

Typological similarity affects attention in L3 mini-grammar learning: An ERP study

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While linguistic transfer can only obtain from one source in L2 acquisition (the L1), the dynamics of transfer source selection among competing choices (L1 or L2) in L3 acquisition have been debated for over a decade (e.g., Rothman, González Alonso & Puig-Mayenco, 2019). The present study uses event-related potentials (ERPs) to examine transfer source selectivity between the L1 and L2 in L3/ L_n acquisition.

We constructed two mini-languages (MLs) lexically based on English and Spanish, respectively. Both languages display novel gender agreement (unique to Spanish) between determiners, nouns, and adjectives. Number marking, realized within the NP domain in both Spanish and English, was also introduced as a control. Table 1 details the full design of the MLs. Adjectives carried number (singular/plural) and gender (masculine/feminine) morphology in both MLs. Agreement morphemes, as well as the article, were common to both ALs, and equally phonotactically plausible in both English and Spanish. Gender and number information was marked on both the article and the adjective, but not morphologically transparent on the noun itself. Gender violations were always realized on the predicative adjective, in sentences like (1). 50 L1 Spanish L2 English speakers participated in the experiment. After receiving implicit training on grammatical sentences only in one of the MLs (Mini-Spanish, $N=26$; Mini-English, $N=24$), participants were tested behaviorally to a criterion of 80% accuracy in agreement. Once this threshold was reached, we recorded the EEG activity to critical sentences ($N=144$) in a violation paradigm with RSVP (450/300ms).

Based on the typical latencies of the N400 and P600 components, we compared average voltages between grammatical sentences and gender violations in three time windows: 200-500ms, 300-600ms and 400-900ms. Results (Fig.1 and 2) show no effects for the Mini-Spanish group in the 200-500ms time window (all $p > .05$). A broadly distributed positivity ($F(1, 25) = 4.61$, $p < .05$, $\eta^2 = 0.01$) emerges in the 300-600ms window and disappears in the later period. The Mini-English group shows a significant triple interaction in the 200-500ms time window between Condition, Hemisphere and Anterior-Posterior ($F(1.41, 32.48) = 3.85$, $p < .05$, $\eta^2 = 0.002$), indicating more negative voltages for gender violations relative to the grammatical condition in the right-anterior region. No effects or interactions with Condition emerge in later periods. We propose that the positivity in the 300-600ms time window for Mini-Spanish may be an instance of the P300 component, typically elicited in connection to the detection and categorization of task-relevant stimuli. Thus, while both groups are L1 Spanish-L2 English, their ERP responses to gender violations could reflect differential allocation of attentional resources as a consequence of exposure to different MLs. Typological proximity between L1 Spanish (a morphologically rich language) and Mini-Spanish seems to focus attention on the morphology shortly after initial exposure, while this is not the case when the same speaker population is exposed to Mini English. Implications for models of morphosyntactic transfer in L3 acquisition are discussed.

Example (1) of a gender violation in Mini-Spanish.

(1) Ze camion es *car-eju y ze reloj tambien.
 the-MASC-SG truck-MASC-SG is expensive-FEM-SG and the watch too.

