

Phrasal level features in agreement production: Evidence from multiple possessors

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Plural nouns in the modifiers of a subject affect the processing of agreement with the singular head noun, labeled as agreement attraction effects. Previous studies found that the first local noun (*the gates*) in (1a) in a stacked PP modifier induces more plural agreement than the second one (*the castles*) in (1b). Among the analyses of this asymmetry, the hierarchical analysis argues that the first local noun is hierarchically closer to the head noun and thus interferes with its encoding to a larger extent (Franck et al. 2002). The linear analysis attributes the asymmetry to the linear distance between the local noun and the head noun. A recent, phrasal analysis argues that the modifier phrase (*the gate(s) of the castle(s)*) primarily interferes with the head noun (Yoo and Shen 2024); as the first local noun in (1a) is the head of the modifier phrase, it has a larger effect.

Unlike previous studies, this study investigates two constructions where the local nouns precede the head noun, namely the stacked possessor construction (StackedPoss) in (2) and the conjoined possessor construction (ConjPoss) in (3). Given the structure and word order of the local nouns, the linear analysis predicts that in both cases, the second local noun induces greater attraction effects, as the second local noun is linearly closer to the head noun. In the syntax literature, the first conjunct is argued to be higher than the second conjunct (see Zhang 2010) and the first possessor is higher than the second. The hierarchical analysis thus predicts that in both cases, the first plural local noun induces greater attraction effects, as the first local noun is hierarchically closer to the head noun. The phrasal analysis predicts that the second local noun induces more attraction effects in (2) as it is the head noun of the entire possessor phrase (*the congresswoman's cameraman*), but no asymmetry in (3), as neither local noun is the head.

Experiment We conducted two 2-alternative-forced-choice experiments, one for each construction. The target conditions are in (2) and (3). In each construction, the head nouns are singular and the number features on the local nouns are manipulated (SG-SG, SG-PL, PL-SG). The items were presented one word at a time for 250ms with 150ms inter-word pause. At the end of each item, the participants were asked to choose the correct verb form between a singular and a plural form (*is/are, was/were*). The choice of the plural form is evidence of attraction. Each participant saw 10 items per condition (30 target items in total), and 60 filler items. The choice and position of the correct option were balanced. In the analysis, we first compare SG-SG with the SG-PL and PL-SG conditions pooled together to check if having one plural local noun increases attraction, then compare SG-PL with PL-SG directly to check if there is any asymmetry of attraction effects.

Results and discussion 100 native speakers of English were recruited for each experiment. Responses from participants failing more than 50% of the fillers were removed from the analyses. Responses of 86 participants were included in the StackedPoss experiment and 84 in the ConjPoss experiment. Responses that took longer than 4000ms or shorter than 200ms were removed.

For all conditions, the singular verb form is correct. The correct (singular) response ratios are shown in the Figures 1 and 2. Generalized linear mixed effect models were constructed to model the response ratios and the results are shown in Tables 1-4. In stackedPoss, having one plural local noun induced more attraction effects ($p < 0.01$ in Table 1). Crucially, the second local noun induces more plural agreement than the first local noun ($p = 0.04$ in Table 2). In conjPoss, having one plural local noun did not induce more attraction effects ($p = 0.97$ in Table 3). Crucially, the asymmetry between the local nouns was not significant ($p = 0.14$ in Table 4).

The patterns are predicted by the phrasal analysis, and not the hierarchical or the linear analysis. The feature of the modifier phrase (rather than individual nouns inside the phrase) plays a primary role in interfering with the encoding of the subject. In stackedPoss, the second local noun heads the possessor phrase and thus determines the feature of the entire modifier, so it affects the encoding more than the first local noun. In conjPoss, neither local noun heads the conjunction phrase thus neither local noun induces more attraction effects than the other.

