4pSW11. A closer look at perceptual epenthesis in cross-language perception

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1. On perceptual repair

Perceptual epenthesis

- Various tasks demonstrate that listeners perceive and report a vowel in non-native consonant sequences: AX discrimination, speeded ABX, syllable counting (Dupoux et al. 1999, Kabak & Idsardi 2007, Berent 2006)
- Dupoux et al conclusion: "not only does phonotactic knowledge influence the classification of the individual phonemes, but it can also induce the perception of 'illusory' phonemes that have no acoustic correlates."
  - –*Take-home message*: Phonology has a top-down effect that prevents listeners from accessing the faithful acoustics of a phonotactically illicit sequence.

Production of non-native sequences

- Production studies of obstruent-obstruent & obstruent-nasal onset clusters by English speakers demonstrate that the preferred repair of non-native sequences in production is conditioned by phonetic considerations (Davidson 2006, in press).
- Can repair patterns in perception also be attributed to phonetic factors?

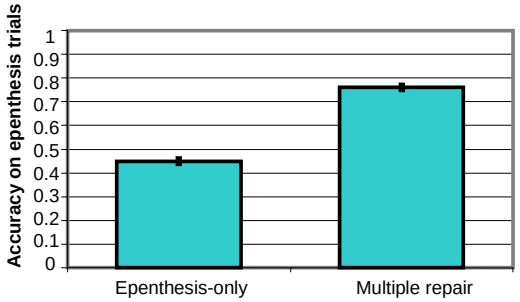
Main question: Is there an interaction between phonological and phonetic information in the perceptual repair of phonologically illicit sequences?

1. Compare AX discrimination task containing only #CC~#CəC trials (Epenthesis-only: Davidson 2007) to AX task pairing #CC to multiple repairs.
2. Does the consonant combination of the target cluster affect patterns of repair?

2. Methodology

- *Participants*: 38 speakers of English
- *Stimuli*: 16 types of #CCáCV~#CəCáCV nonwords divided into 4 manner combination categories
  - — Stop-Stop (SS): /dg/, /gd/, /kt/, /tk/
  - — Stop-Nasal (SN): /dm/, /bm/, /pm/, /tm/
  - — Fricative-Stop (FS): /vb/, /fp/, /zb/, /sp/
  - — Fricative-Nasal (FN): /vm/, /zm/, /fm/, /sm/
- *Trial types*: #CCáCV target items paired with epenthesis, prothesis, C1 deletion & C1 change tokens
  - — E.g. /dmafa/~/dəmafa/, /dmafa/~/ədmafa/, /dmafa/~/mafa/, /dmafa/~/tmafa/,/zmafa/,/bmafa/
  - — Recorded by a native Russian speaker
- *Task*: AX discrimination counterbalanced for order, ISI (250, 1500) (*no significant differences for order, ISI)*

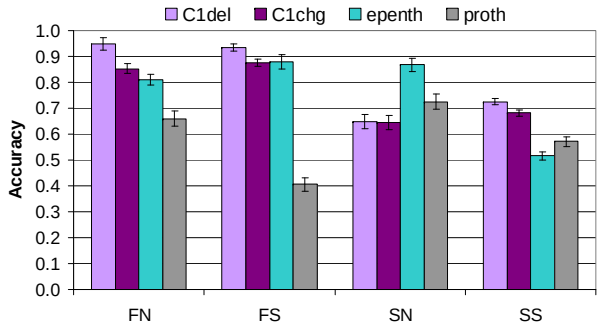
3. Results



- **Epenthesis-only experiment**: No significant manner combination differences & all below chance

Performance difference between epenthesis-only & multiple repair AX tasks

- In epenthesis-only task, listeners do not consider other possible perceptual repairs.
  - –This may lead to a task effect in previous research.
- Long-term CC representations are less robustly encoded and therefore the phonetic information in the stimulus decays more quickly than for phonotactically legal CəC.
- Since most trials include a CəC stimulus, a CəC representation remains strongly activated across trials.
- Residual activation of CəC and a more robust long-term representation cause listeners to respond "same".



Manner combination results ($p < 0.01$)

FN: proth < C1chg = epenth < C1del **SN**: C1chg = C1del < proth < epenth
FS: proth < C1chg = epenth < C1del **SS**: epenth = proth < C1chg = C1del

Manner combination and phonetic similarity of repair

The repair with the lowest accuracy is the most phonetically similar to the target cluster.

- **FN/FS**: In prothetic forms, periodic noise of the fricative remains adjacent to either nasal anti-formants (FN) or silence (FS) (contiguity of primary acoustic cues). (Fleischhacker 2005)
- **SS**: In epenthetic forms, the stop burst and epenthetic vowel are confusable.
- **SN**: Because C2=[m], the burst is not audible (or present on spectrogram). This either causes the perception of the initial silence as no consonant being present (C1 deletion), or as any arbitrary stop (C1 change).

4. The role of phonological information in perceptual repair

Warping the phonetic percept

- It is possible that higher accuracy on epenthesis trials in Multiple Repair experiment is due to phonological knowledge warping the phonetic percept of the cluster stimuli into a different repair.

Stimulus:	[CC]	[CəC]	
Percept:	|əCC|	|CəC|	→ *Response*: "Different"

- This account predicts differential accuracy on "same" trials based on the number of phonetically similar repairs.
  - –Stop-initial should be worse than fricative-initial because, e.g., listeners could be hearing one presentation of the cluster as prothetic and the other as epenthetic.
- However, there are no significant differences for same trials and performance is above 90% for all manner combinations.

OR

Accurate phonetic perception with miscategorization

- Listeners have accurate perception of the phonetic properties of the CC stimulus, but because the long-term CC representation is less robust, the phonetic trace decays quickly, becoming confusable to varying degrees with multiple phonotactic sequences.
- In a task involving phonetic comparison like AX, listeners will respond "same" if CC is paired with a phonetically similar (=confusable) repair because there is not enough evidence to confirm that they're different.
- This account predicts that in a task in which listeners are presented with contrasting categories and less time to decision, they should be above chance in categorizing CC stimuli regardless of manner combination.
  - –Future research!