

# Hierarchy effects in copula constructions\*

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This paper develops a generalization about agreement in German copula constructions described in Coon, Keine, and Wagner (2017), and proposes an analysis that ties it to other well-established hierarchy phenomena. Specifically, we show that “assumed-identity” copula constructions in German exhibit both person and number hierarchy effects, and that these extend beyond the “non-canonical” or “inverse” agreement patterns described in previous work on copula constructions (see e.g. Béjar and Kahnemuyipour 2017 and works cited there). We present experimental evidence to support this generalization, and then develop an account that unifies it with hierarchy phenomena in other languages, with a focus on PCC effects. Specifically, we propose that what German copula constructions have in common with PCC environments is that there are multiple accessible DPs in the domain of a single agreement probe (see, e.g., Béjar and Rezac 2003, 2009, Anagnostopoulou 2005, Nevins 2007). We also offer an explanation as to why *number* effects are present in German copula constructions but notably absent in PCC effects. We then place our account within the broader context of constraints on predication structures.

## 1 Agreement in copular constructions

In many languages, copula constructions exhibit unusual agreement patterns (see Béjar and Kahnemuyipour 2017 for a recent overview and references). This paper investigates the syntax of such patterns on the basis of German. An example is provided in (1) and (2), which shows the agreement options in *predicational* and *specificational* copula constructions in German and English. The agreement pattern in English is unsurprising: the copula consistently agrees with the linearly first DP (which we will refer to as “DP<sub>1</sub>” here), but the same is not the case for German. Here the copula must agree with the pronoun *du* ‘you’, regardless of its linear position.

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\* Many thanks to Megan Jezewski for programming the experiments. For helpful feedback and discussion, we would like to thank Boris Harizanov, Jutta Hartmann, Caroline Heycock, Laura Kalin, Omer Preminger, and audiences at NELS 47 (UMass Amherst), MIT, and the Manitoba Workshop on Person (Winnipeg). 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.



The ungrammaticality of (4) is surprising in light of its structural analogy to the wellformed structure in (3). We now consider three potential ways in which this contrast could be explained.

One option is what we will refer to as the MAXIMIZE AGREEMENT ACCOUNT. This line of account relates the ungrammaticality of (4) to the agreement between  $T^0$  and *das Problem*, and requires that  $T^0$  agree with the featurally most marked DP, where 1st and 2nd person DPs are more marked than 3rd person DPs. As indicated in the gloss in (1) and (2), both DPs bear nominative case in German copular constructions, and both are hence visible to  $\varphi$ -agreement, in contrast to English (in which the predicate nominal is in the accusative). It is then possible that the availability of the 2nd person DP *du* in (4) prevents agreement with the 3rd person DP *das Problem*, leading to ungrammaticality. An account along these general lines has been proposed for Eastern Armenian by Béjar and Kahnemuyipour (2017).

A second line of approach to the ungrammaticality of (4) is to rule it out for SEMANTIC reasons. Such an account requires that in sentences in which one DP is referential (*du*) and the other denotes a description (*das Problem*), the description has to originate in the lower position and it is consequently the referential DP that controls agreement. In (4), *das Problem* must then necessarily start out as the lower DP. Many accounts treat copula constructions like (4), in which the first DP seems to act like the predicate of the sentence (so called ‘specificational copulas’), as indeed involving predicate inversion (Heggie 1988, i.a.). Similarly, Heycock (2012: 230–231) proposes an equative analysis of specificational copula that is nevertheless asymmetric and involves inversion of the lower DP. In this analysis, a  $\text{Pred}^0$  head ( $F^0$  in her terminology) takes the “more intensional” DP as its complement and the referential DP as its specifier.<sup>1</sup> On such an account, (4) is ruled out because its  $\text{PredP}$  structure violates a semantic constraint. Another semantically-based constraint that might plausibly rule out the  $\text{PredP}$  structure in (4) has been proposed in terms of  $\theta$ -role assignment by Moro (1997: 37–38).

A third potential line of explanation for the ungrammaticality of (4) is what we will refer to as the PCC ACCOUNT. This account treats the underlying  $\text{PredP}$  structure as illformed for morphosyntactic reasons, akin to the Person Case Constraint (PCC; see Perlmutter 1971, Bonet 1991, Anagnostopoulou 2003, 2005, Nevins 2007; and Anagnostopoulou to appear for an overview). As is well-known, many

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<sup>1</sup> Building on work by Romero (2005), Heycock proposes that either the specifier DP is of type  $e$  and the complement DP of type  $\langle s, e \rangle$ , or the specifier is of type  $\langle s, e \rangle$  and the complement of type  $\langle s, \langle s, e \rangle \rangle$ .

languages impose restrictions on the person values of DPs within a certain domain (typically ditransitive constructions, but not limited to those). To give just one example, in Catalan, ditransitive constructions in which the indirect object is 3rd person and the direct object is 1st or 2nd person are ungrammatical, whereas the inverse is possible.

(5) *Person Case Constraint in Catalan (Bonet 1991: 178)*

- a. En Josep, **te** 'I va recomenar la Mireia.  
 the Josep, 2CL 3CL recommended the Mireia  
 'Mireia recommended him (Josep) to you.' (✓ 2 > 3)
- b. \*A en Josep, **te** **li** va recomenar la Mireia.  
 to the Josep, 2CL 3CL recommended the Mireia  
 intended: 'Mireia recommended you to him (Josep).' (\*3 > 2)

The contrast between (3) and (4) clearly bears a resemblance to the contrast in (5), which might suggest an analytical connection, which is in fact what we will propose in section 4.

These three lines of analysis are summarized in (6).

- (6) a. MAXIMIZE AGREEMENT ACCOUNT:  
 copula agreement has to target the featurally most marked DP
- b. SEMANTIC ACCOUNT:  
 the intensional DP must be the complement of Pred<sup>0</sup>
- c. PCC ACCOUNT:  
 certain constellations of DPs within a domain are impossible for morphosyntactic reasons

In this paper, we investigate hierarchy effects in a specific type of German copula clauses, so-called “assumed identity” constructions (see Heycock 2012 and Béjar and Kahnemuyipour 2017). In these constructions, DP<sub>1</sub> is assigned the role or place of DP<sub>2</sub> (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 in a way that standard predicational or specificational copula clauses like (1) and (2) do not. Thus, while the sentences in (1) and (2) are truth-conditionally equivalent,

the role assignment *I am him* is clearly truth-conditionally different from *He is me*. We observe that in such constructions, German exhibits both person and number hierarchy effects, as illustrated in (7) and (8). It is possible for DP<sub>1</sub> to be a Part(icipant) DP (that is, 1st or 2nd person) and for DP<sub>2</sub> to be 3rd person, as in (7a), but the inverse is ungrammatical (7b). This contrast does not exist in English, where *I am him* and *He is me* are both well-formed. We additionally observe a number hierarchy effect, such that it is possible for DP<sub>1</sub> to be plural and for DP<sub>2</sub> to be singular (8a), but not the other way around (8a).

