Prosodic Constraints on Scope Interpretation: Evidence from Quantifier–Negation Interactions in German

Golshan Shakeebaee (shakeebaee@em.uni-frankfurt.de)[1], Ai Chen[1], Frank Kügler[1], Markus Bader[1]
[1]Linguistics Department, Goethe University Frankfurt

Sentences in German that combine negation with quantified noun phrases are often scope-ambiguous, permitting both surface-scope (Quantifier $>$ Negation) and inverse-scope (Negation $>$ Quantifier) interpretations [7](see Table 1). Although both readings are in principle available, comprehenders generally prefer the surface-scope interpretation [2, 4]. Previous work has attributed scope preferences to a range of factors, including structural parsing biases, discourse context, processing demands, pragmatic considerations, and prosody [1, 3–6]. In particular, contrastive topic intonation (e.g. rise–fall or "hat" contour) has been argued to favor inverse-scope readings [3, 6]. However, it remains unclear to what extent these effects generalize across quantifier types, as previous work has focused primarily on universal quantifiers [8, 9]. In addition, it remains unclear whether rising–falling contours generally cue inverse-scope interpretations or whether their effects vary across quantifier types that differ in their preference for surface-scope readings. The present study therefore examines whether the effects of intonation on scope interpretation depend on quantifier type and syntactic position in German.

Across three experiments, 114 participants completed a forced-choice comprehension task on sentences containing *jede* ('every') and *ein* ('a/one') (Table 1). Each experiment used a 2×2 design crossing QUANTIFIER POSITION (*prefield*, before the finite verb, vs. *midfield*, after the finite verb) and INTONATION CONTOUR (falling–falling vs. rising–falling). Acoustic analyses confirmed that the prosodic manipulation was successfully implemented: rising–falling contours were consistently realized with a hat pattern, consisting of a rising accent on the quantifier, a high plateau, and a falling accent on the negative particle (Figure 2), with no systematic differences in duration. Behavioral results revealed asymmetry across quantifier types (Figure 1). Inverse-scope interpretations were substantially more available in the *jede* ('every') experiments than in the *ein* ('a/one') experiment. For *jede* ('every'), rising–falling contours increased inverse-scope interpretations, with stronger effects in prefield than midfield configurations. In contrast, sentences containing *ein* ('a/one') yielded near-floor rates of inverse scope and showed no reliable effects of intonation or position.

The observed asymmetry across quantifier types suggests prosodic cues do not uniformly trigger inverse scope, but instead modulate interpretations that are already comparatively accessible. In addition, the *jede* ('every') experiments showed inter-speaker variability, with some participants consistently accessing inverse scope and others rarely doing so. This pattern resembles the heterogeneous response distributions reported in previous work on quantifier–negation ambiguities [4] and further supports the view that scope preferences emerge from the interaction of multiple grammatical, prosodic, and processing-related factors rather than from a categorical parser preference alone.

References

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Figures and Tables

Table 1: Example stimuli for the three quantifier constructions. PF = prefield; MF = midfield.

Construction	Pos.	Example sentence
jede subject	PF	Jeder Tierpfleger hatte das Zebra in dem Gehege nicht gepflegt. *'Every zookeeper had not cared for the zebra in the enclosure.'*
	MF	Das Zebra in dem Gehege hatte jeder Tierpfleger nicht gepflegt. *'The zebra in the enclosure had not been cared for by every zookeeper.'*
jede object	PF	Jede Frage von der Journalistin hatte der Politiker nicht beantwortet. *'Every question from the journalist, the politician had not answered.'*
	MF	Der Politiker hatte jede Frage von der Journalistin nicht beantwortet. *'The politician had not answered every question from the journalist.'*
ein object	PF	Eine Geschichte in dem Buch hatte der Autor nicht vorgelesen. *'A story in the book, the author had not read aloud.'*
	MF	Der Autor hatte eine Geschichte in dem Buch nicht vorgelesen. *'The author had not read aloud a story in the book.'*

