Are the facilitatory effects of cognate words real?

A study with Portuguese/English bilingual children and adults

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“Gin *dranken* in het *restaurant*, whisky in het *hotel*, champagne in bed. Later effect: Oh God, *migraine*. Tablet in warm *water!*”
Lexical and semantic representations in the acquisition of L2 cognate and non-cognate words: Evidence from two learning methods in children

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How bilinguals represent words in two languages and which mechanisms are responsible for second language acquisition are important questions in the bilingual and vocabulary acquisition literature. This study aims to analyse the effect of two learning methods (picture- vs. word-based method) and two types of words (cognates and non-cognates) in early stages of children's L2 acquisition. Forty-eight native speakers of European Portuguese, all sixth graders (mean age = 10.87 years, SD = 0.83), participated in the study. None of them had prior knowledge of Basque (the L2 in this study). After a learning phase in which L2 words were learned either by a picture- or a word-based method, children were tested in a backward-word translation recognition task at two times (immediately vs. one week later). Results showed that the participants made more errors when rejecting semantically related than semantically unrelated words and correct translations (semantic interference effect). The magnitude of this effect was...
Results

Both, at electrophysiological and behavioral levels, the results were of inhibition for cognate words relative to noncognate words.

✓ CG > NCG

Importantly, masked priming effects were modulated by cross-language match of the O and P codes:

✓ O-P+ translations > O-P+ unrelated
✓ O-P+ > O-P-
<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>L2 Task</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schwartz, Kroll, &amp; Diaz (2007). <em>Language and Cognitive Processes.</em></td>
<td>English-Spanish bilinguals</td>
<td>Naming</td>
<td>✓ CG = NCG &lt;br&gt; ✓ O+P+ &lt; O+P-</td>
</tr>
<tr>
<td>Dijkstra, Miwa, Brummelhuis, Sappelli, &amp; Baayen (2010) <em>Journal of Memory and Language</em></td>
<td>Dutch-English bilinguals</td>
<td>Lexical Decision (LDT)</td>
<td>✓ CG &lt; NCG &lt;br&gt; ✓ O+ &lt; O- &lt;br&gt; ✓ P affected only &lt;br&gt; Identical CG (P+ &lt; P-) &lt;br&gt; Language Decision (LDT) ✓ CG &gt; NCG &lt;br&gt; ✓ O+ &gt; O-</td>
</tr>
<tr>
<td>Comesaña, Ferré, Fraga, Soares, Rauber, &amp; Romero (2013). <em>International Symposium of Bilingualism.</em></td>
<td>Spanish-Catalan bilinguals</td>
<td>LDT with identical and non-identical CGs</td>
<td>✓ CG &lt; NCG &lt;br&gt; ✓ O+ &lt; O-; P+ &gt; P- &lt;br&gt; LDT with only non-identical CGs ✓ CG &gt; NCG &lt;br&gt; ✓ O-P+ &gt; O-P-</td>
</tr>
</tbody>
</table>
Tarragona Experiments: non-identical + identical CGs

[Bar graph showing comparisons between O+ and O- groups for P+ and P- categories, with significant differences marked by asterisks.]
Tarragona Experiments: only non-identical CGs
What can we conclude from the results of these experiments?

- Stimuli list composition affect cognate processing.

- The effect of P on CG word processing varied as a function of the stimuli list composition.

- Thus, identical and non-identical CG words are differently processed, probably because they have a differential representation in bilingual memory, as Dijkstra et al. (2010) have pointed out.
But...what model can accommodate these data?

A symbolic, localist connectionist framework (Dijkstra et al., 2010)
But...what model can accommodate these data?

A lexical-morphological hypothesis (Davis, Sánchez-Casas et al., 2010)
Both models were developed based on empirical data from adult populations. Thus, we do not know whether their postulates work for children.

From literature review we know that the access to P codes seems to weaken as age or reading ability increase (Newman, 2012) as well as O interference is more pervasive in children than in adults (Nation, 2009; Ventura, Morais, & Kolinsky, 2006).

Besides, the precise representation of identical and non-identical CGs are not clarified in both models. Maybe because it is not well understand the effects of P in cognate word processing.
OBJECTIVES

- To explore whether phonological influences change as age/exposure to print increases by using a go-no go task combined with a masked priming paradigm.

HYPOTHESES

- Phonological influences in CG word recognition should be greater for children than for adults since the access to P codes weakens as age or reading ability increases.

- The effects of P will be of inhibition for non-identical CG words, specifically for CG with lower O overlap (O- cognates).
EXPERIMENT 1 - children

Participants (selected from an International School in Porto [CLIP]). They completed the Language History Questionnaire (Li, Sepanski, & Zhao, 2010)

• 22 fourth grade Portuguese – English (L1 – L2) bilingual children
  • Mean age = 9.32 years (SD = 0.49)
  • Mean age of acquisition = 4.6 (SD = 0.9)
  • Mean years of instruction = 4.1 (SD = 1.1)

Self-ratings (Mean and SD) of L2 proficiency based on a 7-point Likert scale (from 1-low to 7-high)

<table>
<thead>
<tr>
<th>Proficiency</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>5.6 (0.7)</td>
</tr>
<tr>
<td>Writing</td>
<td>5.1 (0.8)</td>
</tr>
<tr>
<td>Speaking</td>
<td>6.4 (0.9)</td>
</tr>
<tr>
<td>Listening</td>
<td>6.0 (1.2)</td>
</tr>
</tbody>
</table>

DMDX software (Forster & Forster, 2003)
### Materials

**• Targets**
- 192 English target words (96 non-identical cognates - CG + 96 non-cognates - NCG matched in frequency and length)
- CG words were divided in 4 experimental conditions matched in frequency, MLBF, length, and orthographic and phonological neighbors.

