



Effects of Latin-Based Cognates on L3 Reading Comprehension

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ABSTRACT

An eye-tracking study with participants speaking Italian and Spanish as an L2 reveals that L3 reading situations may be processed similarly to non-cognates, but the L2 of the reader may have more impact on eye-tracking measures when compared with etymological similarity of the word to their L2.'

INTRODUCTION

Definitions:

- **Fixation:** A period in which the fovea of the eye is stable for 200-300 ms (Rayner 1998)
- **Saccade:** The movement or "jump" as the eye travels between fixations (Rayner 1998)
- **First Fixation Duration:** Measure for how long the eye was stable the first time it passed over an area of interest (a word in our case)

Research Questions

- In Spanish and Italian, languages that share etymological ancestry with a large percentage of cognates, can cognates impact cognition of reading in an L3 if the participant has a similar L2?
- Do participants with different L2s have different eye tracking measures in reading tasks?

Hypotheses

- H1: Cognates will have lower amounts of fixations, fewer regressions, and shorter dwell times.
- Null H: There will be no difference in eye tracking measures between cognates and noncognates.

METHODS

Participants

12 Participants with a strong L2 background in either Spanish (n=6) or Italian (n=5) and little or no background in the L3 were recruited

Instruments

Participants eye movements were recorded on an EyeLink 1000 Plus eye tracker with a sampling frequency of 1000 Hz. Based on a framework from a previous study, 10 target words were selected, five cognates and five non-cognates (Bosma 2020). These words were put into simple, paragraph length texts. Researchers created eight texts in total, and participants saw four texts each: One with target cognates in L2, one with target cognates in L3, one with target non-cognates in L2, and one with target non-cognates in the L3. Both language groups received the same texts in corresponding languages in 12 point courier new font.

Procedure

- Participants were instructed to read each passage and be prepared to answer a brief comprehension question to ensure cognizance during trial regardless of language
- Calibration was performed initially and then recalibrated between each reading passage and drift correction occurred within trials.
- Data was excluded from one participant due to difficulties in obtaining accurate measures after calibration complications.

Example Text With Target Cognates Bolded:

El hermoso cabello de Gandalf or
I bellissimi capelli di Gandalf



Gandalf caminó hacia el **puente**, con el cabello ondeando al viento. Pensaba que su cabello era el mejor y no sentía **culpa** por tenerlo tan hermoso. El cabello combinaba bien con un **anillo** arrebatado a un enemigo. Su cabello se sentía suave contra su **piel** gracias al champú L'Oréal. Subió a un **árbol** alto desde donde todos podían admirar su hermoso cabello.

Gandalf cammina verso il **ponte**, con i capelli soffiando nel vento. Pensava che i suoi capelli fossero i migliori e non sentivo la **colpa** di avere bei capelli. I capelli vanno bene con un **anello** preso da un nemico. Sentiva i capelli lisci sulle **pelle** a causa del suo shampoo L'Oreal. Scalava un alto **albero** dove tutti potevano vedere i suoi bei capelli.

Analyses

After Log transforming first run dwell time (how long the eyes stayed during the first pass), first fixation duration, and total dwell time (how long the eyes were on the target word in total), Anova and Student's T-tests were used for statistical analysis. Total fixation count and first fixation duration were the two measures primarily considered in results section.

RESULTS

Full Population Results

In comparing between readers of different L2's there was no statistical significance across the categories analyzed, indicating that there was no difference in how different languages read the words (Table 1). However, when researchers afterwards ran an ANOVA test comparing the interaction between a readers' L2 and the cognate condition, statistical differences arose in the number of fixations and the first fixation duration time (Table 2 and Table 3).

Table 1

Independent Samples T-Test of Cognates vs. Non-Cognates Full Pop.			
	Statistic	df	p
Skip	1.770 ^a	218	0.078
Fixation Count	-0.769	218	0.443
First Fixation Duration Log	-1.083	200	0.28
First Run Dwell Time Log	-0.965	200	0.335
Dwell Time Log	-0.904	200	0.367
Regression In	-1.004 ^a	200	0.317
Regression In Count	-0.564	200	0.573

Note. H_a μ c $\neq$ μ n

^a Levene's test is significant (p < .05), suggesting a violation of the assumption of equal variances

