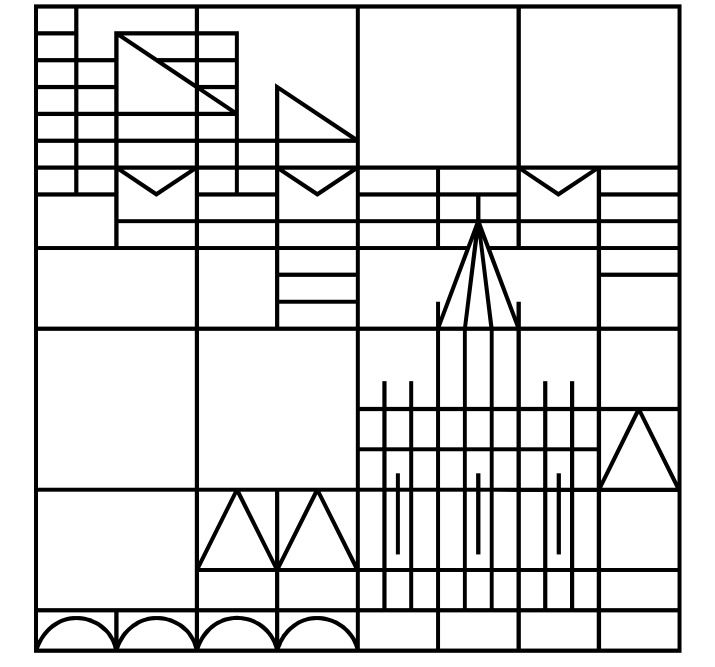


The relevance and weighting of prosodic cues in question interpretation



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Differences between German rhetorical questions (RQs) and information-seeking questions (ISQs)

String-identical RQs and ISQs differ prosodically in duration, voice quality, pitch accent types and edge tone. (Braun et al., 2019, see Table 1)

ISQ	RQ
short	long
modal	breathy
wh: L+H* and low/high edge tones	wh: (LH)* and low edge tone
polar: L*/L+H* and H-^H%	polar: (LH)* and H-%
wh: some prenuclear accents	wh: some prenuclear accents
polar: no prenuclear accents	polar: no prenuclear accents
	wh-syntax preferred (Dehé et al., 2022; semi-spontaneous data)

Table 1: Prosodic and syntactic differences between RQs und ISQs

Goal of the study

We investigate the well-formedness of RQs and ISQs in German in a full factorial experimental design with the **prosodic and syntactic cues** duration, voice quality, prenuclear accent, nuclear accent, edge tone and question type (polar vs. wh) – using Active Learning (AL).

Background & Goal

Material

12 target constructions: *spielen + denn + Badminton* (SWW) 'to play' + 'DiP' + 'Badminton'

Polar: *Spielt denn jemand Badminton?* vs. Wh: *Wer spielt denn Badminton?*

Prosodic manipulation

- Duration: uniform lengthening/shortening of 10%
- Voice quality: breathy, modal
- Prenuclear accent: absent (none), present (H*, L*, L*+H)
- Nuclear accent: L*, H*, L*+H, L+H*, H*+!H*, (LH)*
- Edge tone: L-%, L-H%, H-%, and H-^H%

Cross-splicing of natural recordings by a female speaker (manipulation of difficult contours), resulting in 9216 tokens in 384 conditions.

Procedure

- Multiple-cue categorization study: Exp I. ISQ vs. non-ISQ vs. Exp II. RQ vs. non-RQ
- Online (custom-made JavaScript program, AL System, Settles, 2009)
- Definition of RQ and ISQ + practice phase
- Grouping phase (2 groups, separate AL systems, catch items to exclude inattentive participants)
- Experimental phase

Participants

Experiment I (ISQs)

- 47 (f), 34 (m); 24.3 years on average (SD = 3.5); Group I: N = 62 (77%)

Experiment II (RQs)

- 54 (f), 25 (m), 1 (other); 26.2 years on average (SD = 7.6); Group I: N = 67 (84%)

Method & Analysis

Analysis for Exp. I and Exp. II

- **Step I:** Boosting algorithm, determine which cues/cue combination improved the model accuracy (gain in accuracy > 1%, Chen & Guestrin, 2016)
- **Step II:** Linear regression model

Exp. I: ISQ:

- 28 cues/cue combinations improved model (Fig. 1a, left panel for significant effects)

Exp. II: RQ:

- 29 cues/cue combinations improved model (Fig. 1a, right panel for significant effects)