Means (SD) of the Phonological (P) and orthographic (O) overlap of CG words in 4 experimental conditions.

<table>
<thead>
<tr>
<th></th>
<th>O+P+</th>
<th>O+P-</th>
<th>O-P+</th>
<th>O-P-</th>
</tr>
</thead>
<tbody>
<tr>
<td>O overlap</td>
<td>0.76 (0.06)</td>
<td>0.77 (0.07)</td>
<td>0.58 (0.11)</td>
<td>0.56 (0.09)</td>
</tr>
<tr>
<td>(objective)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O overlap</td>
<td>0.93 (0.04)</td>
<td>0.94 (0.03)</td>
<td>0.69 (0.13)</td>
<td>0.70 (0.11)</td>
</tr>
<tr>
<td>(subjective)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P overlap</td>
<td>0.78 (0.02)</td>
<td>0.38 (0.04)</td>
<td>0.68 (0.03)</td>
<td>0.30 (0.03)</td>
</tr>
<tr>
<td>(objective)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P overlap</td>
<td>0.83 (0.09)</td>
<td>0.77 (0.04)</td>
<td>0.76 (0.09)</td>
<td>0.68 (0.09)</td>
</tr>
<tr>
<td>(subjective)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rsp= .76 (p<.001)

Rsp= .26 (p<.01)

<table>
<thead>
<tr>
<th>Words</th>
</tr>
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<tbody>
<tr>
<td>banda-BAND</td>
</tr>
<tr>
<td>prosa-PROSE</td>
</tr>
<tr>
<td>circo-CIRCUS</td>
</tr>
<tr>
<td>raça-RACE</td>
</tr>
</tbody>
</table>
Method

Procedure

Go-no Go task combined with a masked priming paradigm

Design

- Lexicality (word vs. nonword) x Word Status (CG vs. NCG) x Prime type (translation vs. unrelated) x O Overlap (O+ vs. O-) x P Overlap (P+ vs. P-)
Experiment 1: Anova of words

- Status, $F_1(1, 21)= 26.24; \ p < 0.001; \ F_2(1, 183)= 18.08; \ p < 0.05$

<table>
<thead>
<tr>
<th></th>
<th>CG</th>
<th>NCG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>(24.9)</td>
<td>944 (23.3)</td>
</tr>
</tbody>
</table>

- Status x Prime x O x P, $F_1(1, 22)= 6.93; \ p < .05; \ F_2(1, 183)= 8.69; \ p < .05$.
**Participants** (selected following the Language History Questionnaire, Li, Sepanski, & Zhao, 2010)

- 22 Portuguese – English (L1 – L2) proficient bilinguals
  - Mean age = 22.43 years (SD = 4.01)
  - Mean age of acquisition = 7.0 (SD = 2.07)
  - Mean years of instruction = 9.74 (SD = 3.03)

- Self-ratings (Mean and SD) of L2 proficiency based on a 7-point Likert scale (from 1-low to 7-high)

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<td>5.0 (0.8)</td>
</tr>
<tr>
<td>Speaking</td>
<td>5.1 (1.10)</td>
</tr>
<tr>
<td>Listening</td>
<td>5.7 (0.9)</td>
</tr>
</tbody>
</table>

**DMDX software** (Forster & Forster, 2003)
Experiment 2: Anova of words

- Prime type, $F_1(1, \ 21)= 26.24; \ p < 0.001; \ F_2(1, \ 183)= 18.08; \ p < 0.001$

- Status x Prime, $F_1(1, \ 22)= 5.94; \ p < .05, \ \eta^2 = 0.22; \ F_2(1, \ 183)= 8.69; \ p < .05$

[Graph showing CG and NCG conditions with Related and Unrelated conditions, labeled with *]
OBJECTIVES

- To explore whether phonological influences change as age/exposure to print increases by using a go-no go task combined with a masked priming paradigm.

and HYPOTHESES

- Phonological influences in CG word recognition should be greater for children than for adults since the access to P codes weakens as age or reading ability increases.

- The effects of P will be of inhibition for non-identical CG words, specifically for CG with lower O overlap (O- cognates).
CONCLUSIONS

✓ The effect of P in CG processing and its interaction with O is more important than previously considered in literature. Its effects weaken as exposure to print/age increase.

✓ Facilitative effects in CG processing words seem to depend not only on task requirements but also on the type of CG words considered.

Bilingual models of word recognition as the localist, connectionist and the lexical-morphological model need to modify some postulates to accommodate these results.
Thank you very much for your attention!! ;)

The research reported in this paper has been funded by the Spanish Ministry of Economy and Competitiveness (PSI2012-37623)

In memory of our beloved Rosa…