The effects of contextual diversity on reading measures in foreign and native language vocabulary learning

BASQUE CENTER ON COGNITION, BRAIN AND LANGUAGE

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Introduction

- Contextual diversity (CD) refers to the number of different texts in which a word is found (Adelman, Brown, and Quesada, 2006)
- CD predicts RT in lexical decision tasks (Perea, Soares, & Comesaña, 2013)
- In the native language, by the 2nd exposure to a word reading times match those of known words
- For the foreign language, it takes 3-4 exposures to read the new word like a known one

1) Does contextual diversity improve vocabulary learning when exposure is kept constant?

2) Does contextual diversity influence new word reading?

3) Is the influence of contextual diversity the same in the FL and NL?

4) Can these differences be explained by reading behavior?

Stimuli

- 120 short stories
- 8 pseudowords repeated 8 times each, distributed into 1, 2, 4, or 8 texts depending on diversity condition.
- Words were always embedded in the same sentence, but different short stories.

Methods

Participants & Design

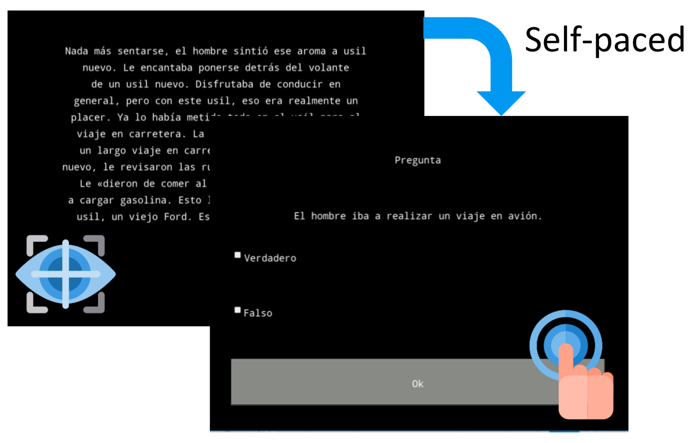
- 27 native Spanish speakers
- 13 did the task in English
- 14 did the task in Spanish
- Within subject diversity
- Between subject language

Language		Contextual Diversity: Very high (1 per text)	High (2 per text)	Low (4 per text)	Very low (8 per text)
	Native (ES)	Native_1	Native_2	Native_4	Native_8
	Foreign (EN)	Foreign_1	Foreign_2	Foreign_4	Foreign_8

Procedure

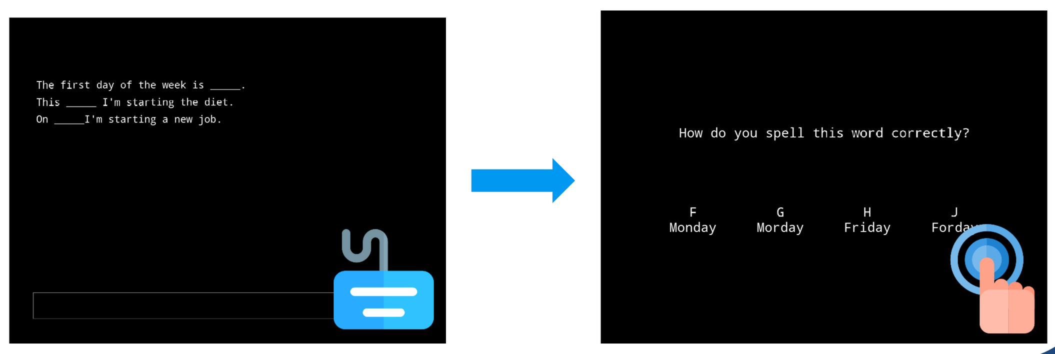
Learning phase

- Participants' eye movements were recorded while reading 30 short stories
- One true/false comprehension question after every story



