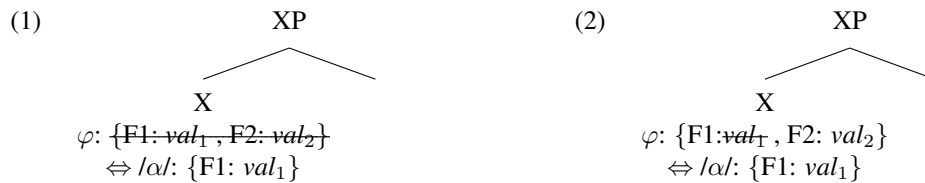# Leftover Agreement:
Spelling Out Kartvelian Number

Tatiana Bondarenko & Stanislao Zompì

1. Introduction

In this paper we examine a pattern of number agreement in the four Kartvelian languages (Georgian, Laz, Megrelian, Svan) and argue that it provides evidence for a certain kind of interleaving of syntax and spell-out. The general theoretical question that drives our investigation is: *how does Vocabulary Insertion work?* Within the framework of Distributed Morphology, it is standardly assumed that Vocabulary Insertion (VI) is *fully replacive* (Bobaljik, 2000): all features are replaced by the exponent (1).

(1)
$$XP$$
X
φ: {F1: ~~val_1~~ , F2: ~~val_2~~}
$\Leftrightarrow$ /α/: {F1: val_1}

(2)
$$XP$$
X
φ: {F1:~~val_1~~ , F2: val_2}
$\Leftrightarrow$ /α/: {F1: val_1}

We, however, would like to argue that Vocabulary Insertion is only *partially replacive:* the exponent replaces only those features that its specification matches exactly; unlexicalized features—which we call *leftover features*—remain syntactically active. For example, consider (2), where a syntactic head X has a feature bundle φ with two features, F1 and F2, and the exponent α that has been matched with φ lexicalizes only F1. We argue that in such a configuration the feature F2, which has not been lexicalized, will remain "visible" to further syntactic computation. A theory in which Vocabulary Insertion is only partially replacive allows spell-out to affect—either feed or bleed—syntactic operations. We show that such a prediction is in fact desired.

Our evidence comes from Kartvelian number agreement. We argue that in Kartvelian languages we see the spell-out of a lower agreement probe affect agreement on a higher agreement probe. In particular, if the exponent of the lower probe lexicalizes a plural feature, the higher probe does not show plural agreement, but when it doesn't, plural agreement on the higher probe is present. Thus, failure to lexicalize the plural feature on the lower probe feeds further agreement.

The paper is structured as follows. Section 2 introduces the main empirical generalization about number agreement in Kartvelian languages. Section 3 provides some background on agreement in Kartvelian. Section 4 presents our proposal and elaborates on the details of Leftover Agreement (LA). In Section 5 we show how LA can explain the generalization about number agreement in Kartvelian. In Section 6 we provide some additional evidence in favor of our analysis. Section 7 concludes the paper.

2. The Kartvelian Discontinuous-Bleeding Generalization

The number-agreement pattern in Kartvelian that we examine in this paper—the Kartvelian Discontinuous-Bleeding Generalization—is summarized in (3). This generalization can be illustrated by comparing how the four languages say *"She VERBs us / you* [PL]*"* (3SG subject, plural participant object), as in (4)-(7).

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(3) **The Kartvelian Discontinuous-Bleeding Generalization**[1] *(to be slightly modified)*
Object number agreement on the suffix appears only when the object's number has not been lexicalized by the exponent corresponding to the prefix.

(4) **Georgian** (Aronson, 1990:172)

    a. **gv**-naxa
       1PL-see.AOR.3SG

       '(S)he saw us.'

    b. **g**-naxa-**t**
       2-see.AOR.3SG-**PL**

       '(S)he saw you (PL).'

(5) **Svan** (Testelets, 1989:9)

    a. **gw/n**-adgäri
       1PL.INCL/1PL.EXCL-kill.PRS

       '(S)he is killing us (INCL/EXCL).'

    b. **ž**-adgäri-**d**
       2-kill.PRS-**PL**

       '(S)he is killing you (PL).'

