Shared syntactic representations in non-native languages

Chiara Facipieri, Michaela Vann, Giulia Bencini
Department of Linguistics and Comparative Cultural Studies, Ca' Foscari University of Venice, Italy

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Abstract

How do speakers represent and process syntactic information in their second and third language? We investigated this question with cross-linguistic syntactic priming of passives from Spanish (L3) to English (L2). We found that cross-linguistic structural priming occurs between two non-native languages in intermediate to advanced speakers of English as an L2 and Spanish as an L3. We take these results to show that multilingual speakers have one integrated shared abstract representation of passives. The findings are compatible with the extension of the bilingual shared-syntax model to multilingual syntactic processing.

Keywords: multilingualism, L3 processing, structural priming, proficiency

Introduction

According to the shared-syntax model of bilingual language production (Hartsuiker et al. 2004, Hartsuiker, Bernolet 2015) syntactic representations are shared between an L1 and later acquired languages as much as possible. Most of the evidence for this model comes from studies that examine processing in an L1 and a later acquired L2. The question of how speakers represent, and process subsequently acquired languages (L3 and beyond) is still unanswered. To our knowledge, Hartsuiker and colleagues (2016) is the only study to have investigated priming between two non-native languages. Their findings support the shared-syntax model: if the representation of a structure is shared between languages, then all languages can activate it with equal strength.

Our study tests the shared syntax model by examining how multilingual speakers of Italian as an L1 represent and process passive sentences in later acquired languages, specifically English (L2) and Spanish (L3). Our research questions were:

1. Do late multilinguals (acquiring an L2 and L3) share syntactic information between their L2 and L3? To answer this question, we examined whether cross-linguistic syntactic priming of passive sentences occurs between Spanish L3 and English L2.
2. Is the strength of priming modulated by language proficiency (Bernolet et al. 2013, Hartsuiker, Bernolet 2017)?

3. Is cross-linguistic structural priming between L2 and L3 influenced by conceptual information?

If the shared syntax model also applies to additional languages, the prediction is that, provided sufficient proficiency, priming should be possible between an L3 and an L2 (and vice-versa). In this study, we looked at priming from the L3 to the L2.

Methods

Participants

26 Italian native speakers (24 Female, 2 Male, M_{age} = 28) took part in a cross-linguistic priming experiment (data collection is ongoing). Participants acquired English as an L2 and Spanish as an L3. Their linguistic background was assessed using a Language Profile Questionnaire. In the survey, participants were asked to rate their language level according to the criteria of the Common European Framework (CEFR) in all four language modalities (writing, listening, speaking, and reading) in their L2 and L3 using a Likert-scale from 1 to 6.

Design and procedure

The study investigated primed production of passive sentence structures from Spanish to English using a within-subjects 2 (structure) x 2 (animacy) factorial design. Example materials are shown in Table 1. Participants read a prime sentence in Spanish and typed in a written description to a target picture in English. The experiment was administered remotely, using Psychopy (Peirce et al., 2019) on the Pavlovia.org platform.

Table 1. Experimental conditions. The animacy condition of the agent (inanimate) was kept constant across conditions.

	Prime structure - Active	Prime structure - Passive
Animate patient	El sol cegó al hombre. The sun blinded the man.	El hombre fue cegado por el sol. The man was blinded by the sun.
Inanimate patient	El huracán arruinó la cosecha. The hurricane ruined the crop.	La cosecha fue arruinada por el huracán. The crop was ruined by the hurricane.

Analysis and results

All descriptions to target pictures were scored for syntactic structure. To be considered a passive, descriptions had to contain the patient as syntactic subject, followed by the auxiliary *be* in any tense, followed by the agent introduced by the preposition *by*. Passives without an explicit agent (e.g., truncated passives) were scored *other,* and excluded from statistical analyses.

The data were analysed with generalised linear models (McCullagh & Nelder, 1989) predicting the log odds (logit) of a passive sentence. The best-fit model is summarised in Table 2.

There was a significant effect of prime structure, indicating that structural priming occurs from an L3 (Spanish) to an L2 (English). There was also a main effect of animacy: participants on average produced 29% of passive responses after Animate patient primes as opposed to 17% after Inanimate patient primes. Animacy effects were independent of prime structure, suggesting that semantic features may drive production in multilingual speakers more than syntactic structure.

Proficiency in the L2 and L3 alone was not significant (this is likely to be due to lack of power). In order to investigate the relationship between priming and self-reported language proficiency, we computed a condensed measure of additional language dominance (i.e., which additionally acquired non-native language is more dominant?). This measure was defined as the difference between the average proficiency scores - negative language dominance scores equal Spanish dominance, whereas positive scores reflect English dominance. The model suggests that Language dominance did not have a significant independent effect on the production of passive responses. However, there was a significant positive Prime Structure x Language dominance score interaction, indicating that as the language dominance score increases, the production of passive responses after passive primes increases as well.

Table 2. Model results.

Predictors	**Coefficient**	**SE**	**z value**	**p**
(Intercept)	-1.30	0.09	-14.01	**<.001**
Prime Structure	0.20	0.09	2.40	**.0339**
Animacy	0.36	0.09	3.82	**.0001**
Language dominance	-0.09	0.1	-1.48	>.1
Prime Structure x Animacy	-0.07	0.09	-1.15	>.1
Prime Structure x Language dominance	0.24	0.1	3.54	**.0093**
Animacy x Language dominance	0.03	0.1	0.80	>.1
Prime Structure x Animacy x Language dominance	-0.10	0.1	-1.70	>.1

Discussion

Our study confirms that priming can occur between two non-native languages (Hartsuiker et al. 2016), in line with the extension of the bilingual shared-syntax model (Hartsuiker et al. 2004) to multilingual syntactic processing: provided that speakers have a high enough proficiency in L2 and L3, they conveniently merge abstract representations of similar syntactic structure. Our results add to these findings that if two non-native languages are involved, in the case of L3 to L2 priming, target language proficiency may need to be higher than prime

language proficiency to observe significant evidence of shared-syntactic representations. Having only tested intermediate to advanced speakers of English and Spanish may have prevented us from seeing a clear modulating effect of only target language proficiency like the one found by Bernolet et al., (2013) and Hartsuiker & Bernolet (2015).

Furthermore, our results confirm our initial prediction that participants would produce more passive responses after animate patient primes regardless of prime structure. This suggests that the patient's inherent accessibility, more than its derived accessibility, allowed for the animate entity to be more easily retrievable and to be encoded in a prominent sentential position, namely the subject of a passive sentence. These findings lend support to the hypothesis that syntactic priming and animacy influence the choice of syntactic structure independently of each other (Pickering & Ferreira, 2008).

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