

Hierarchy effects in copular constructions: The PCC corner of German*

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1. Introduction

This paper presents a new generalization about agreement in German copula constructions, and proposes an analysis that ties it to other well-established phenomena. Specifically, we demonstrate that German shows hierarchy effects similar to those observed in other languages: Person Case Constraint (PCC) effects (e.g. in Romance, Basque), inverse constructions (e.g. in Algonquian), Agent Focus (e.g. in Mayan), and certain dative–nominative patterns (e.g. in Icelandic). Specifically, we propose that what German copula constructions have in common with these environments is that there are *multiple accessible DPs in the domain of a single agreement probe* (see e.g. Béjar & Rezac 2003, 2009, Anagnostopoulou 2005, Adger & Harbour 2007, Nevins 2007, Preminger 2014). We develop a Multiple Agree account (Hiraiwa 2001, Nevins 2007) which both derives apparent hierarchy effects from independent principles, and provides a new explanation for the apparent absence of “Number Case Constraint” (Num-CC) effects (cf. Nevins 2011).

2. Hierarchy effects in copular constructions

This paper contributes a new observation to the growing literature on non-canonical agreement phenomena in copula constructions; see Béjar & Kahnemuyipour 2017 (B&K) for a recent overview and references. Compare the German and English constructions in (1) and (2). While in English the copula consistently agrees with the linearly first DP (“DP₁”), in German the copula must agree with the pronoun *du*, regardless of its linear position.

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| (1) Du bist/*ist das Problem.
you.NOM are/*is the problem
‘You are/*is the problem.’ | (2) Das Problem bist/*ist du.
the problem are/*is you.NOM
cf. Eng.: ‘The problem is/*are you.’ |
|--|--|

*Many thanks to Megan Jezewski for programming the experiment. For helpful feedback and discussion, we would like to thank Boris Harizanov, Jutta Hartmann, Caroline Heycock, Laura Kalin, Omer Preminger, and audiences at NELS and MIT. Coon and Wagner gratefully acknowledge funding from the Canada Research Chair program. Authors’ names are listed in alphabetical order. Errors and misunderstandings are our own.

Due to the word order flexibility in German, it is unsurprising that the DP that does not control agreement can precede the copula. What is surprising when compared to English is that agreement with *das Problem* is impossible. Much existing work analyzes both the English and German examples in (2) as involving inversion. In this type of account, articulated for example in Heycock 2012, the 2nd person pronoun in (2) is the underlying subject of the predication, as in (3). English and German differ in that in English the inverted DP controls agreement rather than the underlying subject. Crucially, in order to exclude agreement with *das Problem* in German (2), the structure in (4), in which the base positions of the two DPs are reversed and T agrees with *das Problem*, must be ruled out.

- (3) [T [PredP *du* [Pred⁰ *das Problem*]]] (4) * [T [PredP *das Problem* [Pred⁰ *du*]]]

One possible account of the ungrammaticality of (4) is to require that in sentences in which one DP is referential (*du*) and the other denotes a description (*das Problem*), the referential element must be construed as the specifier of PredP; (4) is then ruled out for semantic reasons. Another line of analysis is to require that T agree with whichever DP is featurally more marked, regardless of its structural position (under the common assumption that 1st and 2nd is more marked than 3rd), requiring that agreement in (4) must be with *du*. This type of account, which we label a “maximize agreement account”, is articulated for Persian and Eastern Armenian by B&K. In this analysis, English and German differ in that in English, the lower DP is not visible for agreement by virtue of being accusative (see Bobaljik 2008, Heycock 2012), and thus no “maximize agreement” effects are observed.

In this paper, we propose a third interpretation of the facts, according to which PredP structures like (4) are ruled out for syntactic reasons. We assume that underlyingly, either *das Problem* or *du* can be the subject of the copula. In German, but not in English, both DPs are visible for agreement, and in the presence of an agreement probe the derivation in which *das Problem* starts out as the subject (i.e., (4)) crashes due to a hierarchy violation. The observed person hierarchy is strongly reminiscent of the weak PCC.

To distinguish empirically between these accounts, we will investigate so-called “assumed identity” constructions (see Heycock 2012 and B&K), in which DP₁ is assigned the role or place of DP₂ (e.g., when assigning roles in a play). The utility of these constructions lies in the fact that they are sufficiently semantically asymmetric to reveal the underlying subject–predicate relation. While the sentences in (1) and (2) are truth-conditionally equivalent, the role assignment *I am him* is truth-conditionally different from *He is me*.

