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PERCEPTION AND PRODUCTION CHANGE OUT OF SYNC: A STUDY OF INDIAN ENGLISH BILINGUALS

Jupitara Ray, Charles B. Chang
Boston University, City University of Hong Kong
jupitara@bu.edu, cbchang@cityu.edu.hk

Introduction

- Motor theory links production and perception directly; most L2 speech models propose a similar uni- or bidirectional link [1-4]
- Attrition & Drift in Access, Production, and Perception Theory (ADAPPT)[5] argues "no straightforward link"; production and perception rely on different representations, including in L1

DOES CHANGE IN L2 (DUE TO ACCOMMODATION) CAUSE L1 PRODUCTION & PERCEPTION DRIFT?

Methods

Participants

- 50 participants: 25 Hindi-Indian English (IE) bilinguals (HEBs), 25 Telugu-IE bilinguals (TEBs)
- Mean age: 21.2 yrs (HEB), 22.6 yrs (TEB)
- L2 AoA English: ~ by 10 years old
- TEBs reported knowing some Hindi
- Recruited and tested in India

Tasks

- Baseline L1 picture naming: /b/, /p/
- Baseline 3AFC VOT identification task: /b/, /p/, /p^h/
  - VOT steps: Hindi (18), Telugu (17)
  - VOT continuum: Hindi (-98 – 72), Telugu (-87 – 73)
- Baseline L2 word reading: /b/, /p/
- L2 accommodation, elicited by shadowing an American English (AE) talker: /b/, /p/
- Post-accommodation L1 picture naming
- Post-accommodation 3AFC VOT identification task

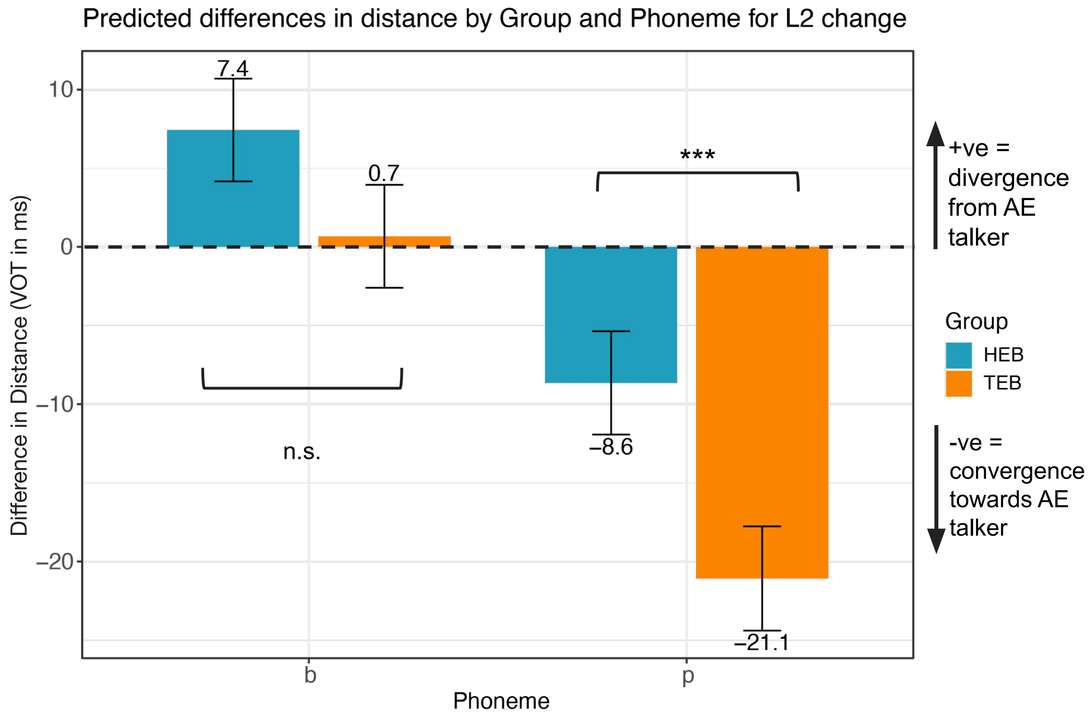
Analysis

- VOT (ms) extracted using a Praat script
- Difference in Distance (DID)[6] for L2 accommodation
  - (|AE talker–Accommodation|) – (|AE talker–Baseline|)
- Change in VOT for L1 production drift
  - Post - Baseline
- Change in perception:
  - Crossover boundaries from modeled curves
- Mixed-effects linear model (lmer) on L2 and L1 VOT production
  - DID/Change ~ Phoneme * Group + (1| Participant) + (1|Item)
- Multinomial model (multinom) on the 3AFC responses
  - Response ~ VOTstep * Task * Language
- Pairwise contrasts (emmeans) on Group & Phoneme
  - DID/Change ~ Phoneme * Group

