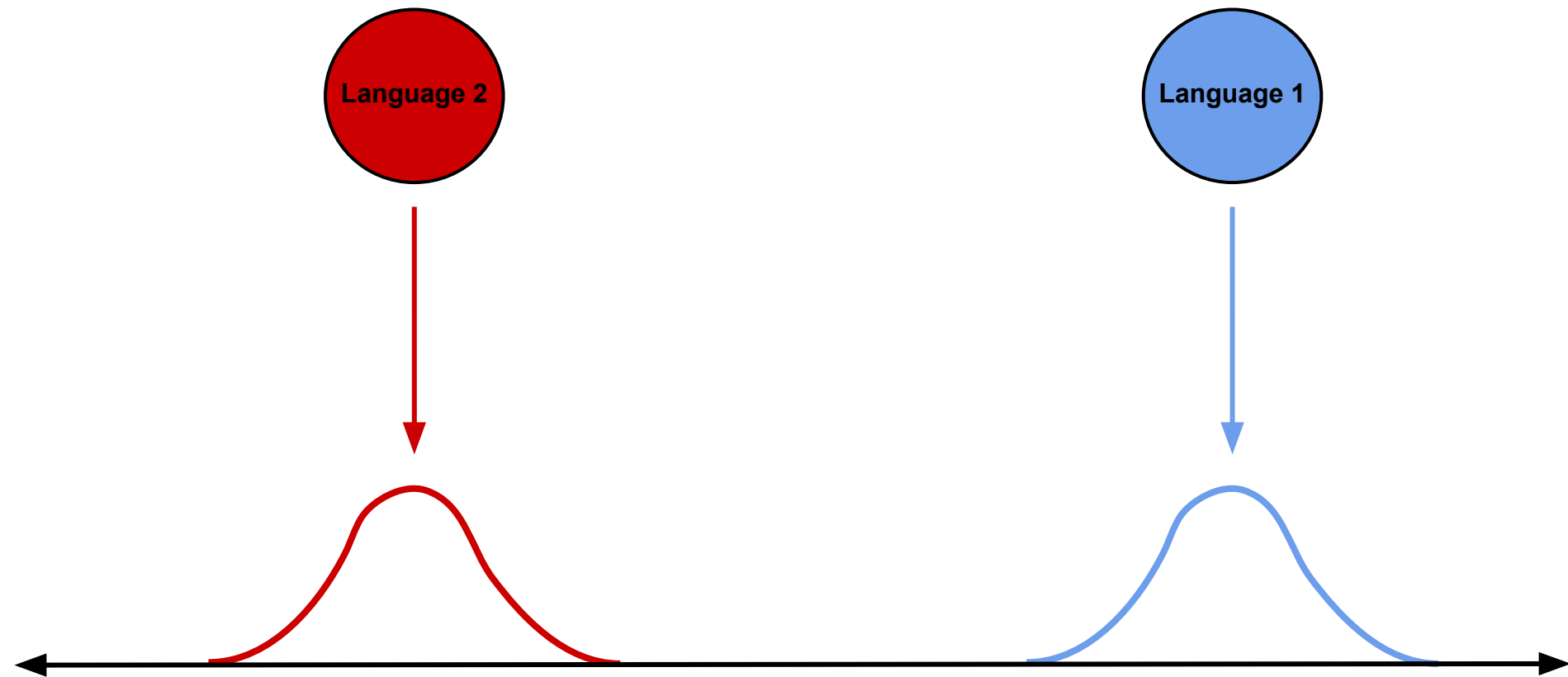


Asymmetric Interference Effects in Code-Switching

Alessandra Pintado-Urbanc
2025 LSA Annual Meeting
10 January 2025



The Bilingual Mind: Represented in DFT



Overview:

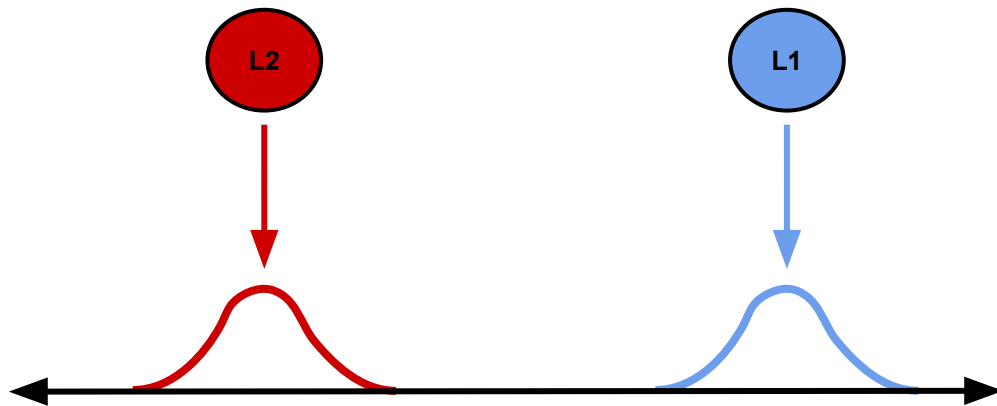
- I. Present how the **bilingual mind** can be **represented in DFT**
 - A. Discuss **language dominance** and **language modes**
 - B. Discuss **code-switching** and **phonetic interference**
- II. Present **experimental data** of phonetic interference in code-switching
- III. Present our **DFT model that captures this effect**
- IV. 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 space**
(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

