

# Switching response modalities in picture naming

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# **SECTION 1: Background & Motivation**

## Background

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- Influence of phonology in L1 written (handwriting) production & of orthography in L1 oral (speaking) production.

## Background

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- Does phonology constrain selection of orthographic representations in written picture naming? (Bonin et al., 2001)
  - Manipulated sound-spelling inconsistency (*cygne – signe*) and position of inconsistency.
- Word-initial inconsistency slowed RTs compared to matched consistent words

Phonology does constrain the activation of orthographic representations (sublexical route) and is co-activated during writing.

## Background

- Orthographic representations are activated during oral production (Rastle et al., 2011)
  - Novel word learning: novel pictures and novel spoken words
  - Manipulated spelling-sound consistency
- Production: spelling regularity slowed RTs in picture naming
  - Emerged right after the new spellings were introduced on the 2<sup>nd</sup> day of training; persisted throughout the 3<sup>rd</sup> day of training.

Test Pictures, Written Names, And Spoken Names

Picture	Irregular Spelling	Regular Spelling	I.P.A.
	THIMP	TIMP	/timp/
	SURP	SHURP	/ʃərp/
	CBRK	CHERK	/tʃæk/

Orthography is involved in tasks where it is not required.

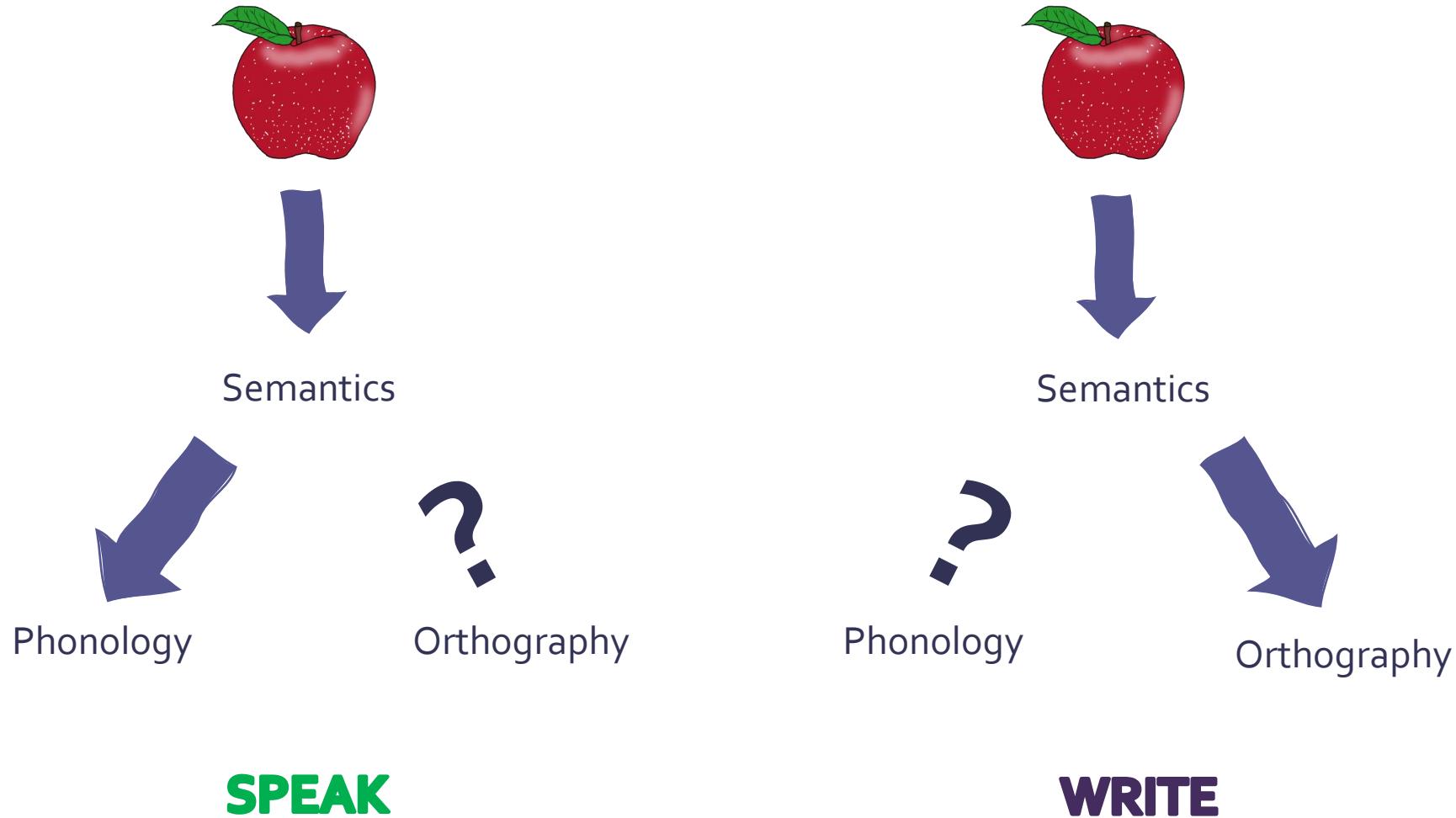
## Motivation

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- Phonology is more dominant than orthography (Luria, 1970; Scinto, 1986; Miceli et al., 1997).
- **Speech perception:** orthographic representations influence the perception, recognition, and processing of spoken language even when “task-irrelevant” (Kolinsky et al., 2012; Pattamadilok et al., 2019).
- **Speech production:** orthographic forms affect phonetic aspects of isolated speech sound production (Stoehr & Martin, 2022).
  - Incongruent grapheme-to-phoneme correspondences (L1 – newly learned speech sounds) negatively affected target-like production and perception in terms of phonetic characteristics. This could suggest that orthographic representations are not only encoded at the lexical level, but also at the speech sound level.