References: [1] Liberman (1957). Some results of research on speech perception. *JASA*. [2] Flege (1995). Second language speech learning: Theory, findings, and problems. In *Speech Perception and Linguistic Experience*. [3] Flege et al. (2021). The revised Speech Learning Model (SLM-r) applied. In *Second Language Speech Learning*. [4] Best & Tyler (2007). Nonnative and second-language speech perception: Commonalities and complementarities. In *Language Experience in Second Language Speech Learning*. [5] de Leeuw & Chang (2024). Phonetic and phonological L1 attrition and drift in bilingual speech. In *The Cambridge Handbook of Bilingual Phonetics and Phonology*. [6] Babel (2010). Dialect divergence and convergence in New Zealand English. *Language in Society*.

Findings

L2 production change



/b/ divergence: HEBs diverged (β=7.4, p=0.02)

TEBs diverged (β=0.67, p=0.14).

/p/ convergence: HEBs (β=-8.6, p<0.001) &

TEBs (β=-21.1, p<0.001)

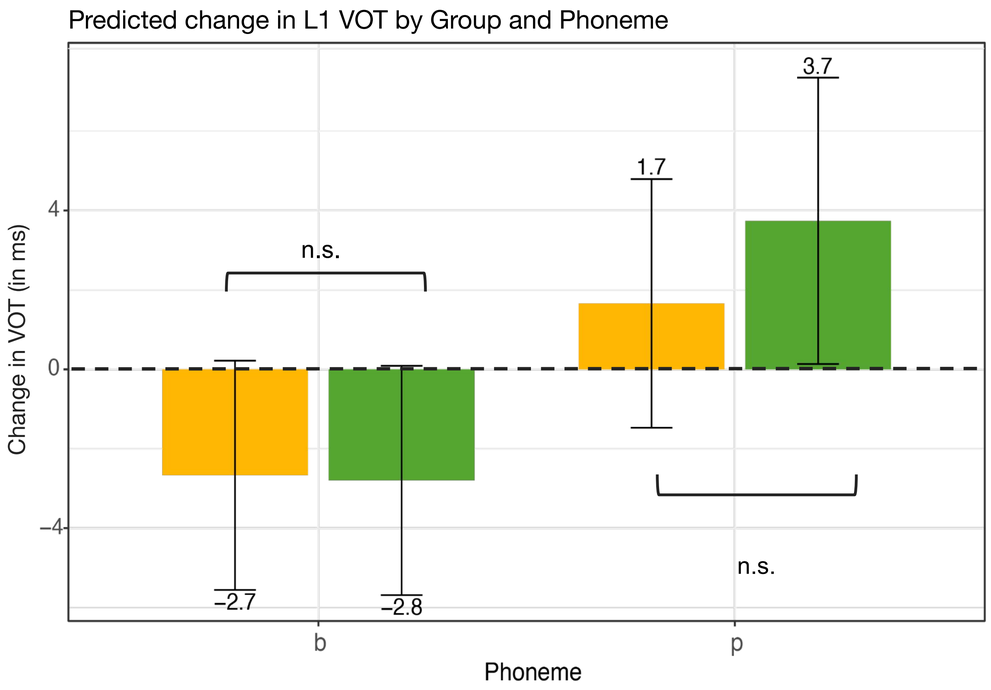
L1 production change

/b/ shortening: HEBs (β=-2.7, p=0.35)

