

The Production of Spanish-English Code-Switching: VOT and the *like*



GrEP July 4, 2011

Page Piccinini
University of California, San Diego



Outline

- Introduction
- Past Research
- Current Research Questions
- Methodology
- VOT-English
- *Like*-duration and vowel quality
- Conclusion



Introduction

- Code-switching is when proficient bilingual speakers switch between two languages in one utterance.
- Most work has been on the syntactic/morphological aspects of code-switching (e.g. Spanish-English Pfaff, 1979; Poplack, 1980; Myers-Scotton, 2008).
- Little research on the phonetics of code-switching.



Past Research

- Past work on phonetics of code-switching investigated whether the switch is categorical or if there is an overlap of phonologies at code-switching boundaries.
- Some posit one merged phonological system where bilinguals must constantly suppress one language's phonology while accessing the other (Roelofs & Verhoef, 2006).
- Studies regarding bilingual speech processing suggest there may be dual activation at least at the phonetic level (Marian et al., 2003; Costa et al., 2000).

Past Research: Grosjean & Miller (1994)

- Experiment
 - French-English bilinguals.
 - EX: Pendant les premiers jours, il faudra qu'il [k]opie [K]ARL constamment.
 - Measure VOT of [k] in “copie” and “CARL” in monolingual and code-switching utterances.
- Results
 - No significant difference in production of [k] in “copie” between contexts.
 - Suggests no anticipatory bleeding effect when speaker about to switch.



Past Research: Bullock et al. (2006)

- Experiment
 - Spanish-English bilinguals.
 - EX: [Todos mis amigos [t]alked Spanish as [k]ids.
 - Measured VOT at pre-switch (“todos”), switch (“talked”), and post-switch (“kids”).
- Results
 - Subjects maintained distinct categories for Spanish and English.
 - However, English VOTs were affected by switching at pre-switch and switch, and Spanish VOTs were also affected at pre-switch but not in the expected direction.



Past Research: Problems

- All scripted material.
- Does not take advantage/consider preplanning.
- Takes away communicative aspect of code-switching.
- Stimuli not always ecologically valid (e.g. proper names as code-switches).



Current Research Questions

1. Will English speech produced at code-switching boundaries be more “Spanish-like” than when produced in a monolingual context?
 - For example, English VOT should be shorter in code-switching utterances compared to monolingual utterances.



Current Research Questions

2. Can an added distraction, such as a non-linguistic task, affect the frequency of code-switching and degree to which the two phonologies overlap?
 - Distraction should put extra stress on processing abilities, thus making it hard to keep the two phonologies separate in general and particularly in code-switching utterances.



Methodology: Subject

- Four pairs of self-identified simultaneous Spanish-English bilinguals (2 F-F, 2 F-M).
- Knew partner before experiment.
- 3 acquired English first, 5 Spanish first.
- 6 listed English as their dominant language, 2 Spanish.
- 7 identified with Mexican culture, 1 Cuban culture.



Methodology: Stimuli

- Conversational topics with picture about Mexican-American culture.
- Prompts given in Spanish and English.
- Conversational topics were:
 1. *Chavo del Ocho* (Mexican TV show)
 2. *Quinceañera* (girl's 15th birthday)
 3. *Día de los Muertos* (Day of the Dead)



Methodology: Tasks

- Control
 - Subjects told to talk for 15 minutes about the prompt until the experimenter returned to stop the recording.
- Distracter
 - Subjects had to individually complete four 12 piece puzzles while discussing the prompt and alert experimenter once done.



VOT-English

- Bilinguals do maintain two distinct categories for monolingual English and Spanish voiceless stops (Flege & Eefting, 1987).
- Current study aims to see if this distinction is maintained in code-switching utterances.
- Voice Onset Time (VOT) of English words beginning in voiceless stops (/p/, /t/, /k/) measured from burst to beginning of following vowel or consonant.



VOT-English: Coding

- VOT coded according to whether in a code-switching phrase or not.
- A segment was considered within a “code-switching phrase” if it was in the same utterance as Spanish with a pause of less than 300 milliseconds between the English and Spanish.
- This included intrasentential, intersentential, and single word switches.



