Animate-accusative agreement marking in Polish activates both semantic and grammatical animacy: eye-tracking evidence

Zuzanna Fuchs (Univ. of Southern California), Anna Runova (Univ. of Southern California)

Background In Polish, linguistic elements (ex. adjectives) agree with a head noun in grammatical gender (masc., fem., neut.), number, and case; agreement is evident on suffixes. Agreement with masc. nouns makes a further distinction in animacy: in the accusative, an adjective agreeing with a masculine animate (M.A) noun takes the suffix *-ego* (ex. *Kup zielonego żółwia.* 'Buy (the) green turtle(M.A).') while an adjective agreeing with a masculine inanimate (M.I) noun takes the suffix *-y* (ex. *Kup zielony długopis.* 'Buy (the) green pen(M.I).') **[1]**. Prior work has shown that processing these agreement suffixes activates both a masculine gender feature and an independent animacy feature **[2]**. However, this work did not consider a special class of nouns that are semantically inanimate but grammatically animate (M.X), in that agreeing adjectives take the *-ego* suffix (ex. *Kup zielonego banana.* 'Buy (the) green banana(M.X).'). It therefore remains an open question whether this agreement marking tracks semantic animacy or abstract grammatical "animacy" (henceforth grammatical animacy) analogous to abstract grammatical gender, or both.

Aims We test whether the suffix *-ego* activates semantic animacy and/or grammatical animacy, building on prior work investigating facilitative processing of noun categorization features **[2,3]**.

Methods Native Polish speakers (n=47) living in Warsaw, Poland completed a Visual World eye-tracking task with displays containing three images, paired with auditory prompts **[Example 1]**. The distractor always had the opposite gender and animacy as the target; gender and animacy of the competitor were manipulated as in **Table 1**. Using the Covered Box Paradigm **[4] [Figure 1]**, one of the images was hidden until 200ms after the onset of the target noun in the auditory prompt. This ensured that gazes to the target in critical conditions were not inflated by non-linguistic preferences for looking at animate objects **[5]**. The study was fully counter-balanced; given the aims, here we discuss results only for M.A and M.X targets, when the corresponding target images were initially hidden by the box.

Predictions Given prior work, we expect more fixations to target in no-match than match conditions. If *-ego* activates semantic animacy, we expect looks to M.A and M.X targets to be reduced relative to the no-match condition in presence of a F.A competitor, and to be reduced for M.X targets in the presence of an M.A competitor. If *-ego* activates grammatical animacy, we expect looks to M.A targets to be reduced for M.X competitors.

Results Cluster-based permutation analyses **[6]** were used to identify time bins in which looks to target differed by condition **[Figure 2]**. Separate analyses were run for each target type and each partial-match condition, with condition as a three-level categorical variable treatment-coded to compare the partial-match condition (reference level) to the match and no-match conditions. Significant clusters for the M.A targets for the contrast with no-match were found for F.A competitors (2750-2850ms, $p=0.02$) and M.X competitors (2650-2950ms, $p<0.001$). For M.X targets, significant clusters for the contrast with no-match were found for M.A competitors (2550-2950ms, $p<0.001$) but not F.A competitors. Notably, there were less looks to M.X targets with M.A competitors than in the match condition (2500-2850ms, $p<0.001$).

Implications We find that *-ego* activates semantic animacy (reduced looks to M.A targets for F.A competitors; reduced looks to M.X targets for M.A competitors, though not F.A competitors, partly aligning with predictions). We also find that *-ego* activates grammatical animacy (reduced looks to M.A targets for M.X competitors). This is novel evidence for agreement marking that activates both a semantic feature and an abstract category feature grammaticalized from it, though participants attend more to the semantic feature (cf. for M.X targets: match > M.A competitors).

Example 1
Sample auditory prompt (M.A target)
Wskarz zielon-ego żółwia.
indicate green-M.ACC turtle.M.ACC.ANIM
“Indicate the green turtle.”

Figure 1 Box disappears 2500ms from start of trial; targets were covered in half of experimental trials, distractors in other half.

