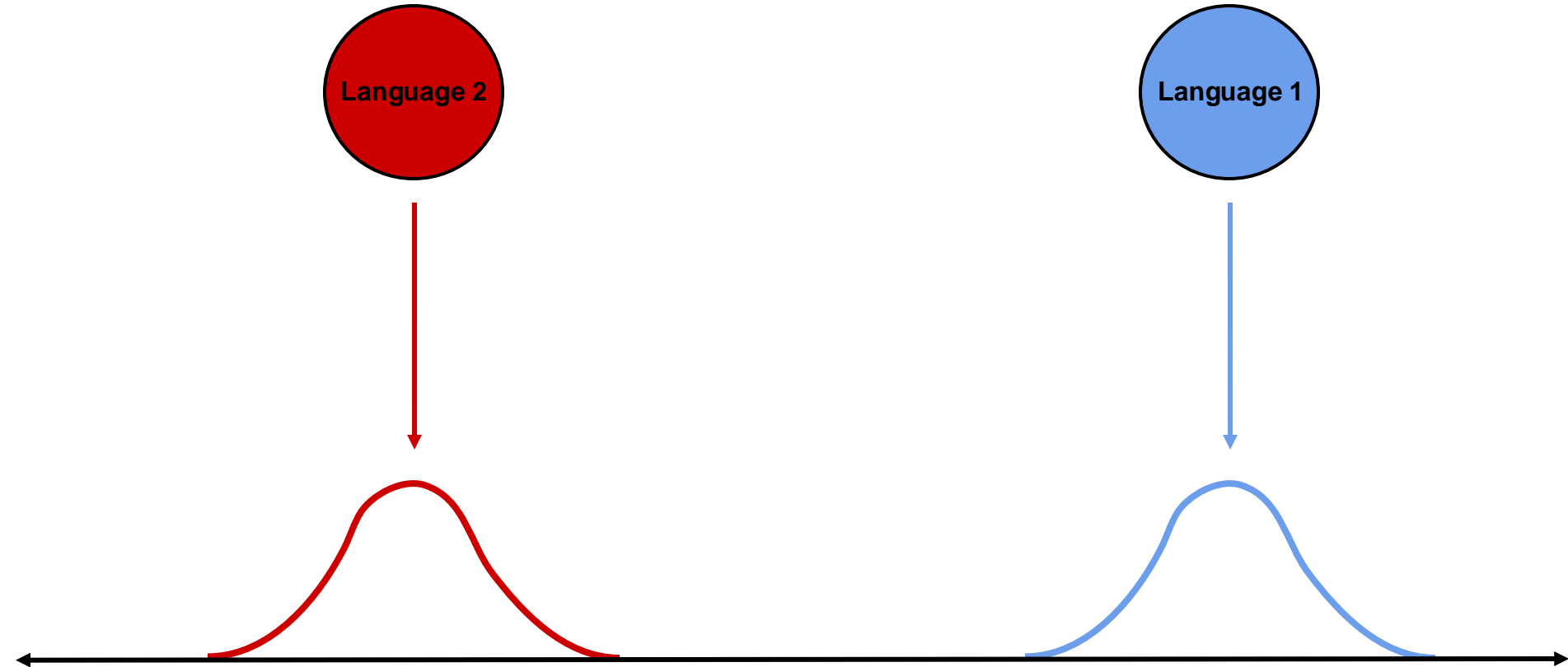


Asymmetric Interference Effects in Code-Switching

Alessandra Pintado-Urbanc
2025 LSA Annual Meeting
10 January 2025

The Bilingual Mind: Represented in DFT



Overview:

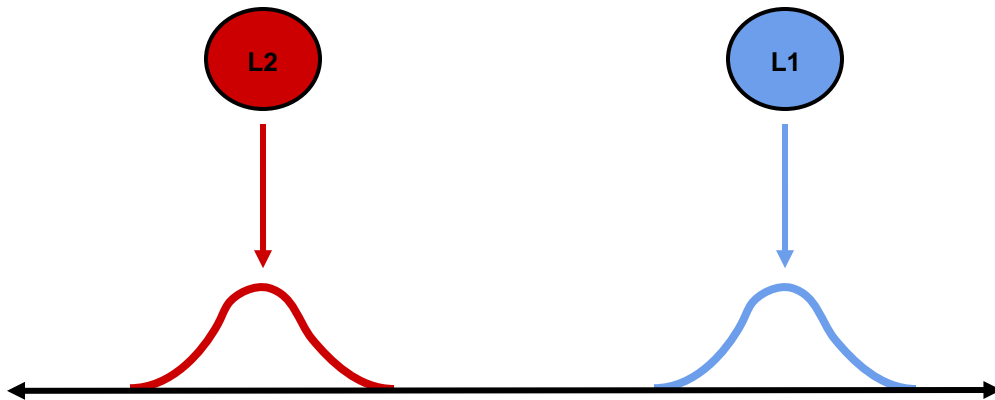
- I. Present how the **bilingual mind** can be **represented in DFT**
 - A. Discuss **language dominance** and **language modes**
 - B. Discuss **code-switching** and **phonetic transfer**
- I. Present **experimental data** of phonetic transfer in code-switching
- I. Present our **DFT model that captures this effect**
- I. Present the model's **new predictions** and **future extensions**

The Bilingual Mind: Two Language Systems

- Two **competing languages** stored within one **mind**
- These competing languages have systems that differ on **syntactic**, **semantic**, **morphological**, **phonological**, and **phonetic** levels

Key Assumption:

- Two **phonetic systems** in a **common representational network**
(Flege, 1995)



The Bilingual Mind: Language Dominance and Modes

Dominance Effects: (Flege, MacKay, & Piske, 2002; Grosjean, 1989)

- Bilinguals typically have a **dominant** and **non-dominant** language
 - Resulting from **age of acquisition**, **daily use**, etc.

