The Toves of the Borogoves: Investigating RC Attachment Ambiguity with Nonce Words

So Young Lee (Miami University), Aniello De Santo (University of Utah)

Introduction. This study revisits relative clause (RC) attachment ambiguity resolution in English, employing nonce words as noun phrases (NPs) to minimize lexical semantics effects. RC attachment ambiguity as in (1) has been central to sentence processing research, providing insights into the interaction of syntactic and semantic information during comprehension. English is known to exhibit a low attachment preference, where RCs are typically associated with the most recent NP (Carreiras and Clifton Jr, 1993; Frazier, 1990).

(1) ***The son of the doctor who was on the balcony*** won the lottery.

Previous research shows that semantic relationships between NPs and RCs significantly influence attachment decisions; lexical and discourse-level information, such as semantic plausibility, can bias attachment when the two NPs differ in how naturally they can serve as RC heads (Altmann and Steedman, 1988; Desmet et al., 2002). Disentangling the complex interactions of factors affecting attachment preferences is thus still crucial in understanding principles of human sentence comprehension. By using nonce words, we aim to reduce lexical semantics dependencies between RCs and NPs, allowing us to explore parsing strategies in the absence of explicit lexical cues. Additionally, we manipulate the length of the RCs to investigate whether prosodic factors, such as the grouping of syntactic constituents based on length, affect attachment preferences (Hemforth et al., 2015).

Experiment 1. We first conducted an offline forced-choice task in English. The target sentences contained a "NP1 of NP2" construction, followed by an RC that could ambiguously modify either the first or second NP. The two nouns were nonce words, and the modified noun phrase was consistently in the subject position (2). Nonce words were a subset of the ARC Nonword Database (Rastle et al., 2002) validated for high plausibility (Kharkwal, 2014).

(2) ***The shagoner of the voncenist who espoused secrets*** swindled the interrogator.

The sentences also varied in the length of the RCs — 5/6 (short) vs. 9/12 (long) syllables. A total of 32 target sets and 60 fillers were distributed across two groups using a Latin square design. In a web-based questionnaire, participants (N = 54) read each sentence and answered a forced-choice question (e.g., "*Who espoused secrets?*"). Crucially, and in contrast to previous studies, we did not observe a clear LA preference. Importantly, stark individual differences were observed across participants (Figure 1 and 2). While some participants exhibited a strong, consistent LA preference across items, some demonstrated a strong HA preference, and others treated the sentences as being truly ambiguous. Also in contrast with previous work, we found no significant effect of RC length ($p = 0.24$). However, a slight group-level trend was observed, with long RCs showing a marginally higher HA rate (mean: 0.52) than short RCs (mean: 0.50).

Experiment 2: Plausibility Norms. As participants are known to make semantic inferences even from nonce words, we also ran a study probing at the plausibility of each RC in Experiment 1 modifying either the full complex NP (*The voncenist's shagoner*) or the second NP only (*The voncenist*) unambiguously. In a web-based Prolific questionnaire, participants (N = 50) were asked to rate the plausibility of such unambiguous sentences on a 7-points likert scale. A linear-mixed effects model run on z-score transformed judgments shows a preference for the second NP ($t = 6.522$, $p \leq 0.001$) but again no differences in terms of the length condition ($t = -1.104$, $p = 0.270$) nor an interaction effect ($t = -0.207$, $p = 0.836$). While this different in plausibility deserves further investigation (for instance, it could suggest a preference towards simpler constructions — a bare noun vs. a possessive construction — with nonce words), it is crucial to note that this tendency should then favor Low Attachment in ambiguous constructions, thus highlighting the surprising (population level) null effect in Experiment 1.

Conclusion. Overall, our results underscore the diversity of strategies employed during attachment resolution, and suggest that, when the semantic influence of the NPs is minimized, participants' individual profiles might take prominence over previously reported group-level tendencies. While these results are preliminary, nonce word tasks might then be crucial in explor-

ing individual differences and cross-linguistic preferences in attachment resolution.

Altmann & Steedman. 1988. Cognition. **Carreiras & Clifton**. 1993. Language and Speech. **Desmet et al**. 2002. The Q. J. of Exp Psych. **Frazier**. 1990. Comprehension processes in reading. **Hemforth et al**. 2015. Lingua. **Kharkwal**. 2014. PhD Dissertation. **Rastle et al**. 2002. The Q. J. of Exp Psych.