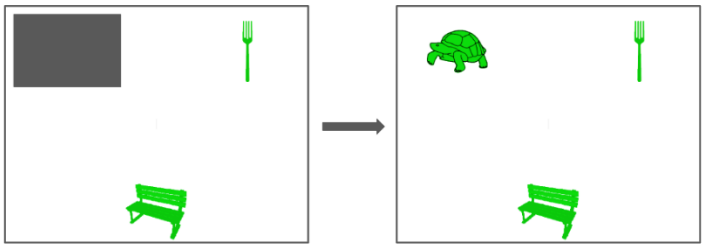


Table 1 Critical conditions for MA and MX targets; conditions for counter-balancing not shown.

Condition	Target	Competitor	Distractor		Target	Competitor	Distractor
no-match	**M.A**	F.I	F.I		**M.X**	F.I	F.I
partial-anim	**M.A**	F.A	F.I		**M.X**	F.A	F.I
partial-gen	**M.A**	M.I	F.I		**M.X**	M.I	F.I
partial-gram	**M.A**	M.X	F.I		**M.X**	M.A	F.I
match	**M.A**	M.A	F.I		**M.X**	M.X	F.I

Figure 2a Looks to masculine-animate (M.A) targets by condition

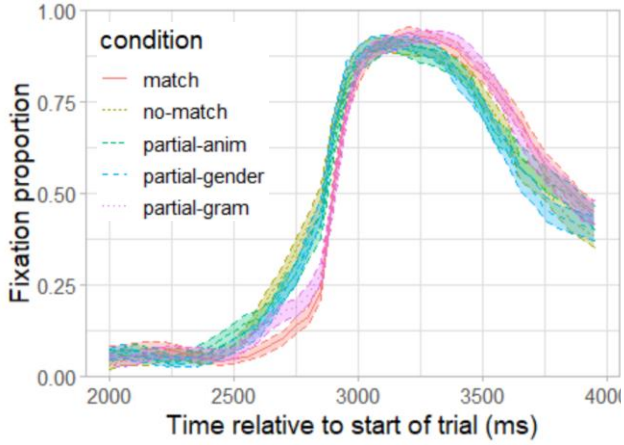
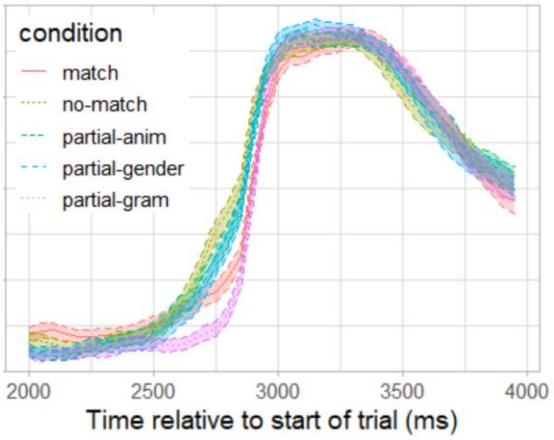


Figure 2b Looks to masculine grammatically animate (M.X) targets by condition



References

[1] Corbett, G. (1983). The Number of Genders in Polish. *Papers and Studies in Contrastive Linguistics*, 16, 83–89. **[2]** Fuchs, Z. (2023, September). *Processing agreement morphology indexing more than one feature activates both features independently: Evidence from Polish VWP* [Conference presentation]. Architectures and Mechanisms for Language Processing, San Sebastian, Spain. **[3]** Fuchs, Z. (2023). Processing of grammatical gender agreement morphemes in Polish: evidence from the Visual World Paradigm. *Morphology*. **[4]** Schwarz, F., Bill, C., & Romoli, J. (2019). Reluctant Acceptance of the Literal Truth: Eye Tracking in the Covered Box Paradigm. *Proceedings of Sinn Und Bedeutung*, 20, 61–78. **[5]** New, J., Cosmides, L., & Tooby, J. (2007). Category-specific attention for animals reflects ancestral priorities, not expertise. *PNAS*, 104(42), 16598–16603. **[6]** Maris, E., & Oostenveld, R. (2007). Nonparametric statistical testing of EEG- and MEG-data. *Journal of Neuroscience Methods*, *164*(1), 177–190.