Background

- Breathy phonation is crosslinguistically rare.
- Questions about its acoustic correlates remain.
- We know that it may yield:
  - SHORTER closure duration in voiced obstruents
  - LONGER breathy intervals and subsequent vowels
  - INCREASED HI-H2 and other spectral values
  - DECREASED Cepstral Peak Prominence (CPP) values
- Breathy sonorants are particularly rare.
- Phonation-type contrasts in obstruents (plain vs. breathy) often trigger acoustic differences that are weaker, absent, or more variable in sonorants.
  - Ex: H1-A3 diffs. in subsequent vowels sensitive to vowel context & word position for sonorants but not obstruents.

Breathiness and Vowel Quality

- Previous work on breathy sonorants has investigated temporal, spectral, and cepstral measures.
- Consonant phonation-type may also affect the quality of subsequent vowels, however.
- Breathy voice may be associated with:
  - LOWER F1 values in Chantaburi Khmer, Chong, Green Mong, Javanese, Moore but NOT in Gujarati.
  - More CENTRALIZED F2 values in Javanese, Moore.

Experiment 1: Phonation-Types & Vowel Quality in Marathi

Observations:
- Great variation by speaker.
- Male vowel space more condensed overall.
- Breathy voice (as in previous studies) often associated with lowered F1 values.
- Sporadic centralizing of F2 (a la Javanese)
- For some vowels, for some speakers.

Take-home message:
- Fairly consistent effect of breathiness on vowel quality in terms of F1—and F2, to a lesser degree.

Experiment 2: Obstruency, Phonation, and Vowel Quality

Methods

- Marathi (Indic) contains breathy obstruents & sonorants.
- Initially: [m, n, r, Ẁ, Ẅ] gold.
- [d], [l]: similar to [g], [l].
- [g]: a similar voice quality.
- Plot full vowel space for each speaker.

Discussion

- Among 14 speakers—4 in Exp. 1, 10 in Exp. 2—there is no dearth of variability.
- Breathy phonation affects vowel quality in terms of both F1 and F2, but:
  - How much, in which vowels, and the extent to which breathiness interacts with quality effects differs widely.
  - More data (more speakers, tokens, vowels, word-position and segmental contexts, etc.) is desirable and will (hopefully) allow more generalized patterns to emerge.
  - An issue: "The leakage of air through the partially open glottis [in breathy voice] widens the bandwidth of individual formants, thereby obscuring formant structure." (Gordon 2001: 41)
- Too true: computerized methods of collecting data are sometimes challenged by this, as illustrated with data from Prat below.

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