Testing phase

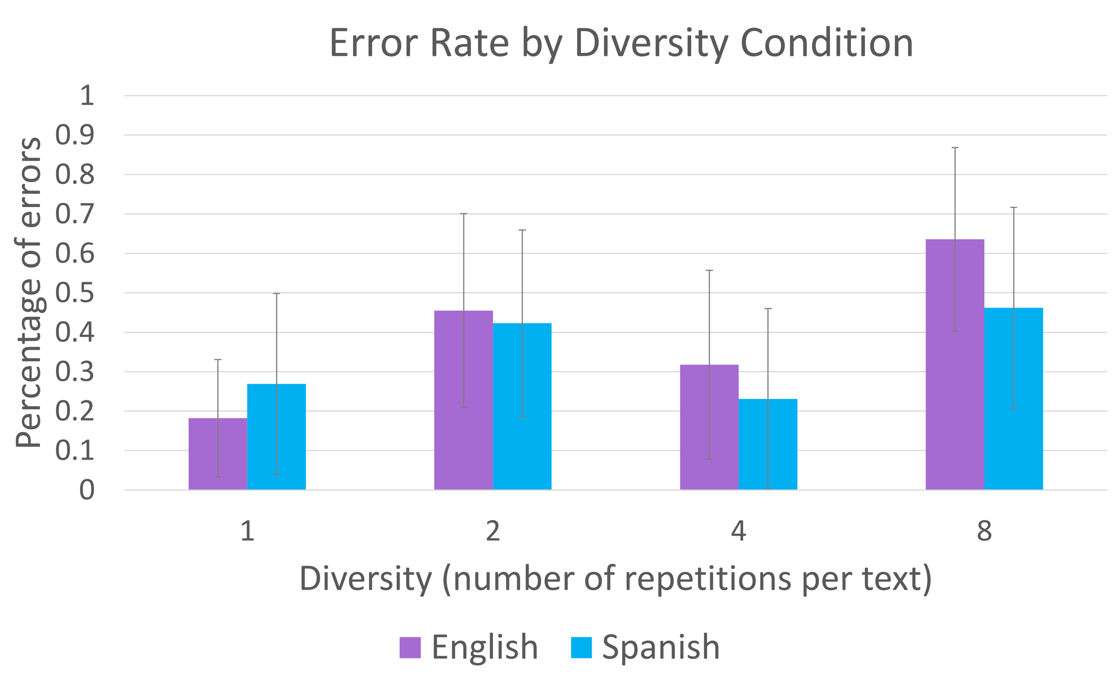
- Fill-in-the-blank
- Word form recognition

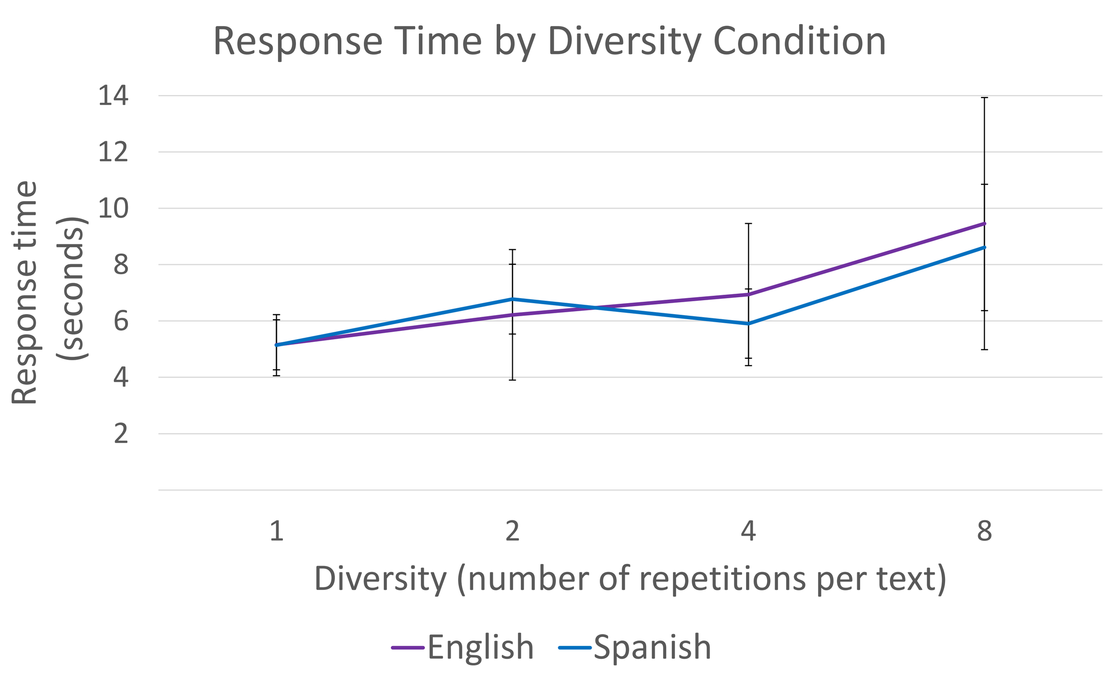


Results

Behavioral Results *(ANOVAs)*

	Language	Diversity	Interaction
Recall (accuracy)	*F*(1, 22) = .06, *p* = .80	*F*(3, 66) = 1.49, *p* = .23	*F*(3, 66) = 1.16, *p* = .33
Recognition (accuracy)	*F*(1, 22) = .27, *p* = .61	***F*(3, 66) = 4.27, *p* = .008**	*F*(3, 66) = .58, *p* = .63
Recognition (RT)	*F*(1, 22) = .13, *p* = .72	***F*(3, 66) = 5.15, *p* = .003**	*F*(3, 66) = .27, *p* = .85

