Murrinhpatha number mismatch as partial Agree

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1 Introduction

Number marking on verbs in Murrinhpatha (non-Pama-Nyungan, Australia) has two striking properties. First, apparent mismatches occur: *singular* marking is used for some *dual* subjects and *dual* marking is used for some *paucal* subjects. Second, the singular-dual mismatch is conditioned by the position of an apparently unrelated element, the non-sibling marker *ngintha/nintha*. In (1), *ngintha* is prefixal and the word-initial prefix does not match the subject's number, whereas in (2), *ngintha* is suffixal and there is no mismatch. Nordlinger and Mansfield (2021) argue that this pattern diverges from known morphotactic principles reported in the literature.

(1) **ba-** **ngintha-** ngkardu -nu
1**SG**.13.FUT- NSIB.DU.F- see -FUT
'We (two non-siblings) will see it.' (Nordlinger and Mansfield 2021:6)

(2) **nguba-** nhi- ngkardu -nu **-ngintha**
1**DU**.13.FUT- 2SG.OBJ- see -FUT -NSIB.DU.F
'We (two non-siblings) will see you.' (Nordlinger and Mansfield 2021:6)

In this paper, I propose that the facts emerge solely from the action of Agree (Chomsky 2000) operating over a featurally complex representation of number (Harbour 2014). Mismatches result from partially-defective intervention: Agree takes place not with the subject itself, but with the non-sibling marker – an intervening element which bears a subset of the subject's features.

The analysis hinges on some interesting theoretical assumptions, listed in (3).

(3) a. Number is encoded using Harbour's (2014) feature system.
b. All else equal, learners will posit the smallest set of probe features necessary to encode the contrasts present in the agreement morphology (building on Preminger 2019).
c. Morphemes expone meanings denoted by feature sets (rather than exponing features directly).
d. Mobile affixation is syntactic (at least in this instance).

The paper is structured as follows. Section 2 presents the relevant generalizations, following Nordlinger and Mansfield 2021. Section 3 introduces assumptions (3a) and (3b). Section 4 proposes that mismatched number agreement is derived

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from partially-defective intervention. I show that this analysis is able to account for the full pattern, provided we adopt assumptions (3c) and (3d). Section 5 discusses a puzzle that the mobile affixation pattern raises for linearization and modularity. Section 6 briefly concludes.

2 The pattern

Murrinhpatha is a polysynthetic language with radical pro-drop. It is a member of the Southern Daly language family (northern Australia; see Green and Nordlinger n.d. for information on the languages of the Daly region). There is a four-way number system in the pronoun morphology: singular, dual, paucal, plural. Verbs take a prefix called the *classifier* (bolded in (4)) – a portmanteau encoding conjugation class[1] (glossed as a numeral), tense, aspect, mood, subject person, and subject number. This paper focuses on the number-marking function of the classifier.

(4) a. **ba-** ngkardu -nu
1SG.13.FUT- see -FUT
'I will see it' (Nordlinger and Mansfield 2021:4)

b. **nguba-** ngkardu -nu
1DU.13.FUT- see -FUT
'We (two siblings) will see it.' (Nordlinger and Mansfield 2021:4)

Strikingly, kinship (specifically, non-siblinghood[2]) of dual and paucal subjects is obligatorily marked in the verbal complex.[3] (4b), which lacks a non-sibling marker, is obligatorily interpreted as having a sibling subject. A dual non-sibling subject requires a non-sibling marker, as in (5).[4]

(5) **ba-** **ngintha-** ngkardu -nu
1SG.13.FUT- NSIB.DU.F- see -FUT
'We (two non-siblings) will see it.' (Nordlinger and Mansfield 2021:6)

Note that (5) exhibits a number mismatch: the classifier is singular, even though the subject is dual. I will propose that this type of mismatch is due to intervention of the non-sibling marker. (Compare to (5) to (4b), which lacks the non-sibling marker and accordingly lacks a number mismatch.)

For expository purposes, I will use constructed examples to illustrate the full pattern. All generalizations are drawn from Nordlinger and Mansfield 2021, and all constructed examples are based on Mansfield 2019.

[1]The classifier may be a sort of light verb, with each 'conjugation class' associated with a different light-verb semantics (see Nordlinger and Mansfield 2021 and references therein).

[2]This paper follows a terminological convention well established in the literature on Murrinhpatha (and other Australian languages) whereby *siblinghood* is to be understood as a relation which holds not only between children of the same parents, but also between children of brothers and between children of sisters (see Davidson 2018:54 for discussion).