VOT: Coding Continued

- **ML** = monolingual

I I saw it but just like a really long [t]ime ago.

- **CS-ES** = pre-switch

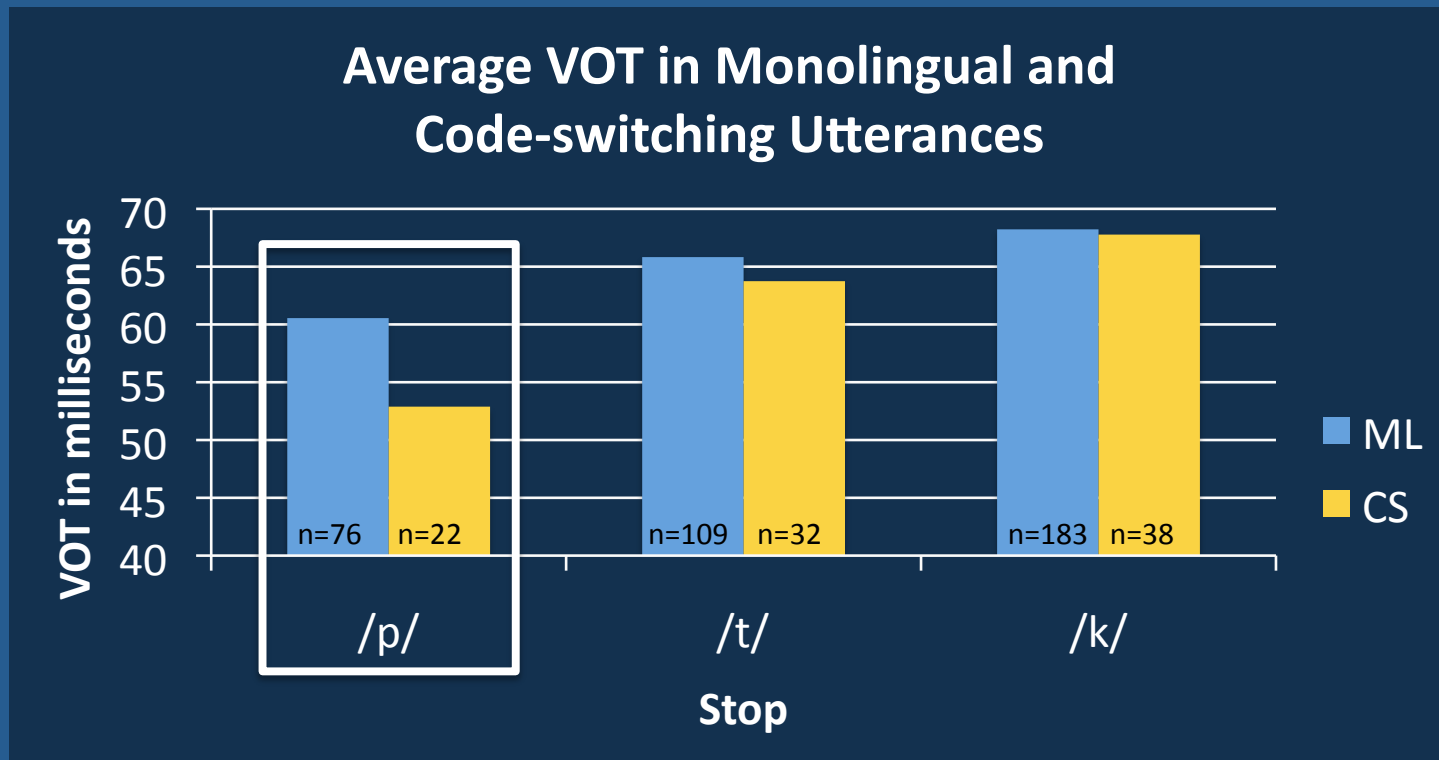
Kinda like you know how they [p]ut on esos aretes...

- **CS-SE** = post-switch

...no sé mucho like a lot of [k]ountries...



VOT-English: Results



- Significant effect of stop (/p/ shorter than /t/ and /k/, $p < 0.05$).
- Cohen's d values show small to medium effect for /p/, $d = 0.38$.
- Significant effect of speaker.