(6) **Laz** (Lacroix, 2009:294, ex. (734–5))

    a. **m**-dziom-**an**
       1-see.PRS-**PL**

       '(S)he sees us.'

    b. **g**-dziom-**an**
       2-see.PRS-**PL**

       '(S)he sees you (PL).'

(7) **Megrelian** (Kipshidze, 1914:76)

    a. **m/v**-tʃ'argn-**a(n)**
       1-write.PRS-**PL**

       '(S)he writes us.'

    b. **r**-tʃ'argn-**a(n)**
       2-write.PRS-**PL**

       '(S)he writes you (PL).'

In (4)-(7) we see that whether or not the prefix lexicalizes PL determines whether suffixal number agreement will be present. This dependency is summarized in Table 1:

	Does the prefix lexicalize PL?	Does the suffix show PL agreement?
1PL in Georgian & Svan	YES	NO
1PL in Laz & Megrelian	NO	YES
2PL in all four languages	NO	YES

Table 1: Dependence between PL suffixal agreement and the exponent of the prefixal agreement

This pattern of number agreement raises the question: why does the suffix's presence depend on the features lexicalized by the prefix? Our answer is as follows. The prefix and the suffix represent two different probes, and because Vocabulary Insertion is only partially replacive, the unlexicalized plural features on the prefixal probe are accessible and get agreed with by the suffixal probe.
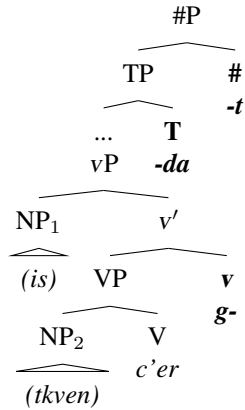
3. Background on Kartvelian verbs

Kartvelian verbs have three slots that are relevant for agreement in their wordforms. These are illustrated in (8) with an example from Georgian.

(8) (is) (tkven) gada-**g**-c'er-**da-t** *Georgian*
    (3SG.NOM) (2PL.ACC) PVB-**2**-describe-**COND.3SG-PL**

    '(S)he would describe you (pl).'

We will assume that the prefix (*g-* in (8)) corresponds to an agreement probe on *v*. Note that the first of the two suffixes that show agreement in (8) also conveys information about the temporal/modal orientation of the clause. We will assume that this suffix (*-da* in (8)) realizes the T head. Finally, we will assume that the suffix that realizes number features (*-t* in (8)) corresponds to a # head that is above T in the syntactic structure. Our assumptions about slots-to-probes correspondence are illustrated in (9).

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[1] The term ***discontinuous bleeding*** has been used in the morphological literature (Noyer 1992 on Berber) for the phenomenon whereby insertion of one affix that expresses two features bleeds insertion of another non-adjacent affix that could have expressed one of those features.

(9)   **Three agreement probes: *v*, T, #**

```
                #P
              ⁀
        TP        #
      ⁀           -t
     ...    T
    vP     -da
   ⁀
 NP₁      v′
  ⁀      ⁀
(is)  VP      v
     ⁀        g-
   NP₂   V
  ⁀    c'er
 (tkven)
```

Given these assumptions, we restate the generalization from the previous section in the following way:

(10)   **The Kartvelian Discontinuous-Bleeding Generalization** *(final version)*
Object number agreement on the #-probe appears only when the object's number has not been
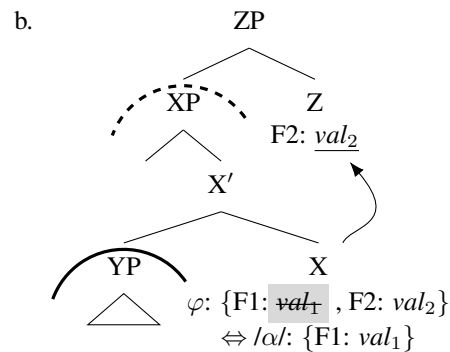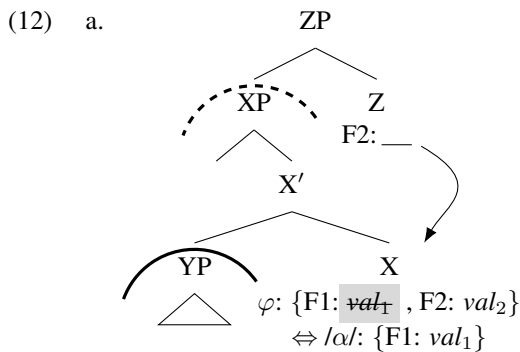lexicalized by the exponent corresponding to the *v*-probe.