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

- A **code-switched word** can exhibit **phonetic differences** from the same word produced in a monolingual context

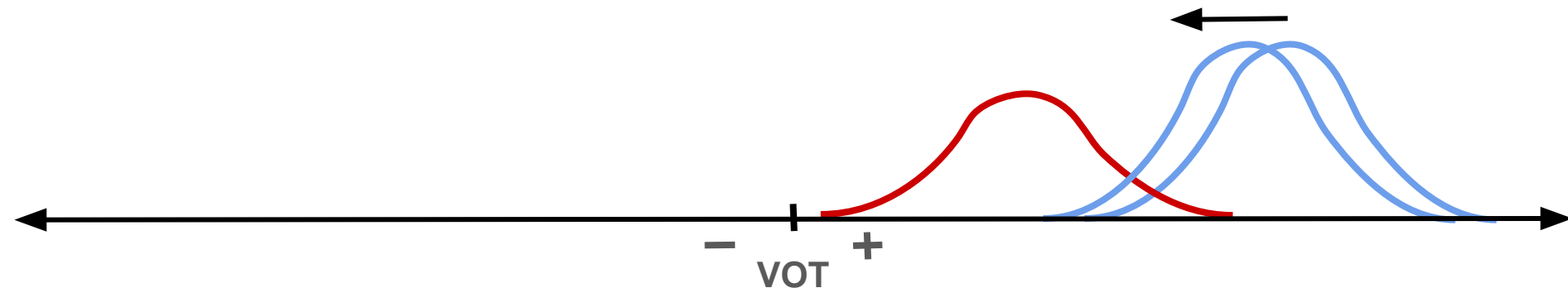
Phonetic Differences: (Grosjean, 2012)

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



DFT Predictions: Overlapping Inputs

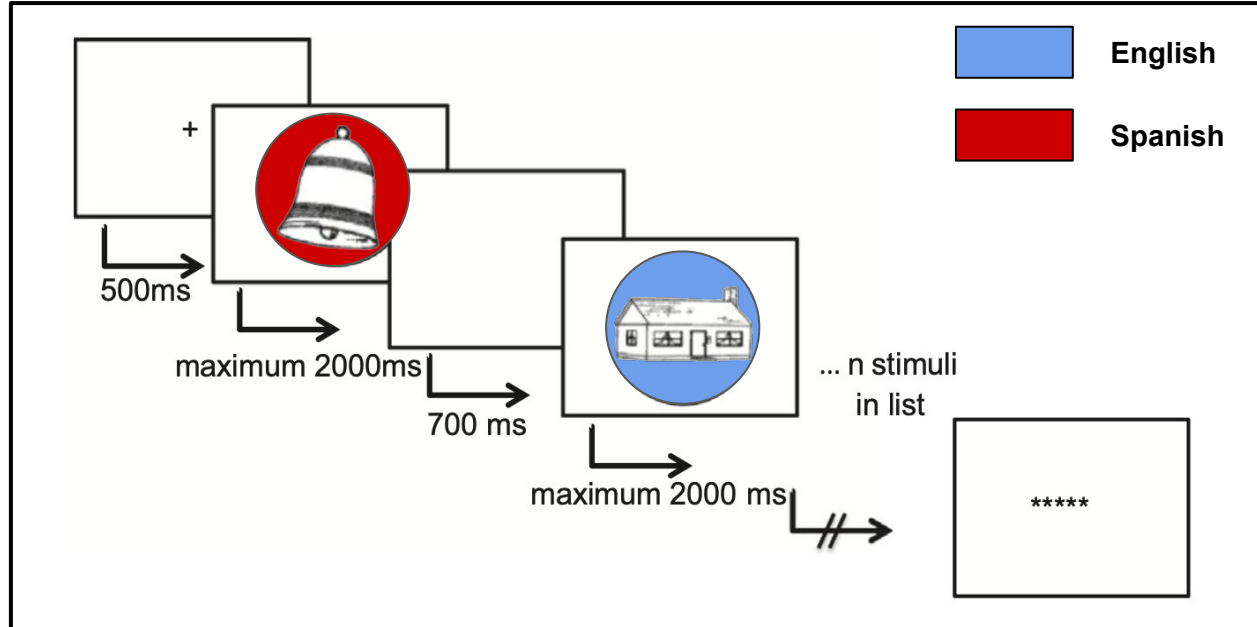
- If language inputs are **overlapping**, during instances when both inputs are sufficiently activated (e.g. during code-switching) **productions** will result in **phonetic differences**



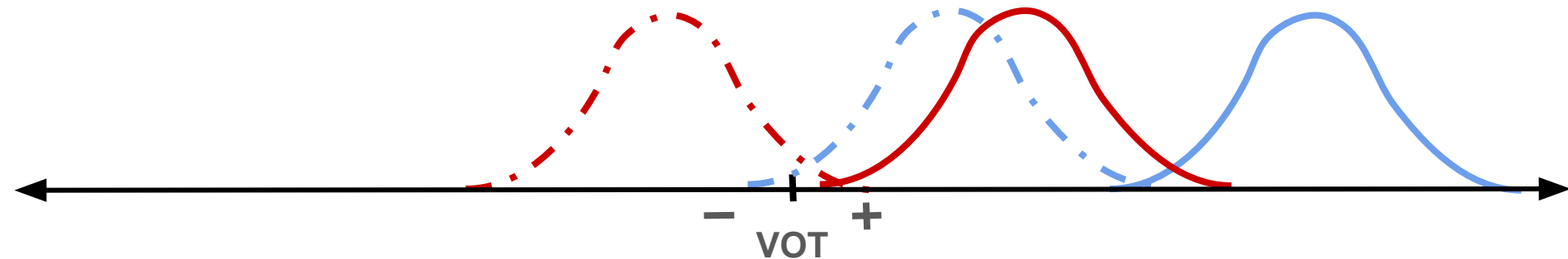
The Data: Olson (2013)'s Language Switching Task

