

## Agreement attraction in grammatical sentences

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According to the feature percolation account of agreement attraction [1], attraction effects are expected in grammatical sentences: the plural feature would occasionally percolate from the attractor to the singular subject, and the resulting (incorrect) expectation of a plural verb would manifest itself in longer reading times on the singular verb. In contrast, [2] propose that agreement attraction in comprehension can only be observed in the ungrammatical sentences: when readers notice the ungrammaticality, they attempt to reanalyze the sentence. At that stage, they sometimes misretrieve the attractor instead of the target, which makes the sentence seem grammatical, hence the attraction effect. In line with this proposal, attraction effects were rarely found in grammatical sentences, which limits the scope of the attraction phenomenon to the processing of ungrammatical constructions.

We suggest that agreement attraction in grammatical sentences is not observed because of an unsuitable control condition. The effects are usually studied in conditions such as (a) and (b):

- a. The admirer of the singer supposedly thinks ...
- b. The admirer of the singers supposedly thinks ...
- c. The admirer of the play supposedly thinks ...
- d. The admirer of the plays supposedly thinks ... the show was a big success.

The feature percolation account predicts a slowdown in (b) as compared to (a). But according to ACT-R [3] and the encoding interference account [4], we would expect a slowdown in (a) in comparison to (b) due to the interference arising from the attractor matching the head's number feature. Effectively, the attraction and the interference effects might cancel out giving the incorrect impression that agreement attraction effects do not arise in grammatical sentences.

We aimed to provide a better control condition: to reduce the interference effect, we made the nouns differ in animacy, and the verb compatible with only an animate subject. We expected to find the slowdown that the feature percolation account predicts in (d) in comparison to a control condition (c) where no (or a smaller) slowdown due to interference is expected. 16 items were created in a 2x2 design with main factors of semantic interference and number match/mismatch between the verb and the attractor.

In an online single trial experiment where 4296 participants each saw a single experimental sentence (thus excluding adaptation to the stimuli and strategic effects), we collected reading times, sentence acceptability ratings, and question responses (*Who considered the show a success? – Admirer/Singer/Admirers/Singers/I'm not sure*). We found a significant plural complexity effect (elevated RTs in conditions b and d) at the pre-critical region (*supposedly*) and thus can not interpret the data from the critical region (*thinks*): the slowdown could result from agreement attraction or from spillover processing of the previous region. The acceptability ratings (Est.=-0.19, SE=0.05, t=-4.26) and the question response accuracies (Est.=-0.24, SE=0.04, p<0.0001) were lower in the attraction conditions b and d. Lower accuracies stem from attraction mistakes (participants chose the correct noun with wrong number marking – *admirers*), demonstrating the pattern predicted by the feature percolation account and replicating the results of [5]. Although the reading times data were inconclusive, question response accuracies suggest that processes postulated by the feature percolation account might be deployed at least at the post-interpretative stage during question answering. Interference accounts cannot predict retrieval of a word that was not present in the actual input (*admirers*), while the feature percolation account makes specific predictions that exactly such a representation will be formed.

[1] Nicol, J. L., Forster, K. I., & Veres, C. (1997). Subject–verb agreement processes in comprehension. *Journal of Memory and Language*, 36(4), 569-587. [2] Wagers, M. W., Lau, E. F., & Phillips, C. (2009). Agreement attraction in comprehension: Representations and processes. *Journal of Memory and Language*, 61(2), 206-237. [3] Lewis, R. L., & Vasishth, S. (2005). An activation-based model of sentence processing as skilled memory retrieval. *Cognitive science*, 29(3), 375-419. [4] Oberauer, K., & Kliegl, R. (2006). A formal model of capacity limits in working memory. *Journal of Memory and Language*, 55(4), 601-626. [5] Patson, N. D., & Husband, E. M. (2016). Misinterpretations in agreement and agreement attraction. *The Quarterly Journal of Experimental Psychology*, 69(5), 950-971.

