



## INTRODUCTION

### What is gestural drift?

- **Gestural drift** is the change in first language (L1) productions for bilingual speakers as a function of changes in exposure to a second language (L2).
- Gestural drift is a perceptually guided change in the speech of bilingual speakers, because of a change in their linguistic environment (Sancier & Fowler, 1997).

### Evidence from earlier research:

- **English voiceless stops** (e.g., *potato*, *tent*) have a **longer duration** than equivalent sounds in Brazilian Portuguese, Canadian French, French and Greek:
- **after living in an English speaking country**, the acoustic properties of voiceless stops in these languages changed:
  - A single speaker's voiceless stops, /p, t/ (e.g., *Portugal*, *tempo*), in Brazilian Portuguese **became longer** after spending several months away from Brazil. (Sancier & Fowler, 1997)
  - and **the amount of foreign language influence**, differed in that:
    - Advanced English learners of French produced **longer** English voiceless stops than beginning learners (Flege, 1986) [L2 on L1 influence]

• The above studies suggest that changes in speakers' productions in L1 are related to both their exposure to and their proficiency in L2.

Will finalize later- cannot get all the objects to group

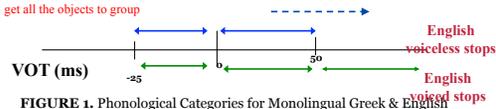


FIGURE 1. Phonological Categories for Monolingual Greek & English

### We are interested in whether gestural drift will be observed:

1. in speakers with **different bilingual backgrounds**:
  - simultaneous Greek-English bilinguals vs. native Greek speakers studying in the US
- 2. In speakers with **different amounts of L2 experience**:
  - Speakers with only a few years vs. many years of L2 experience
2. In **real words vs. nonwords**
3. in **different phonological categories**:
  - voiceless stops (/p,t,k/) vs. voiced stops (/b, d, g/)

## PREDICTIONS

### A greater amount of gestural drift will be observed:

- in speakers with **less L2 language experience**:
- in **nonwords** as compared to **real words**:
  - because nonwords have only a sub-lexical, not a lexical representation.
- in **voiceless stops** vs. **voiced stops** (for L1 Greek speakers)
  - because English voiceless stops are not a phonetic category in Greek.

## METHODS

### Participants:

- 8 Greek-English bilingual speakers
- 2 simultaneous bilinguals (SB)
- 4 native Greeks studying in the U.S. (NG)
- 2 native Greeks who have been in the US for 40+ years (NG40)

### Materials:

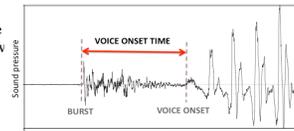
- word-initial /p, b, t, d, k, g/ were elicited in real words and nonwords in Greek:
  - before /a, i, u, e, o/
  - **Real words:** *πάστα* /pasta/ pasta; *μπορέω* /boreso/ I can; *τίγρης* /tigris/ tiger
  - **Non-words:** /dakadifas/, /kougemos/, /kifrenis/
- 129 different real words and 113 different non-words were elicited

### Procedure:

- Speakers read lists of words presented in random order.
  - in a carrier phrase.
    - e.g., *πάστα, τώρα είπα πάστα; pasta, I just said pasta*
- Speakers repeated real words 3 times and non-words 1 time. The nonwords were always repeated after the real words.
- Two L2 experience conditions:
  - **Low L2 experience condition:** recording was made immediately after the speakers returned to the U.S. after at least a 2-week (X = ? Days, range = min to max days) stay in Greece.
  - **High L2 experience condition:** recording was made several months after return to the U.S.
    - > 2 SB, 2NG and 2 NG40 were recorded 3 months after returning to the U.S.
    - > 2 NG speakers were recorded 8 months after returning to the U.S.

