



# Semantic and Phonological Interference in Talker Discrimination

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## Introduction

- ▶ When two words are presented in sequence, listeners have difficulty making a decision about talker identity (indexical information) when the two words form a lexical compound [1]. This is in line with models of speech perception that take into account top-down information [2].
- ▶ Bilinguals are less distracted by interfering stimuli than monolinguals in non-verbal tasks. Bilinguals also perform more poorly than monolinguals in verbal tasks [3].
- ▶ **Purpose:** To investigate monolinguals' (ML) and bilinguals' (BL) abilities to attend to indexical information in situations where linguistic information is highly salient. Specifically,
  - ▷ Do monolingual and bilingual young adults differ in ignoring irrelevant linguistic influences in a talker discrimination task?
  - ▷ Does semantic and phonological information affect these discrimination processes differently?

## Method

### Participants:

	ML (n = 47)	BL (n = 62)
Age	21.72 (3.29)	22.08 (3.97)
PPVT	101.7 (9.01)	93.23 (10.60)*
Cattell	106.3 (11.41)	104 (12.65)
Self-rated proficiency:		
English speaking	97.13 (14.77)	95.35 (10.19)
English understanding	96.87 (14.77)	96.90 (7.44)
Other language speaking	--	90.65 (13.57)
Other language understanding	--	92.90 (12.32)

\*  $p < 0.0001$

### Task:

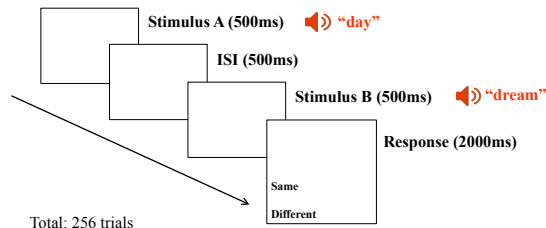
- ▷ "Are the two words you just heard spoken by the same or different person?"

### 4 Word types:

1. Lexical compound (day-dream)
2. Rhyme (day-bay)
3. Reversed compound (dream-day)
4. Unrelated (day-sheet)

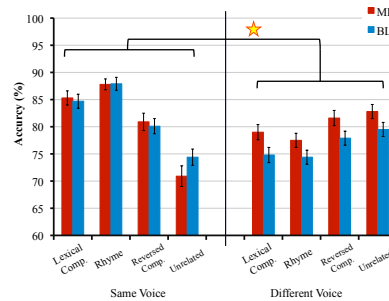
### 2 Voice types:

1. Same voice
2. Different voice



## Results

### 1) Accuracy: Same and Different voices

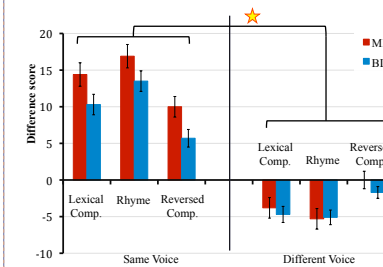


### 2 (Language group) x 2 (Voice Type) x 4 (Word Type) ANOVA

- ▶ **Voice type:** Same > Different \*
- ▶ **Word type:** Lexical compound, Rhyme, Reversed compound > Unrelated \*\*
- ▶ **Voice type x Word type:** For the Same Voice, accuracy is higher when words are linguistically related than when they are not; for Different Voice, accuracy is higher when the words are loosely semantically related or unrelated \*\*

### 2) Interference Effects

- ▶ Interference effect = Experimental condition – Unrelated condition
- ▷ (+) = Experimental more accurate than Unrelated (i.e., "facilitation")

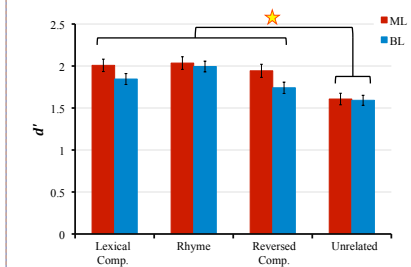


### 2 (Language group) x 2 (Voice Type) x 3 (Interference Type) ANOVA

- ▶ **Language group:** Monolingual > Bilingual\*
- ▶ **Voice type:** Same > Different \*\*
- ▶ **Interference type:** Lexical compound = Rhyme = Reversed Compound  $p = .007$ .
- ▶ **Interference type x Voice type:** For Same Voice, linguistic information facilitates talker discrimination; for different voice, linguistic information interferes with talker discrimination \*\*

### 3) $d'$ Analysis

- ▶  $d' = z(\text{Hit rate}) - z(\text{False alarm rate})$
- ▷  $d'$  of 1.0 = 69% correct for both different and same trials



### 2 (language group) x 4 (word type) ANOVA

- ▶ **Word type:** Lexical compound, Rhyme, Reversed compound > Unrelated\*\*
  - ▶ Overall, speakers of linguistically related words are more discriminable than speakers of unrelated words.
  - ▶ Even though there is an interference effect of linguistic information (on different voices), it is not as great as the *facilitation* effect of linguistic information (on same voices) → higher  $d'$  for talkers of linguistically related words
- \*\* $p < 0.001$  \* $p < 0.05$

## Discussion

- ▶ Monolinguals and bilinguals are equally influenced by lexico-semantic and phonological information when attending to indexical qualities of the talker.
- ▶ Comparisons of accuracy indicate that the lexical and phonological status of words both *interferes* with and *facilitates* talker discrimination.
- ▶ Different types of linguistic interference are processed in a top-down fashion:
  - ▷ When two words are either semantically or phonologically related, listeners expect them to be spoken by the same speaker.
  - ▷ When two words are loosely semantically related or unrelated, listeners expect them to be spoken by different speakers.

## References

- [1] Babel, M., & Narayan, C. (2012). *Linguistic effects on talker discrimination: The effect of semantic cohesion*. Presented at the LabPhon13, Stuttgart.
- [2] Grossberg, S. (2003). Resonant neural dynamics of speech perception. *Journal of Phonetics* 31, 423-445.
- [3] Bialystok, E. (2011). Reshaping the mind: The benefits of bilingualism. *Canadian Journal of Experimental Psychology*, 65(4), 229-235.

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