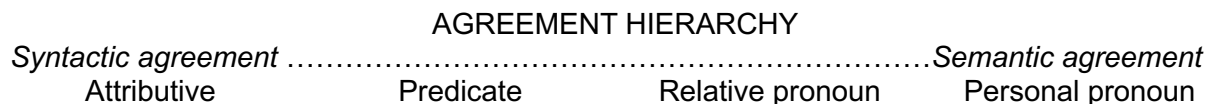


Semantic and syntactic agreement in Russian

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Agreement can be seen as a window into the mind's representation of the interface between form and meaning. This is because distinctions in formal features, such as number or grammatical gender, correlate with distinctions in the real world, such as numerosity or natural gender. In order to understand the nature of this interface, it is informative to consider cases where there is a conflict between syntactic and semantic agreement. For example, in Russian, the word *vrach* ("doctor") is syntactically masculine, but it may refer to a female individual. Thus, an agreeing element will bear either masculine or feminine features depending on whether semantic or syntactic agreement is involved.

According to the agreement hierarchy (Corbett, 1979, *Journal of Linguistics*) the preference for syntactic vs. semantic agreement varies cross-linguistically as a function of the type of element that agrees with the noun, with attributive dependencies (e.g. determiner-noun or adjective-noun dependencies within the noun phrase) occupying the syntactic agreement extreme of the hierarchy, and personal pronouns at the semantic agreement extreme, with predicate and relative pronoun dependencies occupying intermediate positions.



Here, we report a web-based rating study designed to test the predictions of the agreement hierarchy as it applies to dependencies involving Russian nouns similar to *vrach*.

In the experiment, 120 participants rated 48 sentences like 1a-h (see p.2) on a scale of 1 (least acceptable) to 6 (most acceptable). Experimental items used syntactically masculine target nouns like *vrach* (doctor), referring to a female referent (creating a conflict between syntactic and semantic gender), with each item using a different target noun. The experiment manipulated dependency type: whether the element agreeing with the noun was attributive (a modifying adjective as in 1a,b), predicative (a past tense verb, as in 1c,d), a relative pronoun (as in 1e,f) or a personal pronoun (as in 1g,h). We also manipulated semantic vs. syntactic gender match. In the semantic match conditions (1a,c,e,g), the agreeing element bore feminine morphology (thus agreeing with the natural gender of the referent of the "doctor"), while in the syntactic match conditions (1b,e,f,h) it bore masculine morphology (thus agreeing with the grammatical gender of the lexical item *vrach*).

Summary statistics are shown in Fig 1 (p.2). Ratings were analysed using Bayesian ordinal linear mixed effects models. An initial model comparing syntactic vs. semantic agreement within each dependency type showed a syntactic agreement preference for attributives ($b=3.15$, $CrI=[2.64,3.66]$), a semantic agreement preference for predicates ($b=-8.17$, $CrI=[-9.02,-7.34]$) and personal pronouns ($b=-8.01$, $CrI=[-8.96,-7.13]$), and no preference for relative pronouns ($b=-0.09$, $CrI=[-0.5,0.32]$). A second model used interaction contrasts to measure the extent to which the preference for semantic or syntactic agreement differed among dependency types. Compared with the baseline relative pronoun conditions, the attributive conditions had a greater syntactic agreement preference ($b=3.45$, $CrI=[2.93,3.97]$), while the predicate and personal pronoun conditions had a greater semantic agreement preference (pred: $b=-7.93$, $CrI=[-8.94,-7.02]$; pronoun: $b=-7.5$, $CrI=[-8.43,-6.64]$). The preference orderings among attributive, relative and personal pronoun dependencies are therefore consistent with the agreement hierarchy, but the predicate dependencies are more semantically oriented than predicted. We believe that the inclusion of the name in the sentence (e.g. "Tatyana Ivanova" in 1c,d) in the predicate condition led to an early commitment to the semantic gender interpretation, which was not revised at the point where "doctor" was later processed. We are currently running a version of the experiment that introduces the female character via a picture, rather than via the target sentence.

1a. Attributive (adjective-noun): semantic gender match

Татьяна Ивановна - **наша** врач из больницы №7.
Tatyana Ivanova (is) **our[fem]** doctor from hospital number 7.

1b. Attributive (adjective-noun): syntactic gender match

Татьяна Ивановна - **наш** врач из больницы №7.
Tatyana Ivanova (is) **our[masc]** doctor from hospital number 7.

1c. Predicate (verb-subject): semantic gender match

Татьяна Ивановна **была** врачом в больнице №7.
Tatyana Ivanova **was[fem]** a doctor at hospital number 7.

1d. Predicate (verb-subject): syntactic gender match.

Татьяна Ивановна **был** врачом в больнице №7.
Tatyana Ivanova **was[masc]** a doctor at hospital number 7.

1e. Relative pronoun: semantic gender match

Татьяна Ивановна - врач, **которая** принимает в больнице №7.
Tatyana Ivanova (is) a doctor **who[fem]** works at hospital number 7.

1f. Relative pronoun: syntactic gender match

Татьяна Ивановна - врач, **который** принимает в больнице №7.
Tatyana Ivanova (is) a doctor **who[masc]** works at hospital number 7.

1g. Personal pronoun: semantic gender match

Татьяна Ивановна - врач, **она** принимает в больнице №7.
Tatyana Ivanova (is) a doctor; **she[fem]** works at hospital number 7.

1h. Personal pronoun: syntactic gender match.

Татьяна Ивановна - врач, **он** принимает в больнице №7.
Tatyana Ivanova (is) a doctor; **he[masc]** works at hospital number 7.

Figure 1: Box plot showing median ratings and distributions for the eight conditions