- (5) *Person hierarchy: Part > 3* (6) *Number hierarchy: PL > SG*
- | | |
|--|--|
| <p>a. Ich bin er.
I.NOM am he.NOM</p> <p>b. *Er ist ich.
he.NOM is I.NOM</p> | <p>a. Sie sind er.
they.NOM are he.NOM</p> <p>b. *Er ist sie.
he.NOM is they.NOM</p> |
|--|--|

We show that in exactly these constructions, hierarchy effects appear. Configurations in which DP₁ is a 1st or 2nd person Participant and DP₂ is 3rd person (Part > 3) are grammatical, as in (5a). The reverse (3 > Part) is ungrammatical, as in (5b). German copula

constructions thus exhibit hierarchy effects akin to the (weak) PCC. We also observe a number hierarchy effect: PL > SG is possible (6a), whereas SG > PL is not (6b). After establishing the empirical generalization in section 3, we propose in section 4 an analysis that likens these hierarchy effects to PCC effects, drawing in particular on Multiple Agree analyses of this phenomenon. We then address a question that emerges from our account, namely why number hierarchy effects arise in German copular constructions, but are absent in ditransitive constructions. We offer a new solution that derives the absence of a “Number Case Constraint” (Nevins 2011) from independently-motivated ingredients.

3. Experiment

Here we report on the results of a sentence-rating experiment that supports the conclusion that copular constructions are subject to the person hierarchy in (5) and the number hierarchy in (6). German copula constructions are ineffable if DP₂ is higher than DP₁ on either of these hierarchies. (This contrasts with what is reported in Heycock 2012, discussed in B&K.) In this respect, German copular constructions differ from English, where all person and number combinations are well-formed. We take our results to be compatible with inversion approaches to DP₂-agreement, but argue that neither inversion nor maximize agreement accounts capture the hierarchy effects discovered here.

3.1 Design

We conducted a sentence-rating experiment for both English and German. The experiment used “assumed identity sentences” like (7a) and (7b) and systematically manipulated the person and number specification of the two DPs. To elicit ratings for the assumed identity interpretation, a role-playing background was provided in which specific roles were assigned. Each trial in the experiment consisted of rating one assignment.

- (7) a. (*pointing at you, then at your friend John*)
 You are him.
- b. (*zeigt auf dich, dann auf deinen Freund Karl*)
 Du bist er.

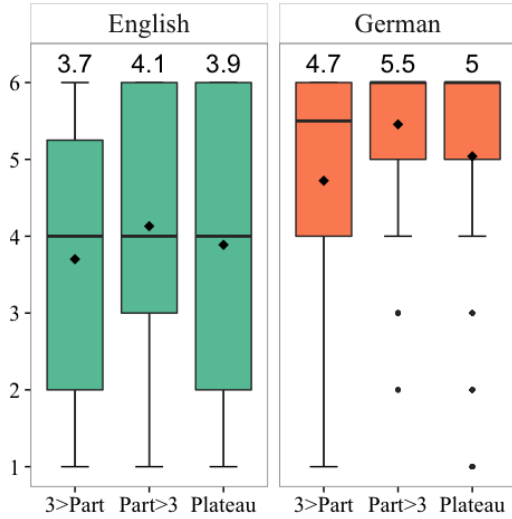
Participants were asked to rate each sentence on a 6-point scale with ‘1’ being completely unacceptable and ‘6’ being completely acceptable. As a control condition, the experiment also included uncontroversially ungrammatical sentences in which the verb agreement is inconsistent with either argument (**You am him*; **Du bin er*). 23 participants took part in the English experiment. The German experiment had 15 participants.

One unusual aspect of the experiment is that it is impossible to lexically vary the target structures (e.g., *I am you*). Given that there is only one possible lexicalization of each condition, we did not manipulate item as a random effect. All participants saw the same sentences, but the order of presentation was randomized.