[3]For an analysis of the diachronic evolution of non-sibling marking, see Blythe 2010.

[4]Non-sibling marking can also be controlled by the object (Nordlinger 2015:506-507). I will not be discussing this here, but it should be looked at in future work.

The classifiers exhibit a three-way number contrast, conflating paucal and plural: singular, dual, paucal/plural. With a singular subject, the singular classifier is used:

(6) **ngurdu-** ngkarl -nu
1**SG**.29.FUT- bring.back -FUT
'I will bring it back.' **(SG subject)** (constructed example)

With a dual sibling subject, the dual classifier is used:

(7) **ngurdrda-** ngkarl -nu
1**DU**.29.FUT- bring.back -FUT
'We will bring it back.' **(DU sibling subject)** (constructed example)

And with a pacual sibling subject or a plural subject, the paucal/plural classifier is used. There is no non-sibling marking for plural subjects (which makes functional sense since there is no ambiguity – plurals are always non-sibling, practically speaking):

(8) **ngurdrdu-** ngkarl -nu
1**PC/PL**.29.FUT- bring.back -FUT
'We will bring it back.' **(PC sibling or PL subject)** (constructed example)

It is with dual and paucal non-sibling subjects that number mismatches arise. With a dual non-sibling subject, the dual non-sibling marker appears. The form of the dual non-sibling marker is sensitive to gender: *ngintha* (F) vs. *nintha* (M). The masculine is only used for uniformly masculine groups, with the feminine used otherwise. By default, the dual non-sibling marker surfaces as a prefix, as in (9). The prefixal dual non-sibling marker triggers a number mismatch: the classifier is *singular* in (9), even though the subject is dual.

(9) **ngurdu- ngintha-** ngkarl -nu
1**SG**.29.FUT- NSIB.F.DU- bring.back -FUT
'We will bring it back.' **(DU non-sibling subject)** (constructed example)

The paucal non-sibling markers are *-ngime* (F) and *-neme* (M). The paucal non-sibling marker always surfaces as a suffix, and always triggers a number mismatch: the classifier is *dual* in (10), even though the subject is paucal.

(10) **ngurdrda-** ngkarl -nu **-ngime**
1**DU**.29.FUT- bring.back -FUT -NSIB.F.PC
'We will bring it back.' **(PC non-sibling subject)** (constructed example)

It is important to note that even when the classifier shows a mismatch in number with the subject, is not the case that the number of the classifier is independent of the number of the subject. The number of the subject still affects the number of the mismatched classifier: (9) has a singular mismatched classifier because the subject is dual, whereas (10) has a dual mismatched classifier because the subject is paucal. Popp (2022a,b) posits that the singular classifier is actually a default

form uninflected for number, and that the apparent singular-dual mismatch in cases like (9) reflects a complete lack of number on the classifier. This analysis cannot extend to the dual-paucal mismatch in cases like (10), which Popp does not address. Accordingly, I will pursue a different line of analysis, treating the singular-dual and dual-paucal mismatches as instances of partial agreement, i.e. agreement with a subset of the subject's features.

What we have seen so far is summarized in (11).

(11)

SUBJECT	SIBLINGS?	NON-SIBLING MARKER	CLASSIFIER	EX.
singular	no		singular	(6)
dual	yes		dual	(7)
dual	no	*ngintha* (F) / *nintha* (M)	singular	(9)
paucal	yes		paucal/plural	(8)
paucal	no	*ngime* (F) / *neme* (M)	dual	(10)
plural	no		paucal/plural	(8)

There is an exception to (11): in some cases with a dual non-sibling subject, a non-mismatching dual classifier appears. This happens when the prefixal templatic slot that the dual non-sibling marker would otherwise occupy is unavailable due to object agreement. There is no object agreement for third person singular direct objects, but other objects do trigger agreement. The object agreement marker surfaces in the prefixal slot. When object agreement is present, the dual non-sibling marker cannot appear in prefixal position; instead, it is suffixal, as in (12). Somehow, this displacement of the dual non-sibling marker eliminates the number mismatch: the classifier in (12) is dual. (Compare to (9), which has a singular classifier.) Nordlinger and Mansfield (2021) identify this phenomenon of 'positional dependency' – i.e. a change in the form of one element (the classifier) conditioned by the linear position of another (the dual non-sibling marker) – as divergent from known morphotactic principles reported in the literature.[5]

(12) **ngurdrda- nhi-** ngkarl -nu **-ngintha**
1**DU**.29.FUT- 2SG.OBJ- bring.back -FUT -NSIB.F.DU
'We will bring you back.' **(DU non-sib. subject)** (constructed example)

In sections 3 and 4, I develop an Agree-based account of (11). The account also predicts (12), provided we stipulate that affix mobility is syntactic. This raises some issues for linearization and modularity, however, which I dicuss in section 5.