# Motivation

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# Motivation

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- The switching paradigm
- Task execution & task inhibition with manipulation of response modality:
- **Switch costs:**
  - Performance for modality switch (oral vs. manual) dropped in comparison to modality repetition in a numerical-judgment task (Philipp & Koch, 2011; Philipp & Koch, 2005).
- **Modality effect:**
  - Longer RTs for vocal than manual responses (Philipp & Koch, 2011; Philipp & Koch, 2005).
- **Asymmetry of modality switching:**
  - larger modality-shift costs for vocal than for manual responses (Philipp & Koch, 2011).

## Motivation

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- Same results for language switching (Costa & Santesteban, 2004; Filippi et al., 2014; Jevtović et al., 2020)
  - Mainly inhibition.
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- **Difference:** speaking and writing can be performed *simultaneously*.
  - Co-activation of phonological & orthographic representations.

## Motivation

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**Goal:** to employ the same paradigm as in task switching for modality switching in **oral and written language production**

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**New-in:** to investigate modality switching in **typing** (Pinet et al., 2016) instead of handwriting.

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**Focus:** to examine (the level of) the co-activation of phonological and orthographic representations during oral and written naming and focus on the strength of this co-activation in each task (speak – type)

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## **SECTION 2: Methodology & Design**

- Response-modality switching (speak, type) in **picture naming**.
- 32 di- & trisyllabic Spanish nouns -- images by MultiPic (Duñabeitia et al., 2018)

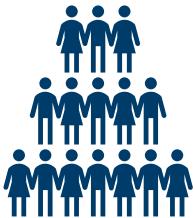
muñeca	pintor	aguja	granja	traje	braga	miel	camisa
vaso	puente	cartero	vaca	fresa	cuerda	pulpo	baño
caracol	pavo	mano	iglesia	goma	manzana	oveja	pierna
cazador	falda	conejo	oreja	bombero	guante	puerta	boca

- Cognate status (Basque, English), log frequency, mean token bigram frequency, no. letters, no. phonemes, no. syllables, bimanual transitions (%), semantic category
- Imageability, visual complexity, name agreement

## Participant profile:



N ≈ 50



18-40 yo



Skilled typists

<https://www.npr.org/sections/health-shots/2010/10/28/130893113/typing-error-your-fingers-know-even-when-your-brain-doesn-t>

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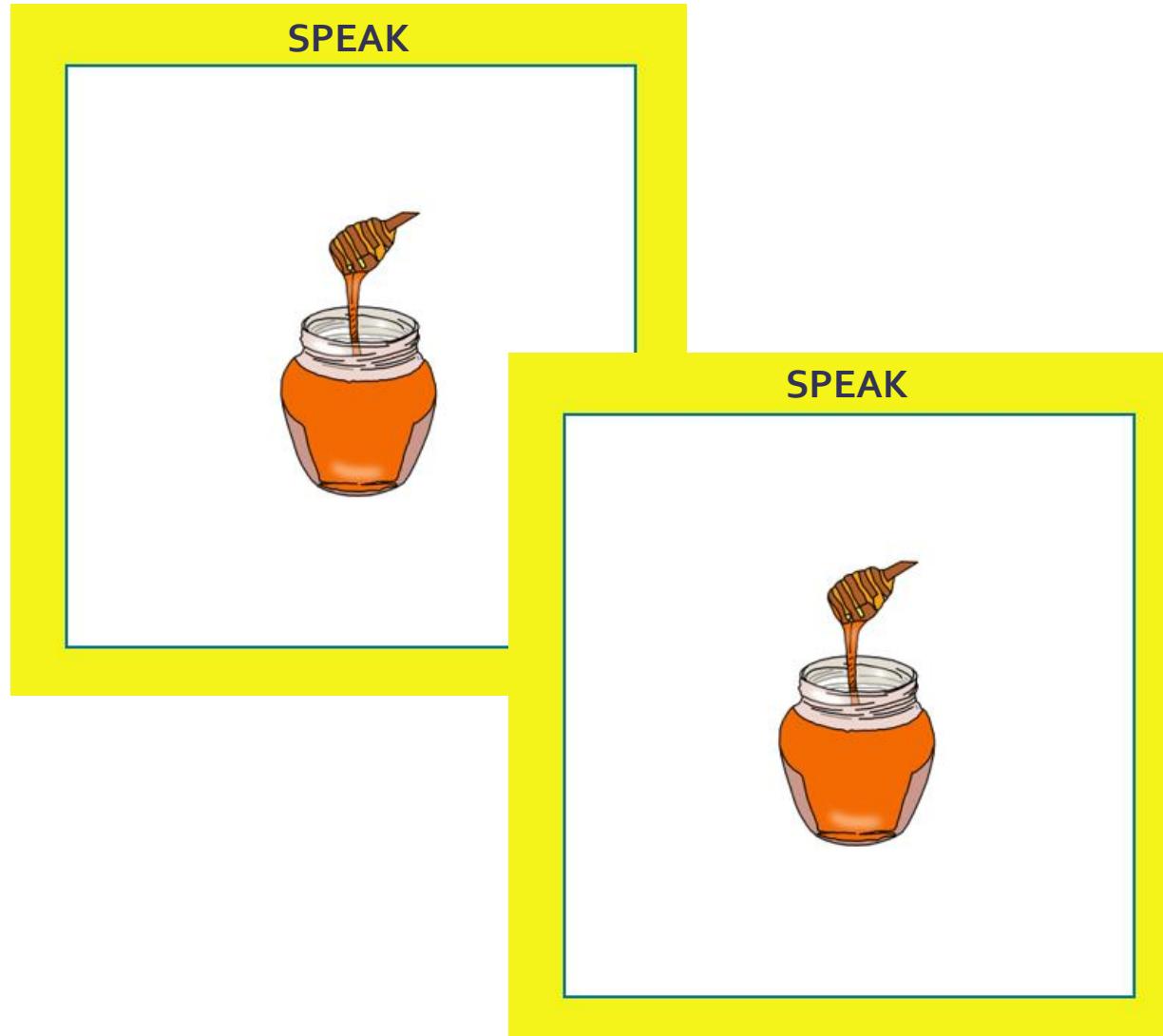
## Methodology & Design