(7) *Person hierarchy: Part(icipant) > 3*

- a. Ich bin er.  
 I.NOM am he.NOM
- b. \*Er ist ich.  
 he.NOM is I.NOM

(8) *Number hierarchy: PL > SG*

- a. Sie sind er.  
 they.NOM are he.NOM
- b. \*Er ist sie.  
 he.NOM is they.NOM

Based on the results of two rating studies presented in section 2, we argue that they provide evidence for the PCC account (6c). That is, we argue that this restriction cannot be reduced to a maximize agreement account or a semantic constraint, but that instead it requires a morphosyntactic constraint on DP combinations akin to the PCC. We discuss a possible *Multiple Agree* account in section 3 which captures both PCC and copula constructions. We also offer an explanation for why number effects are absent in PCC constructions, but present in German copula constructions.

At the same time, our investigation suggests that while a PCC account is necessary, it does not replace the need for a semantic constraint on PredP structures, in either English or German. Thus, we show in section 4 that the complex set of facts we investigate receives a principled explanation if there is both a morphosyntactic and a semantic constraint at play. Furthermore, we show that the German facts crucially differ from the Eastern Armenian data that motivate Béjar and Kahnemuyipour's (2017) maximize agreement account. For the Eastern Armenian pattern, a maximize agreement account is therefore still called for.

Our investigation of assumed-identity sentences in German thus sheds new light on the fine-grained structure of hierarchy effects in copula constructions that is largely masked in more standardly

explored predicational and specificational copula clauses, and it allows us to distinguish between a number of active constraints whose effects are otherwise difficult to tease apart.

## 2 Experiments

This section reports on the results of two sentence-rating experiments that support the conclusion that copular constructions are subject to the person hierarchy in (7) and the number hierarchy in (8) in the sense that German copula constructions are ineffable if  $DP_2$  is higher than  $DP_1$  on either of these hierarchies. (This contrasts with what is reported in Heycock 2012, discussed in Béjar and Kahnemuyipour 2017.) In this respect, German copular constructions differ from English, where all person and number combinations are well-formed.

### 2.1 Experiment 1

#### 2.1.1 Design

Experiment 1 investigates the status of assumed-identity sentences like (9a) and (9b) in both English and German and compares them to uncontroversially ungrammatical control structures. We systematically manipulated the person and number specification of  $DP_1$  and  $DP_2$ . To elicit ratings for the assumed-identity interpretation, a role-playing background was provided in which specific roles were assigned. Each trial in the experiments consisted of rating one such role assignment.

- (9) 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 first experiment 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.

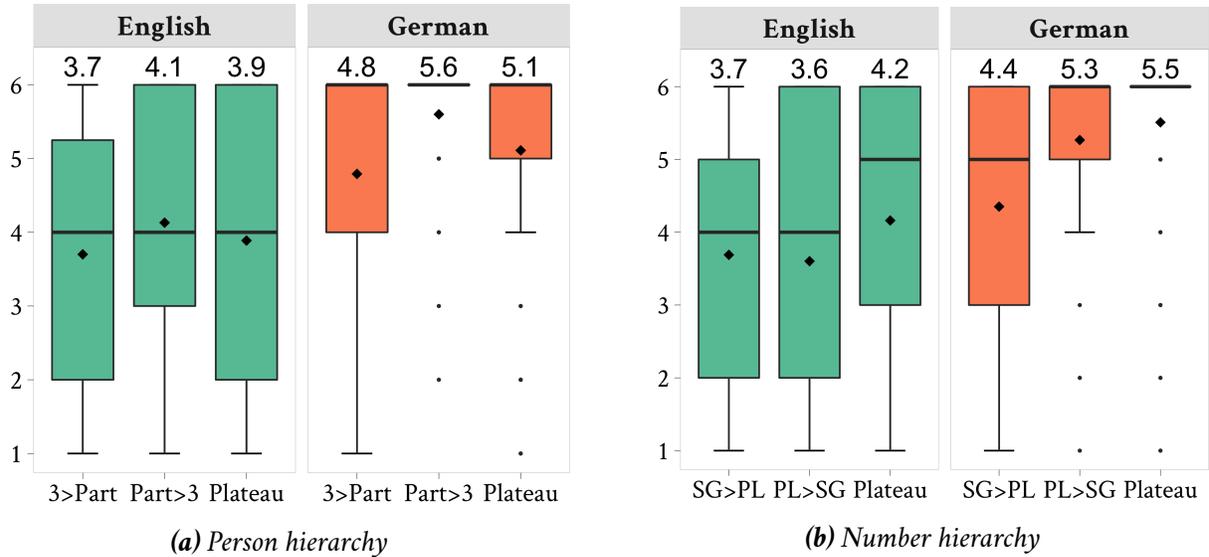
Because the items in the experiments only used pronouns, one unusual consequence of the type of sentences of interest here is that it is impossible to lexically vary the target structures (e.g., *You are him*). Because there is only one possible lexicalization of each condition, we did not manipulate item as a random effect. As a result, all participants saw the same sentences, but the order of presentation was randomized.

### 2.1.2 Results

While the items we used contained every possible person and number combination of DP<sub>1</sub> and DP<sub>2</sub>, we will limit our attention primarily to the role of person and number hierarchies in (7) and (8) above. We consequently put aside combinations in which (i) DP<sub>1</sub> is 1st person and DP<sub>2</sub> is 2nd person ('1>2') or (ii) DP<sub>1</sub> is 2nd person and DP<sub>2</sub> is 1st person ('2>1'); for these see fn. 2 and fn. 3.

The distribution of ratings for the person hierarchy from (7), averaged over number, is given in the form of boxplots in Figure 1(a). '3>Part' represents the distribution of ratings for configurations in which DP<sub>1</sub> is 3rd person and DP<sub>2</sub> is a participant (i.e., 1st or 2nd person). 'Part>3' correspondingly refers to configurations where DP<sub>1</sub> is a participant DP and DP<sub>2</sub> is 3rd person. Finally, the column 'Plateau' represents configurations in which both DPs instantiate the same person value (i.e., 1>1, 2>2, and 3>3). The number above each boxplot represents the condition mean. Analogous boxplots for the number hierarchy in (8) are provided in Figure 1(b). Here, the column 'Plateau' refers to SG>SG and PL>PL configurations.

We analyzed the data using cumulative link mixed-effects regression modeling, 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,



**Figure 1.** By-condition distribution of ratings in Experiment 1. The numbers above each plot represent the condition mean.

namely, random intercepts and slopes by participants for all fixed effects and the correlations between them.