Language Modes: (Grosjean, 1985)

- Continuum from **monolingual** to **bilingual** speech

The Bilingual Mind: Interaction between Languages

- **Code-Switching:** Rapid **systematic** and **predictable** transitions between two (or more) languages
- A **code-switched word** can exhibit **phonetic differences** from the same word produced in a monolingual context

“I think that Dynamic Field Theory es un tema muy interesante.”

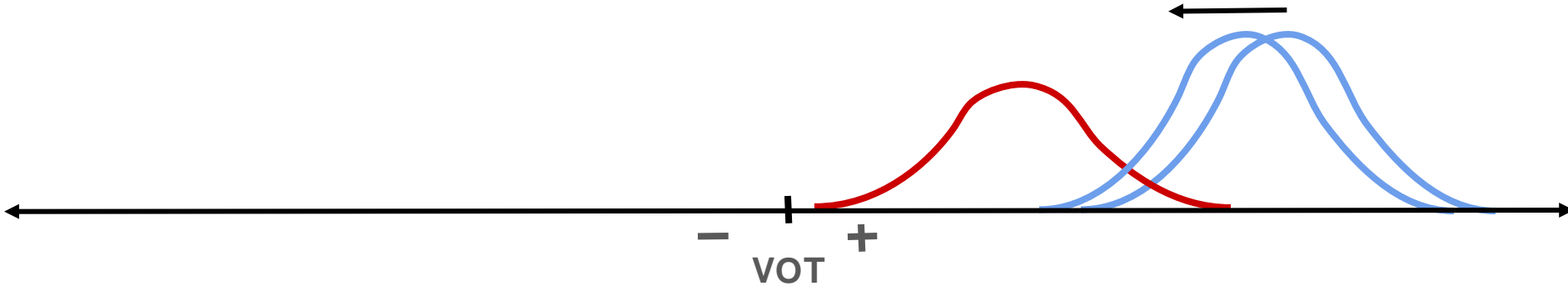
Phonetic Differences: (Grosjean, 2011)

- **Transfer:** *Long-term memory* representations
- **Interference:** *Working memory* representations



DFT Predictions: Overlapping Inputs

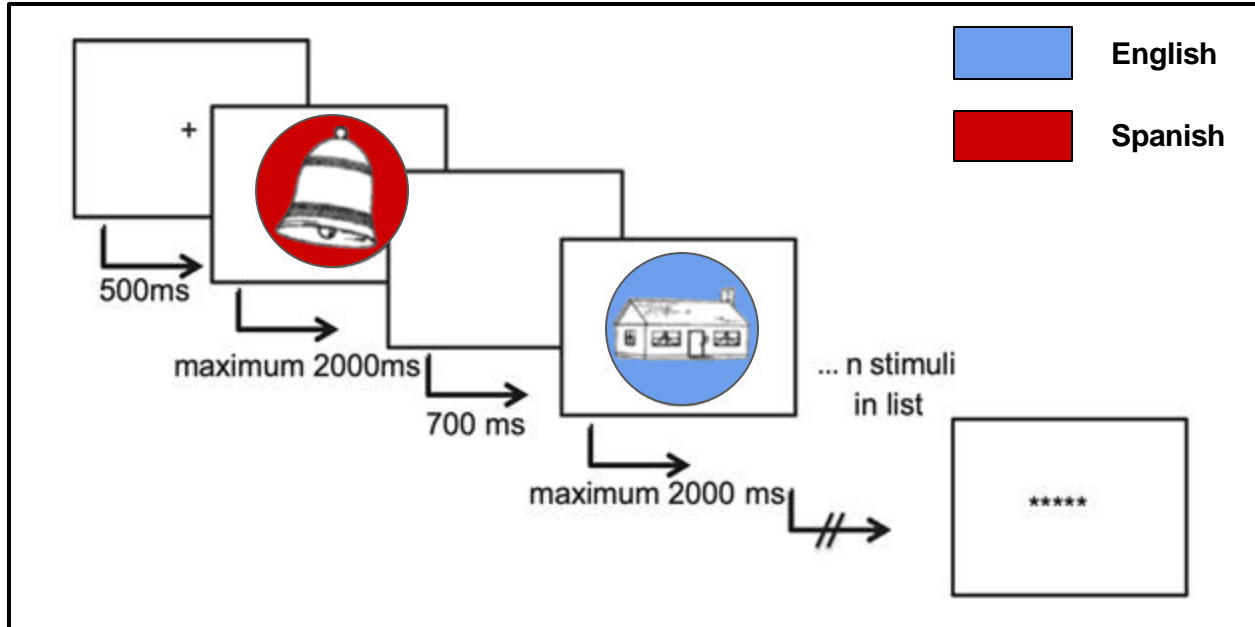
- If language inputs are **overlapping**, during instances when both inputs are sufficiently activated (e.g. during code-switching) **productions** will result in **phonetic differences**



