

On the Multiple Mechanisms of Agreement attraction: Evidence from Romanian

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Agreement attraction errors, where the verb agrees with the intervenor instead of the head (**The key to the cabinets are rusty* [1]), have been widely investigated in online and offline measures. There are two classes of mechanism argued to underlie these effects: 'representational' encoding errors, arising from a noisy encoding of the number of the subject [e.g. 2], and cue-based retrieval errors, arising when a cue-based retrieval for an agreement controller wrongly selects an intervenor [e.g. 3]. Here we investigate the relative contribution of these two mechanisms to agreement attraction effects by looking at these effects in Romanian using SPR with an offline comprehension task [4, 5, 6]. We ran three parallel experiments testing different intervenor - attractor configurations in order to see what types of intervenors attract more. Experiment 1 (N=93) tested bare NP intervenors in Romanian, which cannot grammatically function as preverbal subjects; Experiments 2 (N=67) and 3 (N=63) tested full DP intervenors with adjectival modification - we expect the latter to be more potent agreement attractors [e.g. 7]. In all 3 experiments, the experimental items involved a 2x2 design crossing GRAMMATICALITY with INTERVENOR NUMBER (see 1). The verb was always *au* 'have.3PL'. The head was singular/plural. Each experiment consisted of 24 experimental item sets in 4 Latin Squared lists and 72 fillers. Importantly, *all* experimental items (as well as 24 fillers) were followed by a comprehension question that queried the subject of the utterance. Participants had 4 response options: singular intervenor, plural intervenor, singular head, and plural head. Overall, the results (Fig 1,2,3) show evidence in line with both representational and cue-based accounts. We analyzed the RT experimental data with maximal linear mixed effects models. We found a grammaticality effect in all experiments at target and Spillover: ungrammatical sentences were read significantly slower than grammatical ones ($t/ > 2$). We saw limited evidence for an interference effect in online measures: Intervenor number was significant only in E2 at the spillover ($t = -3.33$), driven by a speed-up for plural intervenors in the ungrammatical conditions (an illusion of grammaticality), as well as a slow-down for singular intervenors in the grammatical conditions (an illusion of ungrammaticality). Both effects can be explained by representational accounts as a partial match between the features represented on the subject noun in memory and the verb; the effect in ungrammatical conditions may be driven by cue-based retrieval as well (e.g. facilitatory interference). However, the slowdown for singular intervenors in grammatical conditions is inconsistent with simple cue-based retrieval accounts, which predict the opposite pattern due to inhibitory interference when NPs share features. To explain the data, cue-based retrieval models need to assume that retrieval of the subject is affected by lossy compression or other types of encoding error [e.g. 8]. In comprehension (Tables 1, 2, Fig 4, 5), offline accuracy was higher in E1 (bare noun intervenors) experiment than in E2/3. In all three experiments, we saw significant effects of both experimental factors and their interaction on response accuracy, with lowest accuracy in the ungrammatical plural intervenor condition (e.g. the agreement attraction configuration). Most response errors were 'percolation' errors, with the intervenor's number feature marked on the subject, but there were also 'cue-retrieval' errors (selection of a feature matched intervenor) and other errors as well. The pattern of offline results is similar to what has been reported for Armenian [5]. The uneven pattern seen in the online RTs suggests that our online data may be underpowered. In addition, the finding of an online 'illusion of ungrammaticality' is unusual and merits further study. Despite these puzzles, these data indicate that both encoding and retrieval-based error mechanisms may be at work in agreement attraction in Romanian, as in other languages [5].

(1) Pisica (Exp 1, 2)/Pisica neagră (Exp 3) de lângă fete (Exp 1)/ fetele brunete (Exp 2, 3)
 cat-the (Exp 1, 2)/cat-the black (Exp 3) DE near girls (Exp 1)/girls-the brunette (Exp 2, 3)
 adesea au mișcări unduitoare elegante (Agreement Attraction Condition)
 often have.3PL movements undulating elegant.
 'The cat/black cat near the girls/brunette girls often have elegant undulating movements.'