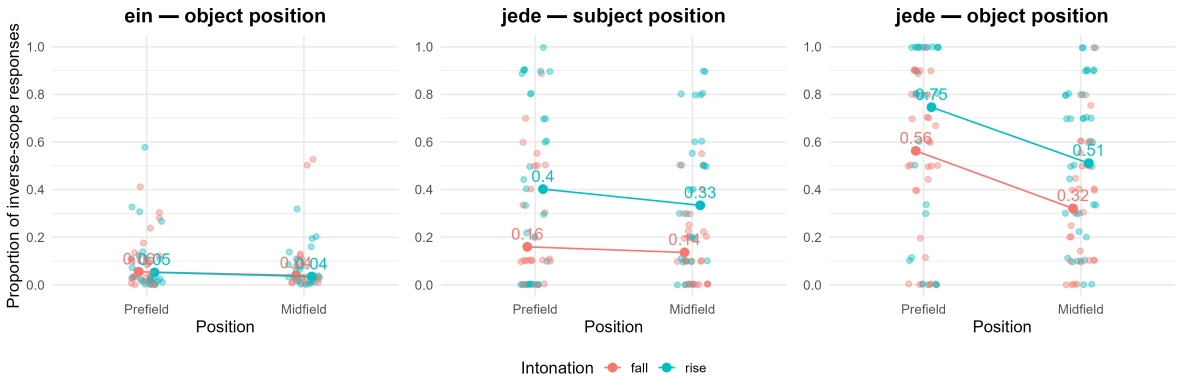

Figure 1: Proportion of inverse-scope responses by POSITION (Prefield vs. Midfield) and INTONATION CONTOUR (rise vs. fall) across the three experiments.

Optional Supplemental Information

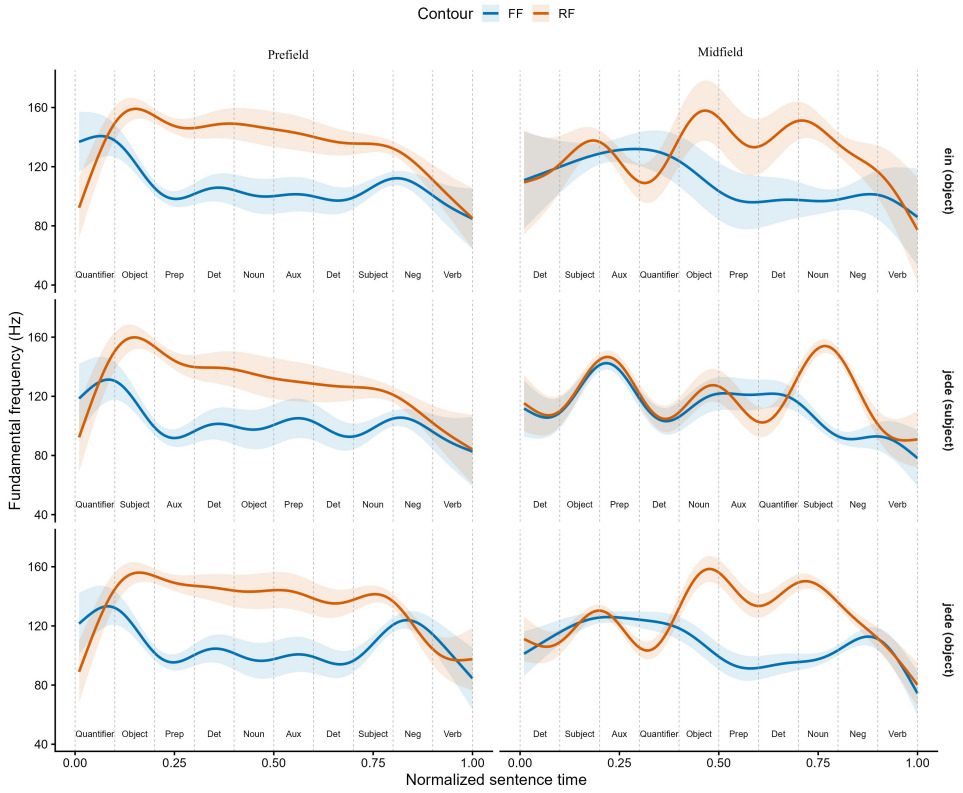

Figure 2: GAMM-predicted F0 contours across normalized time for falling–falling (FF) and rising–falling (RF) intonation patterns