Transfer in Speech Motor Learning: The Role of Voicing

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plan
PsychoLinguistics Aphasia & Neuromodulation Lab

Introduction

- What is the nature of learned speech motor representations?
- Speakers improve production on non-native onset clusters (e.g., **GD**EEMOO, **KT**EEMOO) in speech motor learning paradigm (Buchwald et al., 2019)
- Studying **transfer of learning** can inform us of the representations (Ballard, 2011)
  - General coordination pattern? (e.g., stop-stop clusters)
  - Specific coordination pattern? (e.g., GD, KT)
- **Present study:**
  - Does training on [**voiced**, **voiceless**] clusters transfer to untrained items with different voicing?

Predictions

- If general stop-stop coordination pattern is learned:
  - GD ⇒ KT, KT ⇒ GD } = **Bi-directional transfer**
- If specific coordination pattern is learned:
  - GD ⇏ KT, KT ⇏ GD } = **No transfer**
- Complexity:
  - Voiced clusters are harder to produce aerodynamically (Ohala, 1983) and had lower empirical accuracy rate (Davidson, 2010)
  - GD ⇒ KT, KT ⇏ GD } = **Uni-directional transfer**

References & Acknowledgement

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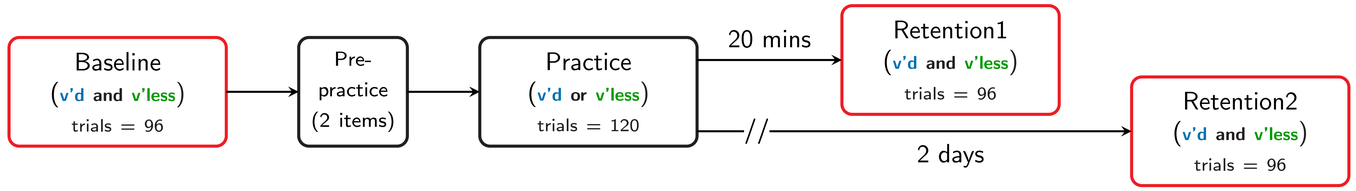
Methods

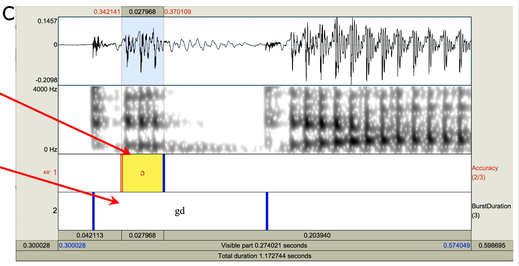
- Speech motor learning paradigm: nonword production with orthography and auditory models



- **Participants:** 20 native speakers of American English
- **Practice:** random & variable practice, no feedback
  - **Voiced condition**: /db/, /gb/, /gd/ (4 words each)
  - **Voiceless condition**: /tp/, /kp/, /kt/ (4 words each)
- **Analyses:** separate mixed effects models for each condition and for each analysis
  1. accuracy∼session*type+cluster+(1|subject)+(1|item)
  2. duration∼session*type+accuracy+cluster+(1|subject)+(1|item)

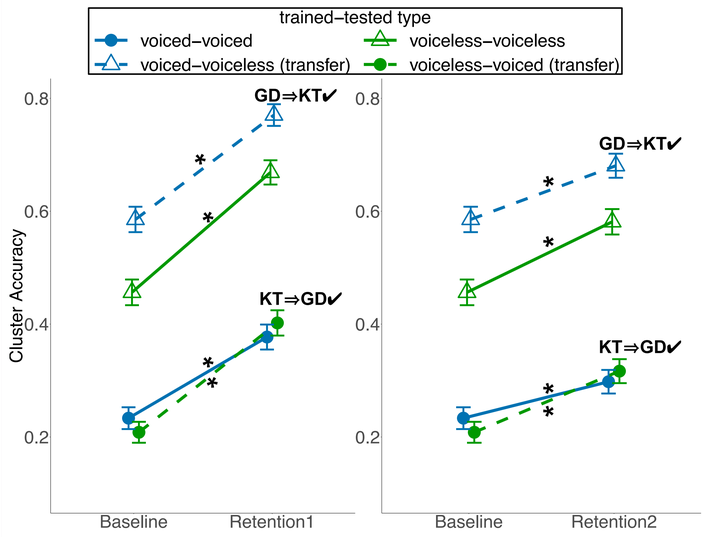
Analysis 1. **Cluster accuracy**: incorrect if there is an epenthetic vowel (Wilson et al., 2014)

Analysis 2. **Burst-to-burst duration** (improvement ≡ shorter duration)



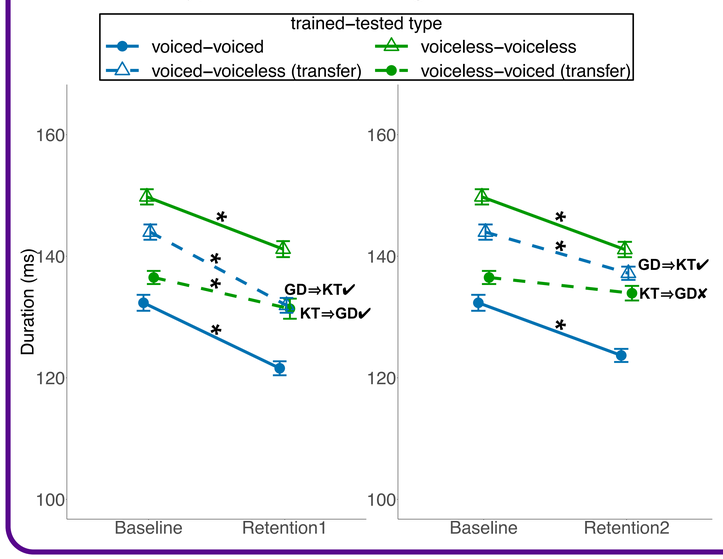
Analysis 1: Cluster accuracy

- At R1: } Bi-directional transfer
- At R2: }
  - session effect not affected by type



Analysis 2: Burst-to-burst duration

- At R1: Bi-directional transfer
- At R2: Uni-directional transfer (voiceless⇏ voiced)
  - for voiceless condition: session effect affected by type
  - magnitude of transfer did not differ between condition: session, condition, type interaction not sig.



Discussion

- The learned speech motor representations encoded general stop-stop pattern
  - Bi-directional transfer across voicing categories
- Possible complexity effect in motor acuity (phonetic measurement)
  - Lack of three-way interaction