

Coordination ambiguity resolution in native and non-native language comprehension

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Garden-path sentences have been examined to investigate the similarities and differences between native (L1) and non-native (L2) comprehension [5,6,7]. Both L1ers and L2ers exhibit garden-path effects during reading, and have difficulty revising initially assigned misinterpretations during comprehension [1,7]. L1/L2 differences have also been reported. [7] reported a larger proportion of misinterpretations of garden-path sentences in L2 than L1 speakers, and [6] reported smaller garden-path effects, and lower comprehension accuracy, in L2ers, which they took to indicate that L2ers may be less likely to initiate reanalysis than L1ers [6,7]. Additionally, reanalysis is modulated by ambiguity length in both L1 and L2ers, with an increased reanalysis difficulty for a longer ambiguous region [1,4,6]. While ambiguity length effects have been examined in subject-object ambiguities, they have not been widely studied in other ambiguities. To further investigate these issues in L1 and L2 processing, we examined the co-ordination ambiguity [1,3] in an eye-tracking while reading experiment.

48 L1ers and 48 proficient L2ers (mean proficiency score = 49/60; range 40-58) read 24 sentences like (1) while their eye-movements were monitored. In (1a/c), the coordinator “and” causes temporary ambiguity, as “the cat” may be initially interpreted as the conjoined direct object of “washed”, when it is in fact the subject of “played”. (1b/d) are unambiguous controls, as the subordinating conjunction “while” renders the direct object analysis impossible. Additionally, in (1a), the temporary ambiguity is disambiguated immediately, whereas in (1c), the ambiguity is longer due to inclusion of a prepositional phrase (“in the garden”) before the disambiguated verb. We expected longer reading times at “played” in (1a/c) than in (1b/d) due to garden-path effects. If maintaining an initial interpretation for longer leads to increased reanalysis difficulty [1,6], we would expect longer reading times in (1c) than (1a). If the initial misinterpretation lingers after reanalysis [1], comprehension accuracy rates should be lower for (1a/1c) than for (1b/1d), and if length influences reanalysis, (1a) should have lower accuracy than (1c). If L2ers are less likely than L1ers to conduct reanalysis [6], they should show smaller garden-path effects during reading than L1ers, especially in the long conditions, and show lower comprehension accuracy rates than L1ers in ambiguous conditions only.

We pre-registered analyses (<https://osf.io/ausmx>) of first-pass, regression path and total viewing times at the disambiguating (“played”) and spillover regions (“with a ball”). There were significant effects of ambiguity in all measures (all $p < .02$). Ambiguity interacted with group only in regression path times ($p = .02$), with a larger garden-path effect in the L1 group (L1 effect = 95ms, L2 effect = 61ms). Ambiguity also interacted with length and region in regression path times ($p < .001$), with longer reading times at the spillover region in long (1c) rather than short (1a) ambiguous conditions. Comprehension accuracy rates showed a significant main effect of ambiguity ($p < .001$), with lower accuracy rates for (1a/c) than (1b/d). This main effect was modulated by length ($p = 0.044$), with lower accuracy in (1c) than (1a), and by group ($p = 0.003$). Although the L2 group showed a larger difference between ambiguous and unambiguous conditions than the L1 group, this was due to L1ers having lower accuracy in unambiguous conditions, while the groups did not differ in ambiguous conditions.

Our results conceptually replicate previously reported length effects on garden-path recovery and misinterpretation observed in the subject-object ambiguity [1,4] and extend them to the co-ordination ambiguity, in both L1 and L2 readers. Although L2ers showed smaller garden-path effects in one measure, potentially compatible with [6], we did not find evidence of increased misinterpretation in L2ers, contra [2,6,7], which would be expected if L2ers do not initiate reanalysis as successfully as L1ers. As L1ers and L2ers were affected by garden-path effects and length effects during processing and in offline comprehension, we suggest that reanalysis processes are influenced by the same factors in L1 and L2 processing.

(1a) Ambiguous, Short

Yesterday afternoon, Ken washed the dog and the cat played with a ball.

(1b) Unambiguous, Short

Yesterday afternoon, Ken washed the dog while the cat played with a ball.

(1c) Ambiguous, Long

Yesterday afternoon, Ken washed the dog and the cat in the garden played with a ball.

(1d) Unambiguous, Long

Yesterday afternoon, Ken washed the dog while the cat in the garden played with a ball.

Question: Was Ken washing the cat?

Figure 1. *Reading times.*

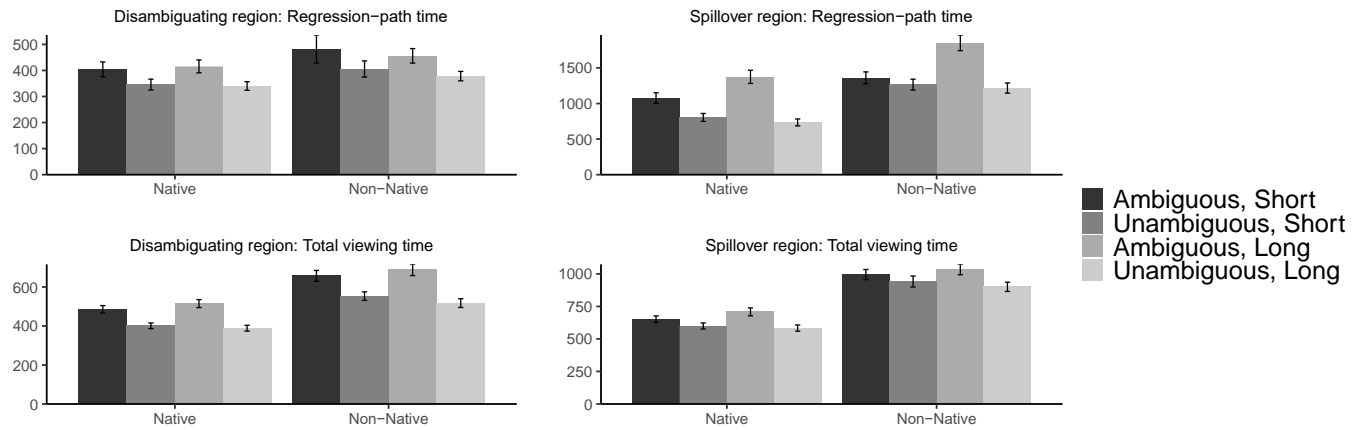
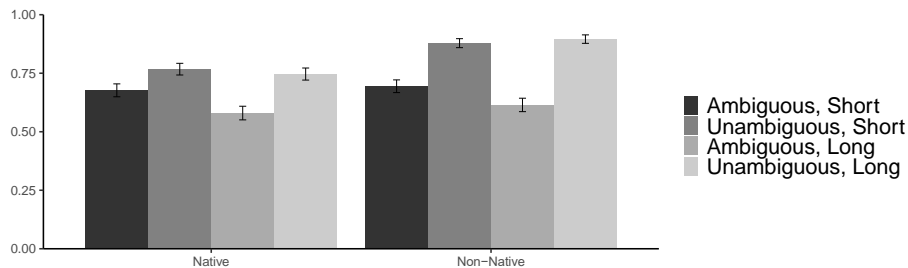


Figure 2. *Comprehension accuracy rates.*



References

[1] Christianson et al. (2001), *CP*; [2] Cunnings (2017), *BLC*; [3] Engelhardt & Ferreira (2010), *LS*; [4] Ferreira & Henderson (1991), *JML*; [5] Hopp (2006), *SLR*; [6] Jacob & Felser (2016), *TQJEP*; [7] Pozzan & Trueswell (2016), *BLC*.