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Modality	Condition
Type	Repeat
Speak	Switch

# Methodology & Design

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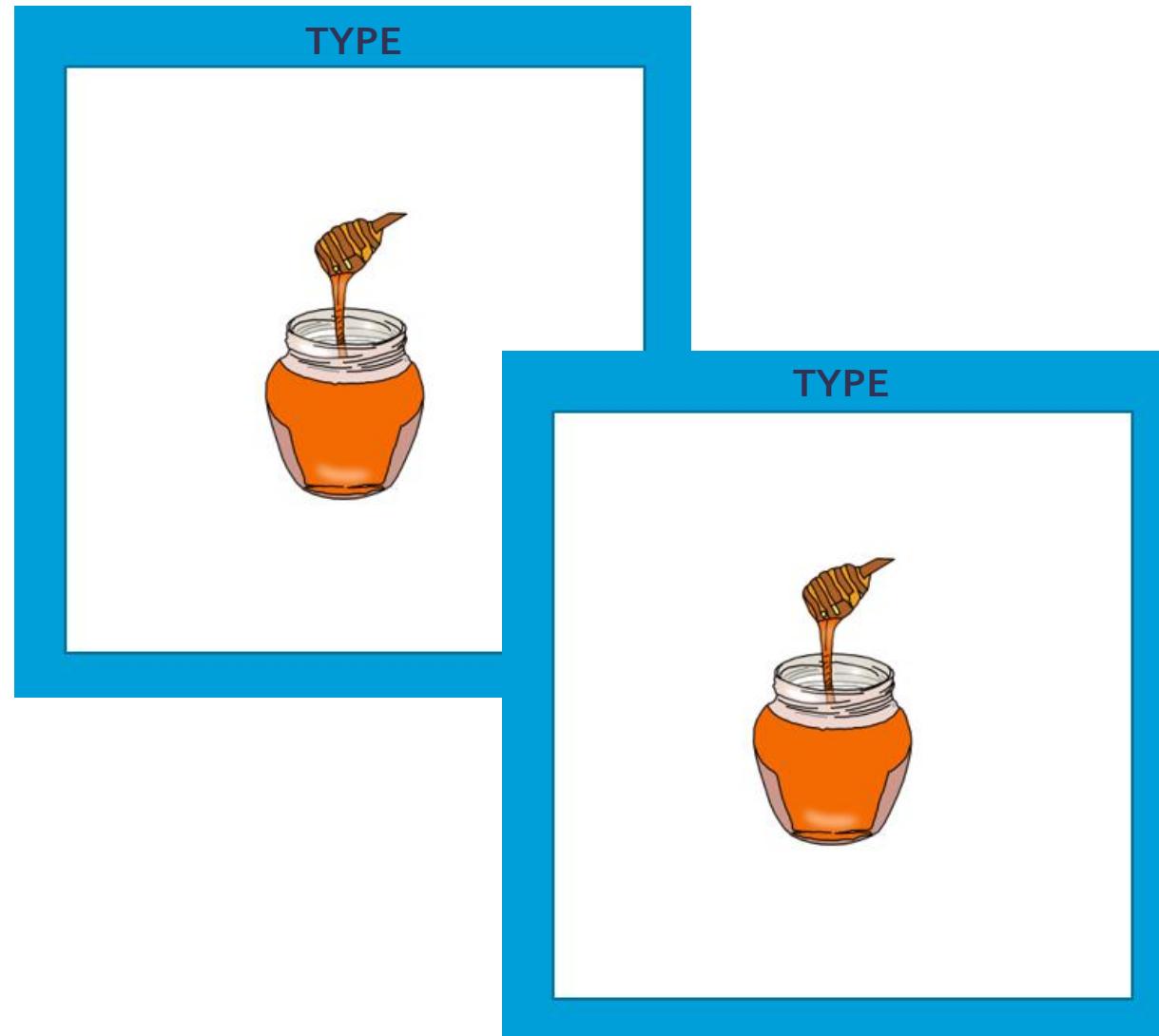