The coefficients of this model are provided in Table 1(a), 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 the factor *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 Table 1(b). 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

**Table 1.** Results of cumulative link mixed-effects modeling for Experiment 1 (see main text for details)

<b>(a) Full model</b>		<b>(b) Nested model</b>	
	$\hat{\beta}$ (SE)		$\hat{\beta}$ (SE)
<i>Person</i>		<i>Language</i>	
Plt.vs.Non-plt	0.38 (0.23)		2.17 (0.64)***
Part>3.vs.3>Part	-1.03 (0.23)***	<i>German</i>	
<i>Number</i>		<i>Person</i>	
Plt.vs.Non-plt	-1.06 (0.16)***	Plt.vs.Non-plt	0.60 (0.36)
PL>SG.vs.SG>PL	-0.83 (0.21)***	Part>3.vs.3>Part	-1.59 (0.37)***
<i>Language</i>		<i>Number</i>	
	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)

\*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$

\*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$

availability (and topicality) of the participants of the discourse. Importantly, because the effect in German was significantly larger in German, it seems to go beyond this pragmatic effect.<sup>2</sup>

<sup>2</sup> In a separate analysis, we investigated the ratings for 1>2 and 2>1 configurations. Collapsing across number, 1>2 configurations received a mean rating of 4.5 in German, whereas 2>1 configurations received a mean rating of 5.5 (in English both received a rating of 3.9). We fitted a mixed-effects model using the predictors *person* (1>2 vs. 2>1), *number* (see main text) and *language* (also see main text). This model revealed a main effect of *person* such that 2>1 configurations received a higher rating than 1>2 configurations ( $\hat{\beta} = 0.92, z = 3.3, p < .01$ ); a main effect of *number* such that PL>SG was rated as better than SG>PL ( $\hat{\beta} = -1.0, z = -2.6, p < .05$ ); a main effect of *language* such that the ratings were higher in German than in English ( $\hat{\beta} = 2.2, z = 2.6, p < .01$ ); and crucially two interactions: First, the effect of the person hierarchy was larger in German than in English ( $\hat{\beta} = 2.1, z = 3.8, p < .01$ ); and second, the same holds for the number hierarchy ( $\hat{\beta} = -2.2, z = -2.9, p < .01$ ). Next, we fitted a model that nested the person and number hierarchies under the levels of *language* (analogously to the analysis reported in the main text). For English, this model revealed no effects (all  $p$ 's  $> .1$ ), but for German, the model showed that 2>1 configurations received a higher rating than 1>2 ( $\hat{\beta} = 1.9, z = 4.2, p < .01$ ), and that PL>SG configurations received a higher rating than SG>PL ones ( $\hat{\beta} = -2.1, z = -3.2, p < .01$ ).

This investigation of 1>2 and 2>1 configurations thus replicates the number hierarchy effect in German, but it also indicates that 1>2 configurations are degraded relative to 2>1 configurations in German. The status of this generalization is not entirely clear to us, however. Informal judgments do not indicate that sentences like (i) are degraded, and in this respect they clearly differ from the hierarchy violations discussed in the main text (also see fn. 3 for an analogous analysis for Experiment 2).

- (i) Ich bin du.  
I am you

We will therefore tentatively put aside 1>2 and 2>1 configurations in the main text.

Finally, the control items, which involved agreement on the copula that is compatible with neither the features of DP<sub>1</sub> or DP<sub>2</sub> (e.g., \**You am he*; \**Du bin er*), and which are hence uncontroversially ungrammatical, received a mean rating of 1.4 in both English and German.

### 2.1.3 Discussion

The results provide evidence that assumed-identity copula constructions are subject to the person hierarchy (7) and the number hierarchy (8) in German. The interactions of both hierarchies with the factor *language* (in the full model) reveals that the size of the effects is significantly greater in German than in English, and hence that these effects go beyond mere effects of pragmatics in German (as any pragmatic effect would also be present in English).

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 (4.8 in Figure 1(a) and 4.4 in Figure 1(b), vs. 1.4 for the controls). One reason for this difference may be that in our control cases, agreement is incompatible with either DP, an error that is easily detectable, while in our test sentences, verb agreement is consistent with one of them. A second relevant factor, which we will investigate more closely in Experiment 2, is that hierarchy-violating assumed-identity sentences are ineffable in the sense that they do not have a grammatical counterpart apart from foregoing the use of the copula in favor of a full accusative-assigning predicate. The lack of a clearly grammatical competitor might then have increased the ratings of the hierarchy-violating sentences. We return to this question in Experiment 2 and again in section 4 below.

Another worry one may have is to what extent pragmatic effects as the one observed in English may confound issues. Obviously a pragmatic account would not differentiate between the languages to account for the observed interactions, but there are other reasons to think that the nature of the phenomenon is really syntactic. For example, an assumed-identity sentences with a ‘camouflage DPs’ (Collins and Postal 2012) such as *meine Wenigkeit* ‘my negligibility’, which refers to the speaker but is syntactically third person, is entirely acceptable, in contrast to (7a):

- (10) Er ist meine Wenigkeit.  
 he is my negligibility  
 ‘He is me.’

## 2.2 Experiment 2

Experiment 1 only tested hierarchy-violating configurations in which the copula agrees with DP<sub>1</sub>. These configurations are degraded, but it is not clear, all else being equal, whether they are degraded because the underlying PredP structure is deviant, or because these configurations require the verb to agree with DP<sub>2</sub>, which in hierarchy-violating configurations is featurally more marked. Béjar and Kahnemuyipour (2017) demonstrate that assumed-identity sentences in Eastern Armenian display precisely such a requirement for the copula to agree with the more marked DP, as illustrated in (11).

- (11) *Shadi, Lina, Karine and Kamnoosh are playing a version of charades where instead of enacting names of movies, books, etc., everyone puts their name in a hat, and players must pantomime one another. The four have just finished their pantomimes. Karine, addressing Kamnoosh, says:*
- a. Shadi-n yes ei/\*er  
 Shadi-SP I be.PST.1SG/\*be.PST.3SG  
 ‘Shadi was me.’
- b. Lina-n du eir/\*er  
 Lina-SP you be.PST.2SG/\*be.PST.3SG  
 ‘Lina was you.’ (Béjar and Kahnemuyipour 2017: 483)

Because the 1st and 2nd person DP<sub>2</sub> is featurally more marked than the 3rd person DP<sub>1</sub> in (11), the verb is required to agree with DP<sub>2</sub>, and the corresponding DP<sub>1</sub>-agreement counterparts are ungrammatical.

The results of Experiment 1 indicate that DP<sub>1</sub> agreement is impossible in hierarchy-violating configurations in German, but the results leave open the question of whether DP<sub>2</sub> agreement is licit or not. Native-speaker intuitions clearly indicate that it is not. For example, the sentence in (12) is uncontroversially ungrammatical on the interpretation ‘He is me’, i.e. with *er* ‘he’ being the subject

of predication and *ich* 'I' being the predicate. The surface string in (12) is grammatical only on the interpretation 'I am he' (i.e., with a hierarchy-obeying base structure, DP<sub>1</sub> agreement, and V2-induced inversion).

(12) #Er bin ich.

he.NOM be.1SG I.NOM

*Intended:* 'He is me.'

*only grammatical as:* 'I am him.'

Experiment 2 is a replication of the design of Experiment 1, but additionally investigates experimentally the status of DP<sub>2</sub> agreement in sentences like (12).

### 2.2.1 Design

The test items used in Experiment 2 are identical to those used in Experiment 1. In addition to these test items, Experiment 2 involved control sentences such as (13). These sentences were preceded by a context sentence (in German) that conveyed the intended meaning. In the sample item in (13), the intended interpretation is that Josef is playing the role of the speaker. Under this interpretation, *er* 'he' is the subject of the underlying predication, and on this interpretation (13) hence requires a DP<sub>2</sub> agreement structure. In light of the intuitive judgment reported in (12), we expect (13) to be rejected on the given interpretation, and in this respect, it should thus differ from the Eastern Armenian pattern in (11).