Results

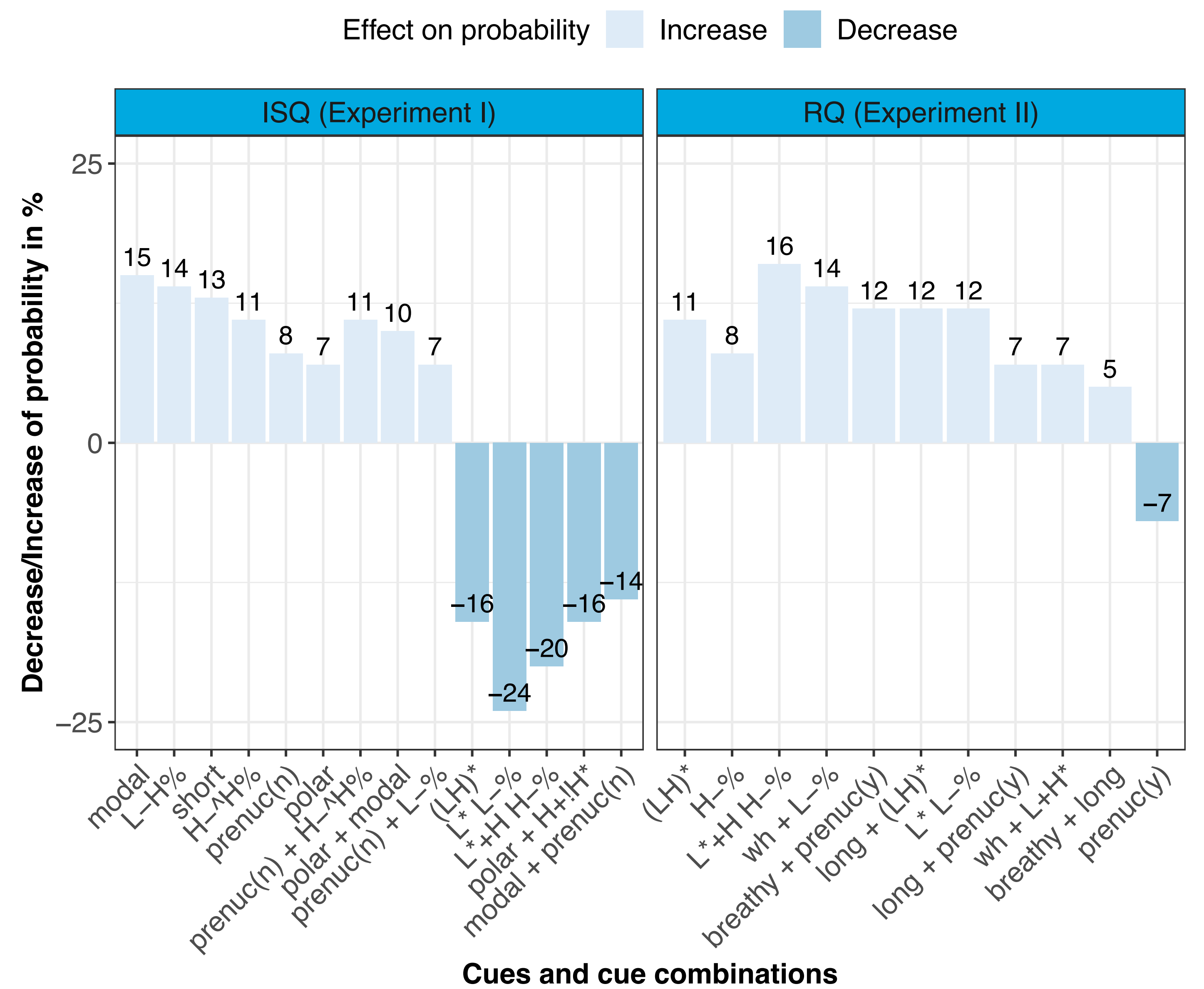


Figure 1a: Estimates of separate linear regression models; bars show the effect of cues/cue combinations on the probability of the baseline question to be classified as ISQ/RQ.