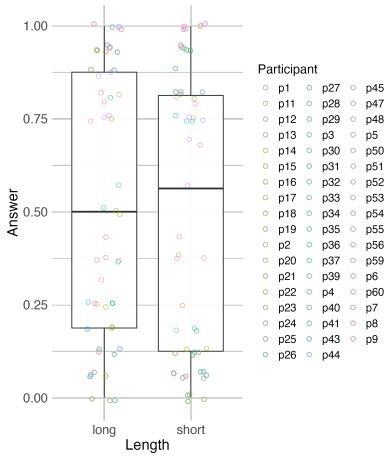

Figure 1: Exp 1. HA answer rate

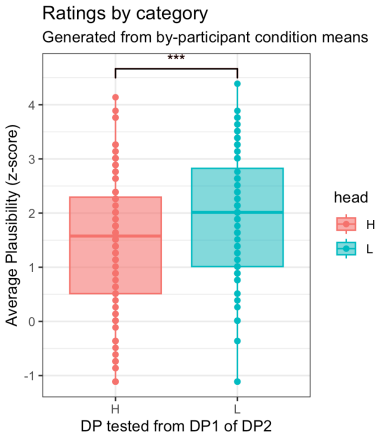

Figure 2: Exp 2. Plausibility Norms

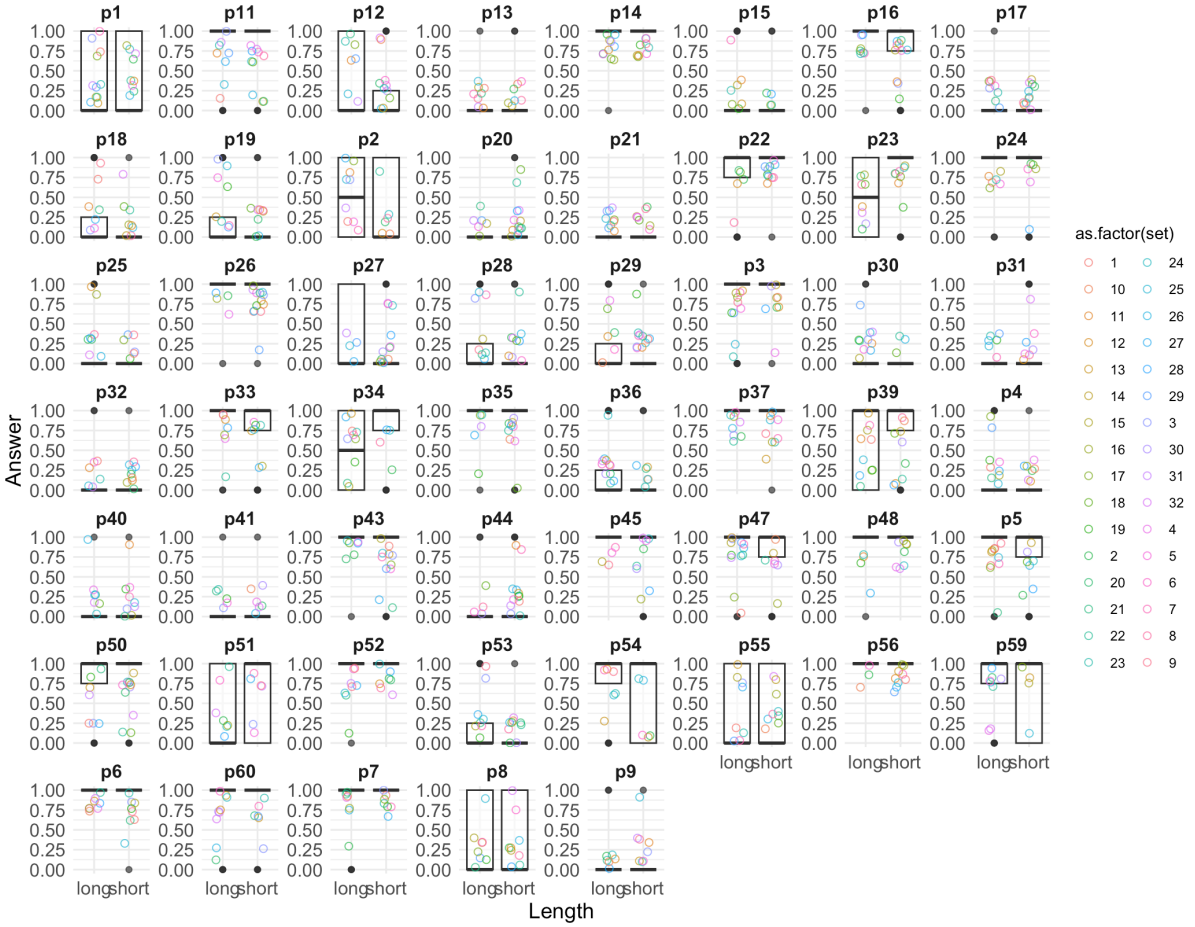

Figure 3: Exp 1. Individual HA answer rates by participants