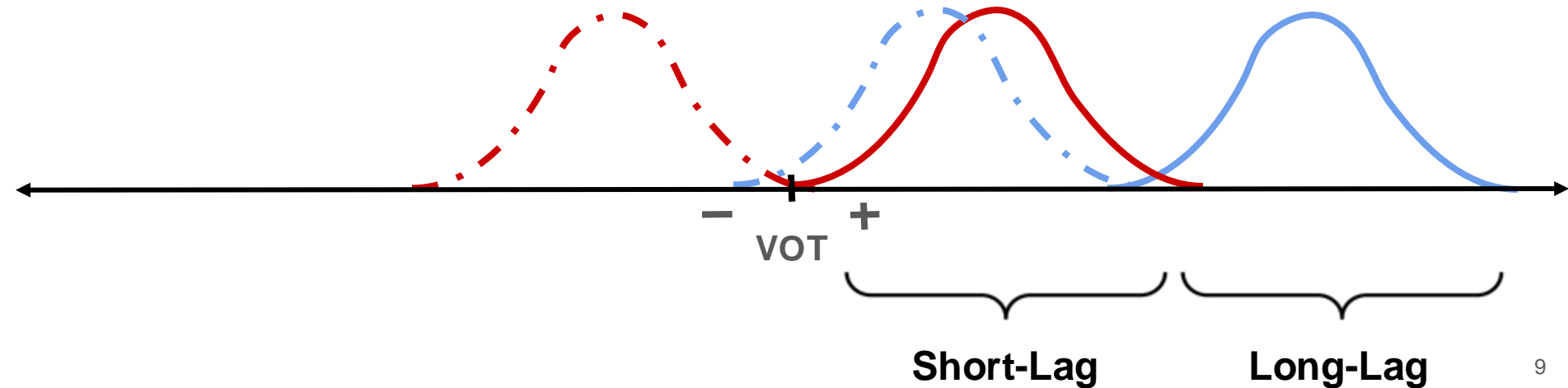
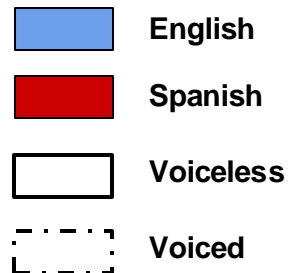
The Data: Olson (2013)'s Language Switching Task

Experimental Condition: Language Modes

- **Monolingual Condition:** 95% of trials in dominant and 5% of trials in non-dominant

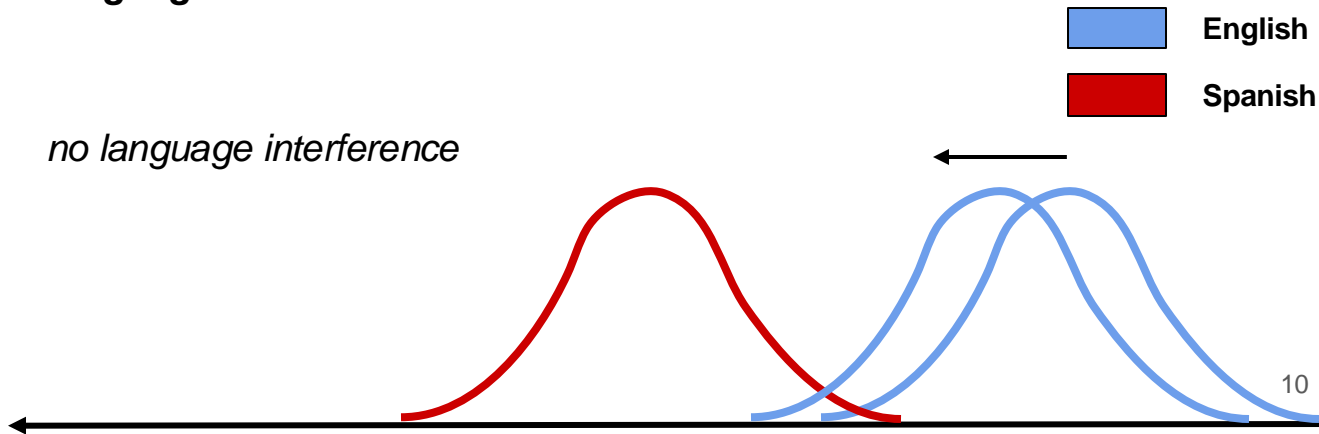
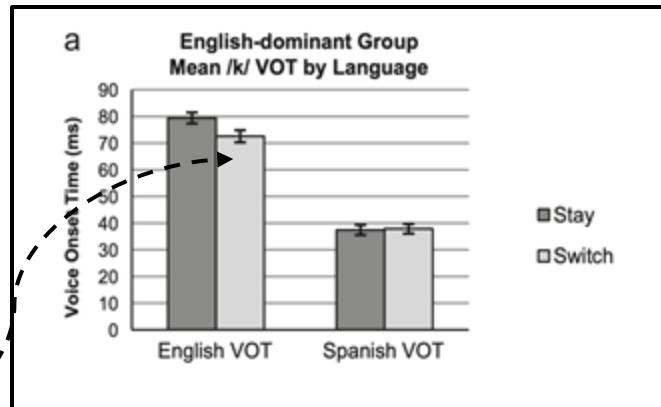


Spanish and English Voice Onset Time:



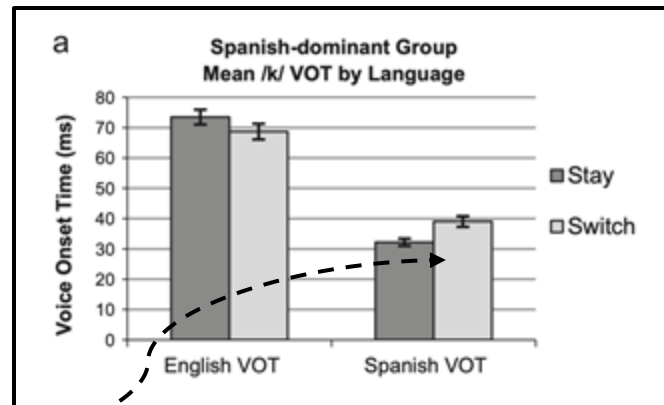
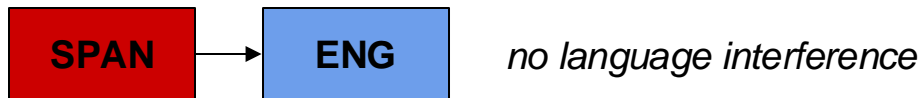
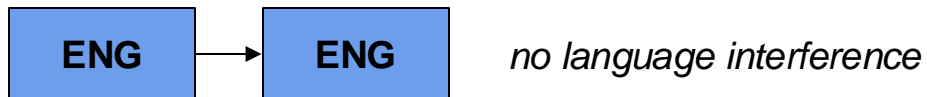
Results: Non-dominant (Spanish) impacting dominant (English)

English Dominant Participants

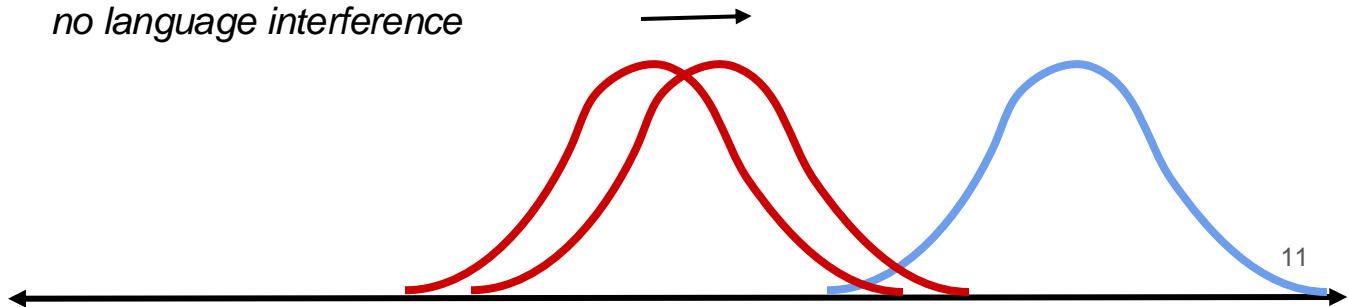


Results: Non-dominant (English) impacting dominant (Spanish)