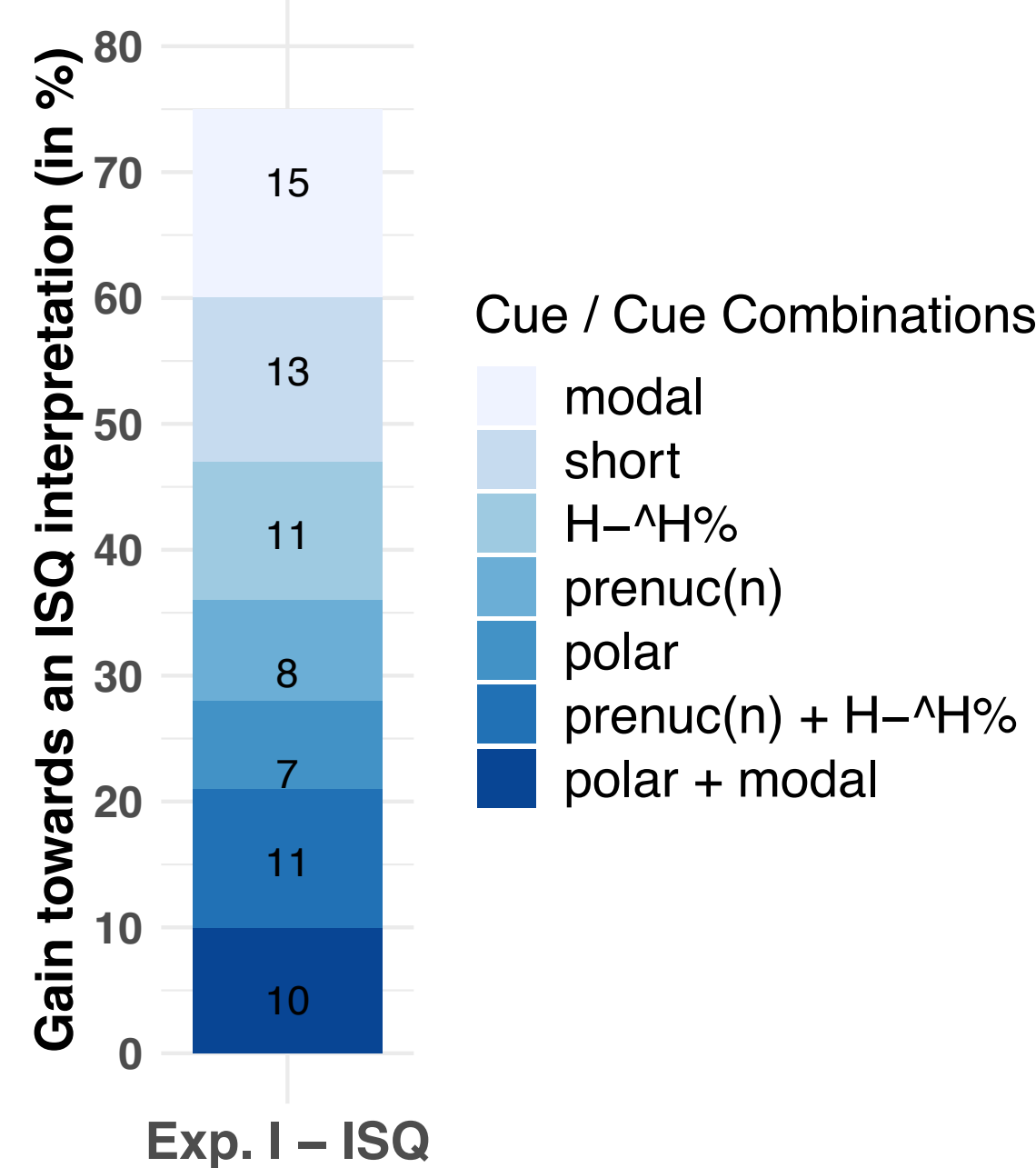


Figure 1b: Example interpretation

Note:

The baseline (intercept) represents the cues/cue combinations for which there was no increase in accuracy for the boosting algorithm.

Baseline for Exp. I: wh, breathy, long, prenuclear accent present (=prenucl(y)), L-%/H-%, H*/L+H*

Baseline for Exp. II: polar, modal, short, prenuclear accent absent (=prenucl(n)), L-%, H*/L+H*/H+!H*

Discussion

Discussion

- Results on question interpretation largely confirm the cues found in production (Braun et al., 2019, Dehé et al., 2022)
 - **ISQ:** polar syntax, short duration, modal voice, prenuclear accents absent, final rises H-^H%
 - **RQ:** wh-syntax, long duration, breathy voice, late peak accents (L*+H and (LH)*), high-plateau contours H-%
- Interestingly, ISQ interpretation reveals a clearer/more unique pattern of cue combinations, while RQ interpretation is achieved by a range of combinations with no unique pattern (Fig. 1a) → Implications for well-formedness of ISQs vs. RQs?
- Future work: Prenuclear accents will have to be analyzed in more detail (currently bundled based on calculation issues)



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