(13) (*pointing at your friend Josef, then at himself*)

Er bin ich

he.NOM be.1SG I.NOM

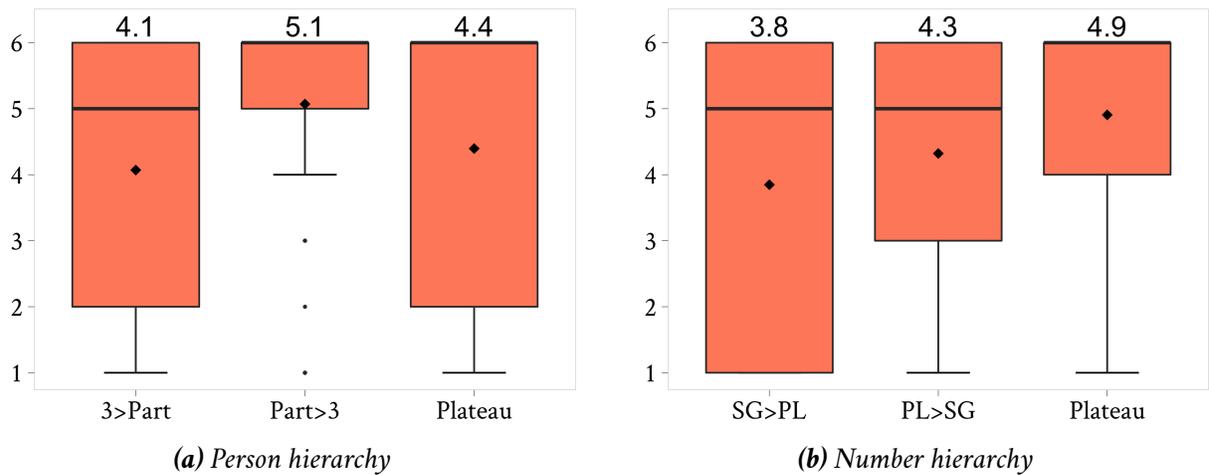
A group of 16 participants took part in Experiment 2. The analysis was identical to that used for Experiment 1, with the exception that we did not conduct an analogous experiment for English, and we therefore did not include a by-language comparison. As in Experiment 1, we separated 1>2 and 2>1

configurations because they are not of immediate interest to the critical questions about the role of the person and number hierarchies in (7) and (8) (see fn. 3 for analysis of these configurations).

### 2.2.2 Results

The by-condition means for the test items, which were identical to Experiment 1 and involved DP<sub>1</sub> agreement, are given as boxplots in Figure 2.

We analyzed the results using cumulative link mixed-effects modeling using the contrast coding from Experiment 1. Responses were predicted from (i) the *person hierarchy* (Part>3 vs. 3>Part vs. Plateau) and (ii) the *number hierarchy* (SG>PL vs. PL>SG vs. Plateau). The model comprised the full random-effects structure. The coefficients of this model are provided in Table 2. The model detected an effect of the person hierarchy such that ‘3>Part’ configurations were rated significantly worse than ‘Part>3’ configurations. The model also detected an effect of the number hierarchy such that plateau configurations received higher ratings than non-plateau ones. Furthermore, there was a numerical difference between ‘SG>PL’ configurations and ‘PL>SG’ ones with ‘SG>PL’ receiving lower ratings, but this contrast did not reach significance ( $\hat{\beta} = -0.51 \pm 0.33, z = -1.54, p = 0.12$ ).<sup>3</sup>



**Figure 2.** By-condition distribution of ratings in Experiment 2. The numbers above each plot represent the condition mean.

<sup>3</sup> We also analyzed separately 1>2 and 2>1 configurations, as reported in fn. 2 for Experiment 1. 1>2 configurations received a main rating of 4.3, whereas 2>1 configurations received a rating of 4.5. A mixed-effects model that predicted rating responses from the person hierarchy and the number hierarchy did not detect any significant effect (all  $p$ 's > .1). We will therefore put aside 1>2 and 2>1 configurations in the discussion in the main text.

**Table 2.** Results of cumulative link mixed-effects modeling for Experiment 2

	$\hat{\beta}$ (SE)
<i>Person</i>	
Plt.vs.Non-plt	0.37 (0.28)
Part>3.vs.3>Part	-1.66 (0.38) <sup>***</sup>
<i>Number</i>	
Plt.vs.Non-plt	-1.16 (0.26) <sup>***</sup>
PL>SG.vs.SG>PL	-0.51 (0.33)

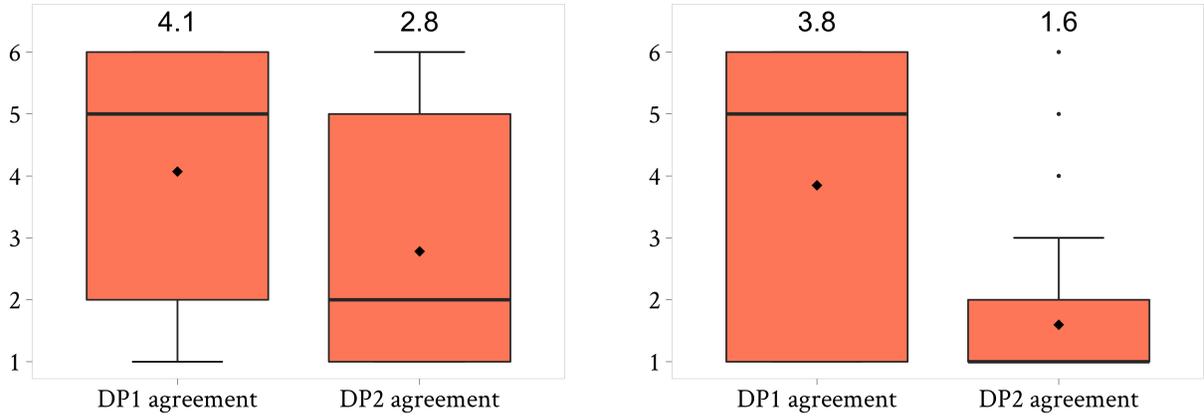
\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$

Next, we analyzed the hierarchy-violating configurations in which the copula shows DP<sub>1</sub> agreement with the corresponding control items in which the copula agrees with DP<sub>2</sub> (see (13)). For the person hierarchy, ‘3>Part’ configurations with DP<sub>1</sub> agreement received a mean rating of 4.1 (see Figure 2(a)). Person hierarchy-violating sentences with DP<sub>2</sub> agreement received a mean rating of 2.8. The distribution of ratings by condition are given in the form of boxplots in Figure 3(a). We used cumulative link mixed-effects modeling to assess the robustness of this difference. Limiting the data set to ‘Part>3’ configurations, we applied a model that predicted rating responses from copular agreement (DP<sub>1</sub> vs. DP<sub>2</sub>). This model revealed that DP<sub>2</sub> agreement structures were rated significantly lower than DP<sub>1</sub> agreement structures ( $\hat{\beta} = -1.3 \pm 0.32, z = -4.0, p < .001$ ).