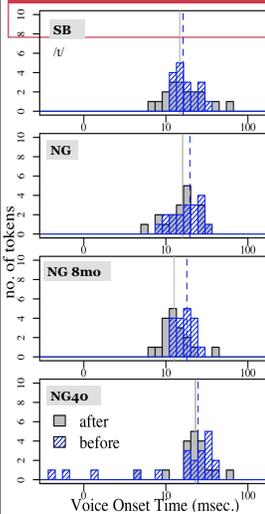
### Acoustic Analysis:

- **Duration (VOT):** voice burst to the onset of v measurement of voice Onset Time for stop consonants.



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## RESULTS: voiceless stops

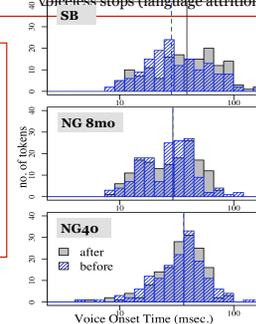


### I. Real words

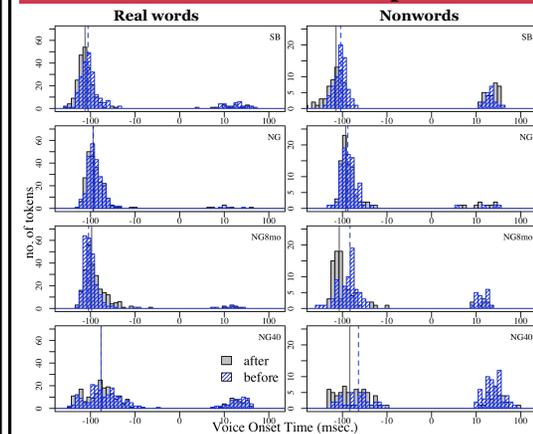
1. Longer /t/ in "**High L2 experience condition**" across speaker groups:
  - Suggests that exposure to L2 influences the acoustic properties of Greek voiceless stops.
  - However, this duration difference was statistically significant only in the two speakers from the NG group who were recorded 8 months after their return to the U.S.
  - This result suggests that length of exposure to L2 may influence gestural drift.
2. No change in duration was observed for /p/ or /k/. This suggests that gestural drift may be specific to particular sounds.
3. The speakers in the NG40 group produced all voiceless stops with **slightly longer durations compared to the other two groups**.
  - Extended experience to L2 may have altered the acoustic properties of L1 voiceless stops (language attrition).

### II. Nonwords

- Nonwords exhibited duration changes in voiceless stops only in the SB group.
- However, the durations were **shorter** (instead of longer) in the low L2 experience condition.
- In other groups, duration of voiceless stops did not differ between the two conditions.



## RESULTS: voiced stops



### I. Real words and nonwords

- I. Absolute duration of voiced stops (with lead VOT) tended to become shorter in the High L2 experience condition for both real words and nonwords.
  - I. That is, speakers were more likely to produce more L1-like voiced stops (with voicing lead) after more exposure to L2.
  - II. This difference between conditions was statistically significant for all the SB and the NG40 groups for both word-types.
- III. Similar to voiceless stops, the voiced stops of the NG40 group had different durational distributions from the other two groups (language attrition)
  - I. The NG40 group was more likely to produce more L2-like voiced stops (with short lag) than the other two groups across the two exposure conditions and word types.
- III. Duration difference between the two L2 experience conditions was observed more clearly in nonwords than in real words.

## DISCUSSION

1. Gestural drift for Greek stop consonants was observed as a function of L2 experience.
2. More gestural drift was observed for the speakers who had been exposed to L2 for the longest time period.
  1. NG40 speakers tended to have longer voiceless stop durations than speakers of the other two groups, although this difference was not significant.
  2. NG40 speakers were more likely to produce short lag voiced stops than speakers in the other two groups (check significance – chi-square?)
3. The two speakers from the NG group who had the most L2 experience in the high L2 experience condition produced significantly longer /t/ durations than in the low L2 experience condition, as predicted.
4. More gestural drift in the expected direction was observed in nonwords than real words for the voiced stops.
5. There were several unexpected findings that are difficult to interpret:
  1. The only significant change as a function of linguistic experience for the voiceless stops for the nonwords was a *decrease* in duration in the low L2 experience condition.
  2. Duration of voiced stops *decreased* in the high L2 experience condition.