

**Title:** The role of domain-general cognitive control in ambiguity resolution in sentence comprehension.

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When reading a sentence, language is taken in incrementally and processed as it comes along. Incremental sentence processing is attributed heavily to constraints on cognitive control, among other factors (such as working memory). To avoid high processing costs, readers commit to an interpretation for the sentence they are reading as early as possible. However, there are processing costs to this strategy as well. Due to a reader's tendency to commit early to an interpretation, misanalysis of the sentence at hand can occur, in which case the reader needs to go back and revise the sentence and develop a new interpretation (Hsu & Novick, 2016). Such misanalysis occurs in garden-path sentences, such as "the father pushed through the crowd at the carnival fell down on the gravel". Here, the reader initially takes "push" as the main clause verb. Upon encountering the second verb ("fell"), the reader needs to revise their initial interpretation such that "pushed" is part of a reduced clause modifying "the father".

The conflict monitoring theory (Botvinick, et al., 2001; Botvinick, 2007) suggests cognitive control is upregulated when conflict is detected. Cognitive control engagement thus biases the processor towards more effective information processing, and away from cost-heavy processing situations. Evidence for this theory is conflict adaptation: after processing trials that induce conflict, it is easier to process another conflict-inducing trial than after processing trials that do not induce conflict. Given that two competing interpretations in sentence comprehension can also give rise to conflict, an interesting question is whether domain-general cognitive control can aid in the resolution of misanalysis. Recent studies suggest that domain-general cognitive control indeed facilitates ambiguity resolution. For instance, Hsu et al. (2020) used a flanker task, in which participants had to indicate the direction of the center arrow in either incongruent (e.g. <<<<<<) or congruent (>>>>>) trials. After a flanker, participants listened to a sentence. Listeners could recover from misanalysis more quickly after responding to incongruent trials than after congruent trials (see also Hsu & Novick, 2016; Thothathiri et al. 2018). Kan et al (2013) explored an inverse relationship and found that ambiguity resolution in a preceding syntactic trial facilitated conflict adaptation on a subsequent incongruent Stroop trial.

In our current study we investigate two questions. First, we ask whether encountering a garden-path sentence heightens domain-general cognitive control in monolingual English-speaking adults. Second, we consider an inverse relationship, wherein domain-general cognitive control modulates faster ambiguity resolution in the same participants. To probe these questions, we will use a word-by-word self-paced reading paradigm. Sentences are immediately preceded and followed by a flanker trial. We present two types of sentences: unambiguous relative clause and (temporarily ambiguous) reduced relative clause sentences. Sentences are followed and preceded by either a congruent or incongruent flanker trial, creating the four conditions illustrated in Table 1.

On flanker trials, response time is always predicted to be longer for an incongruent, than for a congruent flanker; however, the *difference* in response time between the two flanker conditions is predicted to decrease when an ambiguous sentence is read just before the flanker trial, due to

the deployment of cognitive control by said ambiguity. We also expect the classic garden-path effect for the ambiguous reduced relative clauses: reading times at the critical verb will be longer for the ambiguous than the unambiguous versions; however, the *difference* in reading time between the ambiguous and unambiguous sentence conditions is predicted to decrease when an ambiguous sentence follows an incongruent flanker, because incongruency is expected to heighten cognitive control, thus facilitating revision in the ambiguous sentences.

Given these predictions, this study’s hypothesis aligns with current literature that domain-general cognitive control and ambiguity resolution share a two-way relationship: processing ambiguity heightens cognitive control, and heightened cognitive control modulates faster ambiguity resolution. Forthcoming data is predicted to support this hypothesis.

Table 1: Experimental conditions (critical verb is underscored)

Condition (sentence-flanker):	Example sentence:	Flanker
Unambiguous-Incongruent	The generous leader who was donated the plot of land on the coast promised to protect it.	<<><<
Ambiguous-Congruent	The generous leader donated the plot of land on the coast <u>promised</u> to protect it.	>>>>>
Unambiguous-Congruent	The old woman who was sold the juicy berries at the market made some delicious pies.	<<<<<<
Ambiguous-Incongruent	The old woman sold the juicy berries at the market made some delicious pies.	>><>>

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