Figures 1, 2, 3: Average reading times for Experiments 1 (BareN), 2 (AdjInt), 3 (AdjIntHead)

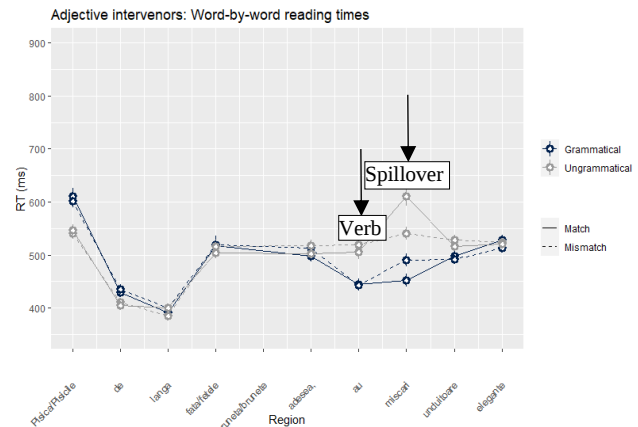
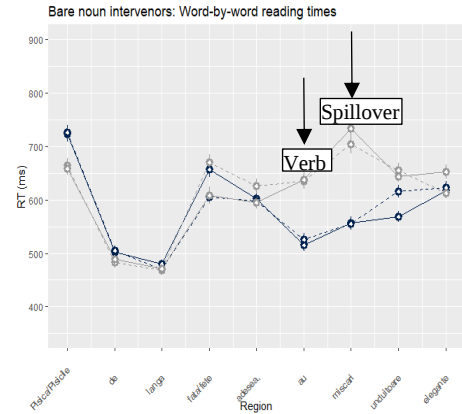
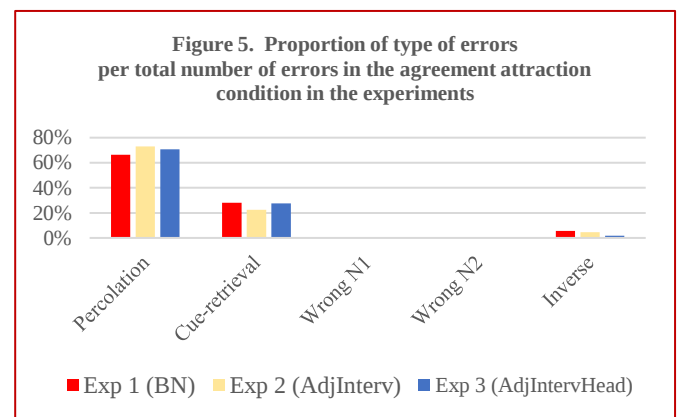
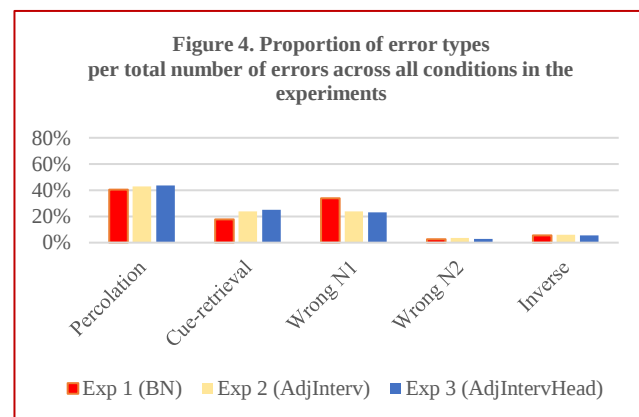
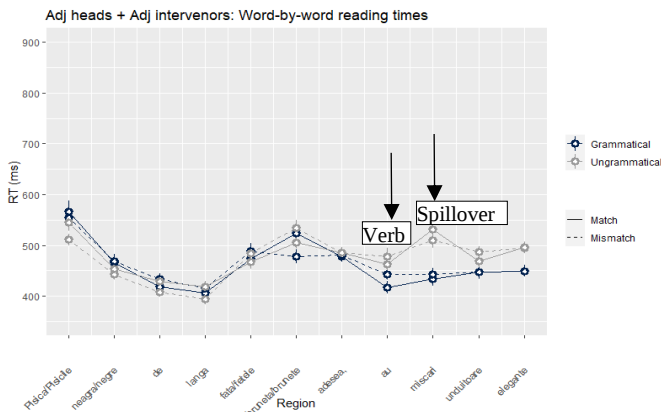


Table 1. Errors out of total answers per condition

Exp	Exp 1 (BN)	Exp 2 (AdjInt)	Exp 3 (AdjIntHead)
Cond			
Gram SG	16.8%	19%	16.4%
Gram PL	9%	11.1%	10.73%
Ungram SG	10.2%	16.14%	14.7%
Ungram PL	21.3%	29.4%	30.8%

Table 2. Types of errors

Percolation	Cue	Wrong N1	Wrong N2	Inverse
N1+ NumberN2	N2	N1+ NumberV	N2+ NumberV	N2 + NumberN1



References [1] Bock & Miller, 1991. [2] Eberhard et al., 2005. [3] Wagers et al., 2009. [4] Parker et al., 2019. [5] Paape et al. (preprint). [6] Patson & Husband 2016. [7] Badecker & Kuminiak, 2007. [8] Yadav et al., 2021