Representational agreement attraction: Evidence from illusory feature conjunction in Hebrew

Mandy Cartner, Maayan Keshev, Stav Lipitz, Brian Dillon and Aya Meltzer-Asscher

Agreement attraction is the phenomenon whereby ungrammatically inflected verbs may be erroneously licensed when a noun in the sentence matches their features, in production [1] and comprehension [2-3]. In this study we find that, in Hebrew, a similar effect arises when an ungrammatical verb matches a *conjunction* of features across nouns, while neither fully matches it (1). This finding provides evidence for representational interference in sentence processing.

(1) The fan.F.SG of the star.M.PL still wait.F.PL

Agreement attraction is usually attributed to *retrieval* [4] or *representational interference* [5-6]. In retrieval based accounts, agreement attraction is attributed to the presence of a fully matching distractor which is mis-retrieved by the verb with some probability. Representational accounts, in contrast, attribute agreement attraction to occasional inaccurate encoding of the elements in the sentence. Specifically, they propose that features of a distractor may spread to the representation of the target. Such representational accounts make the unique prediction that a conjunction of features across nouns may cause similar erroneous licensing (e.g., 1). Retrieval based accounts, however, limit agreement attraction to fully matching distractors. We test this prediction in Hebrew, in which nouns and verbs specify both number and gender features.

**Method**. 88 Hebrew speakers (19 excluded based on filler accuracy) participated in a binary speeded grammaticality judgment task. In 36 item sets with plural feminine verbs, we compare 4 conditions: *Target match*, *No match*, *Composite match* and *Distractor match* (Table 1).

**Results**. Accuracy was analyzed using a Bayesian logistic regression. Accuracy was lower in the *Distractor match* compared to the *No match* condition, replicating the agreement attraction effect. Accuracy was also lower in the *Composite match* than the *No match* condition (Est: 0.4, 95% CrI: [0.02, 0.82]), but still higher than the *Distractor match* condition (0.48, [0.18, 0.78]) (Figure 1A). RTs were analyzed using a Bayesian linear regression model, revealing faster RTs in the *No match* compared to *Composite match* condition (-0.06, [-0.12, -0.01]), and no difference between *Composite* and *Distractor match* conditions (-0.00, [-0.05, 0.04]) (Figure 2).

**Discussion**. Our results indicate that a composite representation of features across nouns may erroneously license an ungrammatical verb. This finding is unexpected under retrieval based accounts (Figure 1B), but follows from representational interference mechanisms. In the *Composite match* condition, although the distractor is masculine, its plural feature may spread to the target resulting in a non-veridical F.PL representation. The fact that accuracy was even lower in the *Distractor match* potentially implicates both encoding and retrieval [7], or may be due to the presence of overtly matching morphology.

**Table 1**. Example set

| Condition | | Sentence |
|---|---|---|
| Target match | | raiti še-ha-ohad**ot** šel ha-koxav**ot** adain mexak**ot** leyad ha-limozina<br>I.saw that-the-fan.F.PL of the-star.F.PL still wait.F.PL by the-limo |
| No match | * | raiti še-ha-ohed**et** šel ha-koxev**et** adain mexak**ot** leyad ha-limozina<br>I.saw that-the-fan.F.SG of the-star.F.SG still wait.F.PL by the-limo |
| Composite match | * | raiti še-ha-ohed**et** šel ha-koxav**im** adain mexak**ot** leyad ha-limozina<br>I.saw that-the-fan.F.SG of the-star.M.PL still wait.F.PL by the-limo |
| Distractor match | * | raiti še-ha-ohed**et** šel ha-koxav**ot** adain mexak**ot** leyad ha-limozina<br>I.saw that-the-fan.F.SG of the-star.F.PL still wait.F.PL by the-limo |

| **M.SG** | **M.PL** | **F.SG** | **F.PL** |
|---|---|---|---|
| ∅ | *-im* | *-et (-at, -a)* | *-ot* |

**Table 2.** Number and gender marking on nouns and present tense verbs in Hebrew.

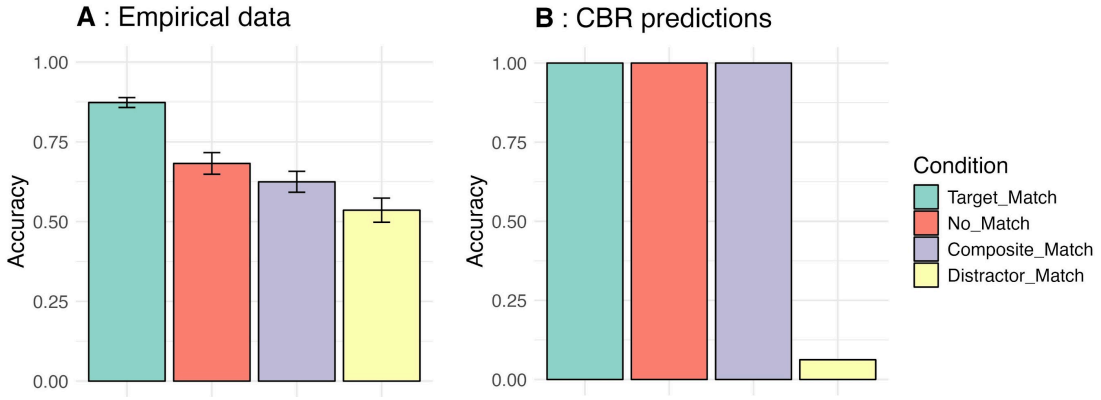


**Figure 1. A:** Mean accuracy of acceptability judgments. **B:** Judgment accuracy predicted by cue-based retrieval. Simulation assumes equal cue weights, decay = 0.5, max activation = 1.5, penalty = -0.6, noise = 0.45.

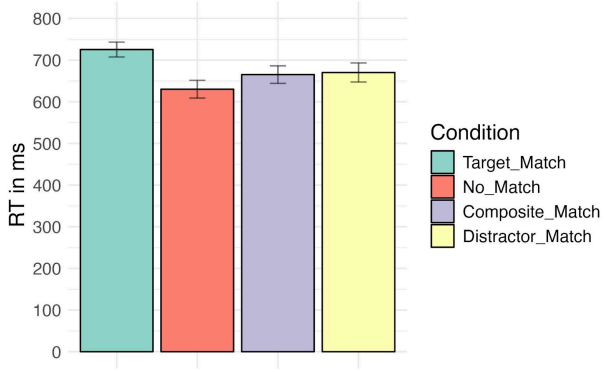


**Figure 2.** Mean RTs in correct trials.

**[1]** Bock & Miller (1991) *Cogn. Psychol.* **[2]** Wagers, Lau & Phillips (2009) *JML*; **[3]** Pearlmutter, Garnsey, & Bock (1999) *JML*. **[4]** Lewis, Vasishth & Van Dyke (2006) *TiCS.* **[5]** Bock, Eberhard, Cutting, Meyer & Schriefers. (2001) *Cogn. Psychol*. **[6]** Eberhard, Cutting & Bock. (2005) *Psychol. Rev*. **[7]** Yadav, Smith, Reich & Vasishth (2023) *JML.*