“Listen my story”: ERP sensitivity to argument structure violations in L2
Chia-Hsuan Liao & Ellen Lau (University of Maryland)
ciao@umd.edu

Event concepts of common verbs (e.g., eat, sleep) are likely to be the same for speakers of different languages, but the argument structure of a verb (e.g., the types and numbers of noun phrases a verb takes), is linguistic knowledge, and can vary from language to language. For example, in English, “listen” is intransitive and requires a preposition to introduce a second argument, whereas in Mandarin, “listen” can take a second argument without any additional functional material. How do different argument structures interact with each other in bilinguals during online sentence processing? We hypothesized that native language argument structure knowledge is particularly difficult for L2 speakers to override in online processing. Therefore, in our experiment, we constructed sentences with verbs of mismatched argument structures in L1 and L2. The prediction was English native speakers can easily reject argument structure violation sentences such as My sister listened the music, while Mandarin L2 speakers of English may often erroneously accept such sentences because they are unable to immediately access the argument structure of their L2 online. Both behavioral and ERP results supported the hypothesis: While L1 speakers showed a prominent P600 effect to argument structure violations, the L2 group showed no ERP differences for the violations, and poorer behavioral sensitivity, even though they showed behavioral and ERP sensitivity to gross phrase structure violations in a control comparison. Our finding suggests argument-verb computation is likely subject to L1 transfer, and has implications for existing L2 processing theory.

Experimental sentences were of Subject-Verb-Object structure, with the verb varying between argument structure conditions: (1) Grammatical and (2) Ungrammatical, and the rest of the sentences were identical. Verbs in the grammatical conditions were transitive in both English and Mandarin (e.g., record), whereas verbs in the ungrammatical conditions rarely takes a direct object in English but are ambitransitive in Mandarin (e.g., listen). EEG data analysis was time locked to the determiner and the noun following the verbs (record/*listen the music). To ensure that not all sentences with an intransitive English verb were ungrammatical and vice versa, we added filler sentences with grammatical intransitive verbs and with ungrammatical transitive verbs. To show that L2 speakers were able to parse English sentences, we adapted sentences with phrase structure violations from [1] as our sanity check items (Table 1). Participants were native speakers of English (n=22) and L2 speakers of English whose L1 was Mandarin (n=28). All the L2 participants were proficient in English, having passed a standardized English proficiency test beyond Common European Framework of Reference for Languages (CEFR) B2 level. Materials were presented using RSVP (600ms/word), with an end-of-sentence grammaticality judgment task.

ERP Results showed a significant interaction between group and argument structure conditions, with a P600 effect in the L1 but not the L2 group (Figure 1), indicating that argument structure of a verb in L2 was not immediately available when computing sentences online. By contrast, in the phrase structure violation control comparison, we observed a widespread negativity at an earlier time window (300-500ms) in both groups (Figure 2), indicating that the L2 group was sensitive to phrase structure violations, (although the absence of a subsequent P600 effect in L2 suggests their processing of these violations is still somewhat non-native-like). Behavioral results also showed that L2 accuracy rate for the argument structure conditions (70.1%) was lower than the phrase structure conditions (91.1%).

Taken together, these results are consistent with the hypothesis that argument structure processing is particularly challenging for L2 speakers when L1 and L2 are in conflict, relative to gross phrase structure violations. While prior studies [e.g., 2] argued that L2 can construct verb-argument relations online, we suggest that L2 speakers do not have immediate access to additional syntactic details required for native-like verb-argument computation.
Table 1: Example stimulus for each condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Grammatical</th>
<th>Ungrammatical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argument structure</td>
<td>My sister is recording the music.</td>
<td>My sister is listening the music.</td>
</tr>
<tr>
<td>Filler</td>
<td>The signer sneezed during the concert.</td>
<td>Teachers cannot hit in the classroom.</td>
</tr>
<tr>
<td>Phrase structure (Sanity check)</td>
<td>The students discussed Frank’s speech about migrants.</td>
<td>The students discussed Frank’s about speech migrants.</td>
</tr>
</tbody>
</table>

L1 speakers

L2 speakers

Figure 1: Grand average ERPs of the Argument structure conditions from the determiner to the nouns at Pz and the topographic distribution in the 300-500 and 600-900 ms intervals at the determiner.

L1 speakers

L2 speakers

Figure 2: Grand average ERPs of the Phrase structure conditions from the preposition to the following word at Pz and the topographic distribution in the 300-500 and 600-900 ms intervals at the preposition.