3 The feature specification of goals and probes

3.1 The featural encoding of number

I adopt Harbour's (2014) feature encoding of number, which is designed to capture the attested typology of number systems more accurately than other feature systems. In Harbour's model, the four-way number system of Murrinhpatha can be encoded using three binary features. The features and their meanings are listed in (13).[6]

[5] See also Popp 2022a,b for a Stratal Optimality Theory analysis.

[6] For precise denotations of these features, I refer the reader to Harbour 2014.

(13) **[+atomic]** = singular
[+additive] = plural
[+minimal] = as small as possible, taking into account any other features combined with
[–atomic], [–additive], [–minimal] = not [+atomic], not [+additive], not [+minimal] respectively

[±atomic] separates singular (atoms) from non-singular. [±additive] separates plural (the only number closed under addition – every union of plurals is plural) from non-plural. [±minimal] is more interesting, because of the way it combines with other features. If [±minimal] exists in isolation, without any other feature present, [+minimal] will correspond to singular and [-minimal] will correspond to non-singular. If, on the other hand, [±minimal] combines with [–atomic], for instance, then [+minimal] will correspond to dual and [-minimal] will correspend to paucal/plural. This behavior of the [±minimal] feature will play a key role in deriving the number mismatch pattern.

The number feature specification of subjects is as follows:[7]

(14) singular subject: [+atomic][+minimal][-additive]
dual subject: [-atomic][+minimal][-additive]
paucal subject: [-atomic][-minimal][-additive]
plural subject: [-atomic][-minimal][+additive]

3.2 A lexical economy condition on probes

Preminger (2019) argues (based on the distribution of Person Case Constraint effects) that in languages or clause types which lack morphological agreement altogether, there is no abstract syntactic agreement. It seems that the learner's default assumption is that all heads lack probes. The learner only posits a probe when presented with clear, direct evidence for a probe.

I propose that this principle applies not only to the presence or absence of agreement altogether, but also to individual features on a head – learners prefer not to posit unnecessary probe features. The result is that each head bears the smallest set of probe features necessary to encode the constrasts present in its agreement morphology.

This means that the classifier head, which conflates paucal and plural in the morphology, does not have a [_ additive] probe feature. The [±additive] feature is solely responsible for differentiating between plural and non-plural, which is not a necessary contrast for the classifier morphology. The [±atomic] and [±minimal] features, on the other hand, are both necessary to encode the three-way number constrast present in the classifier morphology, so the classifier does have [_ atomic] and [_ minimal] probe features.

More importantly, the non-sibling marker only makes a two-way number distinction, so it only needs one number probe feature. When the subject is dual, *ngintha*/*nintha* is used, and when the subject is paucal, *ngime*/*neme* is used. The fea-

[7] Note that the feature combinations listed are the only valid combinations of these three features. All other logically possible combinations are semantically incoherent. See Harbour 2014.

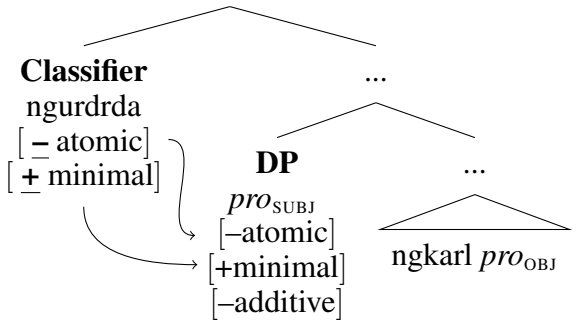
ture which tracks this contrast is [± minimal], so I assume the non-sibling marker bears a [_ minimal] probe feature.[8]

4 Mismatched number agreement as partially-defective intervention

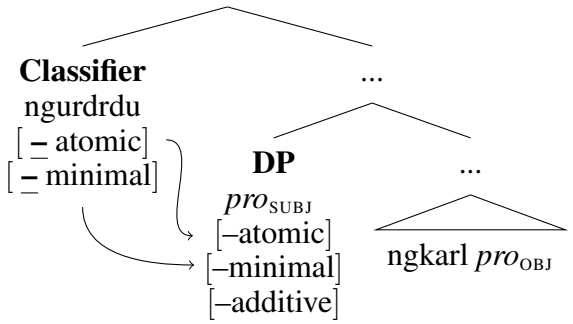
The fact that the non-sibling marker has fewer features than the classifier is crucial in deriving mismatched agreement. I propose that mismatched agreement occurs when the classifier receives the subject's features from the non-sibling marker instead of from the subject itself. Since the non-sibling marker is missing the [±atomic] feature (following section 3.2.), incomplete information is passed on to the classifier about the subject.