VOT-English: Discussion

- At least for /p/, at code-switching boundaries there appears to be an effect of Spanish on productions.
- Lack of consistent results for /t/ and /k/ possibly due to nature of words.
- Task does not affect the degree to which the two phonologies overlap, but does increase frequency of switching.



Like-Duration and Vowel Quality

- Subjects spoke California American English.
- The word *like* was used in both monolingual and code-switching utterances.
- All tokens segmented from beginning of /l/ to end of vowel.
- Duration calculated and F1/F2 measured from midpoint of segment.



Like: Coding

- **E** = English

He would just act really *like*, I don't know.

- **S** = Spanish

Me recuerdo uno es que *like* no sé quien.

- **CS-ES** = immediately before a switch to Spanish

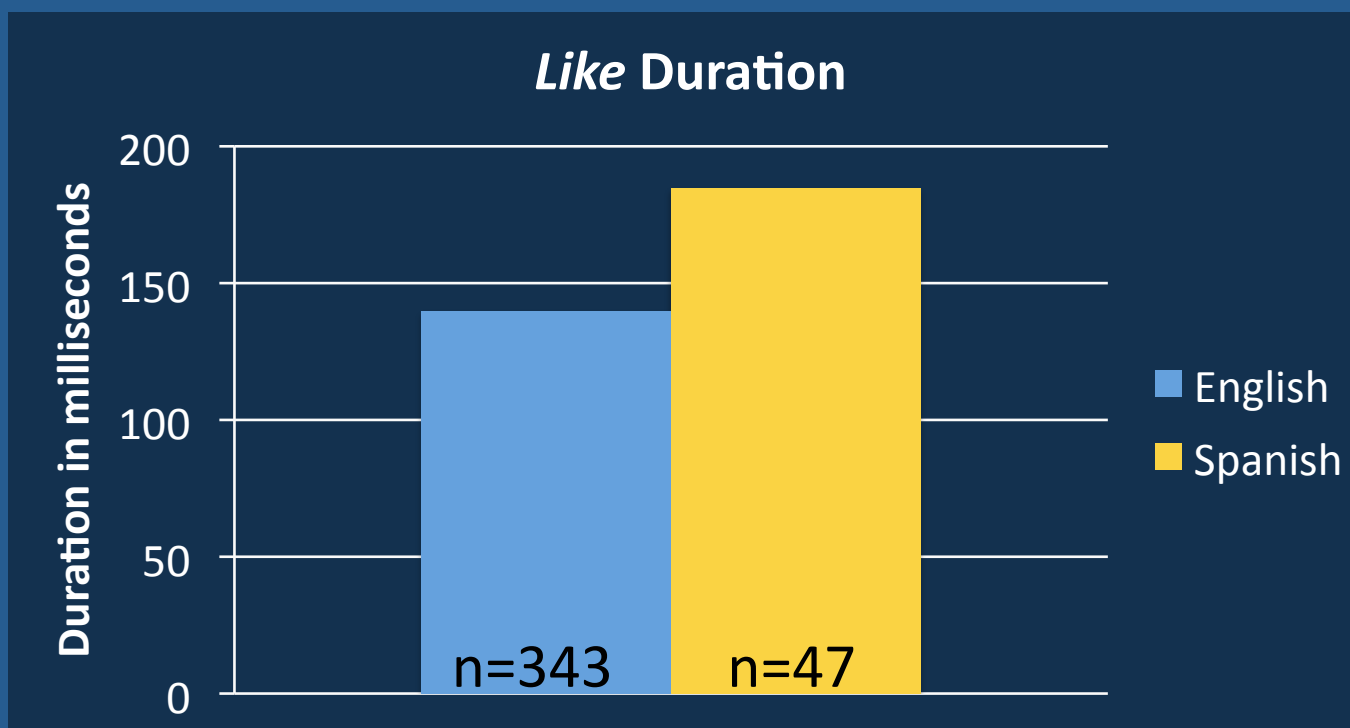
One of these barrels and *like* estaba adentro.

- **CS-SE** = immediately after a switch from Spanish

Esto dos se casaron verdad *like* in real life.