Experimental Condition: Language Modes

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

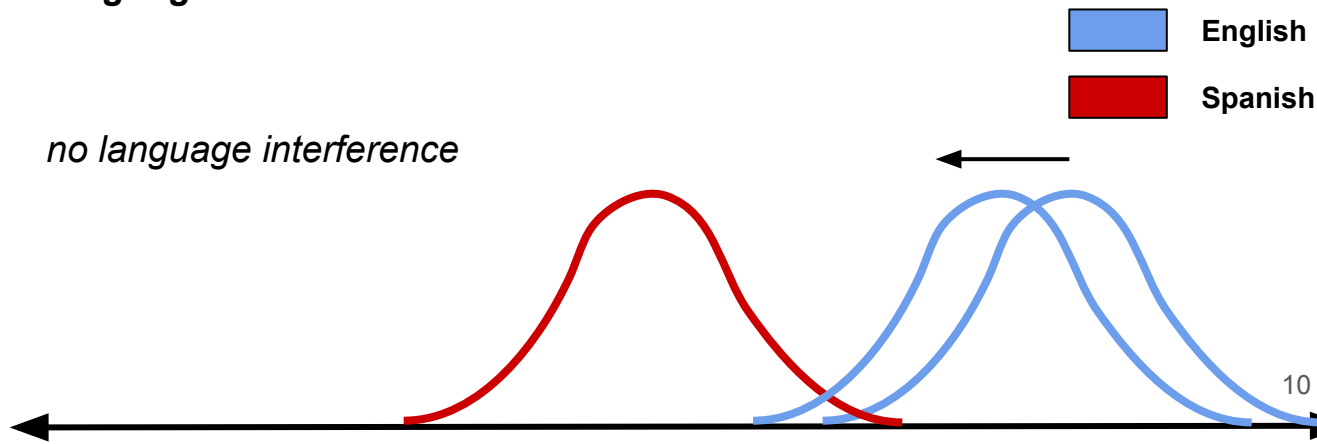
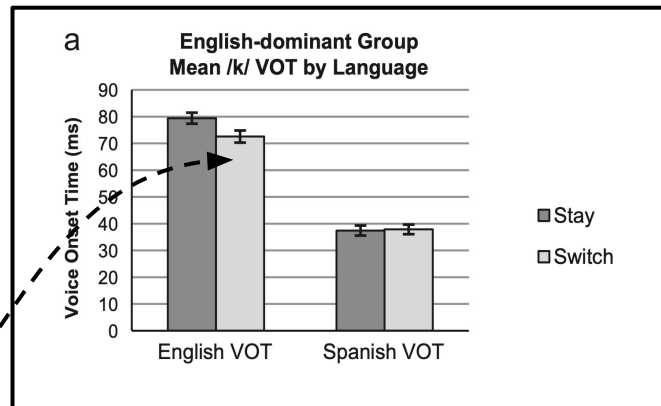
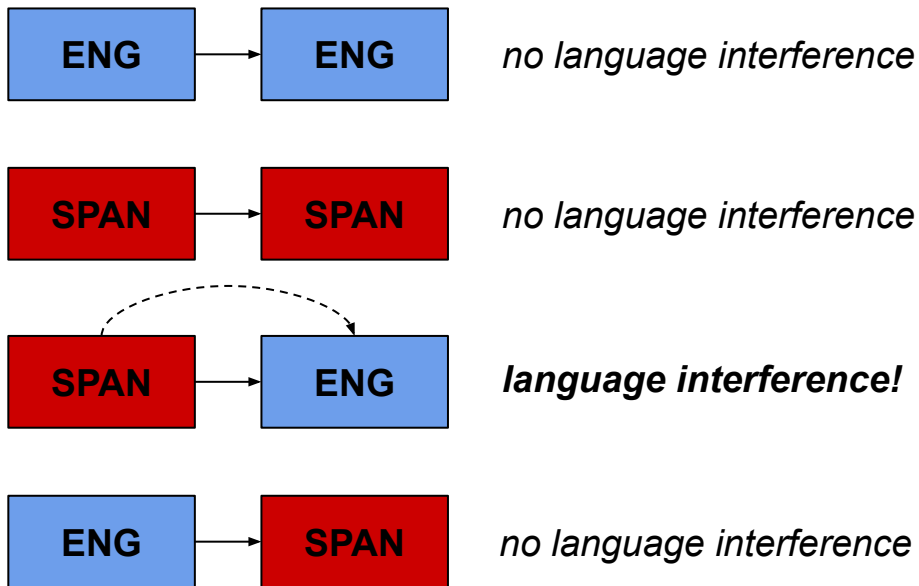


Spanish and English Voice Onset Time:



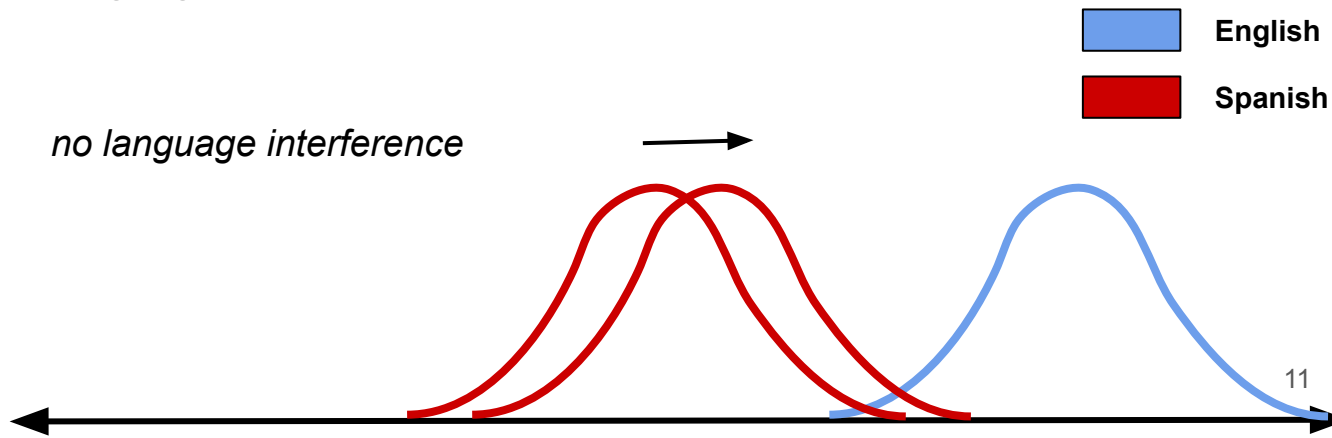
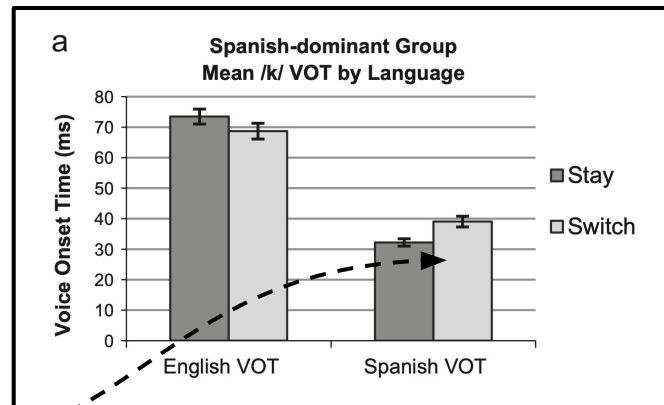
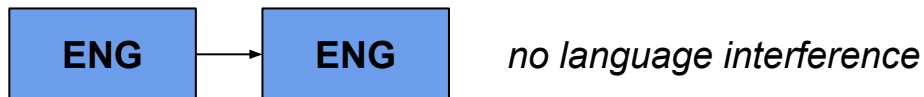
Results: Non-dominant (Spanish) impacting dominant (English)

English Dominant Participants



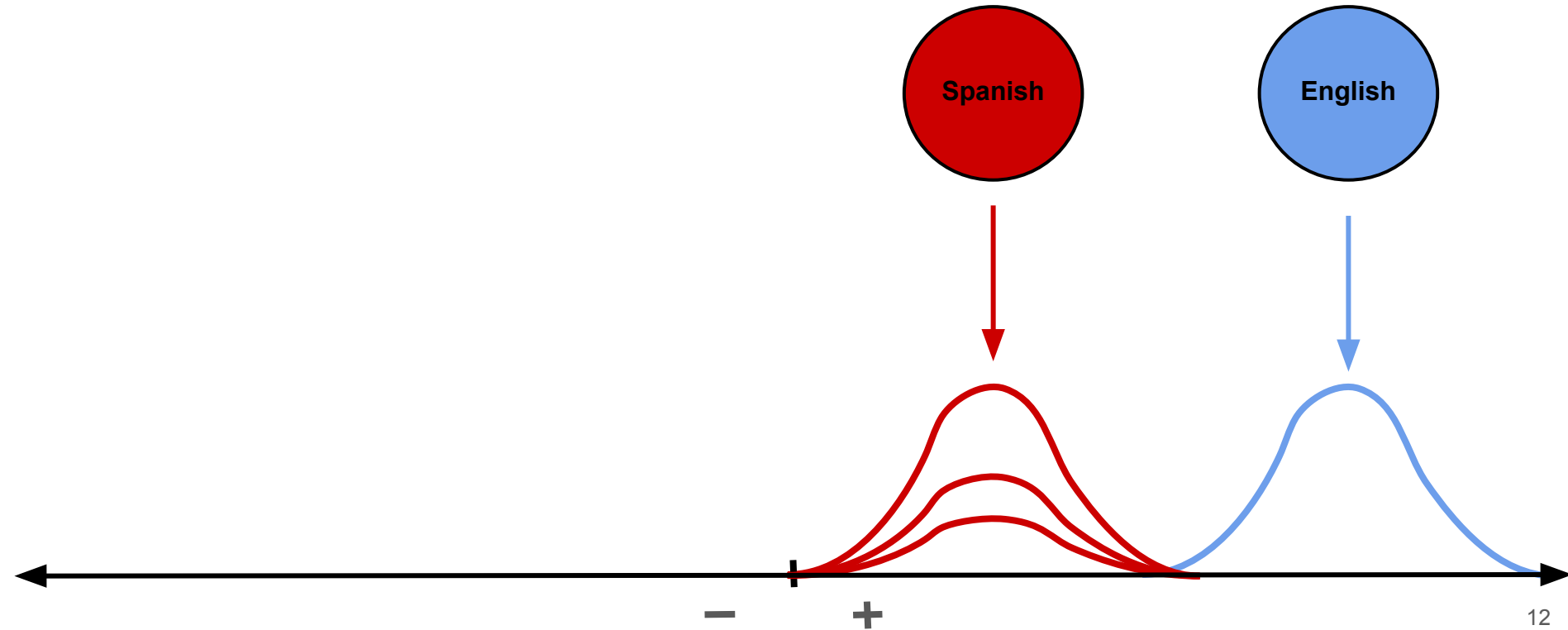
Results: Non-dominant (English) impacting dominant (Spanish)

