

Top-down language control during comprehension: Eye-tracking evidence during reading paragraphs aloud and silently

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Bilinguals apply top-down control during language production to regulate competition from the nontarget language, especially when the nontarget language is the more proficient or dominant language. One of the strongest behavioral indices of dominant-language inhibition is reversed language dominance¹. Sometimes, when bilinguals use both of their languages during a task, the dominant language becomes more difficult to retrieve than the nondominant language. One such task is when bilinguals read mixed-language paragraphs aloud. Bilinguals overwhelmingly produce more language selection errors when words switch from the nondominant to the dominant language than vice versa². However, comprehension studies typically show larger costs for the nondominant language³, with prominent models positing that language selection occurs via bottom-up activation of lexical representations only⁴. In the present study, a total of 96 English-dominant Spanish-English bilinguals read single- and mixed-language paragraphs while their eye movements were tracked to investigate the role of top-down language selection while reading aloud (Experiment 1) and silently (Experiment 2). Paragraphs appeared in four conditions (English-only, Spanish-only, English-mixed, Spanish-mixed) and contained 10 target words (five content words, five function words). In mixed-language paragraphs, target words switched into the other language. We measured the effect of paragraph type on the processing of target words across a range of eye measures: fixation rate, gaze duration, regression rate, and total reading time. Shown in Figure 1, effects of paragraph type while reading aloud was larger for dominant-language English targets compared to Spanish for later occurring measures (regression rate and total reading time). Strikingly, for silent reading, this was true across all four eye measures. Furthermore, the processing of English words slowed in mixed-language paragraphs to the extent that language dominance significantly reversed for regression rates and total reading times in both experiments. These results provide evidence for top-down language control during reading aloud and silent reading, contrasting prominent models of bilingual comprehension which claim that activation is driven bottom-up only. Furthermore, these results point to a more widespread influence of dominant-language inhibition than previously thought, affecting processing at earlier measures while reading and notably, while silently reading.

References

- [1] Tamar H. Gollan, & Matthew Goldrick. Inhibitory control of the dominant language: Reversed language dominance is the tip of the iceberg. *Journal of Memory and Language*, 2023.
- [2] Tamar H. Gollan, & Matthew Goldrick. A switch is not a switch: Syntactically-driven bilingual language control. *Journal of Experimental Psychology: Learning, Memory and Cognition*, 2018.
- [3] Sybrine Bultena, Ton Dijkstra, & Janet G. Van Hell. Language switch costs in sentence comprehension depend on language dominance: Evidence from self-paced reading. *Bilingualism: Language and Cognition*, 2015.
- [4] Ton Dijkstra, & Walter J.B. van Heuven. The architecture of the bilingual word recognition system: From identification to decision. *Bilingualism: Language and Cognition*, 2002.

Figure 1: Effect of paragraph type for target words while reading aloud (Experiment 1) and silent reading (Experiment 2).