An analogous comparison was carried out for number hierarchy-violating configurations. ‘SG>PL’ configurations with DP<sub>1</sub> agreement received a mean rating of 3.8 (see Figure 2(b)); analogous configurations with DP<sub>2</sub> agreement received a mean rating of 1.6. The distribution of ratings is shown in Figure 3(b). Cumulative link mixed-effects modeling that predicted rating responses from copular agreement (DP<sub>1</sub> vs. DP<sub>2</sub>) revealed this difference to be significant ( $\hat{\beta} = -2.6 \pm 0.40, z = -6.4, p < .001$ ).

### 2.2.3 Discussion

The results of Experiment 2 replicate the person-hierarchy effect observed in Experiment 1. Furthermore, there was a numerical effect of the number hierarchy, which is compatible with the results of Experiment 1, but which did not reach significance in the statistical analysis. This might be taken to indicate that the effect of the number hierarchy is less robust than that of the person hierarchy. It is not clear at present whether this reflects a difference in the quality of the effect or a pragmatic



(a) Ratings for '3>Part' configurations by agreement target

(b) Ratings for 'SG>PL' configurations by agreement target

**Figure 3.** Comparison of DP<sub>1</sub> agreement and DP<sub>2</sub> agreement in person and number hierarchy-violating configurations.

difference (as number mismatch configurations are pragmatically marked to begin with, see the results for English in Experiment 1). Overall, the results of the DP<sub>1</sub> agreement stimuli in Experiment 2 are thus consistent with those of Experiment 1.

We furthermore observed that agreement with DP<sub>2</sub> in hierarchy-violating configurations not only does not improve these sentences, but in fact leads to significantly lower ratings for both hierarchies. This finding confirms the native-speaker intuitions reported in (12) experimentally: Copula agreement with DP<sub>2</sub> is impossible, even in hierarchy-violating configurations. This indicates that hierarchy-violating assumed-identity sentences are ungrammatical (or at least severely degraded) regardless of which DP the verb agrees with. The reason for the ungrammaticality therefore seems to be independent of the choice of agreement controller.

### 3 Person, number, and the PCC

The results presented in the preceding section indicate that hierarchy-violating assumed-identity sentences are ungrammatical in German, and that this ungrammaticality holds regardless of whether the copula agrees with DP<sub>1</sub> or DP<sub>2</sub>. In this section, we will investigate the analytical consequences of this restriction. We show that this pattern closely matches hierarchy effects observed in other domains,

in particular the Person Case Constraint (PCC), already mentioned in section 1. As noted above, the PCC prohibits combinations of arguments with certain person features, most frequently discussed in combinations of multiple *internal* arguments, as in ditransitive constructions (see Anagnostopoulou to appear, Preminger to appear for recent overviews and discussion).

We propose that the hierarchy effects in German copulas arise in the same types of environments which have been proposed to cause hierarchy effects in both the PCC and a variety of other constructions cross-linguistically—namely, configurations with two accessible DPs in the domain of a single agreement probe. Like other recent work in this domain (e.g. Béjar and Rezac 2003, 2009, Anagnostopoulou 2005, Adger and Harbour 2007, Nevins 2007, Preminger 2014), we maintain that hierarchy effects are derived from independent morphosyntactic principles; the hierarchy itself has no independent status in the grammar. We offer an account for why German also shows number effects, while the PCC is famously limited to person.

### 3.1 Comparing German copulas and the PCC

We focus first on the person hierarchy effects. The generalization governing the distribution of person features in German copula constructions parallels the one governing the combinations of direct and indirect object clitics in PCC configurations. Examples from Catalan are shown in (14), repeated from (5) above. While the 2>3 configuration in (14a) is grammatical, the reverse configuration in (14b)—along with 3>1 configurations—is ungrammatical.

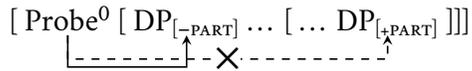
(14) *Catalan Weak-PCC (Bonet 1991)*

- a. En Josep, **te** **l** va recomenar la Mireia.  
 the Josep, 2CL 3CL recommended the Mireia  
 ‘Mireia recommended him (Josep) to you.’ (✓ 2>3)
- b. \*A en Josep, **te** **li** va recomenar la Mireia.  
 to the Josep, 2CL 3CL recommended the Mireia  
 intended: ‘Mireia recommended you to him (Josep).’ (\*3>2)

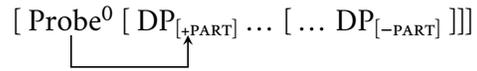
PCC effects are found in a wide range of unrelated languages, and while there is cross-linguistic



(17) \*3>Participant:

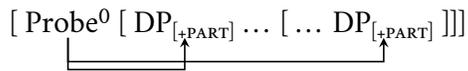


(18) Participant>3:



To extend a licensing account to weak PCC languages like Catalan—which permit participant direct objects if the higher indirect object is *also* a Participant—a variant of *Multiple Agree* is employed (Hiraiwa 2001, Anagnostopoulou 2005, Nevins 2007). Nevins’ (2007) *Contiguous Agree*, for example, permits the probe to license multiple [+PART] DPs so long as no [−PART] DPs intervene, as illustrated in (19). Coon et al. (2017) extend a similar account to German copula configurations, which also permit combinations of Participant DPs, discussed in footnote 2 above.<sup>4</sup>

(19) Participant>Participant:



This type of account provides an explanation for why hierarchy effects arise precisely in copula constructions in German. These are the configurations—like ditransitives in PCC languages—in which we find two DPs, both accessible to the agreeing probe (i.e. both in unmarked nominative case), just as schematized in (16) above. We thus also have a rationale for why no such hierarchy effect arises in English. In German, both DP<sub>1</sub> and DP<sub>2</sub> bear nominative case, and nominative DPs are accessible agreement targets in German. In English, DP<sub>2</sub> (the predicate nominal) is marked with accusative case and hence invisible to the agreeing verbal head (Bobaljik 2008). Preminger (to appear) argues that the licensing requirement must hold only for DPs that are *case-accessible* to a  $\varphi$ -probe. DPs that are in a case that renders them inaccessible to the verbal  $\varphi$ -probe do not need to be licensed. As a result, no licensing failure arises in English copular constructions.<sup>5</sup>

However, as noted above, there is an important difference between PCC and copula environments. The PCC is specifically about *person* features; there are apparently no attested cases of “Number Case Constraint” (Num-CC) effects in the domains for which PCC effects have been described (Nevins 2011).

<sup>4</sup> See Coon and Keine (2018) for an alternative to the licensing account sketched here which does not require *Contiguous Agree* to account for grammatical combinations of Participant DPs.

<sup>5</sup> See Preminger (to appear) for further discussion of the relevance of a DP’s “accessibility” for licensing-based accounts, as well as Coon and Keine (2018) for a critique.