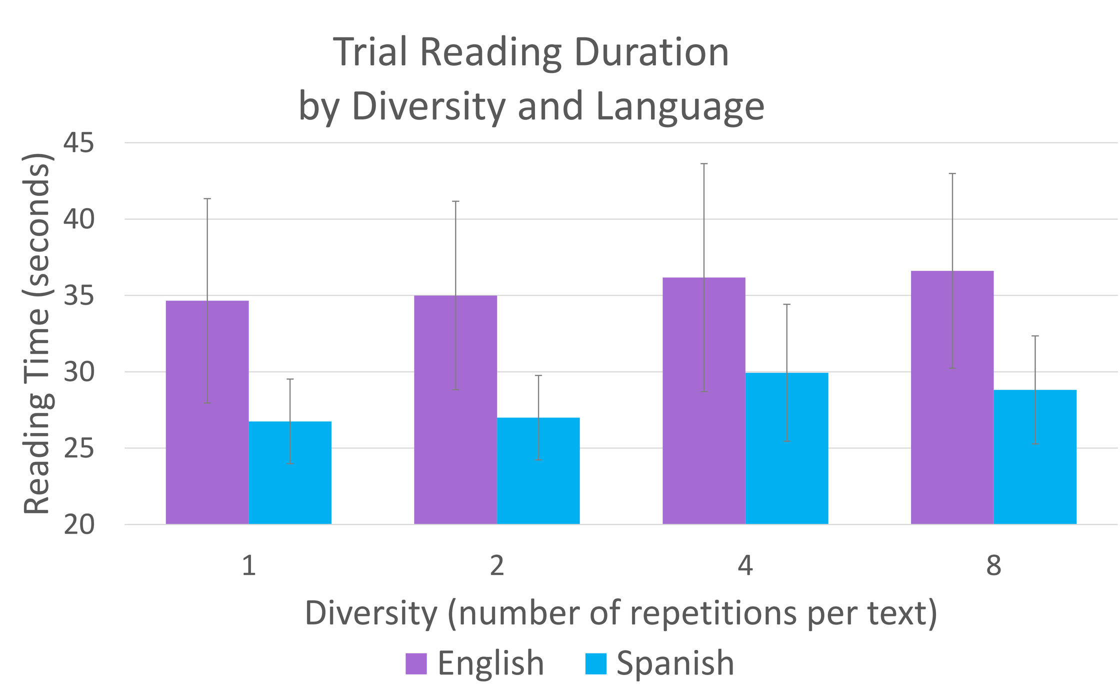




**Note: all error bars represent 95% confidence intervals*

Eye Tracking *(ANOVAs)*

	Language	Diversity	Interaction
First fixation	*F*(1, 22) = .47, *p* = .50	*F*(3, 66) = 1.36, *p* = .26	*F*(3, 66) = .49, *p* = .69
Second fixation	*F*(1, 22) = 1.15, *p* = .30	*F*(3, 66) = .84, *p* = .48	*F*(3, 66) = .76, *p* = .52
Regressions in	*F*(1, 18) = .75, *p* = .40	*F*(3, 54) = 1.80, *p* = .16	*F*(3, 54) = .55, *p* = .65
Total time	*F*(1, 22) = .80, *p* = .38	*F(3, 66) = 2.49, p = .07*	*F*(3, 66) = 1.00, *p* = .40
Fixation count	*F*(1, 22) = .004, *p* = .95	*F*(3, 66) = 1.95, *p* = .13	*F*(3, 66) = 1.45, *p* = .24
Trial duration	***F*(1, 22) = 4.88, *p* = .04**	***F*(3, 66) = 2.94, *p* = .04**	*F*(3, 66) = .36, *p* = .78



Exploratory analyses on the Influence of Reading Measures on Performance

We analyzed the effects of online measures on accuracy and response time on the recognition and recall tasks.
For each of these, we ran backwards stepwise regressions with the ocular measures of interest. The included ocular measures were first fixation, first pass, second fixation, second pass, regressions in, total time, fixation count, and trial duration.

The final models were the following:

- For recognition accuracy: there were no significant predictors other than the intercept.
- For recognition response time: The final model included first fixation (*t* = -2.36, *p* = .028) and first pass (*t* = 2.80, *p* = .011)
- For recall accuracy: there were no significant predictors other than the intercept.
- For recall response time: The final model included first fixation (*t* = -2.48, *p* = .022), first pass (*t* = 2.66, *p* = .015), and trial duration (*t* = 2.99, *p* = .007)

Conclusions

Although conclusions are very preliminary (with only half of our participants), we sill attempt to answer our original questions.

1. Yes, contextual diversity improved performance on the recognition task.
2. No, there were no effects of diversity on single word online measures.
3. Yes, we observed the same effects in both languages and no interactions between the two.
4. To be determined. Reading behavior does influence later response times, in particular first fixation and pass, as well as possibly overall trial duration. Still, tests were exploratory and no clear pattern has emerged yet.

References

Adelman, J. S., Brown, G. D. A., & Quesada, J. F. (2006). Contextual diversity, not word frequency, determines word-naming and lexical decision times. *Psychological Science*, *17*(9), 814–823. https://doi.org/10.1111/j.1467-9280.2006.01787.x

Perea, M., Soares, A. P., & Comesaña, M. (2013). Contextual diversity is a main determinant of word identification times in young readers. *Journal of Experimental Child Psychology*, *116*(1), 37–44. https://doi.org/10.1016/j.jecp.2012.10.014

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