Repeat Speak

## Methodology & Design

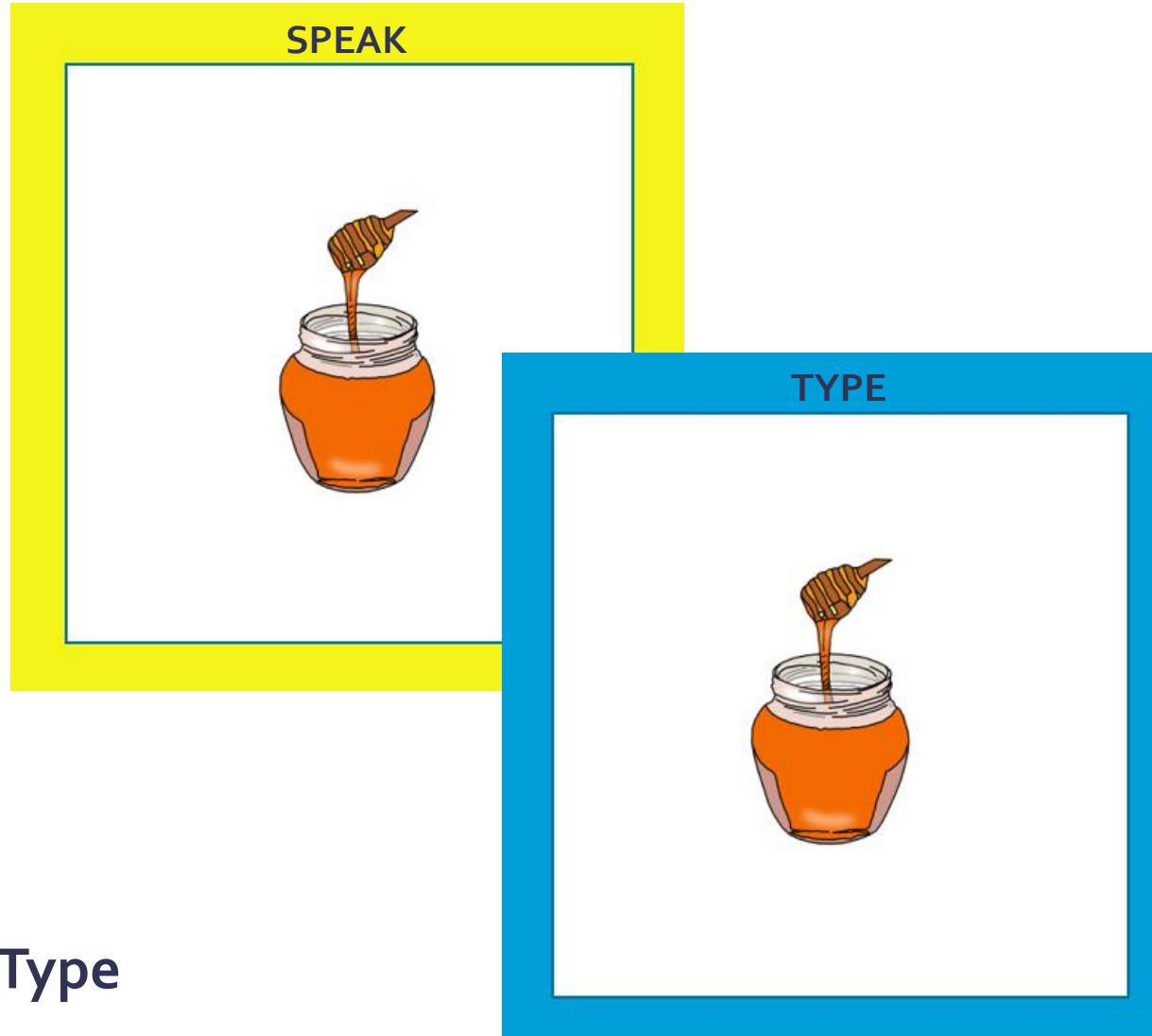
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Repeat Type



# Methodology & Design

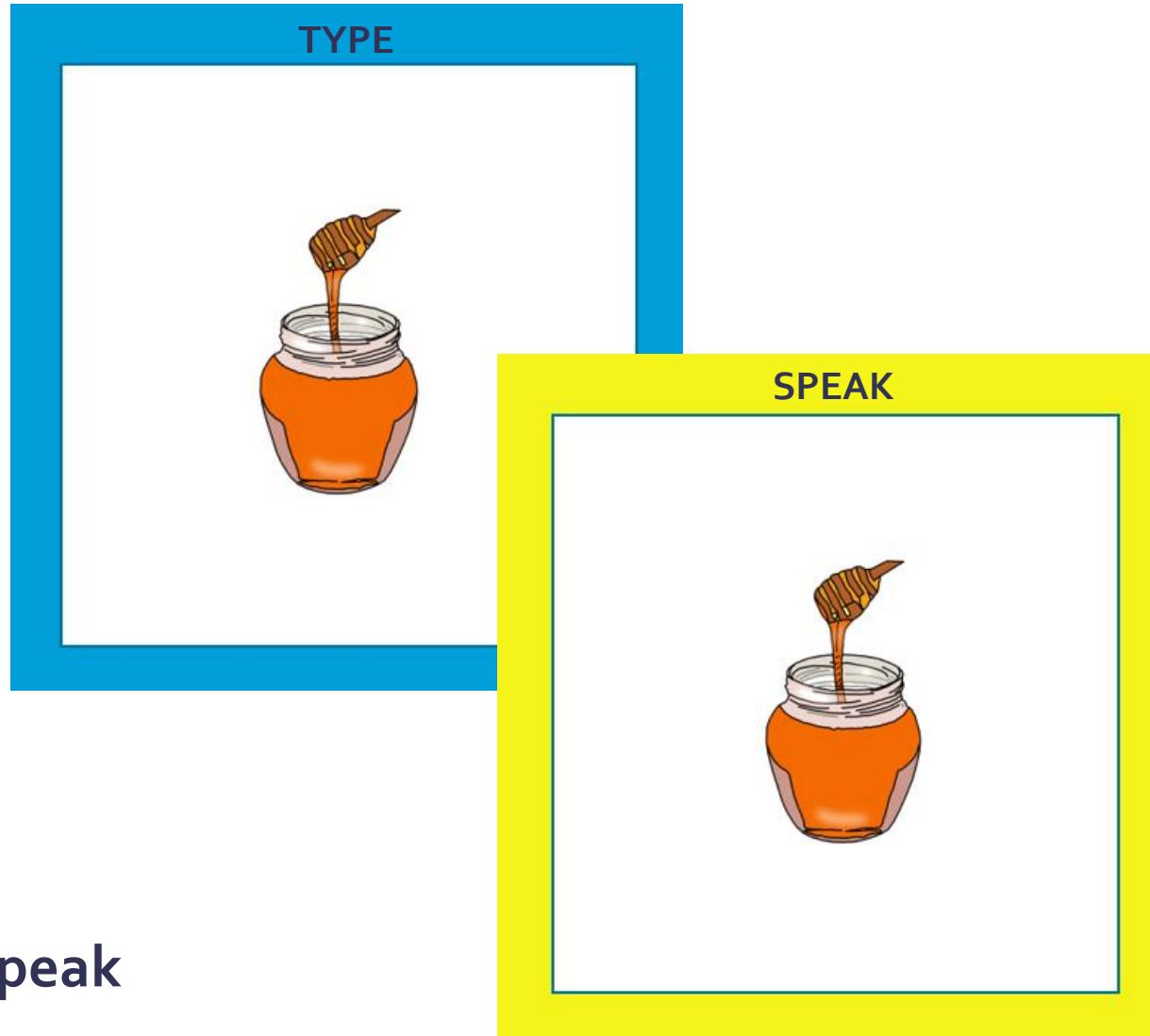
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Switch Speak to Type

