

Priming effect for noun phrase modification in Bengali?

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Abstract

This study examines the impact of syntactic complexity on structural priming effects in the context of noun phrase relativisation in Bengali. The result indicates that speakers of SOV languages, when presented with a binary choice of constructions with different levels of syntactic complexity, are predisposed towards the simpler structure, driven by underlying processing strategies, overriding any priming effect during online comprehension tasks.

Keywords: structural priming; syntactic complexity; noun phrase modification; Bengali

Introduction

Despite the extensive documentation of the robustness of structural priming effect (Mahowald, James, Futrell & Gibson, 2016), the role of syntactic complexity in influencing this phenomenon has not been comprehensively investigated in the priming literature. This suggests a need for deeper examination into how the degrees of syntactic complexity affect the strength and likelihood of priming effects.

Research question

The primary research question of this study probes the predictions and the potential limitations of the two dominant theories on structural priming; namely, the ‘residual activation theory’ (Pickering & Branigan, 1998) and the ‘implicit learning hypothesis’ (Bock & Griffin, 2000) by focusing on the effectiveness of syntactic priming across simple vs complex/rare sentence structures, particularly, in the context of noun phrase relativisation. These theories have been pivotal in understanding how priming operates, yet their scope in the context of diverse syntactic structures, particularly in less commonly studied languages, remains an area for further exploration. Thus, in alignment with the perspectives put forth by Jaeger & Norcliffe (2009), this study has been conducted in Bengali, an Indo-Aryan, South Asian, SOV language that offers a distinct syntactic typology.

Experiment overview

In order to test the predictions of the ‘residual activation theory’ (Pickering & Branigan, 1998) and the ‘implicit learning hypothesis’ (Bock & Griffin, 2000) regarding the impact of syntactic complexity on structural priming effects, we conducted a written sentence completion task (Pickering & Branigan, 1998) on noun phrase relativisation in Bengali which we report below.

Design and materials

The experiment had two conditions. For SRC primes and ORC primes, each item of this experiment contains a block of 3 sentences. The first sentence established the context and described a subject with two different modifiers. These modifiers were simple participial phrases that could be relativised either into an SRC or an ORC. However, the modifiers had been designed in a way such that one of the modifiers could be more easily translated into a subject relative clause (e.g. “The girl wearing a blue frock” to “The girl who is wearing a blue frock”) while the other one could be more easily translated into an object relative clause (e.g. “The girl liked by Arijit” to “The girl whom Arijit likes”) in Bengali. Following the context sentence, the participant was introduced to the prime sentence; a subject relative clause in the SRC prime condition and an object relative clause in the ORC prime condition. The last sentence then asked the participants to describe the subject. The target fragment (e.g. “That girl...”) was designed to force a relative clause description of the subject. Participants were also told beforehand that they could only pick one of the two modifiers to describe the subject. Additionally, in this experiment, the entire block, including the context sentence, the prime sentence, the final question for description and the target fragment was displayed together on the screen to maintain the continuity of the participants' reading experience and to prevent the loss of any contextual details from the sentences. To ensure that the order of presentation had no influence on the priming behavior, the experiment balanced the sequence of the SRC-inducing modifiers and the ORC-inducing modifiers across conditions. This was implemented to rule out any potential biases that the order might impart on the participants' choices.

In all, 18 items were prepared each for the 2 conditions. In addition 72 fillers were interspersed randomly along with the critical items. A total of 2 lists were prepared for this experiment following a latin-square design. Each experiment session started with 5 practice trial. A total of 41 university students participated in this experiment.

To address concerns about the potential complexity of the context sentences, twenty-three participants separately evaluated these sentences on a 7-point Likert scale, with 1 as 'very unnatural' and 7 as 'very natural'. The mean

rating obtained was 4.47 (SD = 0.34), which suggests that participants generally perceived the sentences as moderately favorable.

Response coding procedure

The response data were coded as 1s and 0s for logistic regression analysis. For the SRC prime and ORC prime conditions, responses were coded as '1' if priming was observed, i.e., if the target fragment was completed using the prime structure (i.e. SRC in SRC prime condition and ORC in ORC prime condition) and '0' if priming was not observed, i.e., if the target fragment was not completed using the prime structure.

Results

The statistical analyses has been done using the generalized linear mixed-effects model with logit-link function using the lme4 package (Bates et al., 2015) in R. The result reveals no significant difference between the subject relative clause (SRC) primes in condition (a) and object relative clause (ORC) primes in condition (b) ($z = -0.13$). The result seems to indicate the prime conditions do not have any effect on the participant's default completion choices (63% SRC completions for SRC prime; 64% SRC completions for ORC prime. Similarly, 35% ORC completions for SRC prime; 36% ORC completions for ORC prime).

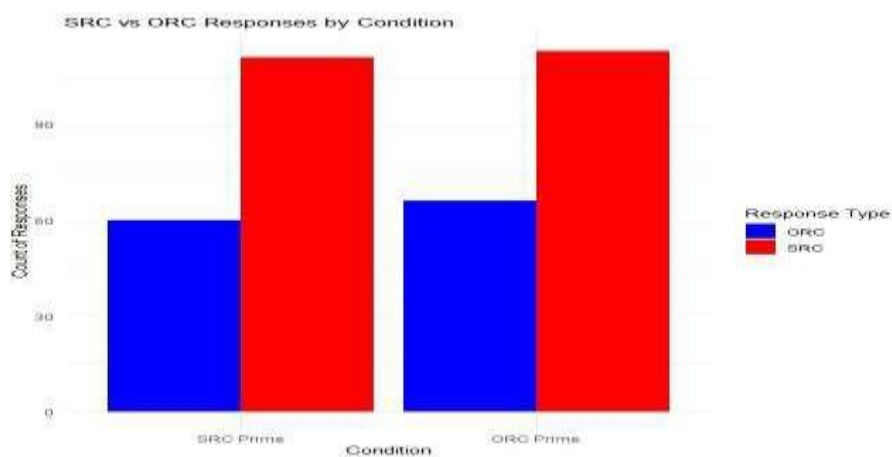


Figure 1: Response Distribution across SRC Prime and ORC Prime Conditions

Discussion

Our interpretation of the result shifts from a priming-centric view to one where processing dynamics come to the forefront. This is especially relevant considering that SRCs are generally easier to process than ORCs, both in

production and comprehension (Hawkins, 1999; Gibson, 1998). Our reinterpretation of the results is further supported by the ‘production-distribution-comprehension’ (PDC) account proposed by MacDonald (2013), which posits that language comprehension is influenced by the distribution of syntactic structures in production within a language. Additionally, the significance of preverbal material in making robust predictions about upcoming verbal heads in SOV languages (e.g., Konieczny, 2000; Vasishth and Lewis, 2006; Husain et al., 2014) further corroborates our re-interpretation of the results. We believe that, in our experiment, the target fragment acting as this preverbal material, in conjunction with the complexity gradient between SRC and ORC, likely steered participants towards the syntactically simpler option. In light of these observations, we propose the ‘Processing over Priming’ (PoP) hypothesis which postulates that speakers of SOV languages, when presented with a binary choice of constructions with different levels of syntactic complexity, are predisposed towards the simpler structure, driven by underlying processing strategies and the distributional patterns of their language. Critically, this hypothesis predicts that the propensity for speakers of SOV languages to form simpler structures will override any priming effect during online comprehension tasks, specifically, when the available choice of constructions has been reduced to a binary option between a simple and a complex counterpart.

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