- (1)
 - a. *The key to [the gates of [the castle]] are missing.
 - b. *The key to [the gate of [the castles]] are missing.
- (2) Target conditions for StackedPoss experiment
 - a. [The congresswoman's [cameraman]]'s video every year... (StackedPoss-SG-SG)
 - b. [The congresswoman's [cameramen]]'s video every year... (StackedPoss-SG-PL)
 - c. [The congresswomen's [cameraman]]'s video every year... (StackedPoss-PL-SG)
- (3) Target conditions for ConjPoss experiment
 - a. [[The congresswoman's] and [the cameraman's]] video this year... (ConjPoss-SG-SG)
 - b. [[The congresswoman's] and [the cameramen's]] video this year... (ConjPoss-SG-PL)
 - c. [[The congresswomen's] and [the cameraman's]] video this year... (ConjPoss-PL-SG)

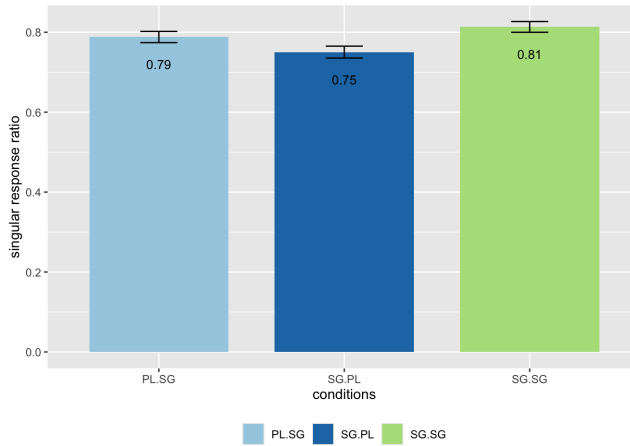


Figure 1: correct response ratio in StackedPoss

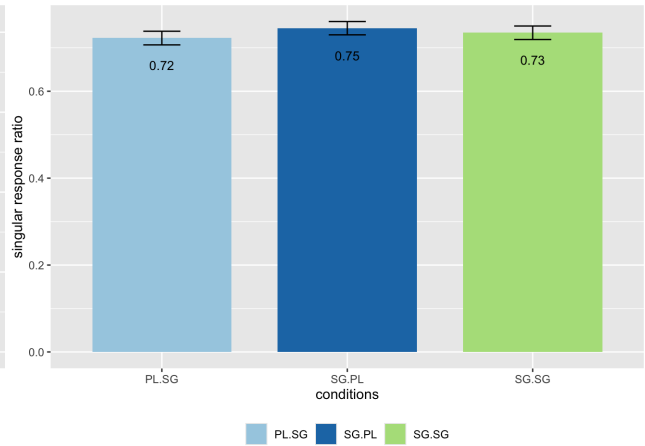


Figure 2: correct response ratio in ConjPoss

	Estimate	Std. Error	z value	Pr(> z)
Intercept	1.53	0.12	12.53	<0.0001 ***
pl	0.30	0.11	2.728	<0.01 **

Table 1: Model results for StackedPoss, SG-SG vs. (SG-PL + PL-SG)

	Estimate	Std. Error	z value	Pr(> z)
Intercept	1.53	0.12	12.51	<0.0001 ***
height	0.26	0.13	2.06	0.04 *

Table 2: Model results for StackedPoss, SG-PL vs. PL-SG

	Estimate	Std. Error	z value	Pr(> z)
Intercept	1.22	0.13	9.67	<0.0001 ***
pl	0.01	0.111	0.04	0.97

Table 3: Model results for ConjoinedPoss, SG-SG vs. (SG-PL + PL-SG)

	Estimate	Std. Error	z value	Pr(> z)
Intercept	1.22	0.13	9.65	<0.0001 ***
height	-0.20	0.14	-1.47	0.14

Table 4: Model results for ConjoinedPoss, SG-PL vs. PL-SG

Selected references: Franck, J, G Vigliocco, and J. Nicol. 2002. Language and Cognitive Processes 17 (4). Yoo, M, and Zheng S. 2024. AMLaP 30. Zhang, N. 2010. Coordination in syntax. CUP.