A duration-based account of speech rhythm in Indian English

Robert Fuchs, robert.fuchs@uni-muenster.de

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Speech rhythm in varieties of English

Native varieties of English (British, American, Canadian, Australian, New Zealand English) have been described as stress-timed.
Nativised varieties of English (Indian, Nigerian, Jamaican, Singapore English and others) have been described as more syllable-timed than native varieties (Platt et al. 1984, 136; Wells 1982).
Previous research on Nigerian (Gut 2005; Gut and Milde 2002; Gibbon and Gut 2001) and Singapore English (Deterding 1994; Deterding 2001; Low et al. 2000), among others, provided evidence for lower durational variability compared to British English.

Phonology of Indian English

Phonological features indicative of a tendency for syllable-timing have been attributed to Indian English (IndE):

- Vowel reduction not as strong as in British English (BrE)
- Monophthongisation of /ei/ to /e/ and /ou/ to /o/ (monophthongs shorter)
- Tense-lax contrast not maintained by some speakers of IndE
- Consonant cluster reduction

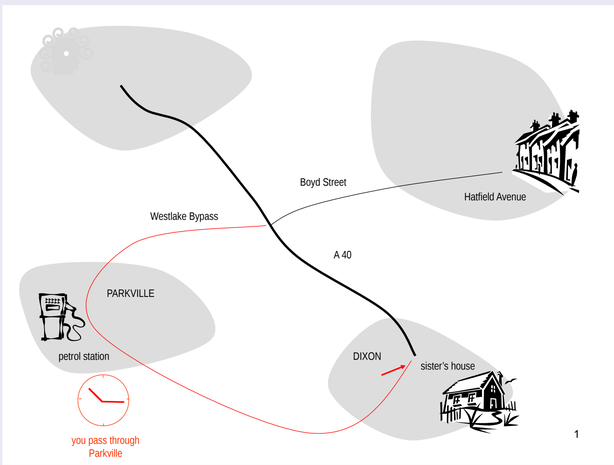
Research questions

Any acoustic evidence for attributing a tendency towards syllable-timing to IndE?
What influence, if any, does a speaker's L1 have on their speech rhythm in IndE?

Data: Read and spontaneous speech

Reading (two to three minutes) and spontaneous speech (ca. five minutes) for 16/11 speakers of IndE and 10/9 speakers of BrE (read/spontaneous). Mock police interrogation to elicit spontaneous yet highly comparable spontaneous speech (Nolan et al. 2006).

Informants play the role of a suspect in a drug trafficking case. All knowledge they possess about the case is displayed on slides. Informants face the double task of cooperating with the police and answering questions truthfully where possible (information displayed in black), while not divulging any incriminating facts (information displayed in red). These cognitive demands make them less self-conscious.



Sociological profile of informants

Indian informants are students at a prestigious university in Hyderabad, Andhra Pradesh, are highly fluent in English and for the most part went to prestigious English-medium convent schools. They have either Hindi, Bengali (Indo-European), Telugu or Malayalam (Dravidian) as L1. Interviews were conducted in early 2012 by the author.
British informants are students at Cambridge University and speak Standard Southern British English. Interviews were conducted by the DyViS research group (Nolan et al. 2006).

Methodology

- Automatic segmentation with HTK toolkit and P2FA, corrected manually → durations of vocalic and consonantal intervals
- Segmentation by the same rater for both BrE and IndE, ensuring high comparability
- Syllabification (Maximum Onset principle)

The following metrics were computed for all inter-pausal intervals longer than 4 syllables/4 vocalic intervals, last syllable discarded:

- Global metrics, not normalised for speech rate: Δ C, Δ V, % V (Ramus et al. 1999)
- Global, normalised metrics: VarcoC, VarcoV (Dellwo 2006; White and Mattys 2007)
- Local metrics: rPVI-C, nPVI-V (Low et al. 2000)
- From the above, speech rate-normalised vocalic metrics have been found to be more realiable (White and Mattys 2007; Wiget et al. 2010).
- Syllabic metrics: nPVI-VC (Liss et al. 2009), nPVI-S, Rhythm Ratio (Gibbon and Gut 2001), Variability Index (Deterding 1994; Deterding 2001), YARD (Wagner and Dellwo 2004), VarcoS (Rathcke and Smith 2011)
- Control/Compensation Index: CCI-V, CCI-C (Bertinetto and Bertini 2008)

All metrics were calculated individually for every inter-pausal interval. The speaker score is the median of all such intervals from one speaker.