In German copulas, however, we found hierarchy effects for both person and number. While this may initially seem to suggest that the two phenomena do not warrant the same analysis, we argue below that the appearance of number effects is derivable from independent differences between the two constructions.

### 3.2 Deriving the presence and absence of number effects

In order to understand the difference between the behavior of person and number features, we discuss an additional ingredient to the licensing-based account of hierarchy effects summarized above. Specifically, recent work on the PCC and other hierarchy effects takes the probe in configurations like (16) above to be divided into at least person and number probes (e.g., Béjar and Rezac 2003),  $\pi^0$  and  $\#^0$ , respectively. Furthermore,  $\#^0$  is universally located higher in the tree than  $\pi^0$  so that  $\pi^0$  will always probe first (Béjar and Rezac 2003, Preminger 2011), as shown in (20).

(20) [ $\#^0$   $\pi^0$  [...DP ... [... DP ]]]

Nevins (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. For Nevins, this means that while a [-PART] feature can intervene for the  $\pi^0$  probe, creating a person hierarchy for effect for 3>Part configurations as in (17) above, no such intervention will happen for the  $\#^0$  probe in SG>PL configurations. Singular DPs for Nevins simply have no number features at all, and thus will never intervene for a probe.

Here we propose an alternative account for the absence of number effects which does not rely on positing an ontological difference between person and number features.<sup>6</sup> Specifically, we adopt proposals of Anagnostopoulou (2003), Preminger (2009) and others that the operation which triggers the pronominal clitic-doubling found in PCC constructions also 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  $\pi^0$  removes it as an intervener, clearing the way for subsequent Agree

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<sup>6</sup> See Béjar (2011) (and work cited there), as well as Preminger (2014) and Coon et al. (2017), for other problems with Nevins' account.

between #<sup>0</sup> 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 (21).<sup>7</sup>

$$(21) \quad [{}_{\nu P} \#^0 [ \pi^0 [{}_{\text{AppIP}} \boxed{\text{DP}_{\text{IO}}} [{}_{\text{VP}} \boxed{\text{DP}_{\text{DO}}} ] ] ] ] ] \quad = \textit{Ditransitive PCC}$$

This universal ordering of  $\pi^0$  and #<sup>0</sup> probes, combined with the proposal that clitic-doubling removes the higher DP as an intervener, immediately captures the asymmetry between the behavior of person and number features with respect to hierarchy effects. It similarly predicts the *presence* of number effects in German copula constructions. This is because it is a general property of German that it lacks clitic doubling. Thus, Agree between  $\pi^0$  and DP<sub>1</sub> in copula constructions does not render DP<sub>1</sub> invisible for subsequent Agree. DP<sub>1</sub> therefore still incurs intervention for Agree between #<sup>0</sup> and DP<sub>2</sub> if the hierarchy is violated, as in (22). Under a licensing account, the effect requires not just [+PART] features, but also [+PLURAL] features to need licensing by the appropriate probe (see e.g. Baker 2011, Coon et al. 2017).

$$(22) \quad [{}_{\text{TP}} \#^0 [ \pi^0 [{}_{\text{PredP}} \boxed{\text{DP}_{\text{SUBJ}}} [ \boxed{\text{DP}_{\text{PRED}}} ] ] ] ] ] \quad = \textit{German copula}$$

This account both avoids the need to posit a deep difference between person and number features, and also makes testable predictions about the types of hierarchy effects found in different constructions. As noted above, we follow other works in taking hierarchy effects to emerge exactly in configurations in which more than one accessible DP is found in the domain of a single probe. Assuming the universal ordering of articulated probes in which  $\pi^0$  always probes first, we predict number effects to be systematically absent in configurations in which the higher DP undergoes clitic-doubling and is thus removed as an intervener for the #<sup>0</sup> probe. This prediction appears to be borne out in PCC constructions, but could also be tested in copula constructions in languages in which subjects are systematically clitic-doubled, for example in certain Romance languages commonly referred to as North Italian Dialects. We leave this as a topic for future work.

<sup>7</sup>Note that the ingredients discussed here are present in earlier works on the PCC such as Béjar and Rezac (2003, 2009), but they do not explicitly discuss them as a means to rule out Num-CC effects.

## 4 Consequences: Constraints on predication structures

We have thus far argued for a morphosyntactic constraint on predication structures in copular constructions, such that it is not possible (i) for the predicate to be 1st or 2nd person when the subject of the predication is 3rd person (person hierarchy) and (ii) for the predicate to be plural if the subject of the predication is singular. Section 4 developed such an account that assimilates the restriction to PCC effects, but we will abstract away from its precise implementation in what follows, focusing primarily on its effect of ruling out (23a,b).

- (23) a. \*<sub>[PredP DP<sub>[3]</sub> [ Pred<sup>0</sup> DP<sub>[1]/[2]</sub> ] ]</sub>  
b. \*<sub>[PredP DP<sub>[SG]</sub> [ Pred<sup>0</sup> DP<sub>[PL]</sub> ] ]</sub>

The crucial motivation for the constraints in (23) came from assumed-identity sentences. But the application of (23) is not limited to such sentences. In addition, (23) also provides a new window onto the agreement restriction that we observed for more standard predicational and specificational copula constructions in section 1. In this section, we show how our account of assumed-identity sentences extends to these constructions, and we investigate the relationship between our hierarchy constraint in (23) and other constraints on predication structures that have been proposed in the literature, arguing that these are not mutually exclusive, and that there is in fact evidence that a non-uniform account is empirically warranted.

### 4.1 Returning to predicational and specificational copula sentences

As we saw in section 1, predicational and specificational copula clauses in German exhibit an agreement restriction such that the copula must agree with the featurally most marked DP. The relevant examples are repeated from (1) and (2) in (24) and (25), respectively.

(24) *Predicational*

Du bist/\*ist das Problem.  
you.NOM are/\*is the problem.NOM  
'You are/\*is the problem.'

(25) *Specificational*

Das Problem bist/\*ist du.  
the problem.NOM are/\*is you.NOM  
cf. Eng.: 'The problem is/\*are you.'

We concluded in section 1 that an account of this contrast needs to block the structure in (26) (=4), in which *du* ‘you’ is the predicate and *das Problem* ‘the problem’ is the subject of the underlying predication structure, and in which T<sup>0</sup> agrees with *das Problem*. At the same time, such an account must allow the minimally different structure in (27) (=3), in which the positions of the two DPs in the PredP are reversed and T<sup>0</sup> agrees with *du* ‘you’, followed by optional movement of *das Problem* above *du*.

(26) \* [ T<sup>0</sup> [ PredP *das Problem* [ Pred<sup>0</sup> *du* ] ] ]      (27) [ T<sup>0</sup> [ PredP *du* [ Pred<sup>0</sup> *das Problem* ] ] ]

This contrast clearly conforms to the person hierarchy constraint in (23a): The structure in (26) involves a 3>Part PredP structure, in violation of the person hierarchy. This suggests that (26) falls under the constraint in (23a). Our account thus provides a novel explanation for the contrast between (26) and (27), and with it agreement restriction in (24)/(25).