## Methodology & Design

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Switch Type to Speak

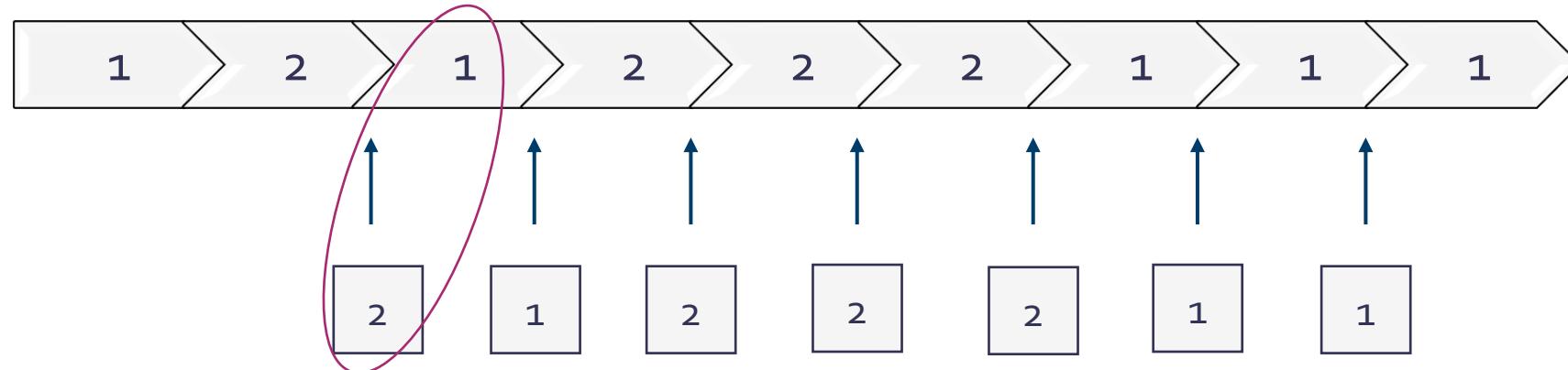
# Methodology & Design

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For the creation of the experimental lists:

Euler package in R (Larsson, 2022): 4 different balanced sequences

- Create pairs **recursively** so we created the sequences based only on the modality variable (type, speak) and assumed the condition variable (switch, repeat) based on the pair values.



