Morphological conspiracies in Georgian and Optimal Vocabulary Insertion[1]

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1 Introduction

When multiple processes serve to enforce a single constraint on surface forms, they form a conspiracy (Kisseberth 1970). A classic phonological example comes from Yawelmani Yokuts (1), where a strict CVX (=CVV or CVC) syllable template is enforced by shortening vowels or epenthesizing new ones in would-be illegal syllables. Another conspiratorial process is apocope, which fails apply just where it would otherwise produce a complex coda. These processes work together to prevent complex syllables from surfacing.

(1)

Process	*Rule*	*Example*
Shortening	$V_{\mu\mu} \rightarrow V_{\mu}$ / __C$]_{\sigma}$	/ʂa:p-hin/ → [ʂaphin] ‘burn-NFUT’
Epenthesis	$\varnothing \rightarrow$ i / C__CC	/paʔt̪-hin/ → [paʔit̪hin] ‘fight-NFUT’
Apocope	V → $\varnothing$ / VC__#	/taxa:-kˀa/ → [taxakˀ] ‘bring-IMPER’ cf. /xat-kˀa/ → [xatkˀa] eat-IMPER’

Data adapted from Kisseberth (1970)

As formulated in (1), the SPE-style phonological rewrite rules are descriptively adequate. Yet such an analysis misses out on an important generalization. It’s entirely coincidental that they are formulated in just the right way to enforce a maximal syllable template. A more explanatory and parsimonious analysis would make direct reference to complex syllables, the surface form Yawelmani’s phonology conspires against.

A major theoretical advantage of Optimality Theory (Prince & Smolensky 1993/2004) is the ability to do just this—to capture conspiracies. In the case of Yawelmani, we can appeal to a markedness constraint like *COMPLEXSYLLABLE, which disfavors surface forms containing syllables larger than CVX. Ranked above other relevant constraints, *CXSYL induces the patterns in (1), effectively killing three birds with one stone. The comparative tableau in (2) illustrates this.

[1] Thanks especially to Sandy Chung, Amy Rose Deal, members of the Winter 2016 UCSC Research Seminar, and audiences at TbiLLC 11, Stanford, Berkeley, NYU, and CLS 52. All mistakes are my own. Abbreviations: 1 2 3 *first/second/third person*, ABS *absolutive*, AOR *aorist (=perfective past)*, DAT *dative*, ERG *ergative*, IMPER *imperative*, IO *indirect object*, NFUT *nonfuture*, NOM *nominative*, OB *(direct) object*, PART *participant*, PL *plural*, PRES *present*, SG *singular*, SPKR *speaker*, STAT *stative*, SU *subject*, TR *transitive*, X>Y *subject acting on object*.

(2) *Input*	*Winner ~ Loser*	*CxSyl	*V#	Max[μ]	Dep[V]	Max[V]
a. /ʂaːp-hin/	[.ʂap.hin.] ~ [.ʂaːp.hin.]	$\mathrm{W}_{0\sim1}$		$\mathrm{L}_{1\sim0}$		
b. /paʔʈ-hin/	[.pa.ʔiʈ.hin.] ~ [.paʔʈ.hin.]	$\mathrm{W}_{0\sim1}$			$\mathrm{L}_{1\sim0}$	
c. /taxaː-kˀa/	[.ta.xakˀ.] ~ [.ta.xaː.kˀa.]		$\mathrm{W}_{0\sim1}$	$\mathrm{L}_{1\sim0}$		$\mathrm{L}_{1\sim0}$
d. /xat-kˀa/	[.xat.kˀa.] ~ [.xatkˀ.]	$\mathrm{W}_{0\sim1}$	$\mathrm{L}_{1\sim0}$			

This paper applies the same reasoning to morphological phenomena. I identify a conspiracy in the Georgian verbal agreement system, and use it to argue for a constraint-based theory of Vocabulary Insertion, building on previous work in OT morphology (Trommer 2001, Kiparsky 2003, Wolf 2008, Xu & Aronoff 2011, Caballero & Inkelas 2013) and Distributed Morphology (DM; Halle & Marantz 1993). In particular, I argue that ranked, violable constraints govern Vocabulary Insertion, the operation which expones abstract syntactic terminals with morphophonological material. Optimal Vocabulary Insertion subsumes the Subset Principle (Halle 1997) and at least some of the postsyntactic operations (impoverishment, fission, etc.) used in standard DM. Applied to the patterns of multiple exponence in Georgian, this approach provides a more explanatory account than is possible in a rule-based morphological theory.