On this unification of the contrast in (24)/(25) and the person hierarchy effects in assumed-identity sentences, *all* predication structures are subject to the constraints in (23). It is simply the case that the effects of these constraints can be clearly diagnosed only in assumed-identity sentences, as their semantics unambiguously reveals the underlying predication structure: The role assignment expressed by *I am him* is clearly truth-conditionally distinct from that expressed by *He is me*. In the underlying predication structures of predicational and specificational sentences such as (24)/(25), it is much more difficult to diagnose which DP is the predicate and which is the subject of the predication. The utility of assumed-identity sentences is thus that they provide one domain in which constraints on predication structures can be observed relatively straightforwardly, but the constraints that they reveal arguably are not limited to assumed-identity sentences, but hold of predication structures more generally.

We have so far limited our attention to the effects of the person hierarchy in (23a). Our extension of hierarchy effects in assumed-identity sentences to agreement restriction in predicational and specificational copula constructions makes an immediate prediction: In light of the evidence from assumed-identity sentences that predication structures like (23b) are also ruled out, we expect similar agreement restrictions in predicational and specificational copular sentences to hold for number as well. This is indeed the case, as (28) attests (also noted by Heycock 2012: 211):

- (28) a. Deine Eltern sind/\*ist das Problem.  
 your parents are/\*is the problem  
 ‘Your parents are the problem.’
- b. Das Problem sind/\*ist deine Eltern.  
 the problem are/\*is your parents  
 cf. Eng.: ‘The problem is/\*are your parents.’

Our account derives this constraint as follows: Because base structures like (23b) are ruled out, the only viable underlying predication structure is (29). Just as in (27) above, agreement is then invariably established with the subject of the predication *deine Eltern* ‘your parents’. Optional movement of *das Problem* across *deine Eltern* then produces the word order in (28b) but leaves the agreement unchanged.

(29) [ T<sup>0</sup> [ LPredP *deine Eltern*<sub>[PL]</sub> [ Pred<sup>0</sup> *das Problem*<sub>[SG]</sub> ] ] ]

This supports our application of (23) to predicational and specificational copula constructions.

## 4.2 The multitude of constraints on predication

This section considers our morphosyntactic constraint in (23) in the context of other constraints on predication structures that we discussed in section 1 above (summarized in (6)). Our account is a PCC ACCOUNT (6c). The two alternatives are a MAXIMIZE AGREEMENT ACCOUNT, which requires agreement with the most marked accessible DP (6a), and a SEMANTIC ACCOUNT on PredP structures (6b). This section argues that the three constraints have distinct empirical effects and that none can be reduced to the other. This suggests that all three are warranted, and that a comprehensive understanding of constraints on predicate structures requires the interaction of multiple constraints.

We first investigate the relationship between the PCC constraint and the maximize agreement account, proposed by Béjar and Kahnemuyipour (2017). This account requires that the copula agree with the featurally most marked DP, irrespective of whether this DP is the complement or specifier of Pred<sup>0</sup>. This requirement rules out (26), repeated here as (30), but not because of its PredP structure, but rather because of the fact that T<sup>0</sup> agrees with a 3rd-person DP when a 2nd-person DP is available.

(30) \* [ T<sup>0</sup> [ PredP *das Problem* [ Pred<sup>0</sup> *du* ] ] ]

Béjar and Kahnemuyipour’s (2017) principal motivation for this constraint comes from the copula agreement pattern in assumed-identity sentences in Eastern Armenian (see (11)). Because our PCC constraint as well as the maximize agreement account rule out (30)—albeit for different reasons—we might wonder whether the effects of one can be reduced to the other. It seems to us that the answer is no. First, as discussed in section 2.2, the Eastern Armenian agreement pattern is distinct from what we observed for German, where hierarchy-violating assumed-identity sentences are ungrammatical even with DP<sub>2</sub> agreement. This indicates that the PCC account is necessary to account for the German facts. On the other hand, the PCC constraint does not account for the agreement pattern found in Eastern Armenian, which indeed requires a maximize agreement account. In light of the evident crosslinguistic differences in this domain, it seems that neither constraint can be subsumed under the other.<sup>8</sup>

The second alternative constraint that we consider here is Heycock’s (2012: 230–231) semantic constraint on predicate structures, according to which the “more intensional” DP must be the complement of Pred<sup>0</sup>. Like our PCC constraint, this semantic constraint has the effect of ruling out the PredP structure in (26), because the more intensional DP is *das Problem*, but it is not construed as the complement of Pred<sup>0</sup>. There is hence some apparent redundancy between our PCC constraint in (23) and this semantic constraint, which again raises the question of whether both are required. In what follows, we will argue that the answer is yes, and that neither can be eliminated in favor of the other.

First, this semantic constraint does not replace the PCC constraint, because hierarchy-violating assumed-identity sentences do not violate the semantic constraint, but are nonetheless ungrammatical. Consider the by-now familiar example in (31). On the desired interpretation of (31) where a third-party

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<sup>8</sup> One interesting question that emerges is why hierarchy-violating configurations are grammatical in Eastern Armenian in the first place, as they violate the PCC constraint. One possibility is that the PCC constraint applies in some language but not in others. This of course raises further analytical questions, though we note that it is consistent with the observation that the PCC likewise does not appear to be universal. A less radical analysis might be to postulate that in Eastern Armenian 3rd person DPs lack a syntactic person feature and therefore they do not enter into agreement with T<sup>0</sup>. Because PCC-like effects seem to only arise when a single head agrees with more than one DP, no hierarchy effects are then expected to arise in Eastern Armenian. We leave a closer study of this intriguing difference between German and Eastern Armenian for future study.

individual is assigned the role of the speaker, the sentence has the underlying predication structure in (32). (32) must therefore be ruled out.

- (31) \*Er ist ich.  
           he is I
- (32) \* [ T<sup>0</sup> [PredP *er* [ Pred<sup>0</sup> *ich* ] ] ]

However, the semantic constraint does not exclude the PredP structure in (32), because the more intensional DP is *ich* 'I' (which is not evaluated with respect to the actual world, but rather the world of the play). The DP *er* 'he' is evaluated with respect to the actual world, and it is hence the more extensional DP. (32) thus obeys the requirement that the more intensional DP must be the complement of Pred<sup>0</sup>. The fact that (31) is nonetheless ungrammatical therefore cannot be attributed to this requirement. By contrast, our PCC constraint (23a) does rule out (32), which leads us to conclude that (23) is required independently of the semantic constraint.

Having established the need for the PCC constraint (23), we next consider the question of whether the semantic constraint can be dispensed in favor of the PCC constraint, or whether both constraints are necessary. We will argue for the latter view. The arguments are based on constraints on underlying predication structures that are not amenable to the PCC constraint in (23).

First, it is well-known that specificational copular constructions are impossible in small clauses (e.g., Moro 1997: 37). Thus, while it is possible for nonfinite clauses that contain a copula to appear in either the predicational or the specificational form (33), the order in small clauses is strict (34).