Table 2

ANOVA – FIXATION COUNT					
	Sum of Squares	df	Mean Square	F	p
Overall model	23.66	3	7.89	2.692	0.047
L2	9.94	1	9.94	3.581	0.06
COGNATES VS. NONCOGNATES	2.14	1	2.14	0.772	0.381
L2 * COGNATES VS. NONCOGNATES	11.58	1	11.58	4.171	0.042

Table 3

ANOVA - FIRST FIXATION DURATION Log					
	Sum of Squares	df	Mean Square	F	p
Overall model	0.32	3	0.11	1.729	0.162
L2	0.23	1	0.23	3.978	0.047
COGNATES VS. NONCOGNATES	0.08	1	0.08	1.417	0.235
L2 * COGNATES VS. NONCOGNATES	0.00	1	0.00	0.019	0.892

These results showed that there were consistently more fixations on noncognate Italian words and that there was a higher variation and average first fixation duration for Spanish words across cognate conditions.

L2 Specific Results

To determine if there were any differences in how cognates affect readers of different languages, 2 t-tests were run on the individual Spanish and Italian language populations, comparing how they read cognates or non-cognates respectively. Most of the results were similar to that of the full population however, each language had a component revealing statistical significance

Table 4 and Figure 1 reveals that Spanish readers skip cognates more frequently than non-cognates. Table 5 and Figure 2 show how Italian readers have higher first run dwell times for noncognates than for cognates.

Table 4

Independent Samples T-Test of Cognates vs. Non-Cognates Spanish Pop.		
	Statistic	p
SKIP	2.022	0.045

Table 5

Independent Samples T-Test of Cognates vs. Non-Cognates Italian Pop.		
	Statistic	p
First Run Dwell Time Log	-2.2205	0.029