4. Our proposal: Leftover Agreement (LA)

We propose that the interleaving of syntax and spell-out proceeds in the following way. If XP is a
phase (▬ ▬ ▬) headed by X (11), then the whole XP undergoes Vocabulary Insertion in the same cycle,
after all the processes within XP are completed. After that, the complement of the phase head—YP—
becomes completely inaccessible (▬▬▬). The accessibility of the uninterpretable features of the phase
head X and of its specifier depends on exponence: (i) features that have been lexicalized by exponents
specified for them become inaccessible; (ii) features that have not been lexicalized by exponents specified
for them—***leftover features***—are still visible to higher heads and can be interacted with.

(11)
```
     ⌒XP⌒
       ⁀
      X′
        ⁀
   YP    X
```
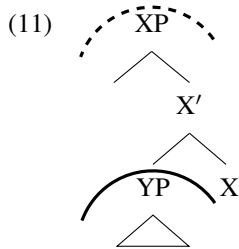
1. **XP** (▬ ▬ ▬): a phase; undergoes Vocabulary Insertion as a whole after all the processes within XP are completed.
2. **YP** (▬▬▬): complement of a phase head; undergoes VI together with XP, but then becomes completely inaccessible.
3. **X and Spec, XP:** bordeline zone; undergo VI when the whole XP does, accessibility depends on exponence: unlexicalized features remain visible to syntax.

Leftover Agreement (LA) is agreement of a higher probe with the leftover features on a lower
probe. Here is how it proceeds (12).

(12)   a.
```
               ZP
              ⁀
        XP         Z
         ⁀         F2: __
        X′
          ⁀
     YP       X
           φ: {F1: v̶a̶l̶₁ , F2: val₂}
           ⇔ /α/: {F1: val₁}
```

b.
```
               ZP
              ⁀
        XP         Z
         ⁀         F2: val₂
        X′
          ⁀
     YP       X
           φ: {F1: v̶a̶l̶₁ , F2: val₂}
           ⇔ /α/: {F1: val₁}
```

Let X be a phase head that has a probe on it; this probe has copied a feature bundle φ through agreement with noun phrases within XP (12).[2] After all syntactic operations within XP have been completed, XP, being a phase, undergoes Vocabulary Insertion, and the head X gets matched with the best exponent available, /α/. It turns out that this exponent lexicalizes only a subset of the feature bundle φ: in (12a) /α/ lexicalizes F1, but not F2. The unlexicalized—*leftover*—features (F2 in (12a)) remain accessible for further syntactic operations. The probe on a higher head Z can find the leftover (= unlexicalized by the exponent) features on the lower head X: in (12a) Z can see F2. Z can agree with and realize X's leftover features (12b). This is **Leftover Agreement.**

In order for LA with a phase head X to be possible, two conditions have to be met. First, the phase head X needs to have the relevant features that the higher probe is looking for. Second, these relevant features should not have been lexicalized by X's exponent. In the next section we will see how these conditions for LA derive the Discontinuous-Bleeding Generalization in Kartvelian.

5. Explaining the Discontinuous-Bleeding Generalization with LA

5.1. Some assumptions

We assume that Agree can proceed downward or in a Spec-Head configuration. Following Deal (2015; 2017), we differentiate two operations within Agree: *interaction*—probes differ in what kinds of goals they interact and agree with during their search—and *satisfaction*—probes differ in what features stop their search. We assume that probes can be *coarse*, and copy more features from noun phrases than what they were searching for. Finally, we adopt the standard assumption that *v* is a phase head.

