Once Bitten, Twice Shy:

The Impact of Predictive Validity on Anticipatory Processing During Sentence Comprehension

Sofia Pelica[1], and Sofia Frade[1,2]

[1]Iscte – University Institute of Lisbon; [2]CIS-Iscte

The father told him to go wash the **eggs.**

BACKGROUND

Readers can use contextual constraints to predict upcoming words.

Word Expectancy is the likelihood of a specific word being predicted based on the sentential context.

(e.g., also known as *cloze probability*; Taylor, 1953)

Prediction Validity refers to the overall likelihood of encountering a correct prediction in the experiment as a whole.

(e.g., Brothers et al., 2017)

Congruent Sentential Context → Higher Word Expectancy & Facilitates Processing

(Brothers et al., 2015, 2017; Huettig, 2015)

AIM

Is the activation of lexical predictions *automatic* or *strategic*?

Strategic because generating specific predictions at the form level may require additional processing, which...

↳ may be metabolically costly

↳ and readers may suppress it when unfavorable.

(e.g., Cevoli et al., 2022; Heyman et al., 2015; Ito et al., 2016; Kuperberg & Jaeger, 2016)

Automatic because readers unconsciously activate associated concepts while processing a sentence, thus...

↳ with a constraining context, pre-activation occurs even at the phonological/orthographic level.

(e.g., Huettig, 2015; Nieuwland, 2019; Pickering & Gambi, 2018)

Support from **Brothers et al. (2017)**'s findings.

Need for Clarification

But other findings support the automatic-activation.

(e.g., DeLong et al., 2018)

METHOD AND RESULTS

Word Expectancy and Prediction Validity effects.

96 participants (88 females)
M_{age} = 22.55, SD_{age} = 3.76

Participantes were randomly allocated to **high** or **low** validity conditions.
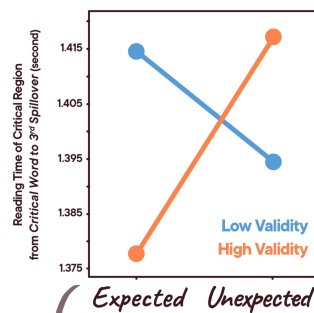
1st Block
120 unexpected
120 expected

2nd Block
30 expected +
30 unexpected
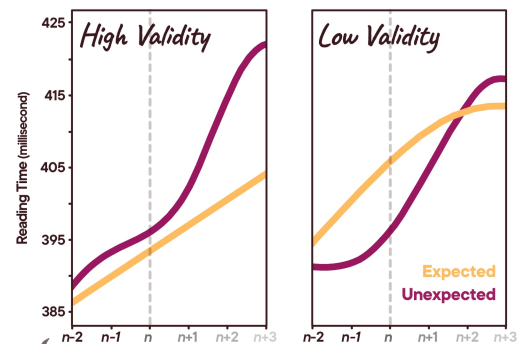
A **self-paced reading** task on Pavlovia was used.

######
A ### ##### #### ######
Ana ##### ####

button presses

n   1   2   3

Only critical and spillover words from the 2nd Block were analyzed.

Expected: *Antes de cozinhar a Antónia vestia sempre um avental que foi bordado à mão.*
Unexpected: *Como ficou em segundo lugar também recebeu um avental que foi bordado à mão.*

Reading Time of Critical Region from Critical Word to 3rd Spillover (second)

Low Validity
High Validity

Expected   Unexpected

Word Expectancy had a significant effect on reading time (b = 16ms, t(3615) = 2.10, p = .035), as **participants took longer to read regions with unexpected words** compared to those with expected words.

High Validity   Low Validity

Reading Time (millisecond)

n-2 n-1 n n+1 n+2 n+3

Expected
Unexpected

Since **all smooth terms were significant** (p <.001), we concluded that the effects of **Word Expectancy and Prediction Validity** (b = 10 ms, p <.001) on reading time cannot be completely explained by a linear relationship.

The **Reading Time** in the Critical Region **varied significantly depending on the conditions** of Word Expectancy and Prediction Validity.

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(1) Our findings suggest that Prediction Validity significantly affects readers' antecipatory processing.

(2) Expected Words have and enhanced effect on reading speed.

(3) But Validity and Expectancy alone may not fully explain these effects. Other factors may play a role!

Limitations: We did not consider other factors such as sentence complexity, word frequency, and reading proficiency.

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