# Methodology & Design



	Repeat	Switch
Target Type	32	32
Target Speak	32	32

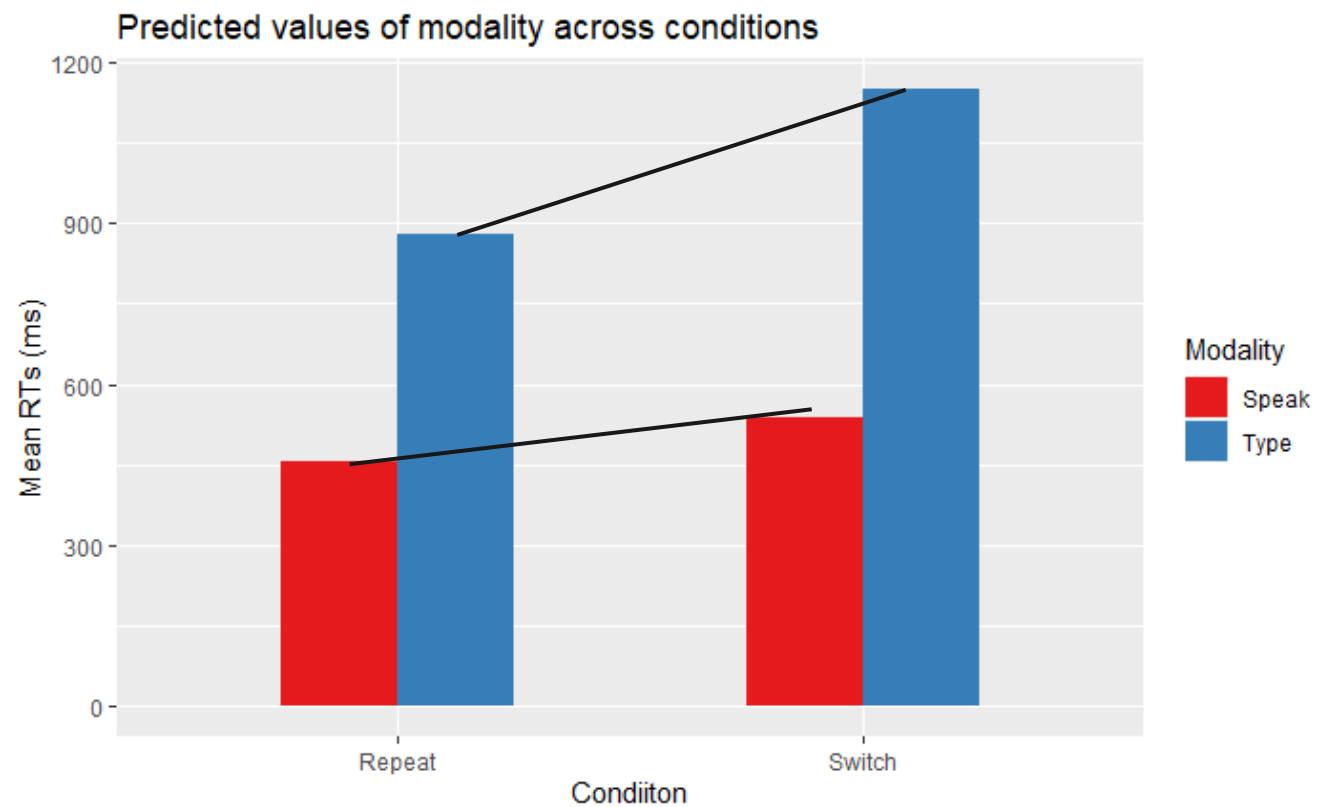
256 trials + 128 fillers = 384 trials

## **SECTION 3: Predictions**

# Predictions

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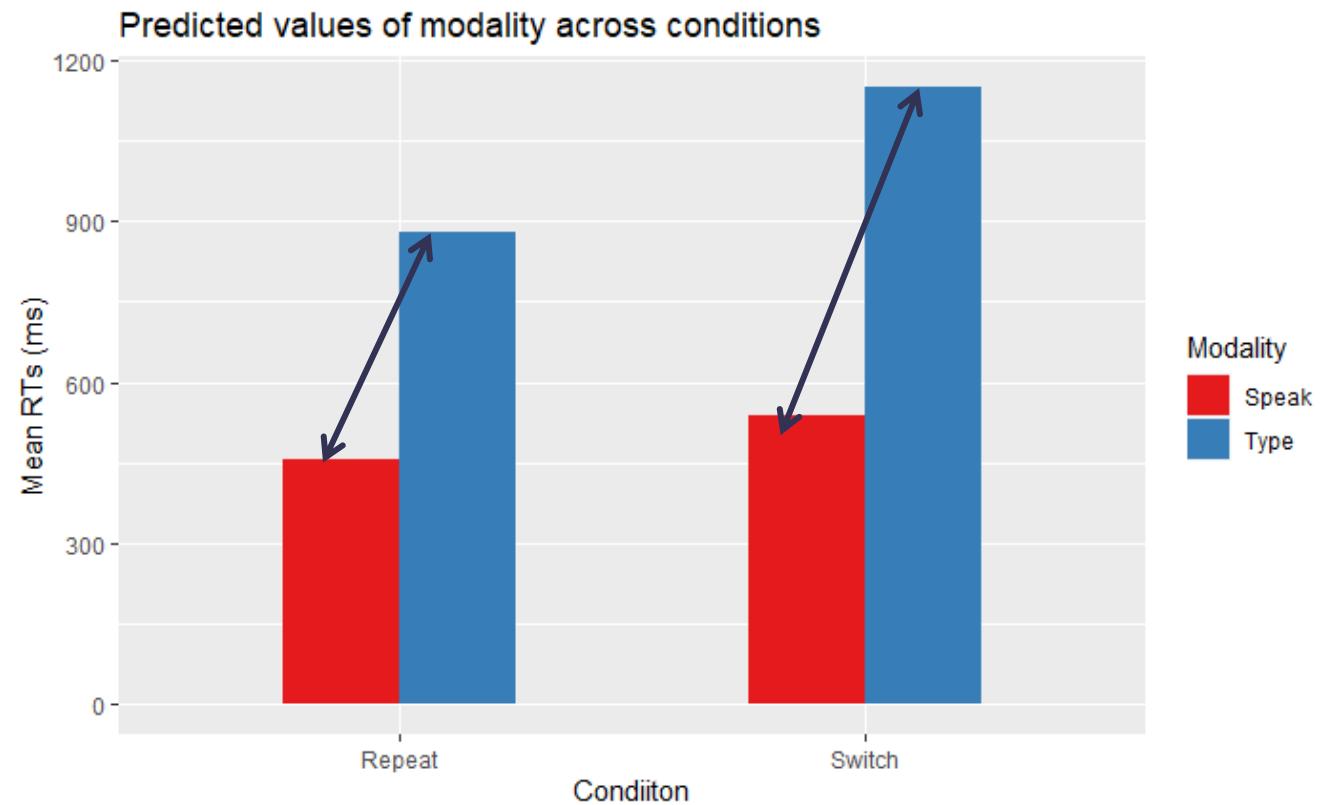
## 1. Main effect of condition on reaction times (RT~Condition)



