

## Late-acquired structures are harder to comprehend in adulthood: processing non-canonical word orders in Italian

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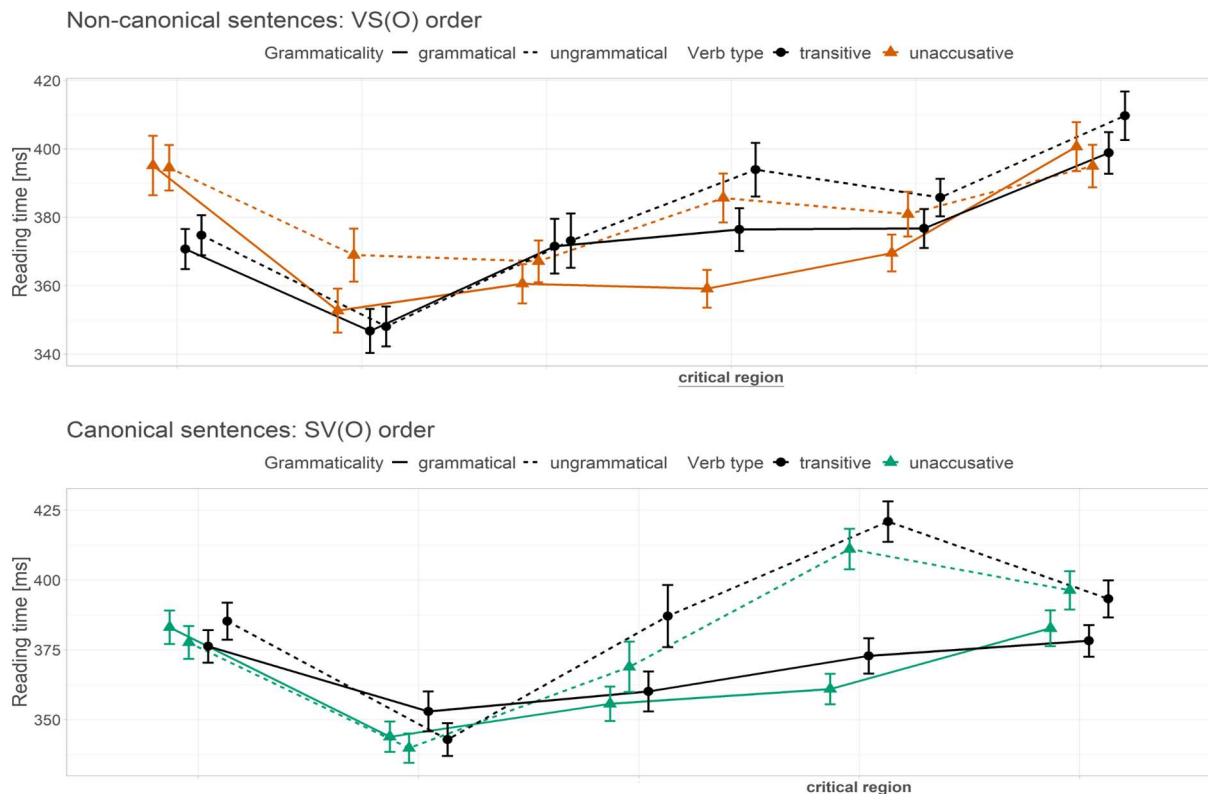
Non-canonical word orders are usually harder to process than canonical ones [1,2]. However, it is unclear which factors modulate this difficulty. Here we focus on the type of verb occurring in non-canonical structures. Italian is an interesting language for investigating this factor, because it exhibits non-canonical post-verbal subjects with both unaccusative verbs (VS) and transitive verbs (OVS) [3]. Notably, OVS structures emerge later than VS structures in L1 acquisition [4,5]. If the delayed acquisition of a structure results in processing difficulties in adulthood [6], one might expect Italian adults to process OVS structures with more difficulty than VS structures. We tested this hypothesis in a self-paced reading study using unaccusative and transitive verbs in non-canonical and canonical sentences. The ability to detect subject-verb agreement violations was used as a measure of processing difficulty. Our results showed that in canonical structures, agreement violations were successfully detected with both verb types. But in non-canonical structures, violations were noticed only with unaccusative verbs. Thus, the delayed emergence of OVS structures in acquisition is associated with later comprehension difficulties, suggesting a relationship between acquisition timelines and processing effort in adulthood.

