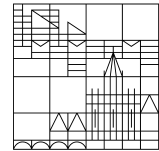# Identifying rhetorical questions in German: the perceptual relevance of pitch accent type, voice quality and the modal particle *denn*

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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 & Sprouse 2007)
- **nuclear late-peak accent** (L*+H) and **breathy voice quality** as characteristics in the production of German *wh*-RQs Braun et al. (submitted).
- **particles** have different functions in questions:
  - → *schon* and *auch* 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?*')
  - **but** influence of *denn* on question interpretation has not yet been empirically tested
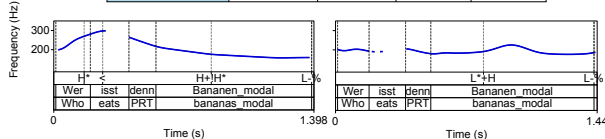
Research Questions:

- **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? 'Who VERB PRT OBJECT?'
- all questions were recorded in four experimental conditions:

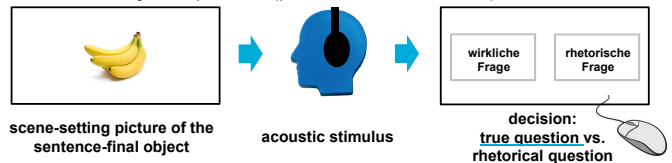| accent type	early-peak (H+!H*)		late-peak (L*+H)	
voice quality	modal	breathy	modal	breathy

Experiment 2:

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

Participants:

- 48 monolingual native German speakers, 24 per experiment (**Exp.1**: Ø = 23.7 years, 19 female; **Exp. 2**: Ø = 22.8 years, 17 female)

Procedure:

- after a picture (providing non-linguistic context), listeners decided whether the *wh*-question played was an RQ or ISQ
- within-subjects: *nuclear accent type, voice quality* (breathy vs. modal)
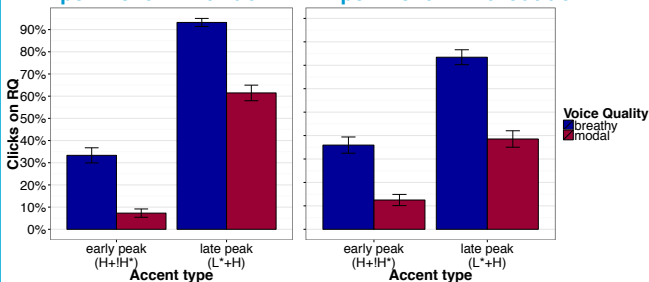- between-subjects: particle (presence vs. absence)

scene-setting picture of the sentence-final object → acoustic stimulus → decision: true question vs. rhetorical question

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*)

- interaction between *accent type, voice quality* and *particle*
  - → *denn* strengthens the respective interpretation (RQs & ISQs)
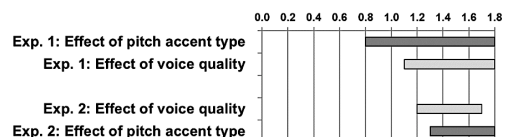
2. Fixations

- 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
  - → **ISQ:** early-peak accent in modal voice quality (H+!H*), **RQ:** late-peak accent (L*+H) in breathy voice quality

Groenendijk, J. & M. Stokhof. 1984. *Studies on the semantics of questions and the pragmatics of answers.* Amsterdam: Universiteit van Amsterdam, PhD Thesis; **Caponigro, I. & J. Sprouse. 2007.** Rhetorical question as questions. *Proceedings of Sinn und Bedeutung,* vol. 11, pp.121-133; **Meibauer, J. 1986.** *Rhetorische Fragen.* Tübingen, Niemeyer.; **Braun, B., N. Dehé, J. Neitsch, D. Wochner & K. Zahner. (submitted 2018).** The prosody of rhetorical and information-seeking questions in German. Language and Speech.; **Thurmair, M. 1991.** Zum Gebrauch der Modalpartikel 'denn' in Fragesätzen: Eine korpusbasierte Untersuchung. In E. Klein, F. Pouradier Duteil & K. H. Wagner (eds.), *Betriebslinguistik und Linguistikbetrieb.* Linguistische Arbeiten 260, pp. 377-388, Tübingen: Niemeyer; **Hellbernd, N. & D. Sammler. 2016.** Prosody conveys speaker's intentions: Acoustic cues for speech act perception. *Journal of Memory and Language,* vol. 88, pp. 70-86.