

Scope ambiguity resolution, event structure bias, and German main clause scrambling

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Introduction Our study exploits German main clause scrambling (SVO → OVS) to investigate the role of the processor's expectations about event structure bias (lexical-pragmatic bias) in quantifier scope ambiguity resolution. Recent results (Dwivedi, 2013) suggest that event structure bias and shallow heuristic approaches precede structural reanalysis, which is only invoked in marginal circumstances. Older work (Kurtzman and MacDonald, 1993) dismisses a direct linear order scope preference. We use German scrambling to show that the processor must resist surface order in order to assert event structure bias.

Most readers would still understand the scope-ambiguous English sentence in (1) to refer to multiple trees. By contrast, readers may more often consider a single diamond in (2), due to previous expectations about diamonds. German scrambling allows us to test whether the influence of event structure bias is affected by surface order without changing the overall syntactic category of the sentence (e.g., to passive). Declarative, active-voice sentences in English permit only one ordering of subjects and objects (SVO). Previous studies (Dwivedi, 2013; Anderson, 2004, *inter alia*) tested the relationship between event structure bias and scope ambiguity resolution using English sentences similar to (1). Without the ability to make a small change to the order of noun phrases, the effect of surface order on the structure inferred by the processor can only be disentangled indirectly (Dotlačil and Brasoveanu, 2015) from event knowledge.

Hypothesis If the reversal of the canonical order of German noun phrases causes an increased singular bias, then event structure bias must overcome resistance from surface order, and algorithmic reanalysis is probably invoked early. If we do not observe a plurality difference, then Dwivedi's result suffices to explain alternate surface orders. Our independent variables are surface order, the object NP's article (singular demonstrative, plural demonstrative, indefinite), and singular or plural interpretation of the object NP. Our hypothesis is that surface order competes with event structure bias, so that singular interpretations are more likely preferred in OVS order. This effect should hold primarily for indefinite object NPs, so that it is not merely surface order creating this change in bias, but an ambiguity resolution mechanism.

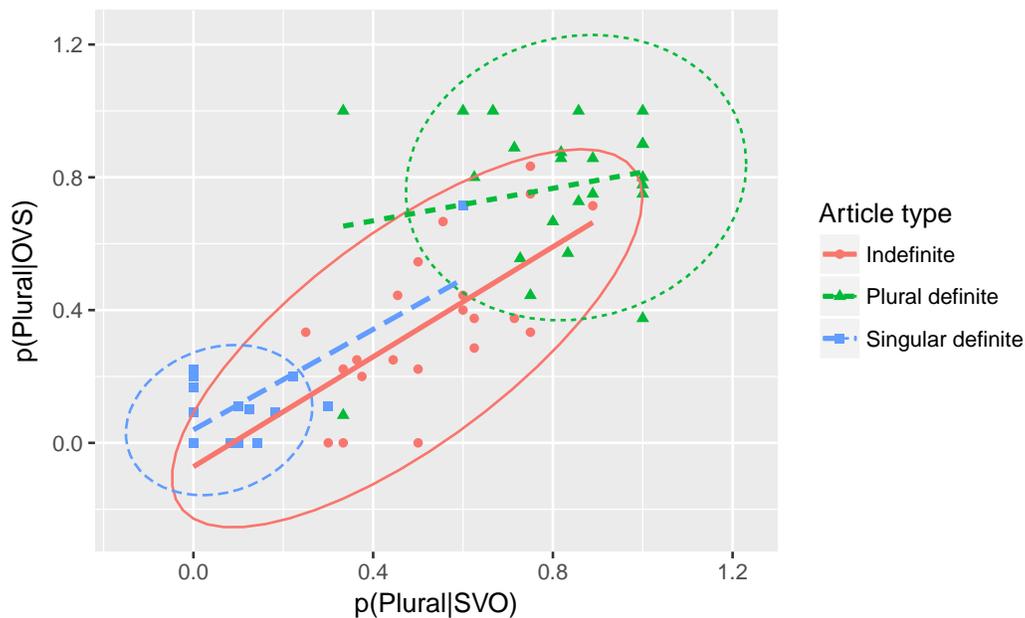
Method and Materials We took 24 English stimuli used in Dwivedi (2013) and adapted them to German. The items consisted of a context sentence followed by a continuation sentence. We varied the article and position of the object NP as in (3) and (4). We elicited subject NP completions of the continuation sentence via a questionnaire ($N = 68$, 24 fillers) and coded each response referring unambiguously to the context sentence's object NP as singular or plural.

Results For the indefinite condition, we fit a logistic mixed-effects regression model with response plurality as dependent variable, separate fixed effects for surface order, a random intercept under item, and a random intercept and slope for surface order under subject. We find a significant main effect of surface order ($b = 0.93$, $p = 0.001$, $z = 3.26$) such that SVO order results more often in a plural response. Pearson's correlation between the percentage of plural responses for SVO and OVS sentences across each article type reveals stronger correlations for the indefinite (0.75) and the definite singular (0.68) conditions than for the definite plural (0.21). However, definite singular items clustered at 9% plural responses overall, unlike indefinite items (40%); see (5).

Conclusions German scrambling provides evidence for a mechanism in which event structure biases force the processor to reanalyse surface syntax, since respondents more often preferred a singular interpretation when the object NP was fronted in the indefinite condition. The correlations across article conditions by surface order show that competition (Paterson et al., 2008) between event structure and surface order biases is activated by an ambiguity-instigating indefinite article, rather than by a surface-order heuristic.

Examples and figures

- (1) Every child climbed a tree.
- (2) Every jeweller appraised a diamond.
- (3) Jeder Spion hat diesen/einen/diese Auftrag/Aufträge erhalten. *Der/die Auftrag/Aufträge*
Every spy-NOM has this/a/these order(s)-ACC received. *The order(s)*
war(en) gefährlich und riskant.
was/were dangerous and risky.
'Every spy received this/a/these order(s). *The order(s) was/were* dangerous and risky.'
- (4) Diesen/Einen/Diese Auftrag/Aufträge hat jeder Spion erhalten. *Der/die Auftrag/Aufträge*
This/A/These order(s)-ACC has every spy-NOM received. *The order(s)*
war(en) gefährlich und riskant.
was/were dangerous and risky.
'Every spy received this/a/these order(s). *The order(s) was/were* dangerous and risky.'
- (5)



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