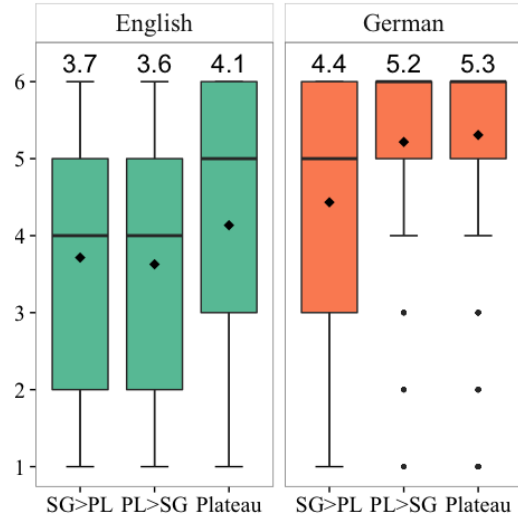
3.2 Results

The by-condition means for the person hierarchy from (5) above, averaged over number, are given in the form of boxplots in (8). In (9) we provide the means for the number hierarchy from (6), averaged over person. The number above each boxplot represents the condition mean. The column ‘Plateau’ refers to configurations in which both DPs instantiate the same value of a feature, i.e., SG>SG, PL>PL, Part>Part, or 3>3.

(8) *Effects of person hierarchy*



(9) *Effects of number hierarchy*



We analyzed the data with cumulative link mixed regression models, using the R package Ordinal (Christensen 2015). We fitted a model that predicted rating responses from the predictors (i) *person hierarchy* (Part>3 vs. 3>Part vs. Plateau), (ii) *number hierarchy* (SG>PL vs. PL>SG vs. Plateau), (iii) *language* (English vs. German), (iv) the interaction between *person* and *language*, and (v) the interaction between *number* and *language*. The factor *language* was sum-coded (English: $-.5$; German: $.5$). The 3-level factors *person* and *number* were Helmert coded. In each case, the first comparison contrasted plateau configurations (coded as $-2/3$) with the two non-plateau ones (coded as $1/3$). The second contrast compared the two non-plateau configurations to each other (for *person* Part>3: $-.5$, 3>Part: $.5$, plateau: 0; for *number* PL>SG: $-.5$, SG>PL: $.5$, plateau: 0). The models comprised the full random-effects structure, namely, random intercepts and slopes by participants for all fixed effects and the correlations between them.

The coefficients of this model are provided in (10), where ‘plt’ abbreviates ‘plateau’. The model revealed significant main effects of the person and number hierarchy: Part>3 configurations are rated higher than 3>Part configurations and PL>SG structures are rated as better than SG>PL. Crucially, there was an interaction between these hierarchies and *language* such that the effect of the two hierarchies was greater in German than in English.

In order to investigate these interactions more closely in the individual languages, we fitted a second model that nested the predictors *person hierarchy* and *number hierarchy* under the levels of the factor *language*. The full random-effects structure of the original model

was preserved. The coefficients for this model are provided in (11). The model detected that in German, 3>Part configurations are degraded relative to Part>3 configurations and that SG>PL is worse than PL>SG. Interestingly, we also found that English shared with German the preference for Part>3 over 3>Part. Notably, however, this effect was significantly smaller than in German. This effect may reflect a pragmatic preference for encoding a participant argument rather than a 3rd person argument as the subject, given the inherent availability (and topicality) of the participants of the discourse. In English, number plateau configurations were also rated higher than non-plateau configurations. This plausibly reflects the marked pragmatic status of person mismatches between the two DPs in the provided role-playing scenario, not properties of narrow syntax.

(10) <i>Full model</i>	$\hat{\beta}$ (SE)	(11) <i>Nested model</i>	$\hat{\beta}$ (SE)
<i>Person</i>		Language	2.17 (0.64) ^{***}
Plt.vs.Non-plt	0.38 (0.23)	<i>German</i>	
Part>3.vs.3>Part	-1.03 (0.23) ^{***}	<i>Person</i>	
<i>Number</i>		Plt.vs.Non-plt	0.60 (0.36)
Plt.vs.Non-plt	-1.06 (0.16) ^{***}	Part>3.vs.3>Part	-1.59 (0.37) ^{***}
PL>SG.vs.SG>PL	-0.83 (0.21) ^{***}	<i>Number</i>	
Language	2.17 (0.64) ^{***}	Plt.vs.Non-plt	-1.46 (0.27) ^{***}
<i>Person:Language</i>		PL>SG.vs.SG>PL	-1.67 (0.34) ^{***}
Plt.vs.Non-plt:Lang	0.43 (0.44)	<i>English</i>	
Part>3.vs.3>Part:Lang	-1.12 (0.41) ^{**}	<i>Person</i>	
<i>Number:Language</i>		Plt.vs.Non-plt	0.17 (0.26)
Plt.vs.Non-plt:Lang	-0.80 (0.30) ^{**}	Part>3.vs.3>Part	-0.46 (0.22) [*]
PL>SG.vs.SG>PL:Lang	-1.69 (0.40) ^{***}	<i>Number</i>	
		Plt.vs.Non-plt	-0.66 (0.17) ^{***}
		PL>SG.vs.SG>PL	0.02 (0.23)
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$		*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$	