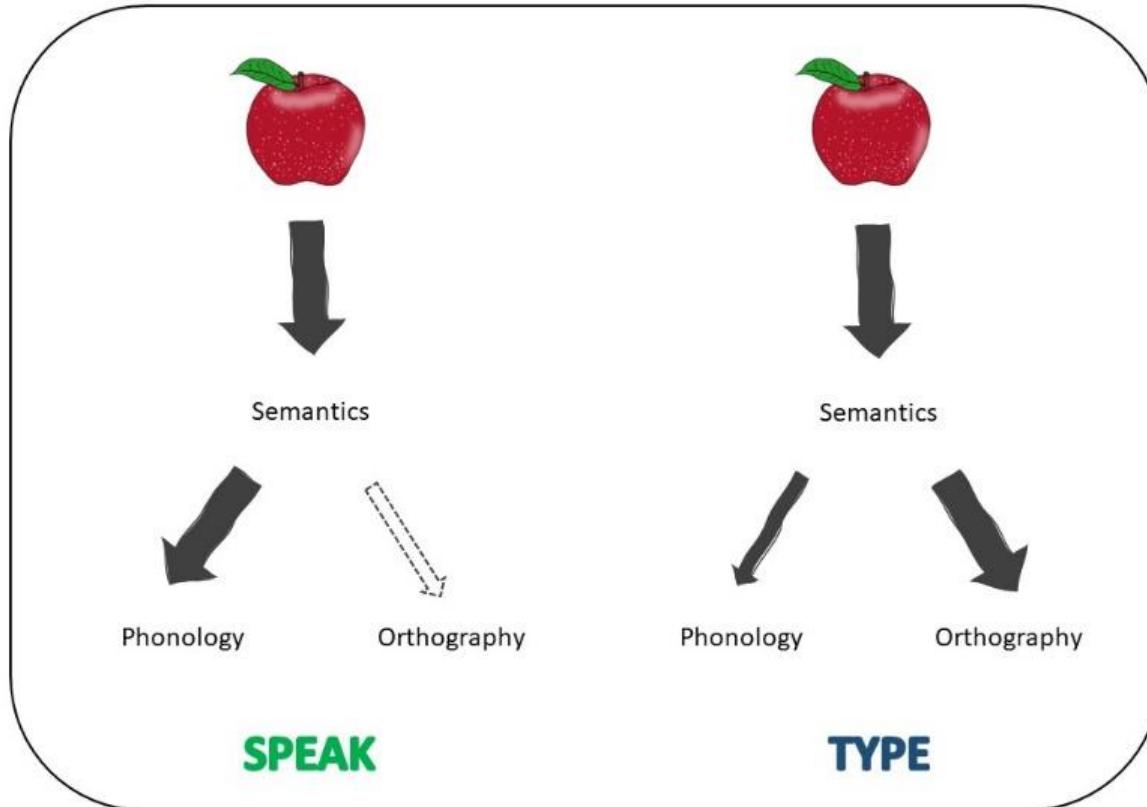
# Predictions

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## 2. Main effect of modality on reaction times (RT ~ Modality)



# Predictions



Phonology strongly co-activated when typing.  
Orthography weakly co-activated when speaking.

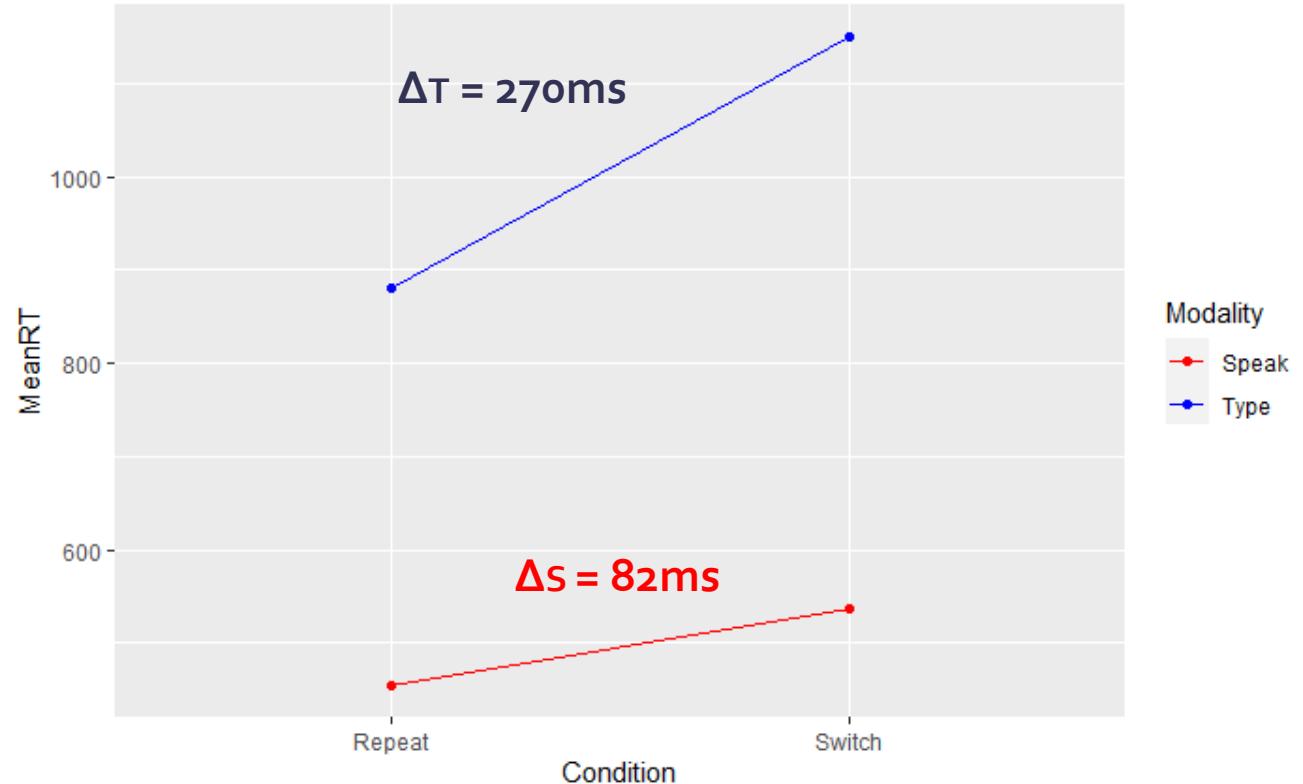
# Predictions

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## 3. Interaction: RT ~ Condition \* Modality)

H1: If phonology is strongly co-activated when typing and orthography weakly co-activated when speaking, larger switch costs to typing than to speaking (for the same item) are expected ( $\Delta s < \Delta T$ )

Ho: If orthography is also strongly co-activated when speaking, we do not expect larger switch costs to speaking than those to typing.



## **SECTION 4: Relevance**

## Relevance

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- Contribute to the research on the role of and interplay between phonological and orthographic representations and their co-activation during language production (oral – typed).
- Employ typing instead of handwriting since the former is widely used and “taking over” handwriting in many everyday activities.
- Speaking and typing are both basic parts of everyday communication and are often conducted simultaneously.
- Theoretical and pragmatic implications regarding the dynamics of our two widely used ways of communication.

## **SECTION 5: Questions**

# Vuestras preguntas?

Thank you!

Eskerrik asko!