Spanish Dominant Participants

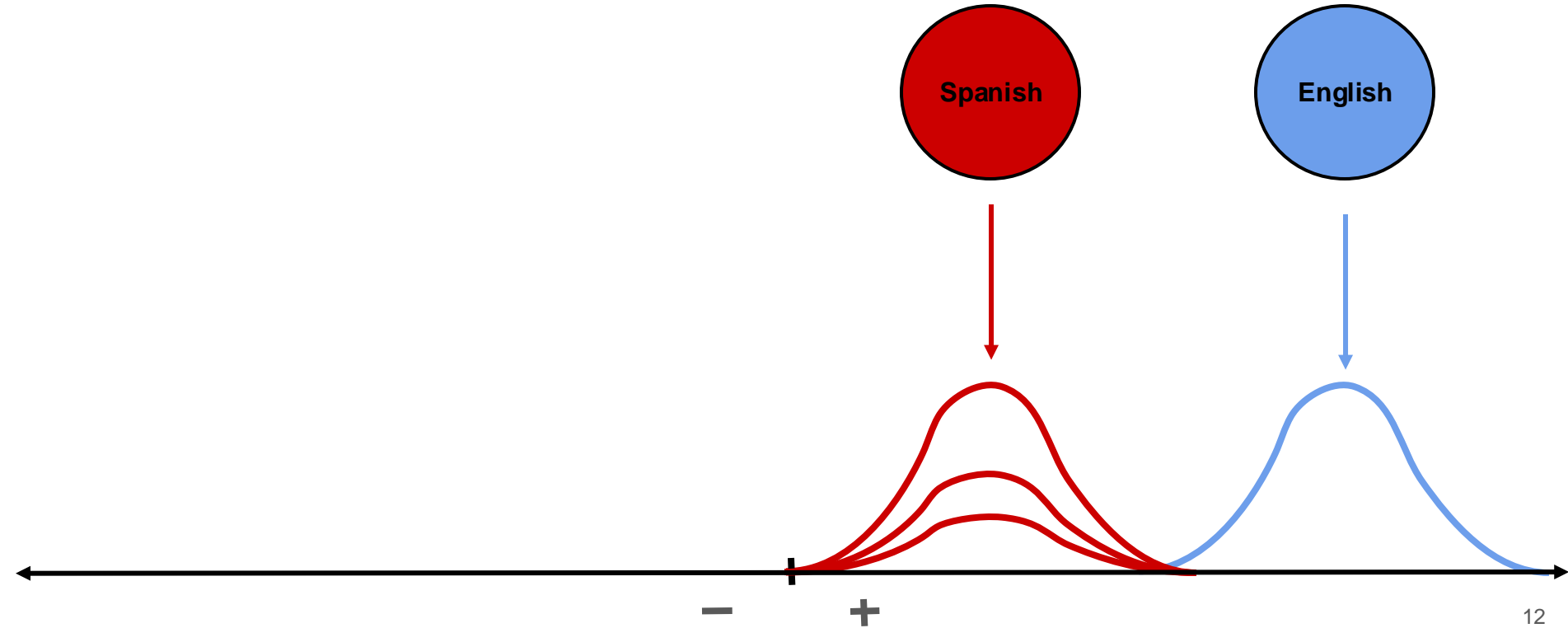


English
Spanish



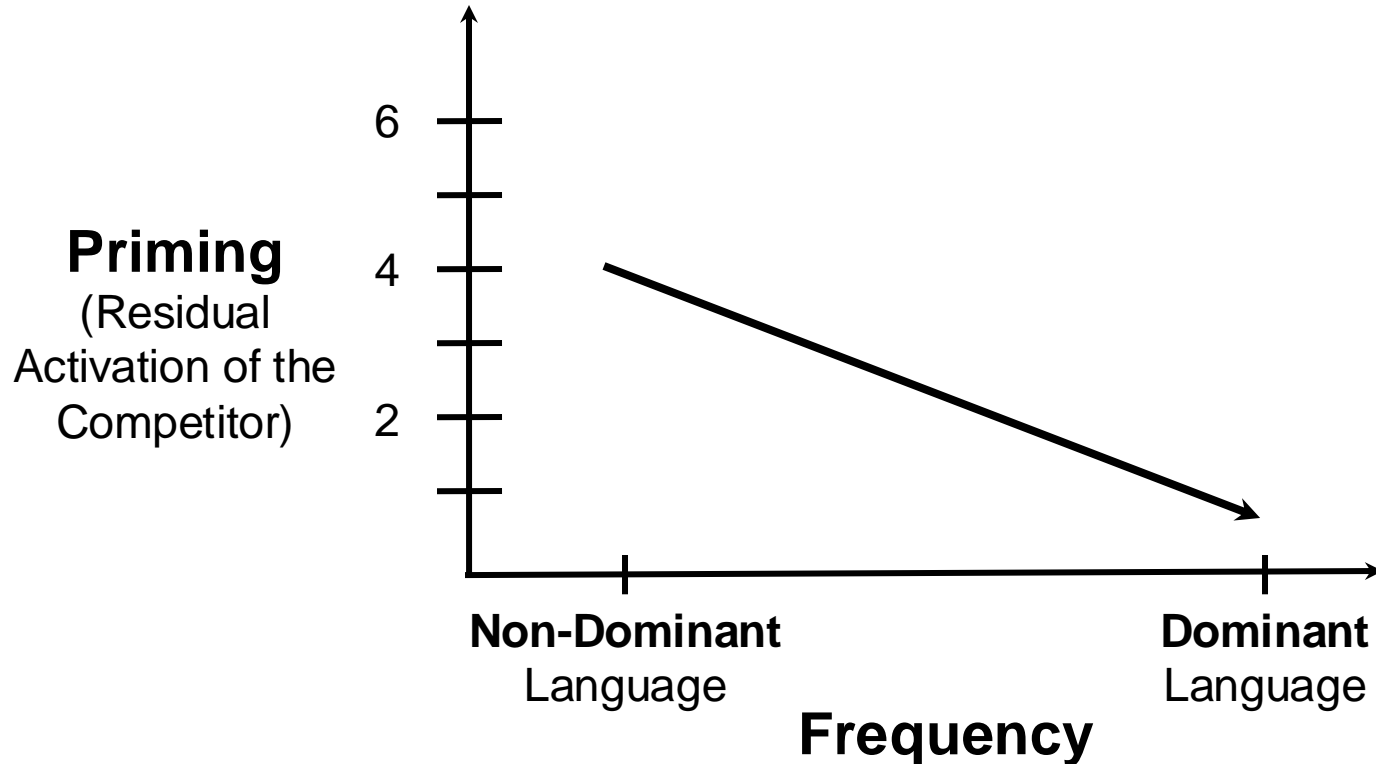
The Model:

- Modulates the **activation (amplitude)** of the language inputs



Inverse Frequency Effect (Ferreira, 2003):

- **Greater** priming effects for **less frequent** items



Model Parameters:

Parameter	Value
τ	20
h	- 5
β	4
c_{exc}	21
c_{inh}	0
c_{glob}	0.9
σ_{exc}	5
σ_{inh}	12.5
q	0
w	21



