

When Causal Expectations Are Violated: Eye-Tracking Evidence from Congruent and Incongruent Arguments

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Discourse comprehension is fundamentally expectation-driven: readers anticipate how upcoming information will relate to the discourse representation constructed thus far. Connectives contribute to this process by providing explicit cues about the coherence relation readers should establish between discourse segments, thereby constraining interpretation and guiding expectations about incoming information (Millis & Just, 1994; Sanders & Spooren, 2007). In argumentative texts, causal connectives (e.g. *therefore*, *consequently*, *hence*, and *as a result*) signal that the upcoming conclusion should follow causally from the preceding arguments. When a continuation is congruent with this expectation, readers can integrate the causal relation into their emerging discourse representation. When it is incongruent, they may need to revisit prior information and revise their interpretation. Previous eye-tracking and event-related potential research suggests that violations of causal and pragmatic expectations often produce delayed integration and reanalysis effects rather than immediate processing disruption (Xu et al., 2015, 2018).

Processing expectations may also vary across readers. One potentially relevant source of individual variation is reading disposition, understood as how readers approach and engage with texts during reading. Following Calloway et al. (2023), we conceptualize reading disposition as a multidimensional construct encompassing intrinsic and extrinsic goals, reading strategies, effort toward comprehension, and avoidance of text difficulty. Although these dimensions are associated with reading experience and comprehension, their role in the processing and revision of discourse expectations remains largely unexplored. This exploratory study therefore examines how reading disposition modulates the early and late processing of congruent and incongruent causal continuations.

To address this objective, a counterbalanced within-participants design was employed. 82 Spanish-speaking university students read 48 argumentative texts while their eye movements were recorded with an EyeLink Portable Duo at 1000 Hz. Each text followed a standardized argumentative structure. The congruent and incongruent versions were identical except for a critical lexical item determining the direction of the conclusion. The congruence manipulation operationalized whether the conclusion was consistent or inconsistent with the causal interpretation supported by the preceding argument.

Analyses targeted a pre-connective background region (BCK) and the post-connective conclusion (S2). First-fixation duration and first-pass reading time indexed early processing, whereas reading-time and regression measures indexed late integration and revision.

Reading disposition was measured with TReAT-Q. Mixed-effects models included congruence, standardized reading-disposition scores, and their interaction.

No reliable effects of congruence or congruence-by-reading-disposition interactions emerged in the early eye-movement measures, indicating that neither expectation violation nor its modulation by reading disposition was detectable during initial processing. Effects were instead concentrated in late eye-movement measures. Incongruent continuations increased the probability of regressions into both S2 (OR = 1.15, 95% CI [1.03, 1.28], $z = 2.46$) and BCK (OR = 1.15, 95% CI [1.05, 1.26], $z = 2.98$), suggesting that readers reinspected both the expectation-violating conclusion and the preceding argumentative context (see Figures 1 and 2). Higher reading disposition was also associated with shorter regression-path durations in S2 (estimate = -0.05 , SE = 0.03, 95% CI [-0.11 , -0.00], $t = -1.98$), irrespective of congruence (Figure 3).

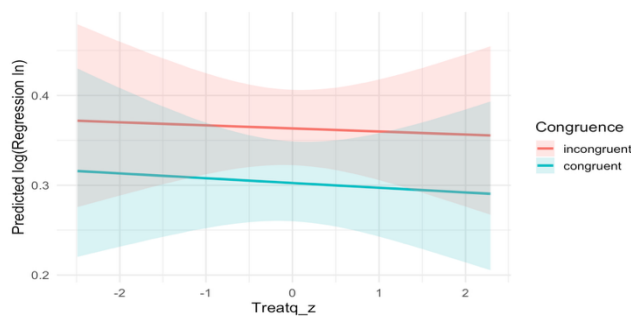


Figure 1. Main effect of congruence on regression-in probability in S2.

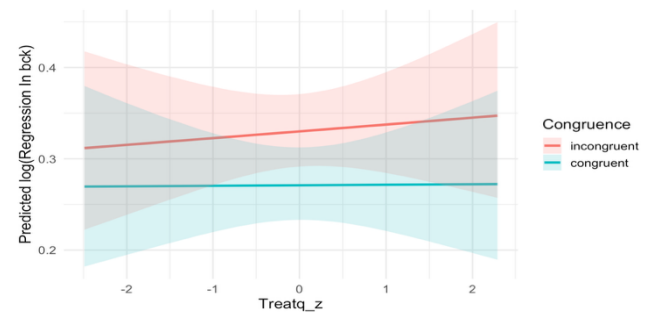


Figure 2. Main effect of congruence on regression-in probability in BCK.

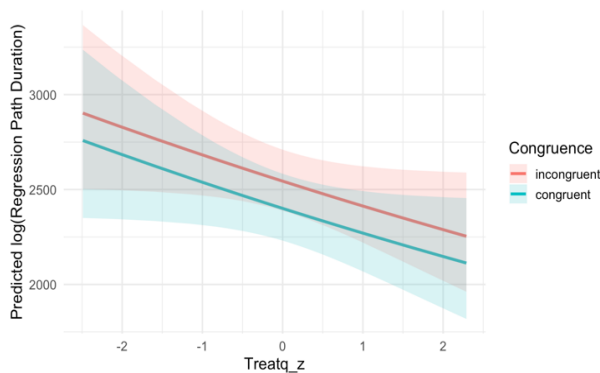


Figure 3. Main effect of reading disposition on regression path duration in S2.

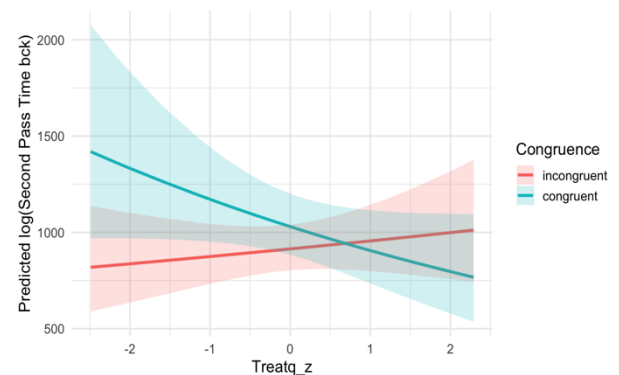


Figure 4. Congruence and reading disposition Interaction on second-pass reading time in BCK.

The only reliable congruence-by-reading-disposition interaction emerged in second-pass reading time in BCK (estimate = 0.09, SE = 0.04, 95% CI [0.02, 0.16], $t = 2.38$). Follow-up comparisons showed longer rereading of congruent than incongruent contexts among

readers with lower disposition scores, with no reliable condition difference at average or higher levels. This pattern tentatively suggests that rereading may support the consolidation of an expectation-consistent interpretation.

Overall, the findings indicate that the consequences of confirming or violating causal discourse expectations emerge primarily during late stages of processing. Incongruent continuations prompted backward-oriented revision, whereas reading disposition selectively influenced the duration and allocation of this late processing rather than initial expectation-based integration. The study therefore shows that causal coherence processing is temporally distributed and that individual differences in readers' approaches to text shape how previously encountered discourse information is revisited.

Keywords: discourse expectations; causal coherence relations; reading disposition; individual differences; eye-tracking; discourse revision

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