**DESIGN.** 96 adult Italian native speakers were tested using a web-based word-by-word self-paced reading paradigm. We manipulated whether the sentences had an unaccusative or transitive verb (VERB TYPE) and whether the subject and verb (dis)agreed in number (GRAMMATICALITY). Half of the agreement violations occurred with a singular verb and a plural subject, and the other half with the reverse configuration. To account for lexical differences between verb types, the same verbs were used in non-canonical (VS/OVS) and canonical (SV/SVO) sentences. Non-canonical sentences had post-verbal subjects, while canonical sentences had pre-verbal subjects (Table 1). Target sentences were introduced by a context sentence licensing the use of non-canonical structures. In non-canonical sentences, the critical region was the subject phrase, i.e., the earliest point when the agreement violation could be noticed. In canonical sentences, the critical region was the post-verbal region, as—after visual inspection of the graphs—reading disruptions were observed at this region across conditions. Reciprocally-transformed reading times were analysed in canonical and non-canonical sentences separately, using mixed-effects linear models with fully crossed fixed effects of verb type and grammaticality and a maximal random effects structure (significance assessed using a .05 alpha level). We hypothesized that unaccusative and transitive ungrammatical verbs would be similarly noticed in canonical sentences. However, in non-canonical sentences violations should be easier to detect with unaccusative than transitive verbs, if acquisition delays can predict adult processing difficulties.

**RESULTS.** In canonical sentences, both unaccusative and transitive verbs showed clear grammaticality effects: reading times were longer after ungrammatical than grammatical verbs and reading disruptions were similar for both verb types (non-significant interaction between verb type and grammaticality). By contrast, in non-canonical sentences the grammaticality effect was significant in unaccusative but not in transitive verbs, consistent with participants being more able to detect agreement violations in VS than in OVS structures (Figure 1). There was also a main effect of verb type, with OVS structures being read more slowly than VS structures, consistent with more processing difficulty. However, the interaction between verb type and grammaticality did not reach significance, likely due to insufficient power, as the grammaticality effect had the same direction across verb types. This possibility is being tested in ongoing work. Finally, the comparison of non-canonical vs. canonical structures showed a larger grammaticality effect in canonical structures, replicating previous findings [1,2]. Overall, our findings suggest that the difficulty of processing non-canonical sentences is modulated by the type of verb, although this result should be taken with caution, due to the lack of a significant interaction between grammaticality and verb type in non-canonical sentences.

**Table 1.** Sample stimuli set (n = 24 p/items set + 54 fillers). The critical region is underlined.

Items 1-24: Non-canonical sentences (VS/OVS)	
<u>Context:</u> Francesca prova i vestiti per lo spettacolo in un negozio <i>Francesca tries on the dresses for the play in a shop</i>	
<b>VS (verb-subject)</b> (un)grammatical	Nel negozio entra/* <b>entrano</b> nel frattempo <u>una signora</u> dalla strada di fronte <i>In the shop, in the meantime a lady enters/*enter from the front street</i>
<b>OVS (object-verb-subject)</b> (un)grammatical	I vestiti li osserva/* <b>osservano</b> nel frattempo <u>una signora</u> dalla strada di fronte <i>The dresses, in the meantime a lady observes/*observe them from the front street</i>
Items 25-48: Canonical sentences (SV/SVO)	
<u>Context:</u> Roberta abbraccia un'amica all'aeroporto <i>Roberta hugs a friend at the airport</i>	
<b>SV (subject-verb)</b> (un)grammatical	L'amica finalmente viene/* <b>vengono</b> <u>in Italia</u> per una settimana <i>The friend finally comes/*come to Italy for a week</i>
<b>SVO (subject-verb-object)</b> (un)grammatical	L'amica finalmente visita/* <b>visitano</b> <u>l'Italia</u> per una settimana <i>The friend finally visits/*visit Italy for a week</i>



**Figure 1.** Reading times in experiment 1 (top panel) and 2 (bottom panel). Points and error bars represent the mean and the SE of the RTs in each region of the sentences. The top plot shows that the effect of grammaticality was higher in VS than in OVS sentences in the critical region (underlined).

**References** [1] Kaiser & Trueswell (2004) *Cognition* [2] Hopp et al. (2020) *Second Language Research* [3] Belletti (1988) *Linguistic Inquiry* [4] Vernice & Guasti (2015) *Journal of Child Language* [5] Abbot-Smith & Serratrice (2015) *Journal of Child Language* [6] Philippis & Ehrenhofer (2015) *Linguistic Approaches to Bilingualism*