Who likes liver? How German speakers use prosody to mark questions as rhetorical
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While an information-seeking question (ISQ) elicits information [1, 2], the implied answer to a rhetorical question (RQ) is usually part of the common ground (e.g. [1, 3]). RQs have as yet mainly been the subject of pragmatic and semantic investigations, but research on their prosodic realisation is still rare. In a first study on the production of RQs in German, [4] found that RQs differed prosodically from ISQs in final boundary tone, pitch accent type, duration, voice quality, and initial pitch. Compared to [4], the present study controls the discourse status of the syntactic object, such that it is always discourse given, as well as the inherent rhetoricity between wh- and polar questions by keeping the contexts the same.

We constructed 22 context-question quadruplets (Tab. 1), manipulating question type (wh vs. polar; half of the contexts were presented with polar and half with wh-questions) and illocution type of context (ISQ vs. RQ; distributed within-subjects). Forty participants were randomly assigned to one of two lists and tested individually. After having read the context silently from a screen, they produced the target question as naturally as possible. So far, data of 12 participants (80=21.7 years, SD=2.27 years, 2 male) have been analysed (n=512, wh: 129 ISQs, 130 RQs; polar: 127 ISQs, 126 RQs). Using Praat, two trained annotators labelled the words (Tier 1), accented syllable(s) (Tier 4), pitch accents and boundary tones (following GToBI [5], Tier 5; see Fig. 1). In case of disagreement, a consensus label was found. We also extracted vocal effort (H1*-A3*, [6]) at three vowels of interest (Tier 3, Fig. 1).

Boundary tones: For polar questions, RQs were predominantly realised with a high plateau (H-%: 74%), while ISQs were mostly produced with a high rise (H+H%: 87%). For wh-questions, RQs mostly show low boundary tones (L-%: 94%), while ISQs were more variable: high rises (33%), low rises (19%) and low boundary tones (45%); Tab. 2.

Nuclear pitch accents: For polar questions, both ISQs and RQs were most often realised with a low-pitched accent (L*: ISQ: 84%, RQ: 77%), followed by a rise (high rise or high plateau). For wh-questions, there is a difference in nuclear pitch accents, however. RQs show a higher proportion of L*+H nuclear accents (55%) than ISQs (3%), while ISQs show a higher proportion of L+H* nuclear accents (43%) than RQs (22%). Moreover, in ISQs, L* (28%) and H+!H* (15%) are more common than in RQs (L*: 9%, H+!H*: 2%); Tab. 2.

Acoustic measurements: Tab. 2 summarizes the means of RQs and ISQs in the acoustic variables initial pitch, duration, and vocal effort, listed by question type (p-values in brackets; note that the significance levels were corrected according to [7]). Our findings show that RQs, compared to ISQs, have a longer utterance duration (for both wh- and polar questions), longer normalised durations of the first word (for wh-questions only) and the final object (for both wh- and polar questions); RQs show a tendency for lower initial pitch (for wh-questions only), and breathier voice quality in all measured vowels (for wh-questions only).

These results are comparable to [4] (except for voice quality and initial pitch), corroborating [4]'s findings in two respects: First, our results suggest that the observed differences can be attributed to illocution type and are not merely an artefact of information-structure. Second, our results support [4]'s findings that the differences between illocution types are realised more clearly in wh-questions than in polar questions. Thus, speakers provide clear prosodic cues to mark interrogatives as rhetorical, at least in wh-questions. Likewise, in a recent perception study (investigating accent type and voice quality), we show that these cues are used by listeners in order to identify RQs. We are currently analysing more data to shed more light on the reported findings regarding initial pitch and voice quality on the one hand, and the difference in the realisation of rhetoricity across question types on the other. We also focus on the production-perception link, testing cues, which have been identified as markers of rhetoricity in production, also in perception.
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