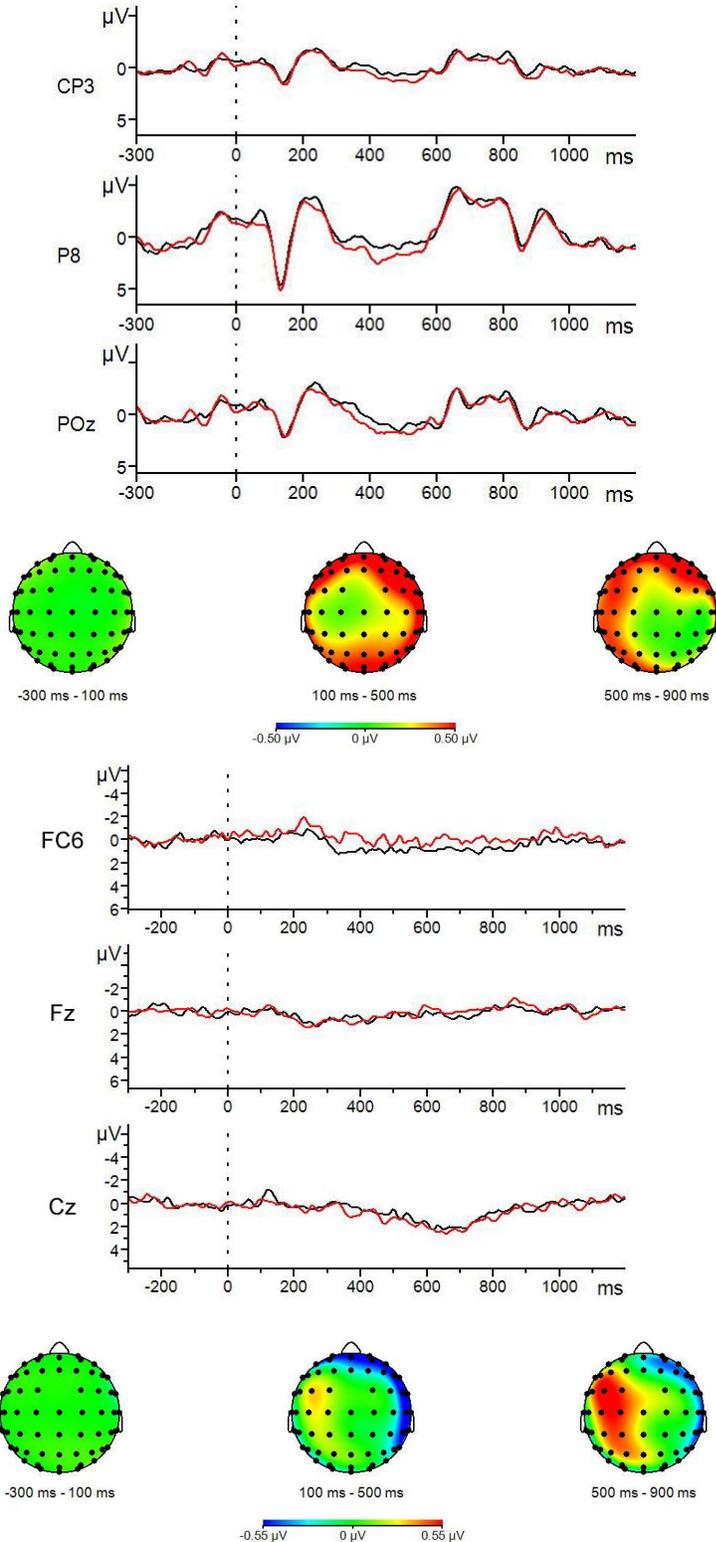


Figure 1. Grand averaged ERP waveforms for the grammatical (black) and gender (red) conditions in Mini-Spanish at electrodes CP3 (left medial), P8 (right posterior) and POz (midline posterior), and topographical distribution maps of the difference wave for the gender-grammatical condition contrast.

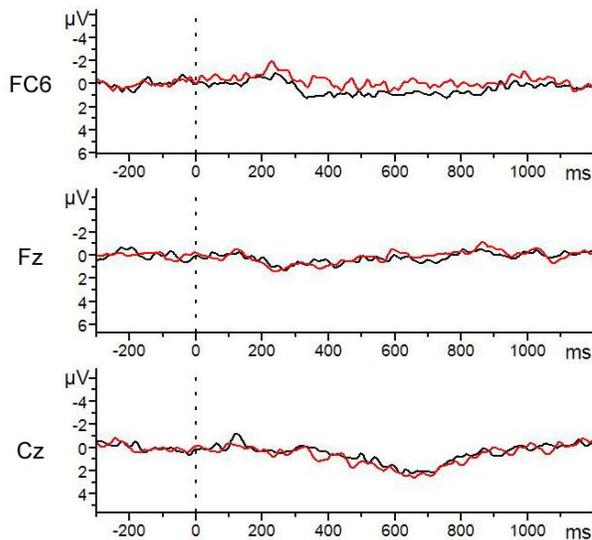


Figure 2. Grand averaged ERP waveforms for the grammatical (black) and gender (red) conditions in Mini-English at electrodes, FC6 (right anterior), Fz (midline anterior) and Cz (midline medial), and topographical distribution maps of the difference wave for the gender-grammatical condition contrast.

Table 1. Full AL design and vocabulary items, and example sentence (feminine singular).

| MINI-SPANISH | | | | MINI-ENGLISH | | | |
|---|--------------|--|--------------|--|--------------|---|--------------|
| Nouns | | | | Nouns | | | |
| Feminine | | Masculine | | Feminine | | Masculine | |
| <i>mochil, taz, ventan, pa-red, llave, calle.</i> | | <i>cuchil, gor, roper, ca-mion, reloj, lapiz</i> | | <i>bag, cup, window, wall, key, street</i> | | <i>knife, hat, closet, truck, watch, pencil</i> | |
| Adjectives | | | | Adjectives | | | |
| <i>amarill-, roj-, pequen-, grand-, nov-, vej-, suci-, limpi-, barat-, car-, cort-, larg-</i> | | | | <i>yellow-, red-, small-, big-, new-, old-, dirty-, clean-, cheap-, expensiv-, short-, long-</i> | | | |
| Inflectional affixes | | | | Inflectional affixes | | | |
| Feminine | | Masculine | | Feminine | | Masculine | |
| Singular | Plural | Singular | Plural | Singular | Plural | Singular | Plural |
| <i>-eju</i> | <i>-ejur</i> | <i>-ezu</i> | <i>-ezur</i> | <i>-eju</i> | <i>-ejur</i> | <i>-ezu</i> | <i>-ezur</i> |
| Article | | | | Article | | | |
| Feminine | | Masculine | | Feminine | | Masculine | |
| Singular | Plural | Singular | Plural | Singular | Plural | Singular | Plural |
| <i>je</i> | <i>jer</i> | <i>ze</i> | <i>zer</i> | <i>je</i> | <i>jer</i> | <i>ze</i> | <i>zer</i> |
| Copula | | | | Copula | | | |
| Singular | | Plural | | Singular | | Plural | |
| <i>es</i> | | <i>son</i> | | <i>is</i> | | <i>are</i> | |
| Conjunction | | | | Conjunction | | | |
| <i>y</i> | | | | <i>and</i> | | | |
| Adverb | | | | Adverb | | | |
| <i>tambien</i> | | | | <i>too</i> | | | |
| Locatives | | | | Locatives | | | |
| <i>arriba, abajo</i> | | | | <i>above, below</i> | | | |
| Example sentence | | | | Example sentence | | | |
| <i>Je mochil es barategu.</i> "The bag is cheap." | | | | <i>Je bag is cheapegu.</i> "The bag is cheap." | | | |

Reference: Rothman, J., González Alonso, J., & Puig-Mayenco, E. (2019). *Third Language Acquisition and Linguistic Transfer*. Cambridge: Cambridge University Press.