

Influence of speaker characteristics on the interpretation of rhetorical questions

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Many perception studies rely on a single (model) speaker. In this work we analyze to what extent idiosyncratic characteristics of a speaker may influence the identification of *wh*-questions as rhetorical or information-seeking in German. Rhetorical questions (RQs) differ from information-seeking questions (ISQs) in their prosodic features, i.e., a longer constituent duration (Beyssade & Delais-Roussarie, 2022; Braun et al., 2019; Sahkai et al., 2022), breathy voice quality and a higher proportion of L*+H accents (rising accents in which both the Low and High tonal targets are aligned with the stressed syllable, later termed (L+H)* in Zahner-Ritter et al. (2022)). In a perception experiment, in which these three factors had been crossed, participants reacted most strongly to accent type, followed in strength by duration and voice quality (main effects only). Utterances, in which all three factors were compatible with the interpretation as RQ were most often rated as RQ, and with every cue that was changed, the percentage of RQ interpretation decreased (Kharaman et al., 2019), see Figure 1.

The present work investigates whether these results can be generalized to different speakers and, consequently, to differences in phonetic implementation of the cues. Therefore, the *wh*-questions of Experiment 1 from Kharaman et al. (2019) were rerecorded by four new speakers (2 male, 2 female). Speaker was manipulated between-items, i.e., each speaker produced eight of the *wh*-questions in Kharaman et al. (2019) (e.g., *Wer mag denn Bananen?* Who likes Bananas?) in four conditions (breathy vs. modal voice quality crossed with rising-falling (L+H)* L-% or early-peak contours H+!H* L-%). Afterwards, the recordings were averaged across conditions and shortened and lengthened by 10 %, respectively to create a long and short versions, respectively (cf. Kharaman et al. (2019)). This resulted in 8 conditions. The 256 items were distributed on eight pseudo-randomized lists with 32 items each, so that the same conditions were at least two items apart and the same lexical item at least eight items apart. Each list contained each condition four times. Each participant was assigned two lists. We tested 16 native German speakers (10 male, 6 female) via headphones in the PhonLab at the University of Konstanz. The participants were asked to give their responses with a three-button box, whose buttons were labeled RQ, ISQ and other.

The results are shown in Figure 2 (responses to ‘other’, 6% of the data, were excluded). Responses to ISQ and RQ were analyzed with logistic hierarchical regression models with the three prosodic variables as fixed factors and participant, speaker, and item as crossed random effects (random intercepts and if possible random slopes for the fixed effects), using the R-packages lme4 and lmerTest (Baayen, 2008; Baayen et al., 2008; Bates et al., 2014; Kuznetsova et al., 2016). The results show main effects of all prosodic factors (all $p < 0.001$) and no interactions ($p > 0.4$). Similar to Kharaman et al. (2019), the effect of accent type ($\beta = 2.7$) was stronger than the effects of voice quality ($\beta = 1$) and duration ($\beta = 0.8$). A combined analysis with the data from Kharaman et al. (2019) showed a main effect of Experiment ($p < 0.0001$ with slightly higher RQ rates than in the present experiment) and interactions between the experiment and all three prosodic cues (all $p < 0.0001$), see Figures 1 and 2 for comparison of the results of the two experiments. As Figure 1 shows, the interaction manifests itself in more RQ responses for the L*+H accent with a long duration or breathy voice quality.

The results of the experiment show that the phonetic realization plays a role for the interpretation of rhetorical and information-seeking questions, as the phonological cues are interpreted slightly differently by the speakers, dependent on their idiosyncratic characteristics. However, the general results are amazingly similar across speakers, suggesting generally stable interpretation of prosodic cues.

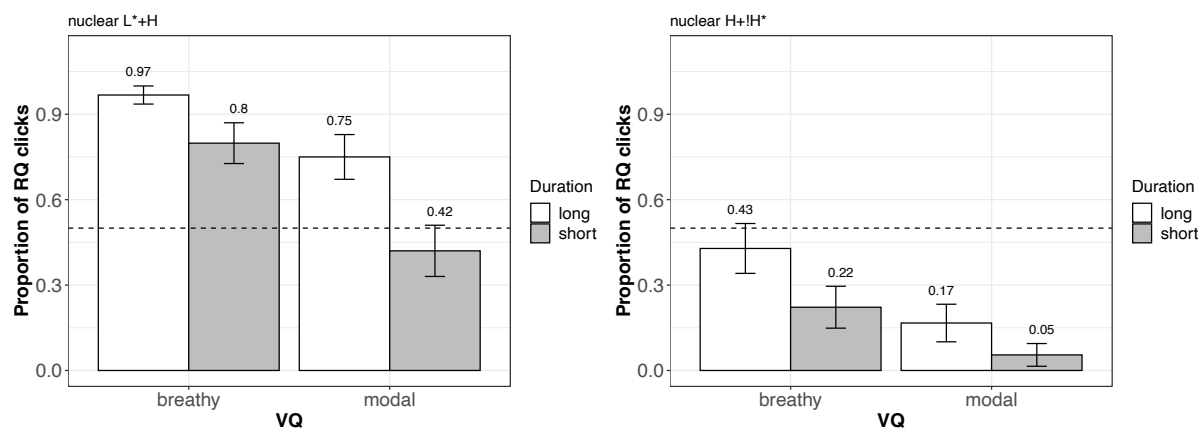


Figure 1: Clicks to RQs in the single-speaker experiment of Kharman et al. (2019). Whiskers show +/-1 SEM

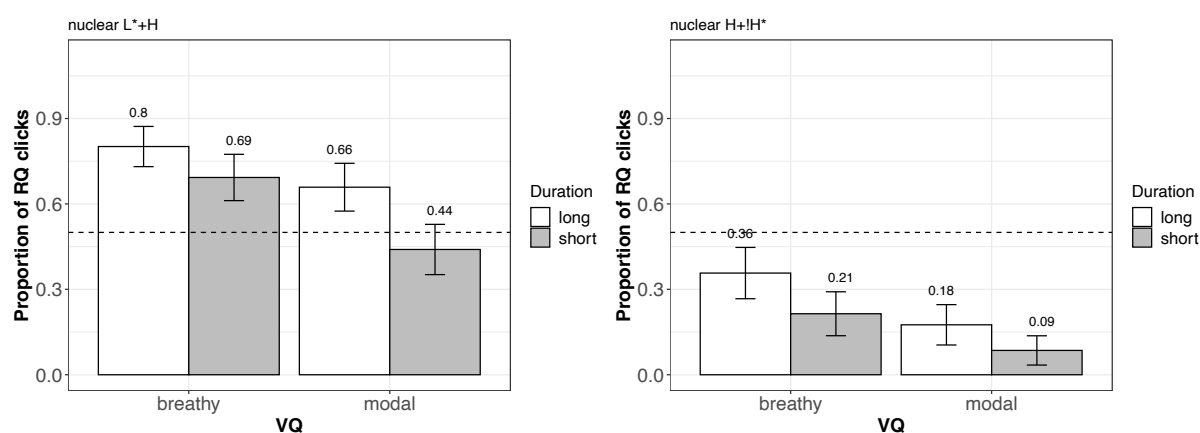


Figure 2: Clicks to RQs in the current, multiple-speaker experiment.

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