The rest of this paper is structured as follows. Section 2 describes the crucial Georgian agreement morphemes and their distribution. Section 3 identifies conspiratorial morphological patterns in the system: multiple exponence of a feature is permitted in certain environments, but avoided elsewhere. Section 4 expounds on the technical aspects of Optimal Vocabulary Insertion (OVI), comparing it to standard DM. Section 5 illustrates the utility of OVI with an analysis of Georgian agreement. The final section concludes.

2 Georgian agreement

Finite verbs in Georgian exhibit an intricate pattern of *φ*-agreement with their arguments, attracting much descriptive (Aronson 1995, Hewitt 1995) and theoretical attention (Halle & Marantz 1993, Trommer 2001, Béjar 2003, Béjar & Rezac 2009, Lomashvili & Harley 2011, Nevins 2011, McGinnis 2013, Blix 2016).

A simplified verbal template is given in (3): both the subject (SU) and the object (OB) can trigger agreement morphemes which occur in three morphological slots. (Throughout this paper I highlight subjects, their associated features, and agreement morphemes in grey; objects and kin are black.)

(3)	*Person prefixes* $\leftrightarrow \pi^0$	*Stem* $\leftrightarrow V^0$	*TAM suffixes* $\leftrightarrow T^0$	*Plural suffix* $\leftrightarrow \#^0$

In the middle is the verb stem. This is often morphologically complex, but its decomposition is not relevant for the purposes of agreement, so I will simply label it V^0. After the stem comes a slot for TAM suffixes, which combine tense–aspect–mood features with subject agreement. I'll assume these are exponents of the familiar head T^0. Allomorphy of TAM suffixes is complex (see Aronson 1995 for a comprehensive description) but it suffices to note that most TAMs have three suffixes, distinguishing participant (1st or 2nd person), 3SG, and 3PL subjects. Certain intransitive stative verbs make a four-way distinction in the present.[2]

(4)

	AOR	PRES.TR	PRES.STAT
1.SU	*–e*	*–∅*	*–var*
2.SU			*–xar*
3SG.SU	*–a*	*–s*	*–s/–a*
3PL.SU	*–es*	*–en*	*–(n)an*

To illustrate the distribution of the TAM suffixes, (5) gives the aorist (perfective past) paradigm for *naxa* '*x* saw *y*'. In every cell the TAM suffix is shaded grey, indicating consistent subject agreement in this slot.

(5)

	1SG.OB	1PL.OB	2SG.OB	2PL.OB	3.OB
1SG.SU	—	—	*g-nax-e*	*g-nax-e-t*	*v-nax-e*
1PL.SU	—	—	*g-nax-e-t*	*g-nax-e-t*	*v-nax-e-t*
2SG.SU	*m-nax-e*	*gv-nax-e*	—	—	*nax-e*
2PL.SU	*m-nax-e-t*	*gv-nax-e-t*	—	—	*nax-e-t*
3SG.SU	*m-nax-a*	*gv-nax-a*	*g-nax-a*	*g-nax-a-t*	*nax-a*
3PL.SU	*m-nax-es*	*gv-nax-es*	*g-nax-es*	*g-nax-es*	*nax-es*

Next consider the person prefixes. There are four of these, indicating 1st person subjects *v–* '1.SU', and participant objects *m–* '1SG.OB', *gv–* '1PL.OB', & *g–* '2.OB'. A fifth prefix, *h–* '3.IO', is triggered by 3rd person dative arguments, but for reasons of space, I will not address it here. I assume these morphemes are exponents of a *φ*-probe I'll call π^0, adopting Béjar (2003) and Preminger (2009)'s label.

[2] The 1st and 2nd person stative present suffixes are transparently related to the copula: compare the independent verbs *var* 'I am' and *xar* 'you are'. For simplicity, I will assume these are synchronically exponents of T^0, just like any other TAM suffix. Treating them instead as enclitic auxiliaries is also compatible with my analysis, so long as the domain of Vocabulary Insertion is defined to include them and the other agreement suffixes together.

(6)

	SU	OB
1st	*v*– '1.SU'	*m*– '1SG.OB' *gv*– '1PL.OB'
2nd	—	*g*– '2.OB'
3rd	—	(*h*– '3.IO')

In most cells of the transitive paradigm (7) it's simple enough to predict which prefix a verb will have. But in 1>2 combinations, in principle *v*– '1.SU', *g*– '2.OB', or even both could appear—yet only *g*– '2.OB' does. Béjar & Rezac (2009) refer to this complementarity among the prefixes as *Agreement Displacement*.