Non-mismatched agreement occurs when the classifier Agrees directly with the subject, i.e. when the subject is the highest element bearing number features in the classifier's c-command domain. Non-mismatch scenarios with dual and paucal subjects are shown in (15). The classifier ends up with the features [–atomic][+minimal] if the subject is dual and [–atomic][–minimal] if the subject is paucal. (**Disclaimer:** the trees in (15)-(16) are highly schematic syntactic representations. No attempt is made to show morpheme order / head movement / affixation.)

(15) a. Dual subject with no mismatch:



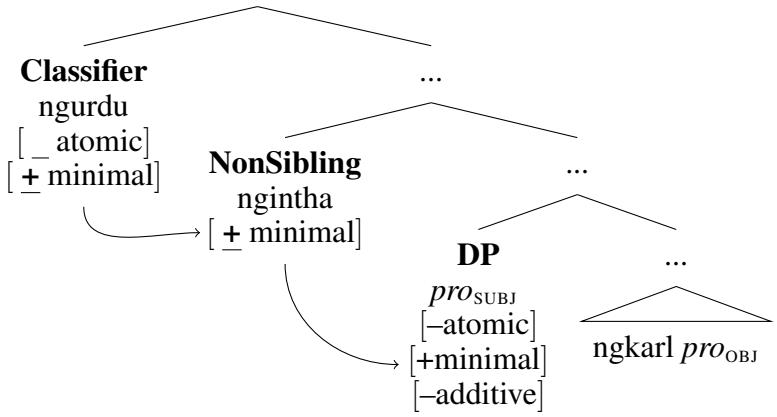
b. Paucal subject with no mismatch:



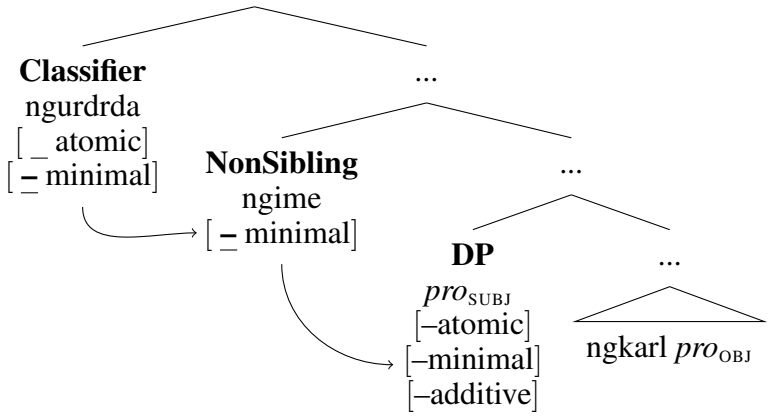
[8] One might wonder by what synchronic mechanism the non-sibling marker comes to be inserted in the first place in clauses with a dual or paucal non-sibling subject. This is an interesting question, but one that I unfortunately have no special insight into. The fact is that the non-sibling markers exist and are sensitive to number, and all I am concerned with here is how this number sensitivity might be featurally encoded given the lexical economy principle that I have proposed.

Mismatched agreement occurs when the classifier Agrees with the non-sibling marker, i.e. when the non-sibling marker is syntactically positioned between the classifier and the subject. Mismatch scenarios with dual and paucal subjects are shown in (16). The classifier ends up with the feature [+minimal] if the subject is dual and [–minimal] if the subject is paucal. The classifier's [_ atomic] probe remains unvalued.

(16) a. Dual subject with mismatch:



b. Paucal subject with mismatch:



In (16), it is crucial that even though the non-sibling marker lacks a [±atomic] feature, it still blocks the classifier's [_ atomic] probe from Agreeing with the subject. That is, the non-sibling marker acts as a *defective intervener* for the [_ atomic] probe (to use Chomsky's (2000) terminology). I make no particular commitment as to how exactly this should be modeled. There are many conceivable technical implementations of this defective intervention effect, and I have no evidence in favor of any one in particular. For instance, one could appeal to disjunctive satisfaction (Roversi 2020: Agree halts as soon as the probing head finds a goal which meets any of its needs) or the Condition on Agree Domains (Puškar-Gallien 2019: a probe cannot search past a goal that another probe on the same head has Agreed with).