5.2. v-agreement

Our proposal is in principle compatible with any approach to prefixal agreement in Kartvelian languages that derives the correct exponents. Here we mostly follow Béjar & Rezac (2009) for concreteness.

The *v*-probe first searches in its complement, then in its specifier. It interacts with NPs that are participants (1st and 2nd person), and coarsely copies all φ-features of the NPs it interacts with. This probe is insatiable (Hiraiwa's 2005 Multiple Agree; Deal's 2017 Insatiability).[3] The exponence of *v* depends on whether its features have been found on the probe's first or second try:

(13) **1st-attempt features:**
    a. *gv-* $\Leftrightarrow$ {1PL}
    b. *m-* $\Leftrightarrow$ {1}
    c. *g-* $\Leftrightarrow$ {2}

(14) **2nd-attempt features:**
    a. *v-* $\Leftrightarrow$ {1}
    b. ($\emptyset \Leftrightarrow$ {2})

The choice of *v*'s exponent is governed by the following rule. *v* lexicalizes 1st-attempt features if there are any. If there are no such features, it lexicalizes 2nd-attempt features. If it has found no features on the second attempt either, it fails (Preminger, 2014), resulting in zero-exponence. Georgian examples (15)-(16) show this dependence of exponence on the number of the attempt: in (15) the features of the 1PL NP have been found on the first attempt (= object), so the exponent is *gv-*; in (16) the features of the 1PL NP have been found on the second attempt (= subject), so the exponent is *v-*.

(15) (is) (čven)
    (3SG.NOM) (1PL.ACC)
    mo-**gv**-k'l-av-da
    PVB-**1PL**-kill-TS-IMPF.3
    '(S)he was killing us.'

(16) (čven) (mas)
    (1PL.NOM) (3SG.ACC)
    mo-**v**-k'l-av-t
    PVB-**1**-kill-TS.PRS.3-PL
    'We kill it.' (Aronson, 1990:171)

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[2] We do not assume, of course, that XP is a complement of Z; many projections may intervene between them.

[3] Alternatively, we could say that the probe is satiable, but it is only satisfied when it interacts with both SPKR and ADDR. As far as we see, this account would be extensionally identical to the one we present.
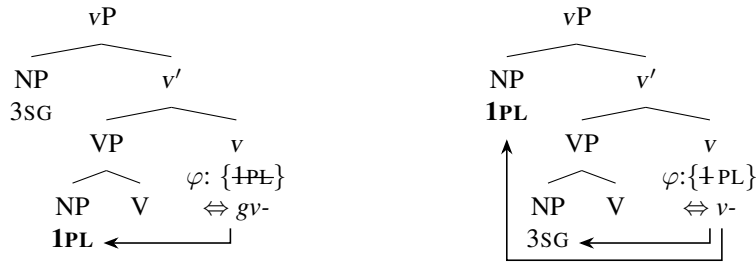
What *v* agrees with is determined by the features of the subject and the object. When both arguments are 3rd person, *v* will fail to agree. When one argument is a participant and one is 3rd person, *v* will agree with the participant argument. When both arguments are participants, *v* will show agreement with the 1st-attempt argument. The two main takeaway points about *v*'s agreement are: (i) that it does not agree with 3rd person NPs; (ii) that in some cases *v* gets features that its exponent does not lexicalize.

5.3. T-agreement

The T-probe interacts with nonoblique (i.e. nominative or ergative) NPs in both person and number. It is satisfied by any φ-feature-bearing NP; as a consequence, it generally just agrees with the subject.[4] The exponence of the T-probe is always conditioned by (or fused with the exponence of) the tense/mood of the clause. It also undergoes a few additional morphophonological interactions with the adjacent #-probe, which we set aside here for reasons of space (but see fn. 6 for discussion). An example from Georgian, exempt from such additional complications, is provided in (17).