Hypotheses

- The metrics will show lower variability for IndE than for BrE. Normalised vocalic metrics in particular should show this, but also syllabic metrics.
- Speech rhythm differences between IndE and BrE are more pronounced in spontaneous speech than in reading.
- CCI will be further towards compensation for BrE, and control for IndE.
- No differences between speakers of IndE depending on L1.

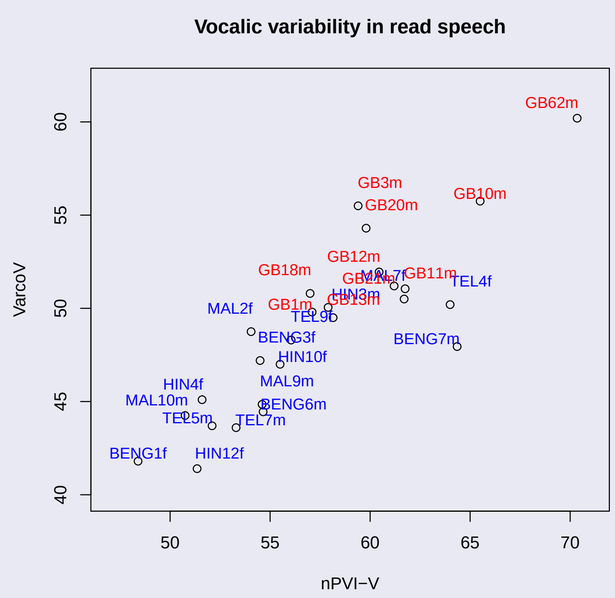
Results: Overview

Significantly less variability in IndE than in BrE (repeated measures t-tests on speaker scores, others p>0.1):

	Read	**Spontaneous**	Hypothesis
VarcoV	p<0.0000	p=0.01	✓✓
nPVI-V	p<0.01	p<0.01	✓✓
nPVI-VC	p<0.05	n.s.	✓✗
nPVI-S	n.s.	p= 0.06	✗ (✓)
%V	n.s.	p=0.13	✗✗

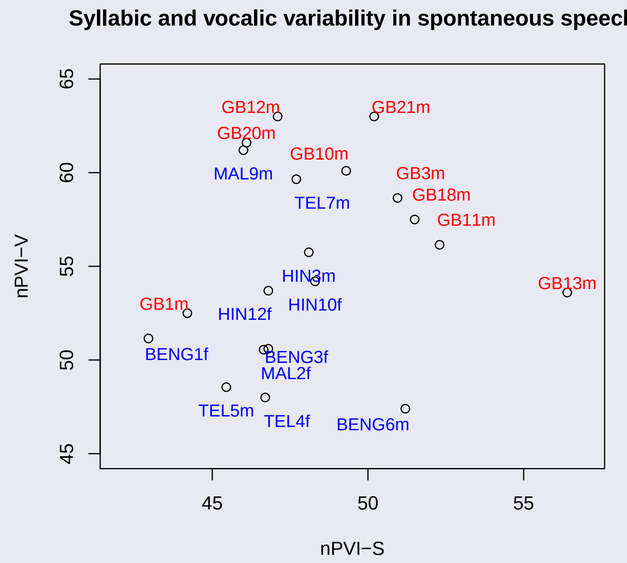
Vocalic variability (reading)

Lower variability of vocalic interval durations for IndE (N=16) than for BrE (N=10) speakers.



Syllabic variability (spontaneous)

Lower variability of syllable and vocalic interval durations for IndE (N=11) than for BrE (N=9) speakers. This is the only syllable- based metric showing near-significant differences.



GB = BrE, BENG = IndE L1 Bengali, HIN = IndE L1 Hindi, MAL = IndE L1 Malayalam, TEL = IndE L1 Telugu

Reading vs. spontaneous speech

VarcoV and nPVI-V were **slightly**, but insignificantly, **higher for spontaneous speech than for reading** in both varieties. This might be due to hesitation phenomena being more prevalent in spontaneous speech.

Conclusions

- **Evidence for somewhat more syllable-timed rhythm in educated/acrolectal IndE** compared to BrE due to less variability in durations of vocalic intervals in IndE than in BrE. Less educated/basilectal IndE speakers might show stronger tendency towards syllable-timing.
- Non-normalised and consonantal metrics did not show differences, but are known to be less reliable; **Consonant cluster reduction apparently not widespread in educated IndE**
- Only very tentative evidence for less variability in syllable durations for IndE
- Absence of difference for CCI might be due to questionable status of tense/long vs. lax/short vowels in IndE.
- **L1 has no discernible influence on IndE rhythm**, but confident conclusions only possible with larger sample.

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