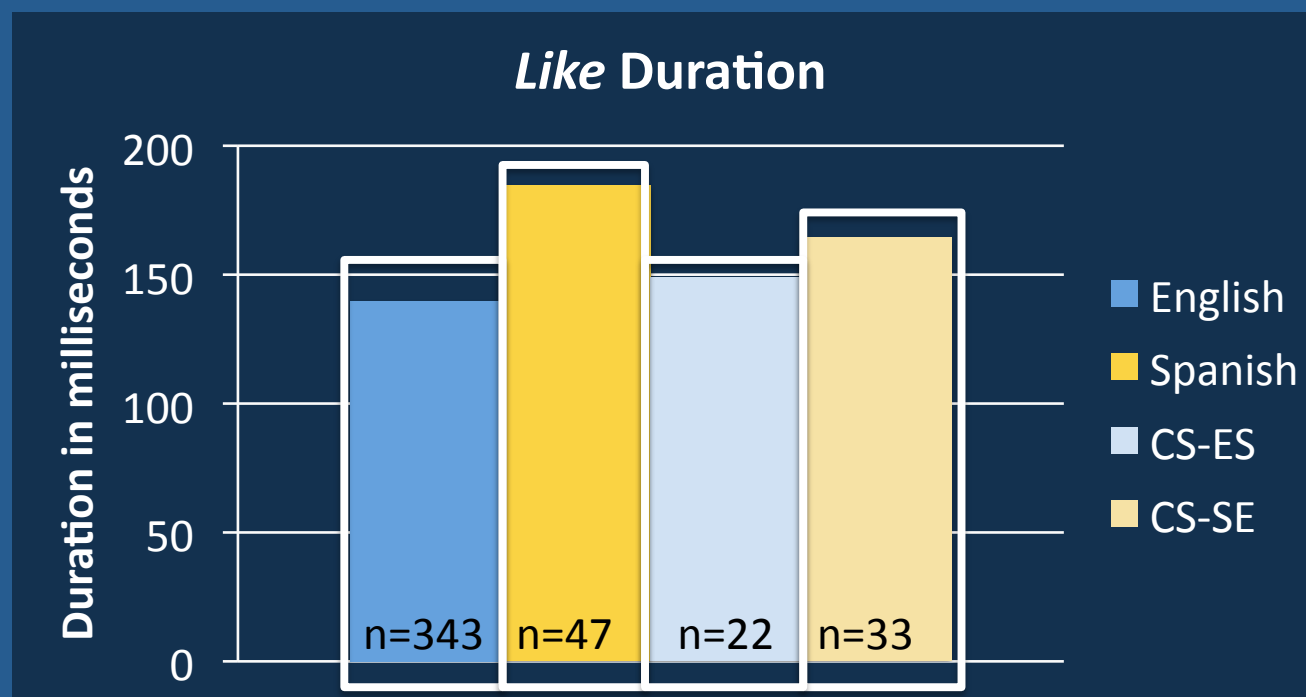
Like: Results Duration



- Significant effect of language (English shorter than Spanish).
- Significant effect of speaker.
- Significant interaction of speaker and task.