Spanish Dominant Participants



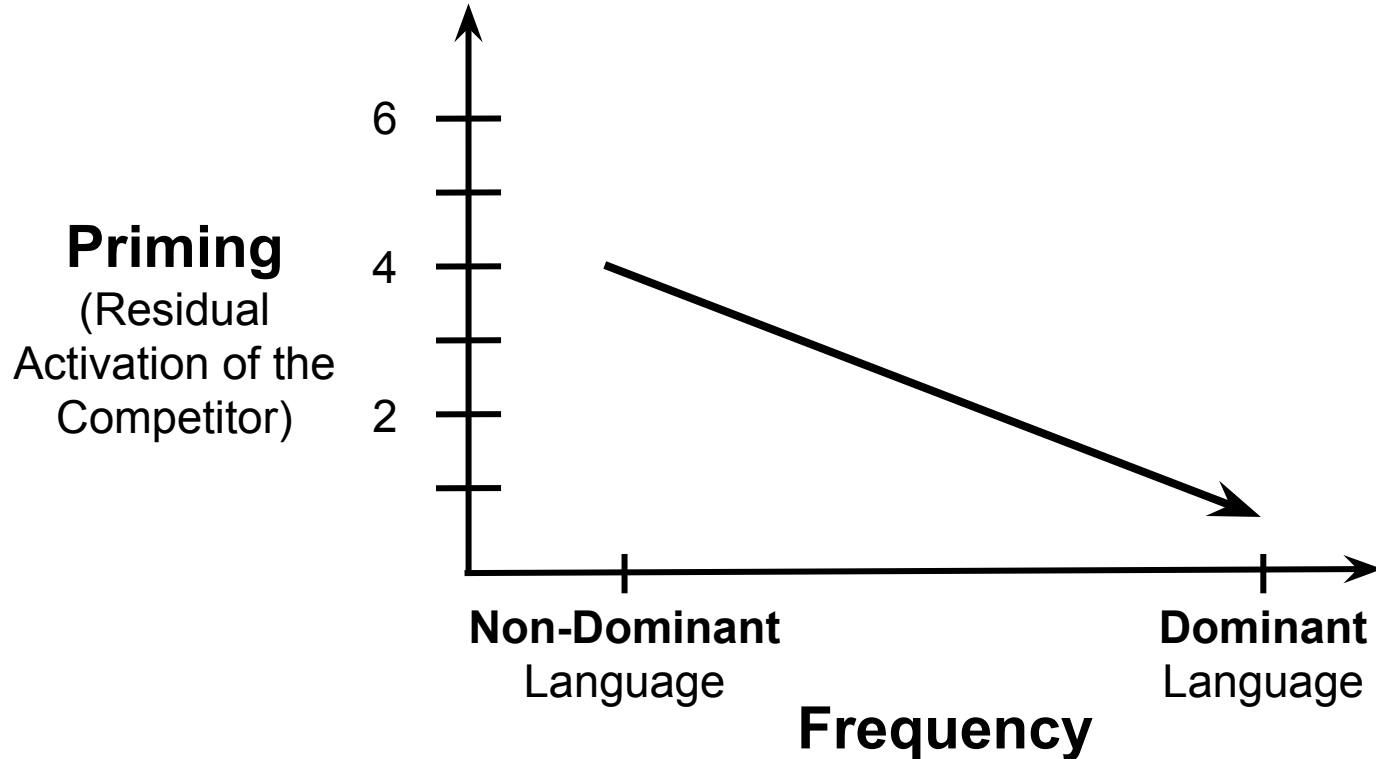
The Model:

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



Inverse Frequency Effect (cf. 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:

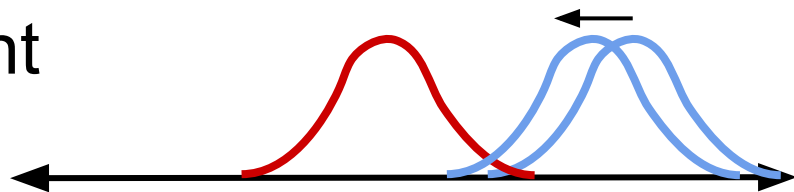
Only want to produce one language at a time

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)