- (33) a. John considers [ a picture on the wall to be the cause of the riot ]  
       b. John considers [ the cause of the riot to be a picture on the wall ]
- (34) a. John considers [ a picture on the wall the cause of the riot ]  
       b. \*John considers [ the cause of the riot a picture on the wall ]

Moro (1997) proposes an inversion account, according to which the underlying predication structure of (33) and (34) is invariably (35a). The sentence in (33b) is produced by inversion, which in turn requires the presence of the copula, and which is therefore impossible in (34b). In other words, due to the

impossibility of inversion in small clauses, (34) reveals—on Moro’s (1997) account—that the underlying predication structure cannot be (35b).

- (35) a. [PredP *a picture of the wall* [ Pred<sup>0</sup> *the cause of the riot* ] ]  
 b. \* [PredP *the cause of the riot* [ Pred<sup>0</sup> *a picture on the wall* ] ]

If this line of reasoning is on the right track, then a constraint is required that bars the structure in (35b). It is clear that the PCC constraint in (23) does not accomplish this. First, both DPs in (35b) are 3rd person singular, and they hence violate neither the person hierarchy (23a) nor the number hierarchy (23b). Second, we also saw that assumed-identity sentences do not show hierarchy effects in English in the first place, and that (23) is hence not operative in English (which we have proposed follows because the two DPs do not bear the same case in English and hence do not agree with the same functional head). It follows, therefore, that (35b) must be excluded by some other constraint, and the semantic constraint plausibly achieves this result.

A second argument for the necessity of a semantic constraint alongside our PCC constraint comes from German. The translational equivalent of English small-clause structures in German involves embedding DP<sub>2</sub> inside a PP, as in (36). For ease of reference, we will refer to this construction as the ‘für-construction’.

- (36) Ich halte ihn für den Schlüsselfaktor.  
 I hold him.ACC for the key factor.ACC  
 ‘I consider him the key factor.’

Importantly, in *für*-constructions, the two DPs clearly do not agree with the same functional head. The DP *den Schlüsselfaktor* ‘the key factor’ is case-marked by the preposition *für* ‘for’, whereas the DP *ihn* ‘him’ receives case from the verb *halte* ‘hold’.<sup>9</sup>

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<sup>9</sup>This becomes particularly clear if the sentence is passivized, as shown in (i). Here the case of *him* is advanced to nominative, but *den Schlüsselfaktor* retains its accusative case.

- (i) Er wurde für {den Schlüsselfaktor / \*der Schlüsselfaktor} gehalten.  
 he.NOM was for the key factor.ACC \*the key factor.NOM held  
 ‘He was considered the key factor.’

Against this background, we make two crucial observations. The first is that our account predicts hierarchy effects to disappear in assumed-identity versions of *für*-constructions, because the two DPs do not agree with the same head. This is indeed the case, as (37) attests.

- (37) Ich hatte ihn für dich gehalten.  
I had him.ACC for you.ACC held  
'I mistook him for you.'

The second observation is that predicational and specificational sentences still exhibit an asymmetry in *für*-constructions that mirrors the restriction in English small clauses in (34), as shown in (38).

- (38) a. Ich halte dich für den Schlüsselfaktor.  
I hold you.ACC for the key factor.ACC  
'I consider you to be the key factor.'
- b. \*Ich halte den Schlüsselfaktor für dich.  
I hold the key factor.ACC for you.ACC  
*Intended:* 'I consider the key factor to be you.'

In light of the fact that *für*-constructions do not exhibit hierarchy effects in assumed-identity sentences and are therefore not subject to the PCC constraint in (23), we conclude that (38b) must be ruled out by some other constraint. The semantic constraint again fits the bill: In (38b), it is the more extensional DP *dich* 'you' that forms the predicate, violating this constraint.

A third argument for the necessity of a semantic constraint in addition to the PCC constraint is based on infinitival clauses in German. As in *für*-constructions, in infinitival clauses the hierarchy effects in assumed-identity sentences disappear, but the restriction on specificational sentences does not, suggesting that the latter cannot be reduced to the former. The disappearance of hierarchy effects in infinitival assumed-identity clauses is illustrated in (39).<sup>10</sup>

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<sup>10</sup>We owe this observation to discussions with David Adger.

(39) Er scheint ich zu sein.  
he seems I to be  
'He seems to be me.'

(39) involves a 3>1 configurations, but it is nonetheless grammatical. It thus clearly contrasts with similar hierarchy violations such as (7b). We will not attempt to develop an account of this curious fact here. Instead, we merely note that similar amelioration in nonfinite clauses have been observed for PCC effects in Basque (Laka 1993, Preminger to appear) and Georgian (Bonet 1991, Béjar and Rezac 2003). See Preminger (to appear) and Coon and Keine (2018) for analyses compatible with the unification proposed here.

What is important for our purposes is that the restriction on specificational sentences does not disappear in infinitival clauses.

(40) a. Du scheinst das Problem zu sein.  
you seem.2SG the problem to be  
'You seem to be the problem.'

b. \*Das Problem scheint du zu sein.  
the problem seem.3SG you to be  
*Intended:* 'The problem seems to be you.'

Because the morphosyntactic constraint in (23) does not restrict infinitival clauses (see (39)), the ungrammaticality of (40b) cannot be attributed to this constraint. As before, a second constraint is thus required, and the semantic constraint produces the desired result.

A final piece of evidence for the coexistence of the PCC constraint (23) and the semantic constraint is that while we have presented evidence that hierarchy-violating assumed-identity sentences are degraded, their degradation is uncontroversially less severe than analogous violations with specificational copular clauses. (41) compares the relative severity of the violation in each case.

- (41) a. ??Er ist du. *assumed identity*  
           he is you
- b. \*Das Problem ist du. *specificational*  
           the problem is you

What underlies this contrast? A hybrid account that assumes both the PCC constraint and the semantic constraint offers a potential answer. The underlying PredP structures for (41a,b) are provided in (42a,b), respectively. Because both structures in (42) involve a 3>2 configuration, they both violate the PCC constraint in (23a). On the other hand, the semantic constraint is only violated by (42b), because in (42a), the more intensional element is *du* ‘you’ and hence in the complement position of Pred<sup>0</sup>, as required.

- (42) a. [PredP *er* [ Pred<sup>0</sup> *du* ] ] → *violates (23)*
- b. [PredP *das Problem* [ Pred<sup>0</sup> *du* ] ] → *violates (23) and semantic constraint*

It therefore stands to reason that the greater severity of the ungrammaticality of (41b) relative to (41a) is due to the fact that (41b) violates a superset of the constraints violated by (41a). Crucial for this line of explanation is of course that there is more than one constraint on underlying predication structures.

In sum, we have argued that the morphosyntactic constraint in (23) is not the only constraint on underlying predication structures, and that it should be taken to complement, rather than replace, semantically grounded restrictions.

## 5 Conclusion

This paper investigated constraints on predication structure through the lens of assumed-identity sentences in German. We argued that these sentences provide evidence for a morphosyntactic constraint on predication structures akin to PCC effects. We then showed how this constraint provides a fresh look at surprising agreement restrictions in more well-studied predicational and specificational copula sentences. An investigation into the relationship between our constraint and alternatives proposed in the previous literature suggested that a non-uniform account is empirically favorable.

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