Identifying rhetorical questions in German: the perceptual relevance of pitch accent type, voice quality and the modal particle denn

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Background & Motivation:
- Information-seeking questions (ISQs) elicit new information with the goal of closing a knowledge gap. (e.g., Groenendijk & Stokhof 1984)
- Rhetorical questions (RQs) imply answers that are already known to all interlocutors. (Caponigro & Striphas 2007)
- nuclear late-peak accent (L*+H) and breathy voice quality as characteristics in the production of German wh-RQs (Braun et al. (submitted)).

Participants have different functions in questions:
- schon and achen are rhetorically connotated (Meibauer 1986)
  - Wer schreibt schon gerne Prüfungen? ('Who likes PRT to take exams?')
  - Was sollten wir auch anderes tun? ('What else should we PRT do?')
- denn can occur in both ISQs and RQs (Meibauer 1986, Thurmair 1991)
  - RQ: Wer geht denn im Sommer Skifahren? ('Who goes PRT skiing in the summer?')
  - ISQ: Wer geht denn heute zum Grillfest? ('Who is going PRT to the barbecue today?')

Research Questions:
- Experiment 1: Are voice quality and nuclear pitch accent type relevant perceptual prosodic cues for the interpretation of German wh-questions as rhetorical or information-seeking when they are presented out of linguistic context?
- Experiment 2: Does the modal particle denn influence the interpretation of these prosodic cues?

Forced-Choice Perception Experiments: Materials & Methods

**Experiment 1:**
- 32 different wh-questions, pragmatically ambiguous between RQ and ISQ: Wer VERB denn OBJEKT? vs. Wer VERB PRT OBJEKT?
- all questions were recorded in four experimental conditions:
  - accent type: early-peak (H+H*) late-peak (L*+H)
  - voice quality: modal breathy modal breathy

**Experiment 2:**
- identical to Exp. 1 but particle denn was cut out of the stimuli

Results:
1. Mouse clicks
   - RQ interpretation: most frequent for stimuli with breathy voice and nuclear late-peak accent (L*+H)
   - ISQ interpretation: most frequent for stimuli with modal voice and nuclear early-peak accent (H+H*)

Experiments 1: with denn  Experiment 2: without denn

2. Fixations
   - empirical logits (elogs) were calculated: fixations to the RQ label divided by fixations directed elsewhere
   - fixations were analysed in 0.1s time windows from object noun onset

Experiment 1:
- significantly more fixations in late-peak than in early-peak condition (0.8s after noun onset)
- significantly more fixations in breathy voice than in modal voice condition (1.1s after noun onset)

Experiment 2 (all effects occurred after noun offset):
- significantly more fixations in breathy voice condition than in modal voice condition (1.2-1.7s after noun onset)
- significantly more fixations in late-peak than in early-peak condition (1.3s after noun onset)

Discussion:
- RQs and ISQs are both reliably identified based on their prosody (i.e. in absence of a disambiguating context)
- prosodic configuration nuclear late-peak accent plus breathy voice quality might be a conventionalized prosodic contour to signal wh-RQs, following recent findings on conventionalized contours by Hellbernd & Sammler (2016)
- when denn is absent, participants still identify the same prosodic combinations as RQ and ISQ
- presence of denn seems to facilitate decisions for the identified prosodic configurations for ISQ and RQ

\[ \text{ISQ: early-peak in modal voice quality (H+H*), RQ: late-peak accent (L*+H) in breathy voice quality} \]


This research has been funded by the DFG (FOR 2111, P6).