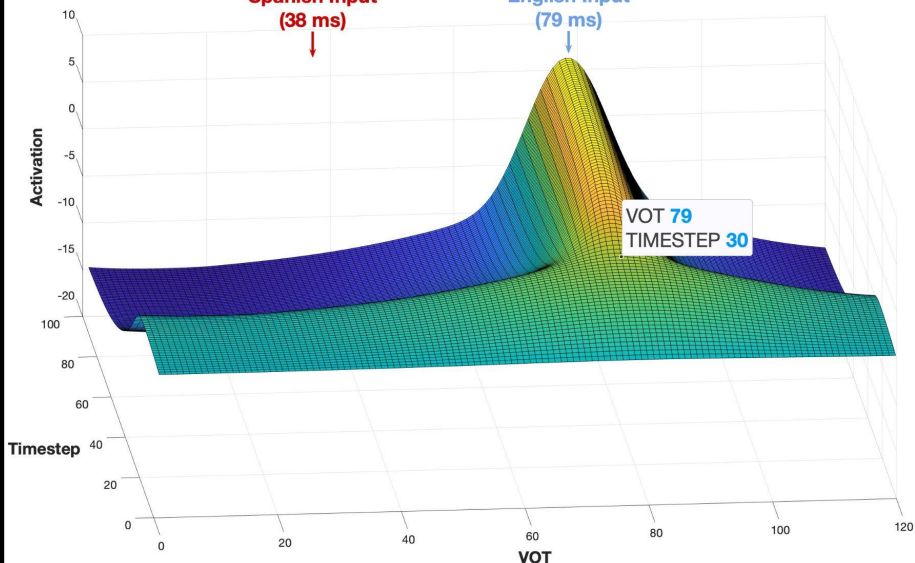
Simulations: English Dominant



Single Simulation of Field Evolution for 'English Stay' Trial

Spanish Input
(38 ms)

English Input
(79 ms)

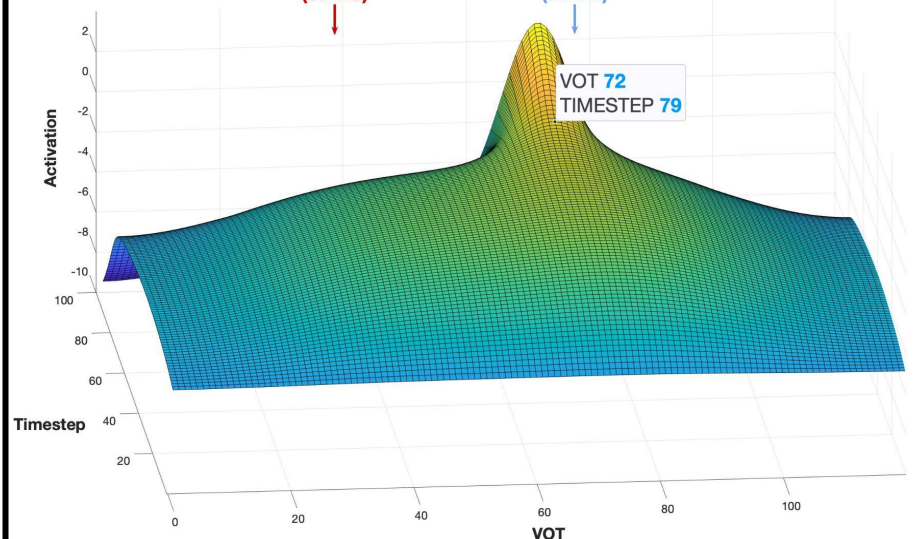


English Stay

Single Simulation of Field Evolution for 'English Switch' Trial

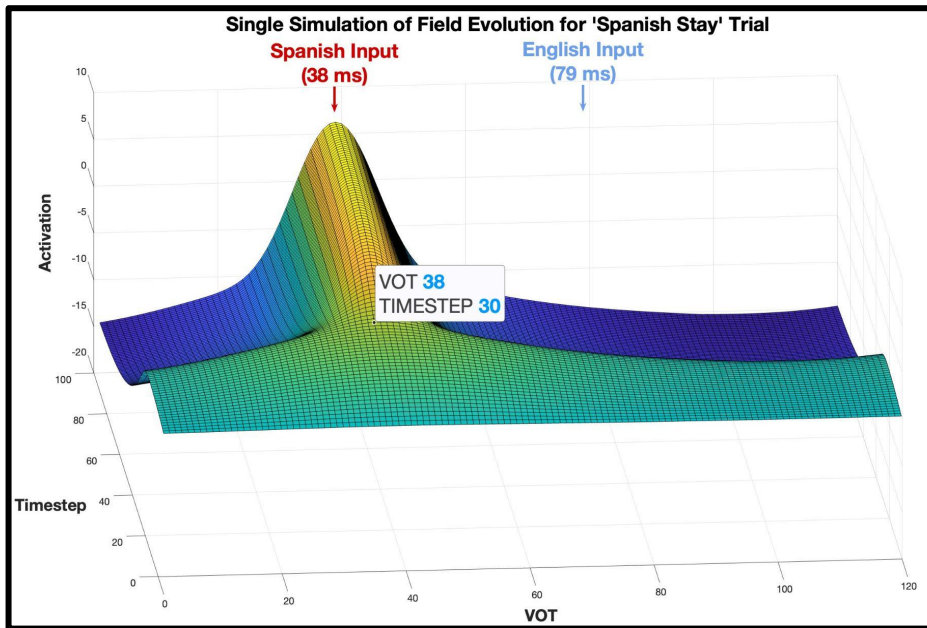
Spanish Input
(38 ms)