Fig. 1

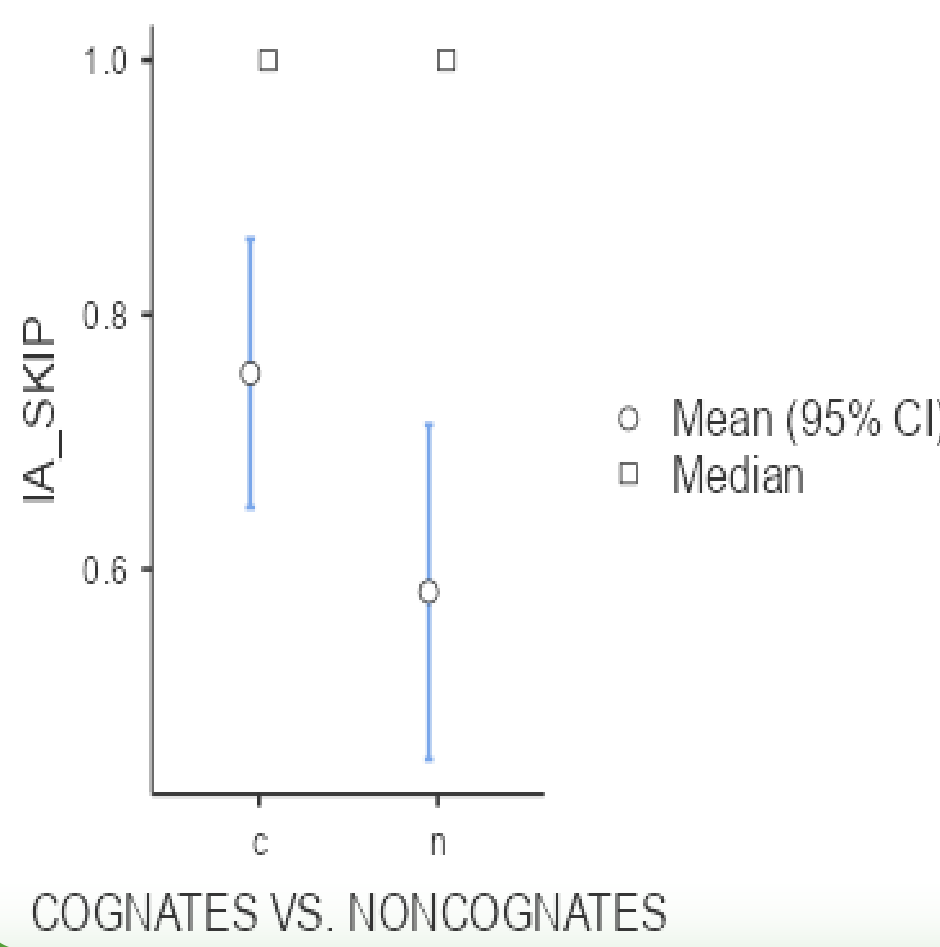
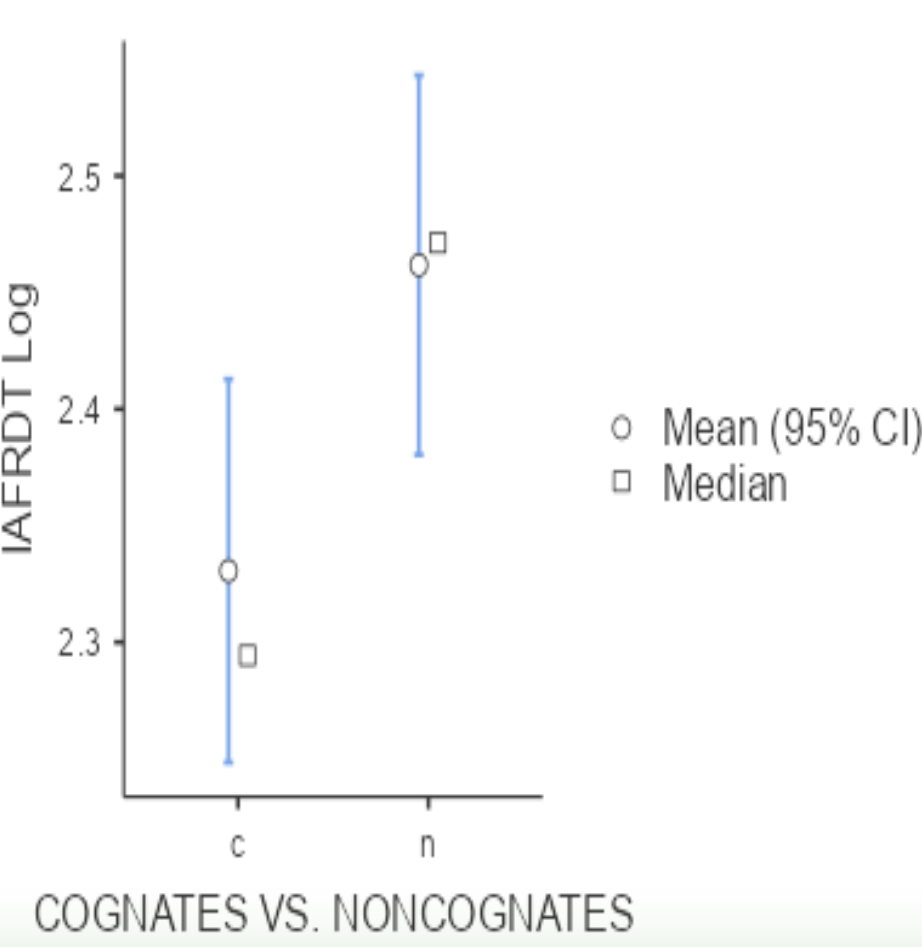


Fig. 2



CONCLUSION

These results provide evidences that suggests our hypothesis is correct, that there is a difference in word processing based on cognate status, and there is a difference in L3 cognate processing based on L2. Spanish speakers skipped cognates more frequently when compared with cognates, while Italian speakers had longer first run dwell time on non-cognates. This evidence is not replicated in many meaures though, suggesting further study is necessary to better understand this topic.

Given the prevalence of Spanish as a first or second language in the United States, these results are unsurprising. While Italian speaking participants were selected based on lack of proficiency in Spanish, it is difficult to avoid any exposure to the language in high school, media, or pop culture. With Italian, the same does not hold true for most communities in the US, and these results suggest that the Spanish speakers in general had a more difficult time in the L3 than their Italian speaking counterparts.

This has implications on second language teaching and pedagogy, showing that cognates are a potentially underutilized resource in certain L3 contexts. These results also support other findings that indicate the importance of language background in language acquisition. This study was limited in its scope and would benefit from replication with more participants and more thorough language proficiency screening. Further studies should be done to investigate these effects in more diverse language families, especially non Indo-European languages.

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