3.3 Discussion

The results show that assumed identity copula constructions are subject to the person hierarchy (5) and the number hierarchy (6) in German. The interaction with *language* (in the full model) shows that the size of the effects are significantly greater in German than in English and hence that they go beyond mere effects of pragmatics in German. Our account, developed section 4, attributes hierarchy effects to the interaction of a ϕ -probe with two *accessible* (here, nominative) DPs. Under this analysis, *all* copula constructions in languages like German are in fact subject to hierarchy effects. But this is obscured by the possibility of surface inversion in copula constructions other than assumed identity copulas, where construing the argument higher on the hierarchy as the subject leads to a proposition that is truth-conditionally equivalent.

We should note, however, that while the configurations that violated the hierarchies received reliably lower ratings in German, they still received a relatively high rating compared to our ungrammatical controls (4.7 in (8) and 4.4 in (9), vs. 1.4 for the controls). One reason

for this difference may be that in our control cases, agreement is inconsistent with either DP, an error that is easily detectable, while in our test sentences verb agreement is consistent with one of them. However, this is still not a sufficient explanation of their relative acceptability: In copulas other than the assumed identity cases which are semantically symmetric, agreeing with the argument lower on the hierarchy is clearly unacceptable (**Das Problem ist du* in (2)). We believe that the ratings of the assumed identity sentences might be inflated because there is simply no other way of expressing the intended meaning other than resorting to a full accusative-assigning predicate, but this needs to be explored more. We also note that our experiment did not actually rule out that the relevant cases are simply realized with the more marked agreement instead, as predicted by the maximize agreement account. Our intuition is that *Er bist du* ‘He are you’ clearly cannot convey the meaning ‘he is you’, and instead it can only report a role-assignment to the referent of *du*—but this needs further testing as well.

4. Person, number, and the PCC

4.1 Proposal

We propose that the hierarchy effects in German copulas arise due to the same confluence of factors which have been proposed to cause hierarchy effects in a variety of other constructions cross-linguistically: *two accessible DPs in the domain of a single ϕ -probe*. Like other recent work in this domain (e.g. Béjar & Rezac 2003, 2009, Anagnostopoulou 2005, Adger & Harbour 2007, Nevins 2007, Preminger 2014), our account derives hierarchy effects from independent principles; the hierarchy itself has no independent status in the grammar.

We focus first on the person hierarchy effects. Note that the generalization governing the distribution of person features in German copula constructions is the same as the one governing the combinations of direct and indirect object clitics in what is known as the “weak PCC” in languages like Catalan (see Nevins 2007 and work cited there). The pattern is shown in (12). In PCC configurations, DP_1 is the indirect object and DP_2 is the direct object. In German copula constructions, DP_1 is the subject and DP_2 is the predicate.

(12) *Generalized weak PCC*

In $DP_1 > DP_2$, if DP_2 is 1ST/2ND-person, then DP_1 is 1ST/2ND-person.

We propose an account of German copula constructions which draws on recent literature on PCC effects. First, we adopt the common assumption that 1st and 2nd person DPs bear the feature [+Part(icipant)], whereas 3rd person DPs are [−Part(icipant)]. The feature [+Part] is marked. We further adopt a version of the Person Licensing Condition (PLC) in (13), which requires [+Part] to be licensed by entering into an Agree relationship with a probe (Preminger 2016, adapted from Béjar & Rezac 2003).

(13) *Person Licensing Condition:* A [+Part] feature on a DP that is a viable agreement target (as far as case, etc. is concerned), and for which there is a clausemate person probe, must participate in a valuation relation.