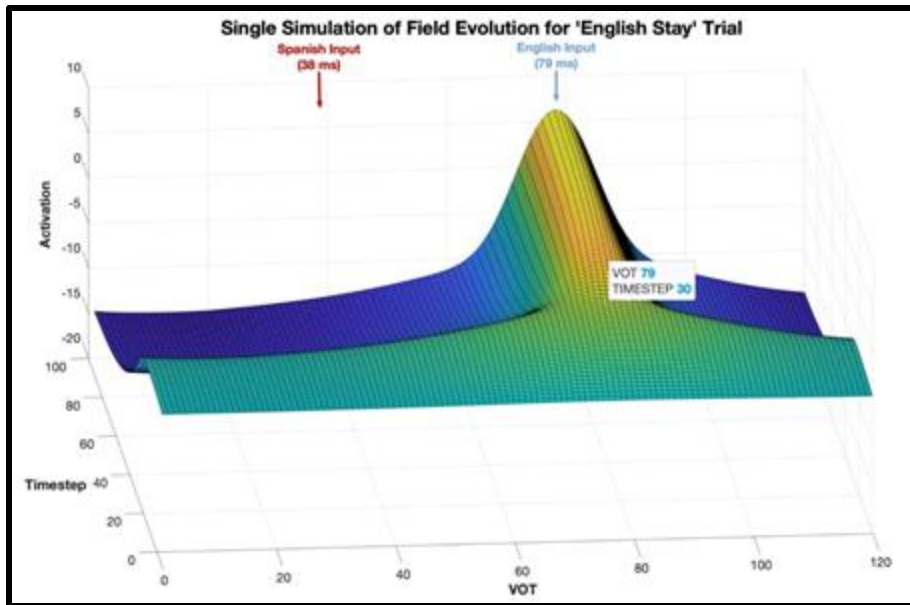
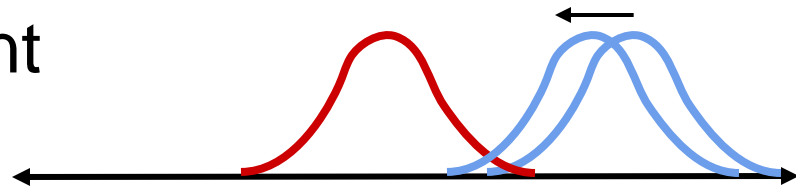
Selection Parameters:
Only want to produce one language at a time

Input Parameters:

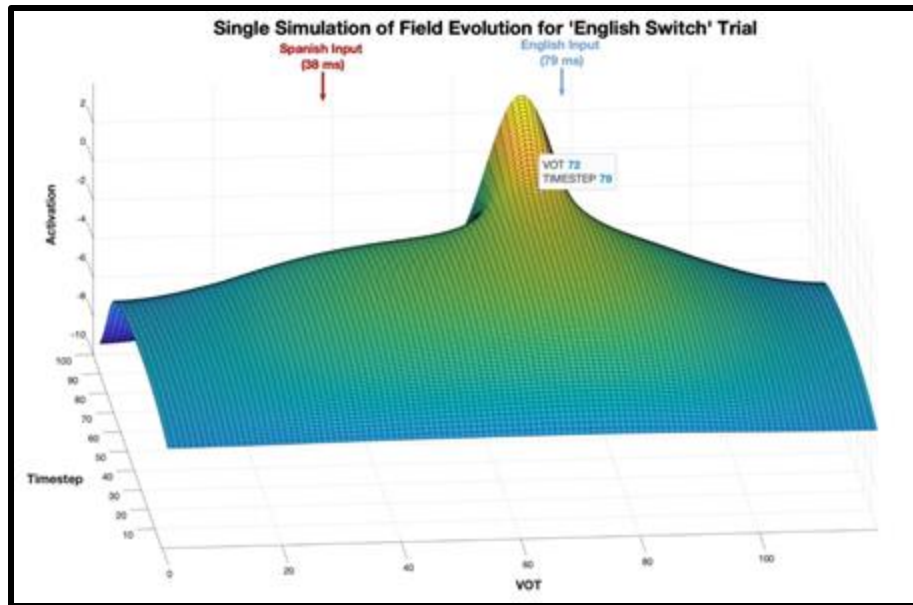
	Activation of Dominant Language Input	Activation of Non-Dominant Language Input
Dominant → Dominant (DOM STAY)	6	1
Non-Dominant → Non-Dominant (NON-DOM STAY)	1	6
Dominant → Non-Dominant (NON-DOM SWITCH)	1	5
Non-Dominant → Dominant (DOM SWITCH)	4	3

Even when operating in “**monolingual modes**” is the competing language **minimally activated**
(Blumenfeld & Marian, 2007; Marian & Spivey, 2003)