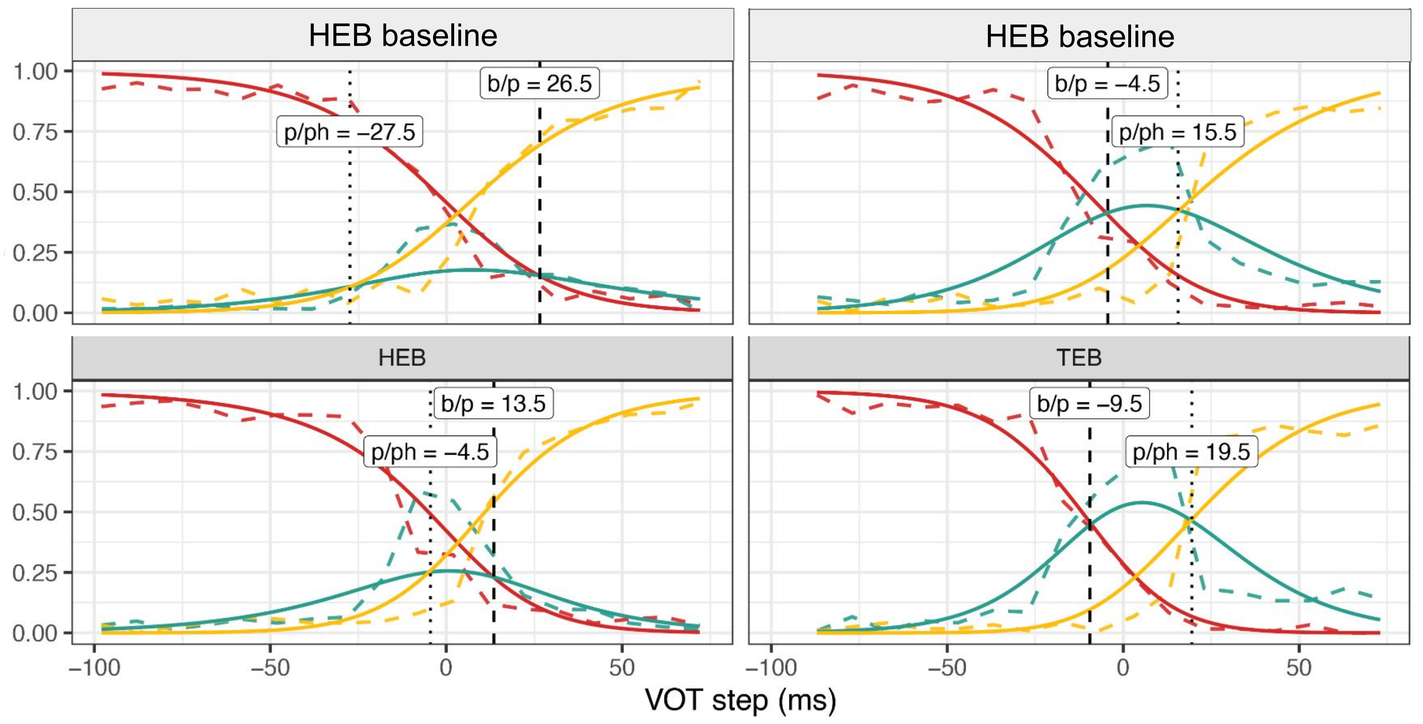
TEBs (β=-2.8, p=0.9).

/p/ lengthening: HEBs(β=1.7, p=0.16)

TEBs (β=3.7, p=0.64).



L1 perception change



Modeled curves show significant shifts:
negative shifts of the /b/–/p/ boundary (HEB: -13 ms; TEBs: -5 ms), positive shifts of the /p/–/p^h/ one (HEB: +23 ms; TEB: +4 ms)

Summary of findings

L2 Production Change (ms)	L1 Production Change (ms)	L1 Perception Change (ms)
HEBs: /b/: +7; /p/: -9	HEBs: /b/: -3; /p/: +1.7	HEBs: /b/-/p/: -13; /p/-/p^h/: +23
TEBs: /b/: +1; /p/: -21	TEBs: /b/: -3; /p/: +3.7	TEBs: /b/-/p/: -5; /p/-/p^h/: +4

- Short-term adjustments in L1 production and perception are not coordinated
  - Providing support for an indirect production-perception link (ADAPPT)
- L2 accommodation influenced L1 perception more than L1 production
  - Perception changes precede production; proves L2 and L1 interact in early bilinguals

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