(17) lists the set of number features which end up on the classifier according to

my proposal in each possible context. The classifier morph which appears in each context is also listed.

(17)

CONTEXT		CLASSIFIER		TREE
SUBJECT	MISMATCH?	FEATURES	MORPH	
singular	no	[+atomic][+minimal]	singular	
dual	no	[–atomic][+minimal]	dual	(15a)
dual	yes	[+minimal]	singular	(16a)
paucal	no	[–atomic][–minimal]	paucal/plural	(15b)
paucal	yes	[–minimal]	dual	(16b)
plural	no	[–atomic][–minimal]	paucal/plural	

Just using standard feature exponence, it is impossible to write down lexical entries consistent with (17) for the different classifier morphs. To see why, first consider the dual classifier. It corresponds to the feature sets [–atomic][+minimal] and [–minimal]. Those sets have no features in common, so if we were to write a feature exponence rule for the dual morph, it would have to expone no number features at all. This in itself is not a problem, but now consider the singular classifier. It corresponds to the feature sets [+atomic][+minimal] and [+minimal]. The only feature that those sets have in common is [+minimal], so it cannot be the case that the singular classifier expones any number features other than [+minimal]. Furthermore, it cannot be the case that the singular classifier expones no number features, because we have already said that the *dual* classifier expones no number features. So it must be that the singular classifier expones [+minimal] and no other number features. But this incorrectly predicts that the singular classifier should be preferred for insertion over the dual classifier in the context of the feature set [–atomic][+minimal] (due to the Subset Principle).

I propose that instead of exponing feature sets, the classifiers expone *meanings denoted by feature sets*. The singular classifier corresponds to the feature sets [+atomic][+minimal] and [+minimal], both of which denote singular. The paucal/plural classifier corresponds to the feature set [–atomic][–minimal], which denotes paucal/plural. And the dual classifier corresponds to both the feature set [–atomic][+minimal], which denotes dual, and the feature set [–minimal], which denotes underspecified nonsingular. This means that (17) can correctly be accounted for if we adopt the semantic insertion rules in (18).

(18) Classifier insertion rules:
– Insert the **singular** classifier if the feature set denotes **singular**
– Insert the **paucal/plural** classifier if the feature set denotes **paucal/plural**
– Insert the **dual** classifier otherwise.

Although this semantic exponence mechanism is nonstandard, it does not seem unreasonable to me. Crosslinguistically, there is a range of number agreement phenomena which seem to challenge simple feature exponence and suggest a level of semantic computation: for instance, plural agreement with collective singular nouns (e.g. Corbett 1979), cumulative number agreement with coordinated arguments and in right-node-raising constructions (e.g. Lyskawa 2021), and cumulative subject+object number agreement (e.g. Gluckman 2018).

5 Morphological position classes and syntactic affix mobility

Recall that the dual non-sibling marker only triggers mismatched agreement when it is prefixal, as in (19). When it is suffixal, as in (20), there is no mismatch.

(19) **ba-** **ngintha-** ngkardu -nu
1**SG**.13.FUT- NSIB.DU.F- see -FUT
'We (two non-siblings) will see it.' (Nordlinger and Mansfield 2021:6)

(20) **nguba-** nhi- ngkardu -nu **-ngintha**
1**DU**.13.FUT- 2SG.OBJ- see -FUT -NSIB.DU.F
'We (two non-siblings) will see you.' (Nordlinger and Mansfield 2021:6)

Nordlinger and Mansfield (2021) note that this is a non-canonical morphotactic pattern – it is remarkable that the linear position of the non-sibling marker affects the form of another element, the classifier.

In a way, one might say that this pattern is evidence in favor of my analysis. My Agree-based analysis predicts that mismatched agreement occurs only when the nonsibling marker syntactically intervenes between the classifier and the subject. If the non-sibling marker were to be syntactically positioned higher than the classifier, no mismatch would occur. The existence of (20), then, seems to validate my analysis: we can just assume that the syntactic position of the non-sibling marker is different in (20) than in (19) – an assumption which seems validated by the difference in their linear position – and the agreement non-mismatch is correctly predicted.