Simulations: English Dominant

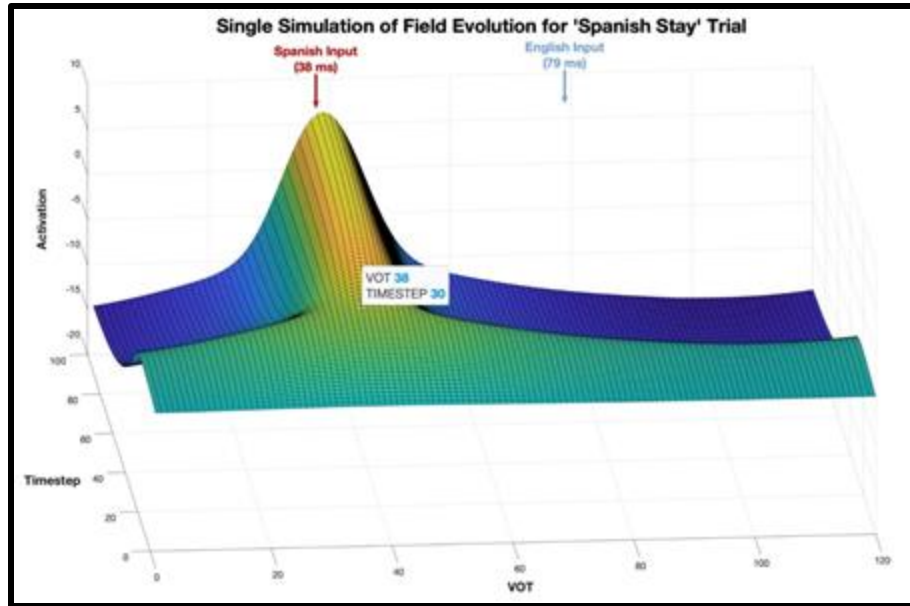


**English
Stay**

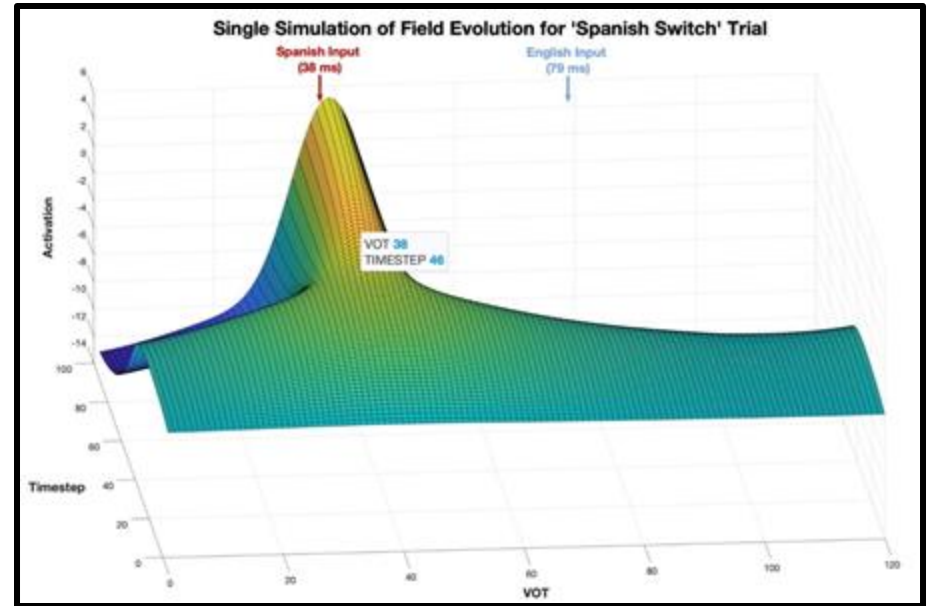


**English
Switch**

Simulations: English Dominant

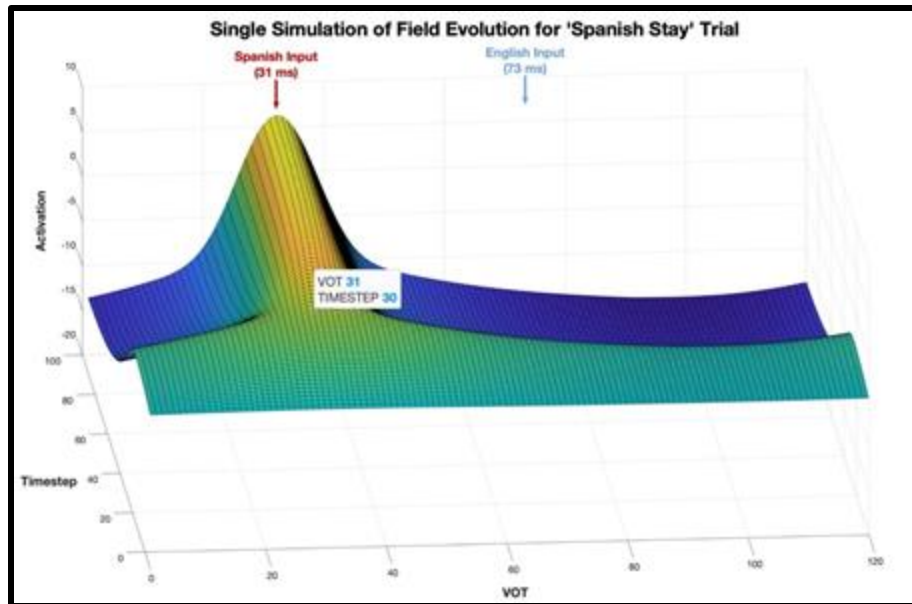
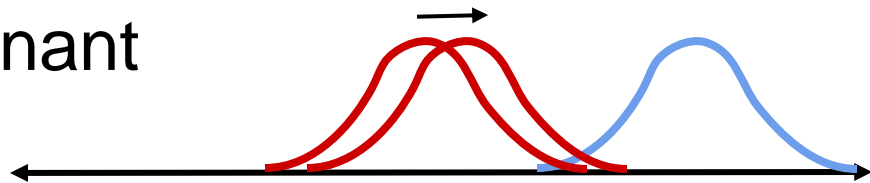