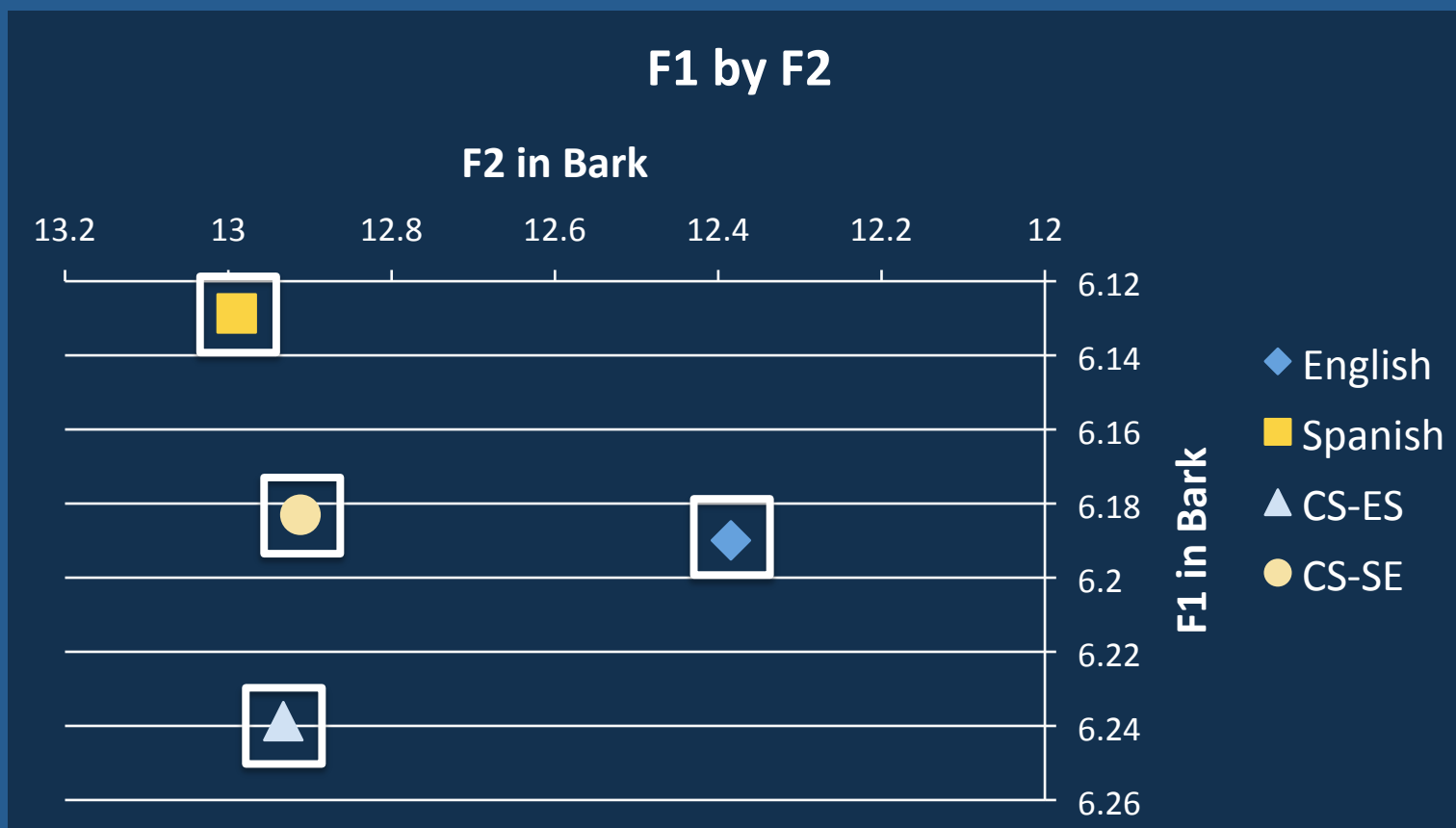
Like: Results Duration



- English is significantly shorter than CS-SE.
- Spanish is significantly longer than CS-ES and
- Spanish is significantly longer than CS-SE.

