3), 466–478. doi:10.1016/j.actpsy.2008.03.014
- Botvinick, M., Braver, T., Barch, D., Carter, C., & Cohen, J. (2001). Conflict monitoring and cognitive control. *Psychological review*, 108(3), 624–52. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/11488380>

- Frazier, L., & Clifton, C. (1998). Sentence reanalysis, and visibility. In J. D. Fodor & F. Ferreira (Eds.), *Reanalysis in Sentence Processing* (Studies in Theoretical Psycholinguistics series) (pp. 143–176). Dordrecht: Kluwer Academic Publishers.
- Hsu, N. & Novick, J. M. (2016). Dynamic Engagement of Cognitive Control Modulates Recovery From Misinterpretation During Real-Time Language Processing. *Psychological Science*, 1-11.
- Huang, Y. T., Gerard, J., Hsu, N., Kowalski, A., & Novick, J.M. (2016). *Cognitive control effects on the kindergarten path: Separating correlation from causation*. Poster presented at the 29th annual CUNY Conference on Human Sentence Processing, Gainesville, FL.
- January, D., Trueswell, J. C., & Thompson-Schill, S. L. (2009). Colocalization of stroop and syntactic ambiguity resolution in Broca's area: Implications for the neural basis of sentence processing. *Journal of Cognitive Neuroscience*, 21, 2434-2444. doi:10.1162/jocn.2008.21179
- MacDonald, M. C., Pearlmutter, N. J., & Seidenberg, M. S. (1994). Lexical nature of syntactic ambiguity resolution. *Psychological Review*, 101, 676–703.
- Tanenhaus, M. K., Spivey-Knowlton, M. J., Eberhard, K. M., & Sedivy, J. C. (1995). Integration of visual and linguistic information in spoken language comprehension. *Science*, 268, 1632–1634.