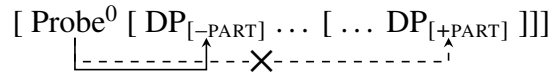
Finally, we assume that a single head may agree with more than one DP (*Multiple Agree*), as long as the resulting Agree dependency satisfies *Contiguous Agree* (14); see Hiraiwa 2001, Anagnostopoulou 2005, Nevins 2007.

(14) *Contiguous Agree*

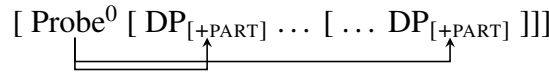
Agree in a marked feature across an unmarked intervener is prohibited.

For the case at hand, Contiguous Agree prevents Agree in the feature [+Part] over a DP bearing [−Part], correctly ruling out hierarchy-violating structures like (5b) above, shown in (15).¹ In a grammatical “plateau” configuration with two [+Part] DPs (§3), the agreeing probe can target features of both DPs without violating (14), as in (16). Finally, in hierarchy-obeying configurations (i.e., Part > 3, in (5a)), the verbal head agrees with DP₁ in [+Part] and stops; since [−Part] features require no licensing (13), ungrammaticality does not arise.

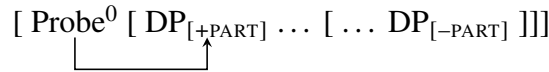
(15) *3 > Participant:



(16) Participant > Participant:



(17) Participant > 3:



This system accounts for both weak PCC effects and German copula constructions—both configurations in which two DPs are in the domain of a single agreeing probe. It furthermore provides a rationale for why no such hierarchy effect arises in English. In German, both DP₁ and DP₂ bear nominative case, and nominative DPs are accessible agreement targets in German. In English, DP₂ (the predicate nominal) is marked with accusative case and hence invisible to the agreeing verbal head (Bobaljik 2008). Because the PLC requires only *accessible* DPs to be licensed, no violation arises (see discussion in Preminger 2016).

We now turn to the effects of the number hierarchy from (6) above. We saw that German copula constructions disallow SG > PL configurations while tolerating all other combinations. A similar PCC-style account of this asymmetry becomes available if the feature calculus and licensing conditions above are extended to number features, as in (18). See Anagnostopoulou 2003, Rezac 2008, and Baker 2011 for similar conditions.

(18) *Feature Licensing Condition*: A marked feature \mathcal{F} on a DP that is a viable agreement target (as far as its case, etc. is concerned), and for which there is a clausemate \mathcal{F} probe, must participate in a valuation relation.

¹We assume that both DPs in the German copula construction are generated internally to a small clause, and that the agreeing Probe schematized in (15)–(17) is finite T⁰.

Under the assumption that [+Pl(ural)] is the marked number specification, and the ϕ -probe may license number features, then SG > PL configurations are immediately ruled out as violations of FLC, just as in the person configurations above. As was the case with person, this hierarchy effect is limited to copula constructions in German because it is only in these constructions that we find two nominative DPs, both visible to the agreeing probe.

4.2 The absence of “Number Case Constraints”

Our account of the number hierarchy effects raises an interesting question. While person restrictions in ditransitive constructions are well-documented, there do not appear to be similar restrictions with respect to number features. In other words, there is no “Number Case Constraint” in double-object clitic configurations (Nevins 2011). In light of the German facts and our account, it is not a priori clear why number does not induce hierarchy effects in ditransitive structures, as it does in copulas.²

We propose that the crucial difference between German copula constructions and PCC-inducing ditransitive structures is that only the latter induce clitic doubling. More concretely, our account of this difference relies on three independently-motivated proposals. First, we adopt the proposal that person and number are separate probes (e.g., Béjar & Rezac 2003), π^0 and $\#^0$, respectively. Second, we assume further that $\#^0$ is universally located higher in the tree than π^0 so that π^0 will always probe first (Béjar & Rezac 2003, Preminger 2011). Finally, we adopt proposals of Anagnostopoulou (2003) and others that clitic doubling renders the doubled DP invisible to subsequent operations.