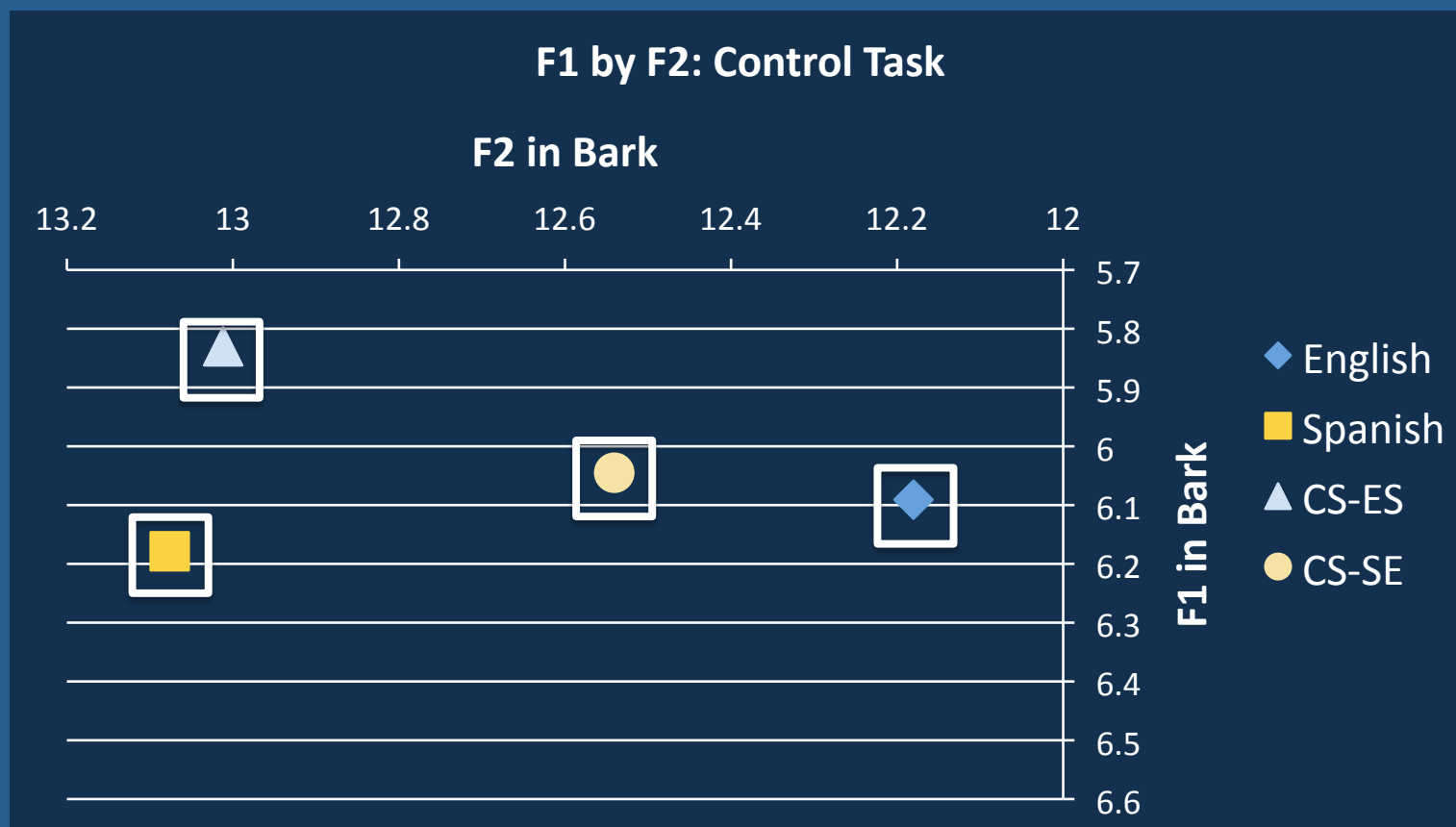


Like: Results F1 by F2



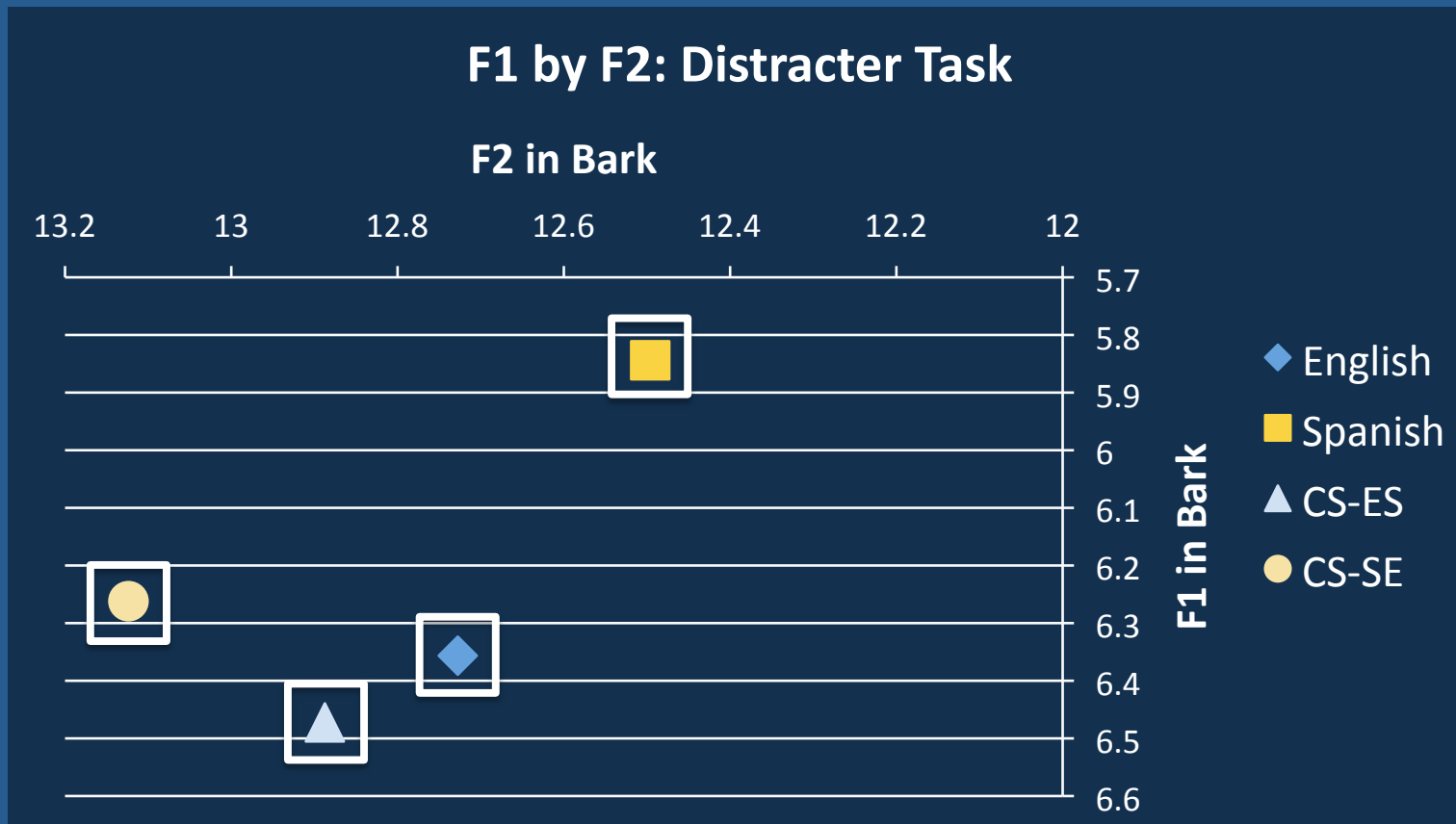
- English significantly farther back than Spanish, CS-ES, and CS-SE.
- Significant effect of task for both F1 and F2.
- Significant effect of language and interaction of language and task for F2.
- Significant effect of speaker.

Like: Results F1 by F2 Control Task



- English significantly farther back than Spanish.
- Large effect size of English farther back than CS-ES ($d=-0.811$).
- Medium effect size of Spanish farther front than CS-SE ($d=0.624$)

Like: Results F1 by F2 Distracter Task



- English significantly lower than Spanish.
- Medium effect size of English farther back than CS-SE ($d=0.458$).
- Spanish significantly higher than CS-ES.

Like: Discussion

- The word *like* is an example of an utterance marker used both within- and between-languages.
- Code-switching *likes* were somewhere in between English and Spanish *likes*, both regarding duration and vowel quality.
- Whether the code-switches patterned more with the language before or after the switch depended on the task.



Conclusion

- This provides initial evidence that speech produced at code-switching boundaries is produced differently than in monolingual contexts.
- Differences affected both duration measurements and vowel quality.
- Effects were not the same across tasks.
- Both tasks were useful in eliciting different types of effects.



Future Work

- More rigorous definition of “code-switching utterance”; see if prosody plays a role in extent of bleeding effect.
- Measure Spanish VOT values for a direct comparisons.
- Examine other phonetic features different between English and Spanish.
- Add other types of tasks.
- Conduct perception studies to test the role this effect plays in speech intelligibility.



Thank you!



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