Using ERPs to investigate the interaction of verb bias and plausibility in Spanish-English bilinguals

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Introduction

The investigation of the **processing of local syntactic ambiguity** has resulted in a number of psycholinguistic studies.
In particular, these studies were most prominent during the 1980's and 1990's and were used to investigate competing models of sentence processing, i.e. **two-stage models** (e.g. Frazier & Clifton, 1986) & **constraint-satisfaction models** (e.g. MacDonald et al., 1994; Trueswell & Tanenhaus, 1994).
In the current proposed study, we will be investigating the interaction of **verb bias & plausibility using ERP measures**. This interaction has been studied principally using behavioral measures such as Reaction Times and eye-tracking measures for reading comprehension (Garnsey et al., 1997; Wilson & Garnsey, 2009).

Background

Verbs can subcategorize for different complements, occasionally resulting in syntactic ambiguity as highlighted in (1) (Garnsey et al., 1997):

(1) a. *The historian **read the manuscript** during the trip.*
b. The hist*orian **read the manuscript** had been destroyed by the fire*.

Because complementizer *that* expression is optional in English, the complement ***the manuscript*** is temporarily ambiguous until the comprehender reaches the following word.
However, verb subcategorization preferences result in clear **verb biases** for certain verbs.
Thus, a verb like ***read*** is biased towards direct object complements and a verb like ***believe*** is biased towards sentential complements.

Plausibility may also guide sentence processing. For example, in (1) a manuscript is a readable item which may help strengthen its initial interpretation as a direct object complement.

To date, Garnsey et al. (1997) is the only study to fully cross verb bias and plausibility. Using both self-paced reading times and eye-tracking, they found an interaction such that comprehenders prioritized verb bias in strongly biased verbs but plausibility modulated comprehension in equi-biased verbs.

Bilingual Sentence Processing

Clahsen & Felser (2006) have argued that second language learners fundamentally process sentences in a different way than native speakers.
In particular, they claim that second language processing involves constructing "shallower" syntactic representations, involving less detail than structures computed during L1 processing, i.e. **Shallow Structure Hypothesis**.
However, Dussias & Cramer Scaltz (2008) found that second language processing can involve the use of verb bias, reflecting similar processing strategies as monolingual parsers.
Furthermore, Kotz et al. (2008) have shown that L2 speakers' ERP records are similar to L1 processers, showing differences in latency and distribution rather than fundamental differences.

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Research Questions

- Will interaction of verb bias and plausibility found in behavioral studies be reflected in the EEG record?
- Will bilinguals make use of verb bias information in their second language?
  - *Potentially, second language speakers will privilege plausibility over verb bias in line with proponents of shallow processing (Clahsen & Felser, 2006).
  - *On the other hand, second language processing may reflect monolingual processing (Kotz et al., 2008) , in which case we should expect use of verb bias over plausibility.

Procedure

16 Spanish-English bilinguals at the University of Granada (Spain) will participate in this reading study.
Proficiency will be measured using the **Boston Naming Test** (vocabulary), the **MELICET grammar test**, and self-reported **Language History Questionnaire**.
320 (160 experimental) sentences in 4 pseudo-randomized blocks will be presented word by word while recording EEG activity.

Materials & Design

4 conditions in **2 x 2 crossed design**, i.e. verb bias x plausibility. 160 fillers will also be included.

Plausibility **Verb Bias**	**Plausible**	**Implausible**
Direct Object	DO Plausible (1a) **accepted**	DO Implausible (1b) **heard**
Sentential Complement	SC Plausible (2a) **claimed**	SC Implausible (2b) **figured**

Sentential Frame:
The talented photographer _____ the money could not be spent yet.
1a. **accepted**
1b. **heard**
2a. **claimed**
2b. **figured**

Discussion

This is the first study that will examine the EEG record of the interaction of verb bias and plausibility in both bilingual and monolingual sentence processing.
Because **the sentential frames are invariant across all 4 conditions differing only in the critical verb**, this experimental design will allow us to **pinpoint more precisely the contribution of verb bias and plausibility in second language speaker**s.
Moreover, Tokowicz & MacWhinney (2005) have shown that even at early stages of L2 acquisition, **ERPs may reveal competence that is not reflected behaviorally**. Thus, this proposed study will help distinguish between competing predictions of L2 processing.