(17) (is)   (čven)   mo-gv-k'l-av-**da**
      (3SG.NOM) (1PL.ACC) PVB-1PL-kill-TS-**IMPF.3.SG**
      '(S)he was killing us.' (Aronson 1990: 171)

5.4. LA in #-agreement

The #-probe may interact with anything that bears # features, and it only copies such features (i.e. it is not coarse). It is satisfied by PL, which it expones as a suffix. Recall from Section 4 that *v*P is a phase, so, by the time # probes, VP has become completely inaccessible (──), whereas the accessibility of *v* and its specifier (the phase edge) depends on exponence: only ***leftover*** (= unlexicalized) features are accessible to # (▪ ▪ ▪ ▪). Consider now the configuration ⟨3SG, 1PL⟩ in the four languages.

(18) **Georgian**	(19) **Svan**	(20) **Laz**	(21) **Megrelian**
gv-naxa	**n**-adgäri	**m**-dziom-**an**	**m/v**-tʃ'argn-**a(n)**
1PL-see.AOR.3SG	11PL.EX-kill.PRS	1-see.PRS-PL	1-write.PRS-PL
'(S)he saw us.'	'(S)he kills us."	'(S)he sees us.'	'(S)he writes us.'

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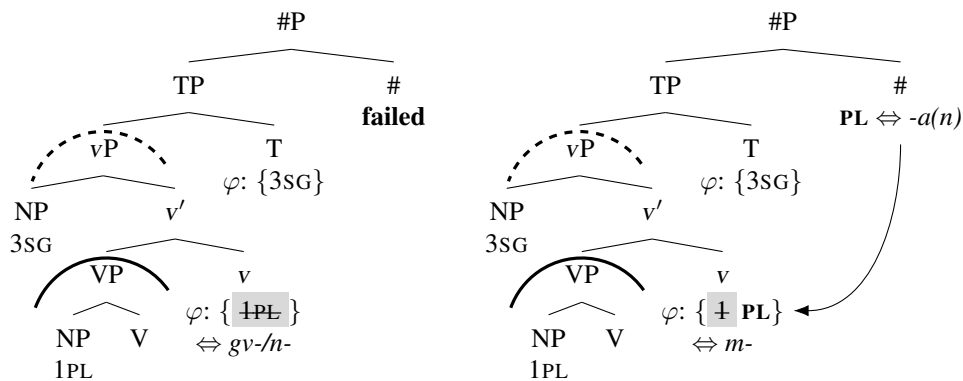
4 But not with the oblique subject of the "inverse" paradigm, which we set aside here.

In Georgian and Svan, the *v*-exponent is fully specified for both 1st person and PL (*gv-/n-*). There are thus no leftover PL features on *v*P's edge, nor any plural NPs accessible to #, given that the subject is SG; hence # fails to agree (Preminger, 2014), resulting in no plural suffix in (18)-(19). Assuming that VP is completely inaccessible is crucial here in deriving the inability of # to directly agree with the object NP itself and get the PL feature from it. This assumption also gives rise to the prediction that if #-agreement with objects is always mediated by leftovers on *v*, then a 3PL object—which is not a participant and thus is not agreed with by *v*—should not be agreed with by # either. This is borne out in (22).[5]

(22) da-v-c'er-di-**(*t)**   *Georgian*
      PVB-1-write-COND.PART-**(PL)**
      'I would write them.'

Let us now go back to Laz and Megrelian. In (20)-(21), the *v*-exponent *m-* is underspecified for number, and hence only lexicalizes the 1st-person feature. The #-probe can thus agree with a leftover PL feature on *v* and expone it as a plural suffix—despite the absence of any accessible plural NPs.

The four languages all pattern alike, however, when it comes to the ⟨3SG, 2PL⟩ configuration. That is because they all lack a fully specified exponent for 2PL, and thus they all show LA with 2PL objects: in (23) through (26), # is able to find the leftover PL feature on *v*, copy it, and expone it.

(23) **Georgian**	(24) **Svan**	(25) **Laz**	(26) **Megrelian**
g-naxa-**t**	**ž**-adgäri-**d**	**g**-dziom-**an**	**r**-tʃ'argn-**a(n)**
2-see.AOR.3SG-**PL**	**2**-kill.PRS-**PL**	**2**-see.PRS-**PL**	**2**-write.PRS-**PL**
'(S)he saw you pl.'	'(S)he kills you pl."	'(S)he sees you pl.'	'(S)he writes you pl.'