As a consequence, in ditransitive constructions, clitic doubling of an indirect object as a result of Agree with π^0 removes it as an intervener, clearing the way for subsequent Agree between $\#^0$ and the direct object. Since PCC configurations always involve clitic doubling, the indirect object will never cause intervention for number agreement with the direct object, deriving the absence of “Number Case Constraint” effects, as shown in (19).

$$(19) \quad [{}_{VP} \#^0 [\pi^0 [{}_{AppIP} \boxed{DP_{IO}} [{}_{VP} \boxed{DP_{DO}}]]]] \quad = \text{Ditransitive PCC}$$

It is a general property of German that it lacks clitic doubling. Thus, Agree between π^0 and DP_1 in copula constructions does not render DP_1 invisible for subsequent Agree. DP_1 therefore still incurs intervention for Agree between $\#^0$ and DP_2 if Contiguous Agree is violated (20). Number is hence subject to the same intervention effects as person in German.

²Nevins (2011) attributes the difference in behavior between person and number to an ontological difference between the two types of features: person features are binary, while number features are privative. Thus, while 3rd person contains a negative feature specification, singular number corresponds to the absence of a feature. Notice, however, that one of the key arguments Nevins (2007) makes for 3rd person bearing a person specification applies to number as well: In English, 3rd person singular verb agreement is expressed with -s, a vocabulary item that must consequently be specified for both 3rd person and singular number. Nevins (2007) concludes from this that 3rd person cannot simply be the absence of a person feature. By the same reasoning, singular number cannot be the absence of a number feature either, contra Nevins (2011). See also Béjar 2011 (and work cited there), as well as Preminger 2014, for other problems with Nevins’ account.

$$(20) \quad [\text{TP } \#^0 [\pi^0 [\text{PredP } \boxed{\text{DP}_{\text{SUBJ}}} [\boxed{\text{DP}_{\text{PRED}}}]]]] \quad = \text{German copula}$$

5. Summary and future work

In this paper, we presented a new take on agreement patterns in German copula constructions. On the maximize agreement account, agreement in German copulas must target the featurally most specified DP. Under the alternative proposed here, agreement in German consistently targets the subject; the appearance of non-subject agreement—as in (2) above—is the result of syntactic inversion of the predicate nominal above the subject. On both accounts, the corresponding effect does not arise in English, because the predicate nominal is accusative, and thus inaccessible to an agreeing probe.

New to our account is the finding that certain subject–predicate combinations are simply ineffable in semantically asymmetric so-called ‘assumed identity sentences’. While Heycock (2012) reports equivalent sentences to be grammatical under various feature combinations, we presented evidence for hierarchy effects. We adopted components of existing PCC accounts in order to model the German effects. Specifically, our proposal made use of the Person Licensing Condition, requiring [+Part] features on accessible DPs to be licensed by an agreeing probe. Person hierarchy effects are thus correctly expected to appear when there is a many-to-one relation between accessible DPs and the agreeing probe.

In the last section, we addressed the question of why number effects appear in German copula constructions, despite the fact that there is no constraint restricting combinations of direct and indirect object clitics based on their number features (i.e. no “Num-CC”). Our account relied on the independently-motivated proposal that clitic-doubling renders the doubled DP invisible to future operations. Assuming that the ϕ -probe is complex, and that person (π^0) probes before number ($\#^0$), the number probe will always have access to the direct object (DP_2), since π^0 will remove the indirect object (DP_1) as an intervener. However, since no clitic-doubling is present in German copula constructions, the subject DP_1 will intervene between the probe and the lower DP_2 . This proposal explains the absence of Num-CC effects in ditransitives, without resorting to ontological differences in the nature of person and number features (contra Nevins 2011).

Finally, our account makes a number of testable predictions. Specifically, all else being equal, we expect to find hierarchy effects in copula constructions in other languages, so long as (i) both DPs in predicate nominals are accessible to agreement, and (ii) there is a clausemate agreeing probe (see Preminger 2016). The appearance of special agreement in copula constructions has been described in a number of languages (see Heycock 2012 and B&K, i.a.), and it remains to be seen whether our approach can be applied to these cases as well. Furthermore, we predict that both person and number hierarchy effects may be present, unless clitic-doubling is involved. Since PCC constructions involve clitic-doubling by definition (i.e. it is not the combinations of arguments that are ruled out, but combinations of clitic-doubles), these are correctly expected to lack number effects.

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