**Spanish
Stay**

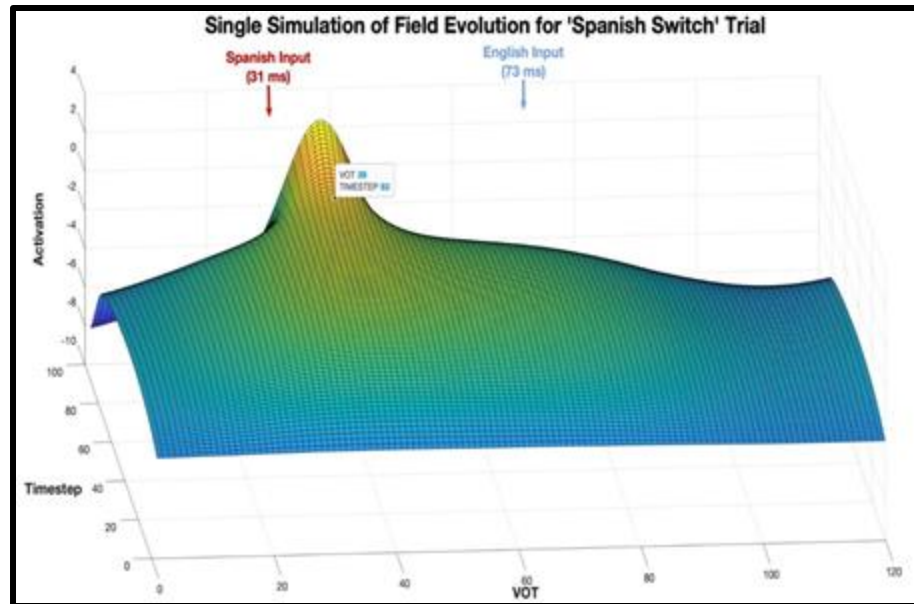


**Spanish
Switch**

Simulations: Spanish Dominant

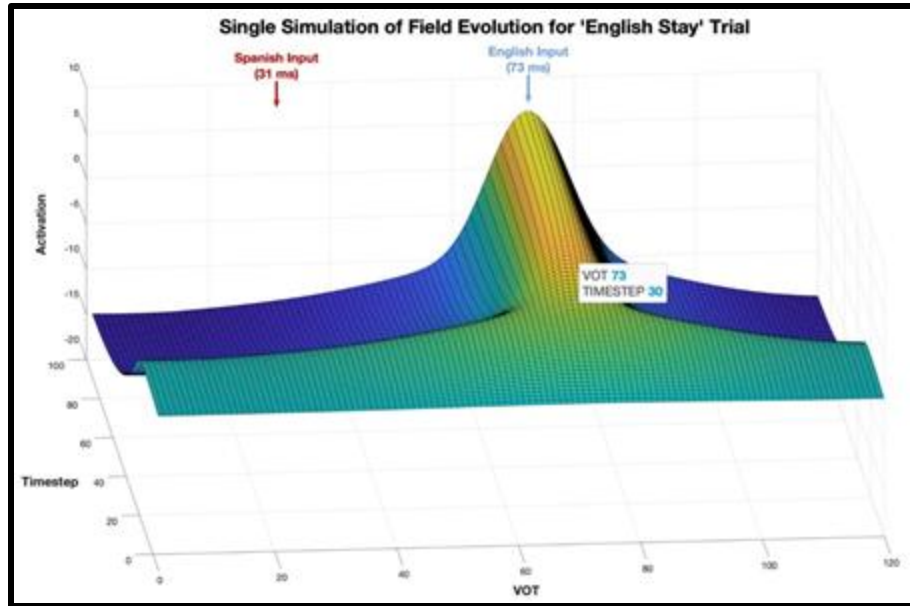


**Spanish
Stay**

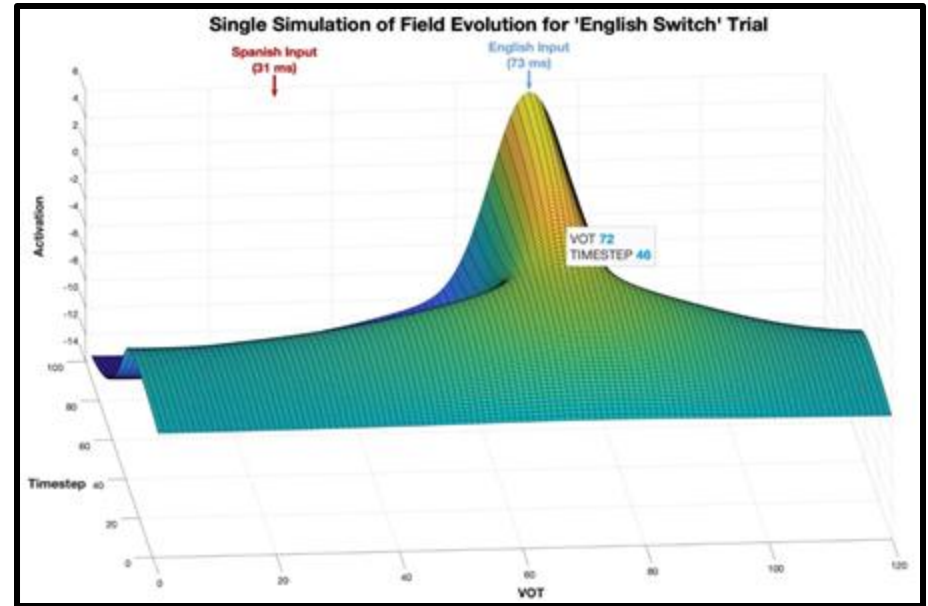


**Spanish
Switch**

Simulations: Spanish Dominant



English
Stay



English
Switch

New Predictions:

- The model predicts there to be **no interference effects** for speakers of languages whose VOT distributions **do not overlap**
- It also predicts a '**switch-cost**' when switching from the **non-dominant language into the dominant** given differences in the timesteps of the onset of peak formation

Future Extensions:

- Adapt the model to account for a **bilingual mode** of communication where asymmetric interference effect is **not** found (Olson, 2013)
- Adapt the model to account for **balanced bilinguals** where interference effects are not found (Tsui et al., 2019)

Thank You!