This concludes our explanation of why #-agreement appears to depend on the exponence of *v*—this happens because *v* is a phase head, whose exponence determines the presence or absence of leftover PL features for # to agree with. In particular, when the subject (in Spec,*v*P) is plural, # can agree with the subject itself,[6] but when the subject (in Spec,*v*P) is singular, #'s only potential access to PL features is via Leftover Agreement with *v*. This is our way to derive the Discontinuous-Bleeding Generalization.

6. Core evidence

On our account, the suffix lexicalizing the plural agreement that could not be lexicalized by the prefix (in our terms, the "LA" suffix) realizes a probe of its own which takes part in genuine syntactic agreement (cf. Foley 2017), in contrast to accounts such as Halle & Marantz's (1993), whereby a single agreement node in the syntax is fissioned into a prefixal and a suffixal exponent later in the morphological component (cf. also Lomashvili & Harley 2011 and Thivierge 2019). In contrast to such accounts, we expect what we term the #-probe to be subject to intervention and phasal-locality effects, just as any other probe may be. In the next two subsections, we argue that both expectations are borne out.

6.1. The first argument in our favor: LA bled by a participant subject

Evidence for intervention effects in LA comes from the Svan contrast grayed out in Table 2. On the one hand, the configuration ⟨3SG, 2PL⟩ shows LA as usual: v^0 cannot lexicalize the PL feature, which

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[5] The form *da-v-c'er-di-t* is possible under a different meaning: 'We would write it/them'.

[6] When the subject is 3PL, there is a single suffix that expresses tense, person and number of the subject:

(i) da-c'er-**dnen**   *Georgian*
     PVB-write-**COND.3PL**
     'They would write it.'

It seems that across all tense/mood forms, this suffix ends with a consonant. One hypothesis could thus be that this suffix expones T and that *-t* expones the #-probe, but *-t* gets deleted by a morphophonological readjustment rule that helps avoid a word-final consonant cluster. Another hypothesis, due to Socolof (2020), is that T and # are not both exponed due to impoverishment of adjacent heads. Our proposal is compatible with both of these approaches.

is thus left over for the #-probe to agree with. However, **LA is bled in** $\langle$**1SG**, **2PL**$\rangle$, unlike in any other Kartvelian language. Why does LA agreement not occur in this configuration?

Object	Subject						
	1SG	1PL.EXCL	1PL.INCL	2SG	2PL	3SG	3PL
1SG	—	—	—	m-...	m-...-d	m-...	m-...-x
1PL.EXCL	—	—	—	n-...	n-...-d	n-...	n-...-x
1PL.INCL	—	—	—	—	—	gw-...	gw-...-x
2SG	ž-...	ž-...-d	—	—	—	ž-...	ž-...-x
2PL	ž-...	ž-...-d	—	—	—	ž-...-x	ž-...-x
3S/P	xw-...	xw-...-d	l-...-d	x-...	x-...-d	...	...-x

Table 2: Svan (Gudjedjiani & Palmaitis, 1986:61)

It seems natural to tie this fact to another peculiarity of Svan's highest probe—the fact that it agrees not just with plural features but also with participant person features. Evidence for this comes from the alternation between two different suffixes for plural: *-d*, which shows up if the subject is a participant, and *-x*, which shows up elsewhere. Knowing that Svan's highest probe also agrees with participant features, we may then just assume that participant NPs can also act as interveners for its search.

More precisely, we assume that Svan's highest probe interacts with, and is satisfied by, just any marked φ-bundle—i.e. any bundle containing PL, PART, or both—so that the only φ-bundle it can skip is 3SG. We thus explain why a participant subject—even if singular—may satisfy its search and bleed LA.

