Rhetorical questions in Persian

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Motivation

- Previous production studies showed that rhetorical questions (RQs) differ reliably from information-seeking questions (ISQs) with respect to F0 featues, duration, and often voice quality
- RQs have lower pitch excursion, longer duration, and more cases of non-modal voice quality than ISQs.
- A number of languages share these phonological and phonetic cues (cf. [1], for German, English, Icelandic, Italian, Stand. Chinese, Cantonese, Japanese, French).
- However, it is unclear whether these results also extend to languages with a different syntactic structure, e.g., the verb-final Iranian languages (SOV).

Research question:

Do RQs differ from ISQs in Persian? If so, which acoustic cues are used to signal that difference?

Background: Persian prosody

- Two higher prosodic units are assumed: Accentual Phrase (AP) and Intonational Phrase [2,3], where the AP usually consists of (L+)H* pitch accent on the stressed (mostly the last) syllable [4].
- Declaratives are often characterized by a series of L+H patterns (APs)
- Research comparing canonical questions with declaratives ([5]) showed:

Polar questions ("yes/no questions")	Constituent questions ("*wh*-questions")
H% boundary tone higher pitch excursion greater final lengthening on the last AP	falling intonation (≈ declaratives) nuclear pitch accent on *wh*-constituent

Experiment (following procedure in [6])

Stimuli:

a) Polar question

Kasi Karafs2 mixurE
anyone celery eat
"Does anyone eat celery?"

b) Constituent question

Ki Karafs2 mixurE
who celery eat
"Who eats celery?"

→ 21 pairs, presented with either RQ or ISQ context

Participants:

12 native speakers of Persian (4 males, 8 females)

Procedure:

- Illocution type (RQ vs. ISQ) and question type (polar vs. consituent) manipulated within-subjects
- Stimuli divided into two lists (½ polar (RQ and ISQ) and ½ constituent (RQ and ISQ))
- 42 items per list, 504 data points in total
- Online Study, recordings made on own devices
- Participants were asked to read through the context and then produce the question in a natural way.

Analysis:

- Consistituents were manually segmented.
- For each constituent, 10 F0-values were automatically extracted using ProsodyPro ([7]).
- 80% of utterances were labelled as breathy, glottalized if there were stretches of non-modal voice quality.

Statistical Analysis:

- Durations were analyzed using lmers ([8]), continuous F0-contours with gamms([9]).

Results:

a) Duration:

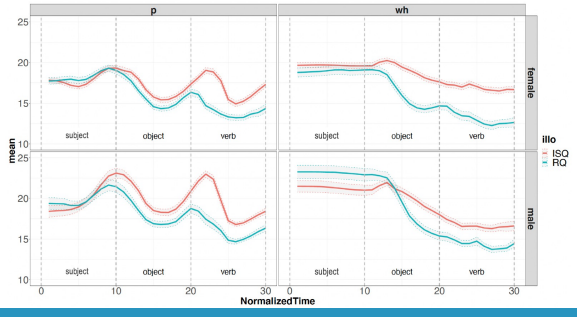
- Both the subject and the object were significantly longer in RQs than in ISQs, in both question types (all $p < 0.01$, ranging from 15% - 28% longer duration in RQs).
- The verb's duration was increased in polar RQs ($p < 0.05$, 11%), but not in constituent RQs (2%).

b) Voice quality:

- significantly more non-modal voice quality in RQ than ISQ (35% vs. 11%, $p < 0.001$)

c) F0:

- Higher F0 excursion in ISQs than RQs, particularly towards the end of the utterance (cf. Chinese), i.e. during the verb



Discussion

- F0, duration and voice quality are used to distinguish between ISQs and RQs in Persian, thus confirming and extending previous findings to a typologically different language family.
- trading relation between duration and F0-cues: while the subject and object were systematically and noticeably lengthened in RQs, the verb was less affected and instead produced with more compressed F0.

References:

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