English Input
(79 ms)

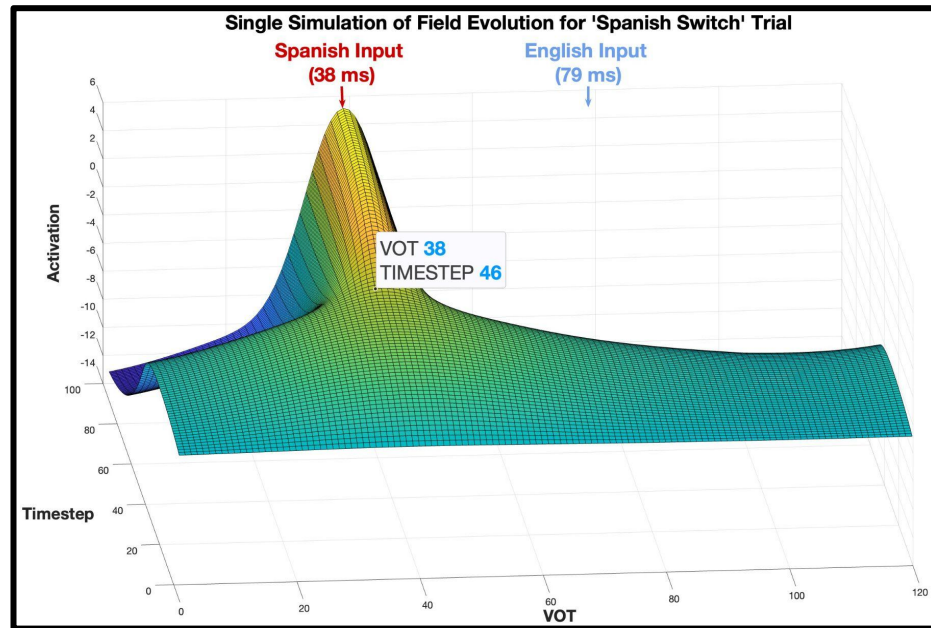


English Switch

Simulations: English Dominant

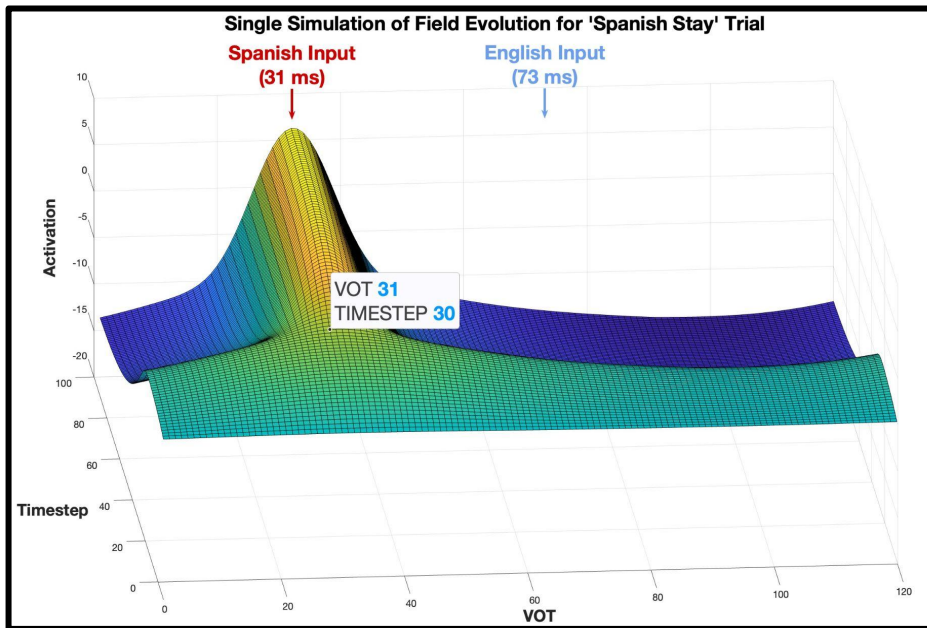
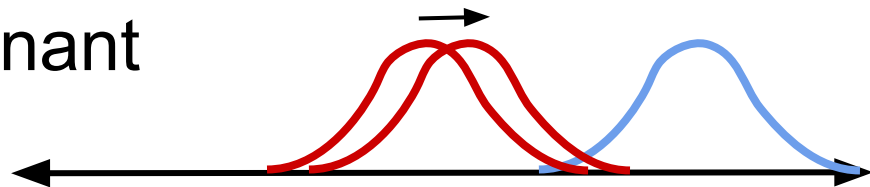