(27)
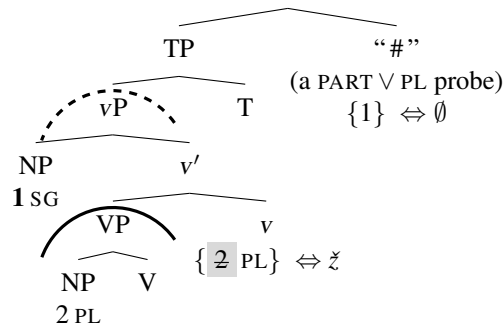
As a bonus, this account also simplifies the treatment of the exponence of the highest probe, which can now be handled by the simple rules in (28). One may wonder why, in the $\langle$3SG, 2PL$\rangle$ configuration, LA is realized by the elsewhere {PL} *-x* rather than by the {PART, PL} suffix *-d*; but the answer already falls out from the account: by the time the highest probe probes, the PART feature on *v* will already have been lexicalized, and so the highest probe will never be able to find it, agree with it, or lexicalize it as *-d*.

(28) a. {PL, PART} $\Leftrightarrow$ *-d*   b. {PL} $\Leftrightarrow$ *-x*   c. elsewhere $\Leftrightarrow$ $\emptyset$

6.2. The second argument: 3PL objects can get agreed with, if high enough

The second argument for our account comes from the sensitivity of #-agreement to phasal locality. Recall from Section 5.4 that, in our system, 3PL objects fail to control #-agreement because they are themselves too far from # and because their features are never copied by *v*. However, we also predict that 3PL noun phrases *should* get agreed with by # in a different syntactic configuration—in particular, whenever such noun phrases manage to escape the *v*P phase.

This seems to be borne out. As noted by Blix (2020), 3PL objects in Georgian can exceptionally control #-agreement if they are scrambled. This is exactly what we predict if such scrambling is to be analyzed as movement of the 3PL object out of the *v*P phase into #'s accessibility domain.[7]

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[7] According to Blix (2020), this is only possible if the subject is inanimate. Neither Blix nor us can explain why.

(29) a. [mesame seri-is nakt'v-eb-s] [saerto punkcia] a-ertianeb-{**t**}/{$^?$s}
   third series-GEN form-PL-DAT common function.NOM PFV-unite-{**PL**}/{$^?$PRS.3SG}

   b. [saerto punkcia] [mesame seri-is nakt'v-eb-s] a-ertianeb-{**s**}/{$^?$*t}
   common function.NOM third series-GEN form-PL-DAT PFV-unite-{**PRS.3SG**}/{$^?$*PL}
   'A common function unites the forms of the third series.'
   Thomas Wier, Léa Nash (p.c.) via Blix (2020) *Georgian*

More generally, our approach predicts that higher probes should display more flexibility in their agreement pattern than lower probes, as a larger array of movements may bleed or feed their access to φ-features. This appears to be correct, too: Kibrik (1996), for example, notes variability in #-agreement in Svan perfect tenses—a pattern that our account holds promise to help us better understand.

7. Conclusion

Our investigation of verbal agreement in the four modern Kartvelian languages has led us to posit an architecture of grammar where syntax and postsyntax are interleaved in a particular way, with the uninterpretable features on a phase edge being accessible or inaccessible to the next phase depending on the outcome of exponence. This allowed us to view the prefix–suffix interactions found across Kartvelian in terms of a notion of Leftover Agreement—agreement by a higher probe (here, the suffix) with the unlexicalized features of a probe on the lower phase's edge (here, the prefix, which we identified as *v*).

We have thereby departed from previous accounts that posited a single probe in the syntax and had it fissioned into a prefixal and a suffixal exponent in the morphology. By taking the prefix and the suffix to realize two syntactically distinct probes, and by treating the relation between the two as one of genuine syntactic agreement, we could then easily accommodate the intervention effects found between prefix and suffix in Svan—a key advantage over morphological accounts like fission (Halle & Marantz, 1993).

Finally, if this much is on the right track, we should expect to also find reflexes of LA well beyond Kartvelian. The research agenda that emerges from this thus aims to assess whether other known prefix–suffix interactions (sometimes previously handled by fission) might also be reanalyzed in terms of LA.

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