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Interpreting Indeterminate Sentences in Aphasia: a Probe into Semantic Coercion

Caitlyn Antal, Alexa R. Falcone, Laura Pissani, Kyan Salehi and Roberto G. de Almeida

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Caitlyn Antal*, Alexa Falcone, Laura Pissani, Kyan Salehi, and Roberto G. de Almeida
Department of Psychology, Concordia University, Montreal, Canada

***corresponding author, caitlyn.antal@mail.concordia.ca**

Introduction

Sentences such as *Mary began the book* are considered indeterminate because they do not make explicit what the subject (*Mary*) began doing with the object (*the book*). Similarly, sentences such as My lawyer is a shark are metaphorical because the relationship between the topic (My lawyer) and the vehicle (shark) is not explicit and needs to be inferred by the reader. These types of sentences have generated much interest because they represent a case study for a central issue in language representation and processing: compositionality—in particular, (1) whether or not semantic composition is simple (classical) or enriched with intended or implicit constituents, (2) what is the nature of the linguistic and cognitive resources involved on the interpretation of the event the sentence conveys, and (3) whether these types of processing mechanisms are lateralized to one of the brain hemispheres. There have been at least two proposals for how the meaning of an indeterminate sentence is attained. One assumes that some form of local semantic enrichment takes place—often via what is called "coercion" or "type-shifting" (e.g., Pustejovsky, 1995, 2011; Asher, 2015). Coercion relies on internal analyses of the noun complement yielding an enriched form of compositionality (viz., [*begin the book*] → [*begin reading the book*]). An alternative view assumes classical compositionality, with much of the interpretation of the sentence being the product of pragmatic inferences (e.g., Fodor & Lepore, 2001; de Almeida & Riven, 2021; de Almeida & Lepore, 2018) triggered by a syntactic gap ([*began* [*v* [*the book*]]; de Almeida & Dwivedi, 2008). Moreover, although it had been proposed that the right hemisphere held a fundamental role for processing metaphors, clinical evidence suggests that both patients with damage to the right (Ianni, Cardillo, McQuire, & Chatterjee, 2014) or left hemisphere (Mancopes & Schultz, 2008; Cieślicka, Rataj, & Jaworska, 2011) are impaired, thus suggesting involvement of both hemispheres in metaphor processing. We investigated the coercion hypothesis as well as the right hemisphere hypothesis in a group of 14 individuals with aphasia from different etiologies, with lesions in either the left or right hemisphere.

Methods

Participants were 5 non-fluent [NF], 4 fluent [FL], 3 mixed but predominantly non-fluent [MN], 2 with mixed aphasia [MX], and 41 healthy controls. In each trial, participants were aurally presented with a sentence, immediately followed by two pictures on a computer screen. Their task was to choose which picture best represented the sentence they heard. Sentences were (a) indeterminate (*The academic began the research*), (b) fully determinate ("preferred": *…conducted the research*), (c) metaphorical (viz., in need of pragmatic enrichment: *…dumped the research*), or (d) determined but non-preferred (*…abandoned the research*). A picture such as in Figure 1a was the correct choice for the

indeterminate and fully determined sentences, whereas a picture such as in Figure 1b was the correct choice for the metaphorical and non-preferred sentences.

Results

We obtained a main effect of group, sentence type, and an interaction. Overall, group analyses showed that, when compared to controls, NF performed worse with indeterminate sentences, while MX performed worse with metaphors. Moreover, we found an effect of hemisphere, whereby individuals with RH lesions (N=5) performed worse with indeterminate sentences than controls, but their performance in metaphor was unimpaired. Crucially, the opposite pattern was true for individuals with LH lesions (N=9), who performed worse with metaphors than controls, but their performance in indeterminate sentences was unimpaired. Results from case-series analyses will be presented.

Conclusions

Our preliminary group analyses suggest that indeterminate sentences may be resolved by a syntactic-gap detection and by pragmatic inferences. The difficulty shown by the NF group in selecting the correct picture when presented with an indeterminate sentence suggests that they have problems computing the syntactic gap that may serve to trigger a search for an appropriate event during semantic composition. Regarding metaphor processing, our results do not provide support for the right-hemisphere hypothesis, and indicate a greater involvement of the left hemisphere. Further, concerning the opposite behavior for indeterminate versus metaphorical sentences, this may suggest that different processing mechanisms are at stake.

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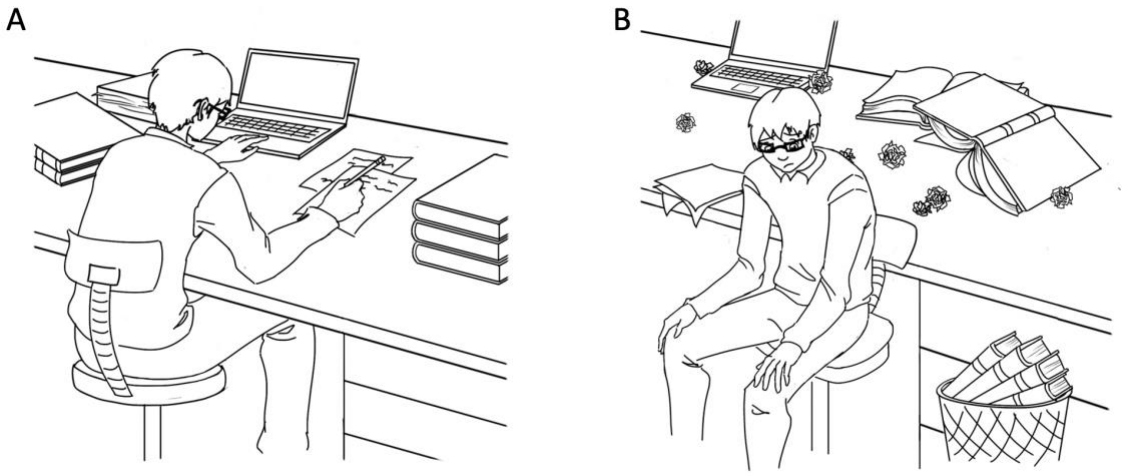

*Figure 1.*Sample drawings employed in the experiment. Participants had to choose which picture best matched a sentence they heard. For picture A, correct sentences were either indeterminate (*The academic began the research*) or fully determinate (*The academic conducted the research*). For picture B, correct sentences were either metaphorical (*The academic dumped the research*) or determined but non-preferred (*The academic abandoned the research*).