Spanish Stay

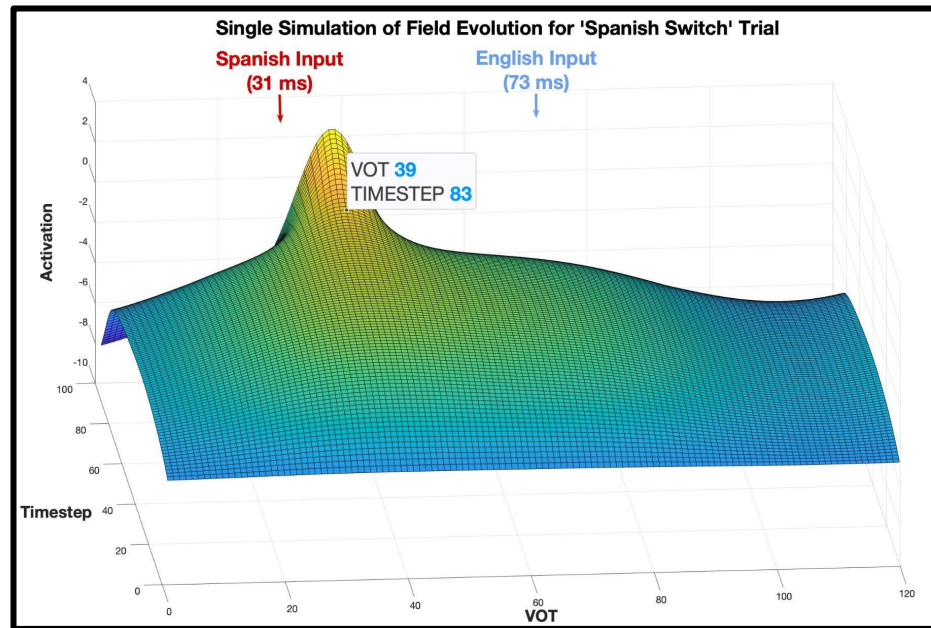


Spanish Switch

Simulations: Spanish Dominant

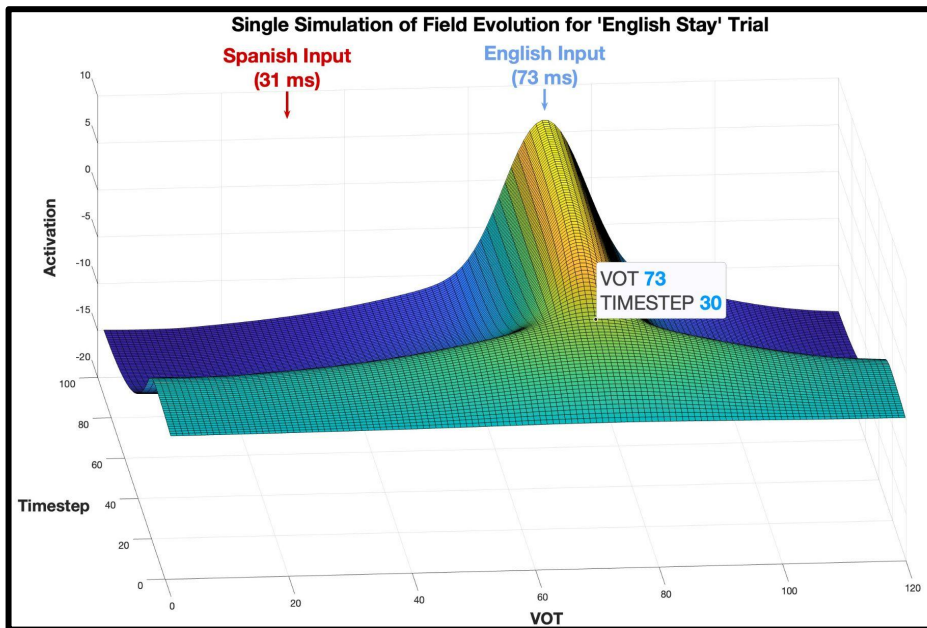


Spanish Stay

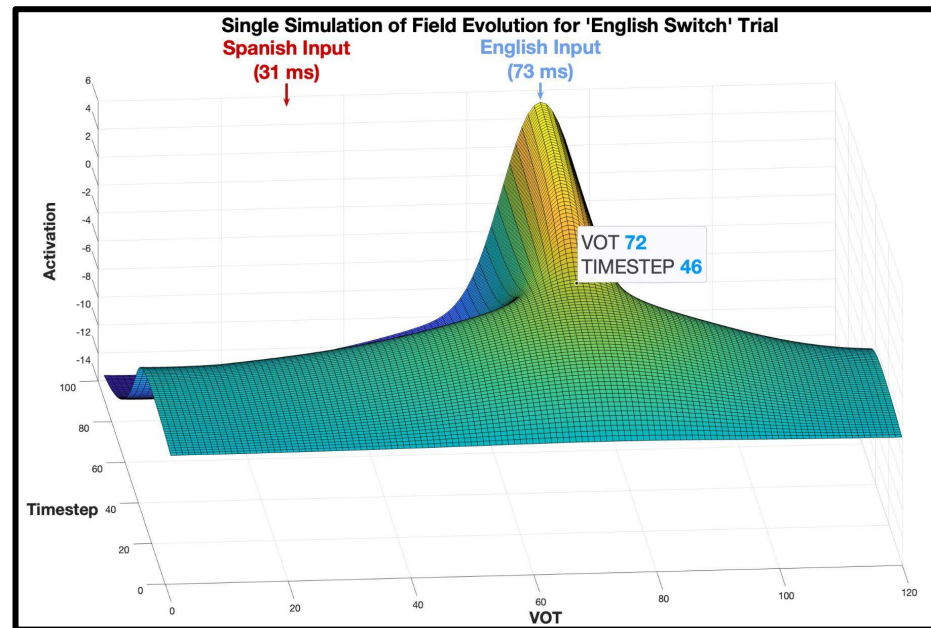


Spanish Switch

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)

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Thank You!