This raises two issues, however. The first issue is that we have to assume a lack of uniformity between the paucal and dual non-sibling markers, both in terms of syntactic position and in terms of linearization. In terms of syntactic position, we have to assume that the paucal non-sibling marker is always positioned low, between the classifier and the subject, since it always triggers an agreement mismatch; whereas the singular non-sibling varies between that low position and a higher position. And terms of linearization, the paucal non-sibling marker's low syntactic position is mapped to the suffixal position (see (10)); whereas for the dual non-sibling marker, the low syntactic position is mapped to the prefixal position, while the higher position is mapped to the suffixal position. This is summarized in (21).

(21)

NON-SIBLING MARKER	SYNTACTIC POSITION	LINEAR POSITION
dual	low	prefixal
dual	high	suffixal
paucal	low	suffixal

The second, more significant issue is a modularity paradox. The displacement of the dual non-sibling marker in (20) appears to be motivated by a morphological position class constraint (Nordlinger and Mansfield 2021) which gives the object agreement marker priority for the relevant templatic slot.[9] The assumption that this purely morphological constraint is able to determine the syntactic position of the

[9]Popp (2022a,b) proposes that position classes are not in fact involved – instead, there is a constraint which favors linearizing person morphology to the left. Regardless, the constraint is postsyntactic, which is all that is relevant here.

non-sibling marker seems countercyclic, and hence undesirable.

One possibility worth considering is that the displacement of the non-sibling marker is not in fact conditioned by a postsyntactic constraint, but is instead conditioned in the narrow syntax. Nordlinger and Mansfield (2021:8) argue that this cannot be the case because what matters is the overt presence of an object agreement marker. They state that in (19), the object's features are present in the syntax, but just happen not to be overtly realized. Note, though, that this does not strictly speaking logically rule out a purely syntactic explanation for the difference in position of the dual non-sibling marker in (19) vs. (20). It is possible that the presence of third person singular direct object features in the syntax in (19), as opposed to second person singular direct object features in (20), is somehow responsible for the variable position of the dual non-sibling marker. Another possibility is that, contrary to what Nordlinger and Mansfield assume, there is in fact no syntactic object agreement in (19), for instance because the relevant probe's relativization is such that it ignores third person singular direct objects. Maybe the position of the dual non-sibling marker could somehow be tied to the presence or absence of narrow-syntactic object agreement. I am not sure how realistic these possibilities are, but I thought I should at least mention them.

Suppose, though, that the difference in position of the dual non-sibling marker between (19) and (20) is indeed due to a postsyntactic constraint on linear order. I want to point out that to whatever extent this seems to raise issues for modularity, I do not think these issues are unique to my analysis. My analysis treats the variable linear position of the dual non-sibling marker as reflecting variablility in its syntactic position. This may seem like an undesirable assumption given that the variability seems to be conditioned by postsyntactic factors. However, abandoning this assumption would not eliminate the modularity paradox. The fact is that the number mismatch is present in (19) but goes away in (20). If we were to assume that the variablility in linear order of the dual non-sibling marker is not syntactic, we would have to assume that the linear position of the dual non-sibling marker (i.e. a PF property) is able to affect the number (i.e. morphosyntactic features) of the classifier – which still seems countercyclic (and this is the puzzle that Nordlinger and Mansfield highlight in their paper, though they do not discuss it in exactly these terms).

The variable-syntactic-position hypothesis should therefore not be dismissed. On the contrary, I think it is favored. The analysis that I have proposed in this paper allows a principled explanation of the (non-)mismatches, becased solely on the operation Agree (Chomsky 2000) acting upon a typologically well-motivated feature set (Harbour 2014) alongside a lexical economy condition on probes (Preminger 2019). If we were to abandon the hypothesis that the variable linear position of the dual non-sibling marker is syntactically determined, we would have to abandon my analysis, leaving us without an explanation for how and why the singular-dual and dual-paucal mismatches occur.

6 Conclusion

I have presented an Agree-based analysis of number mismatches between the subject and verb in Murrinhpatha. My proposal is that the singular-dual and dual-

paucal number mismatches conditioned by the non-sibling marker are not arbitrary, but are the consequence of the feature decompostion of number (Harbour 2014) and a learner bias against positing probe features (Preminger 2019). The analysis also relies on the mechanisms of semantic exponence (18) and partially-defective intervention (16).

A prediction of this analysis is that mismatched agreement requires the non-sibling marker to occupy a particular syntactic position. On the surface, this prediction seems to be validated by the fact that rightward displacement of the dual non-sibling marker eliminates the agreement mismatch (Nordlinger and Mansfield 2021), though the pattern raises problems for linearization and modularity which I have not solved here.

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