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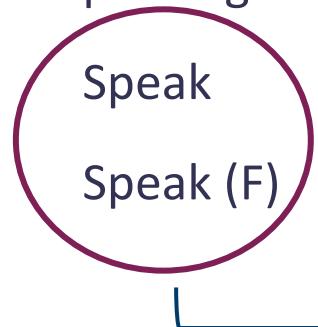
## Predictions

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### 4. Phonetic & motoric priming:

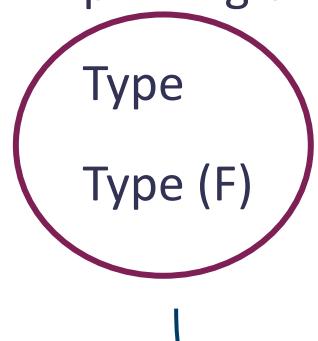
Speech:

priming of phonetic features → /b/ - /d/



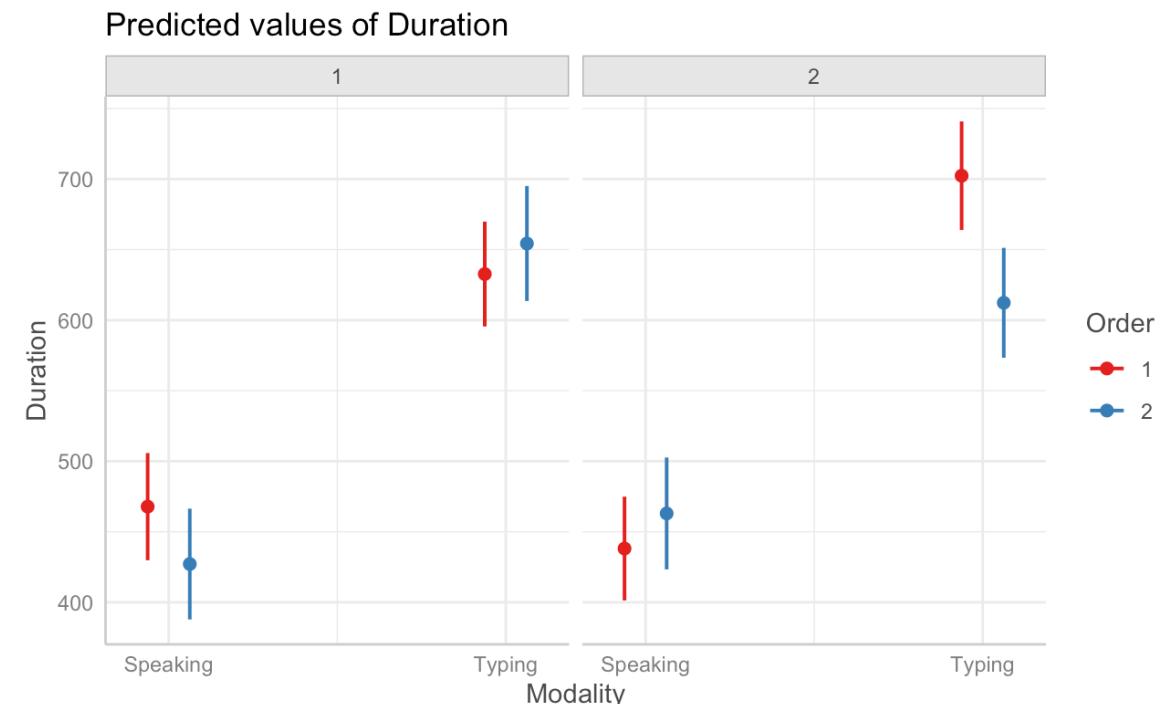
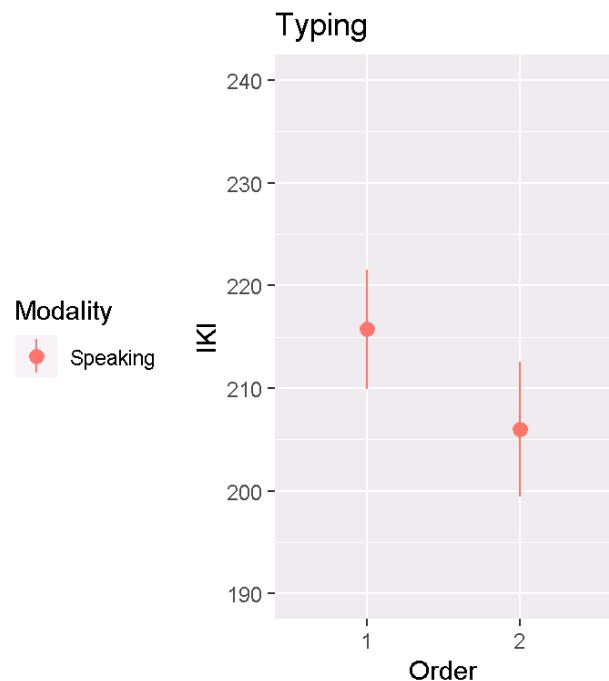
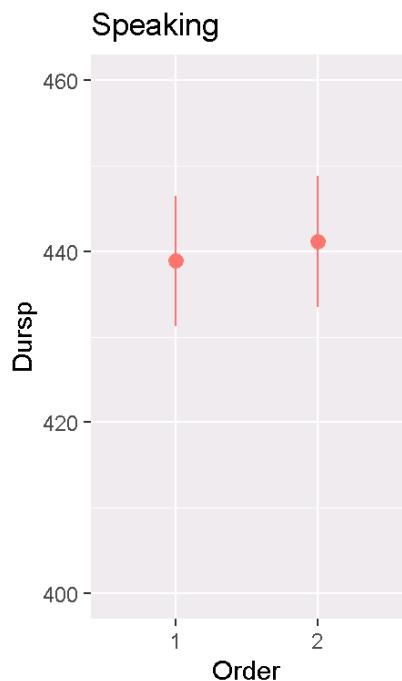
Typing:

priming of motoric features → bigram priming <ro> - <ro>



# Predictions

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Pinet & Martin (in prep)