(7)

	1SG.OB	1PL.OB	2SG.OB	2PL.OB	3.OB
1SG.SU	—	—	*g-nax-e* (**v-nax-e*)	*g-nax-e-t* (**v-nax-e-t*)	*v-nax-e*
1PL.SU	—	—	*g-nax-e-t* (**v-nax-e-t*)	*g-nax-e-t* (**v-nax-e-t*)	*v-nax-e-t*
2SG.SU	*m-nax-e*	*gv-nax-e*	—	—	*nax-e*
2PL.SU	*m-nax-e-t*	*gv-nax-e-t*	—	—	*nax-e-t*
3SG.SU	*m-nax-a*	*gv-nax-a*	*g-nax-a*	*g-nax-a-t*	*nax-a*
3PL.SU	*m-nax-es*	*gv-nax-es*	*g-nax-es*	*g-nax-es*	*nax-es*

The final agreement morpheme in Georgian is the plural suffix –*t* 'PL', which expones a number probe I'll label $\#^0$. This is an omnivorous agreement marker, indicating that either the subject or object is plural. Take the verb in (8): the three-way ambiguity stems from the fact that either or both arguments can trigger –*t* 'PL'.

(8) *g-nax-e-t*
2.OB-see-AOR:1/2-PL
'We saw you' *or* 'I saw you.PL' *or* 'We saw you.PL'

(9)

	1SG.OB	2SG.OB	3SG.OB	1PL.OB	2PL.OB	3PL.OB
1SG.SU	—	*g-nax-e*	*v-nax-e*	—	*g-nax-e-t*	*v-nax-e*
2SG.SU	*m-nax-e*	—	*nax-e*	*gv-nax-e*	—	*nax-e*
3SG.SU	*m-nax-a*	*g-nax-a*	*nax-a*	*gv-nax-a*	*g-nax-a-t*	*nax-a*
1PL.SU	—	*g-nax-e-t*	*v-nax-e-t*	—	*g-nax-e-t*	*v-nax-e-t*
2PL.SU	*m-nax-e-t*	—	*nax-e-t*	*gv-nax-e-t*	—	*nax-e-t*
3PL.SU	*m-nax-es*	*g-nax-es*	*nax-es*	*gv-nax-es*	*g-nax-es*	*nax-es*

But not just any plural argument triggers *–t* ‘PL’. Paradigm (9) outlines those cells that contain a plural argument, but lack *–t*. A descriptive generalization for the distribution of this suffix is given in (10).

(10) If either the SU or OB is plural, the verb will have *–t* ‘PL’, except…
 a. 3PL.SUs and 3PL.OBs do not trigger *–t*.[3]
 b. 1PL.OBs do not trigger *–t*.
 c. 2PL.OBs do not trigger *–t* if the subject is 3PL.

It should be noted that this paper sets aside dative subject constructions, which display so-called ‘inverse’ agreement (Harris 1981, Béjar 2003, Lomashvili & Harley 2011). See Foley (2016) for a comprehensive description and analysis of Georgian agreement, including inverse agreement.

3 Patterns of multiple exponence

The presence of so many *φ*-probes in Georgian has an interesting morphological consequence: it opens the door to *multiple exponence* (Caballero & Harris 2012). Imagine the following situation: two probes X^0 and Y^0 both Agree with the same argument for feature [+F], and there exist both a vocabulary item *α* which expones [+F] at X^0 and another item *β* which expones [+F] at Y^0. If X^0 and Y^0 end up in the same morphological word (complex head), and are spelled out by *α* and *β*, then [+F] is multiply exponed.

This very situation arises in Georgian. For example, the verb in (11) multiply expones the subject’s person features. Both π^0 and T^0 Agree with the 1SG subject, whose [+SPKR] feature can be expressed at both nodes with the person prefix *v–* ‘1.SU’ and the TAM suffix *–var* ‘PRES:1’, respectively. Call this particular case of multiple exponence *1st Subject Doubling*.

(11) *me* *v-dga-var*
 1SG.NOM 1.SU-stand-PRES:1
 ‘I’m standing’

In contrast, consider (12). The verb here bears both the person prefix *gv–* ‘1PL.OB’ and the plural suffix *–t* ‘PL’. Both of these express a [+PL] feature, but their cooccurrence does not constitute multiple exponence, since each [+PL] feature originates from a distinct argument—the fact they are highlighted with different colors is a visual cue for this.

(12) *tkven* *gv-nax-e-t* *čven*
 2PL.ERG 1PL.OB-see-AOR:3SG-PL 1PL.ABS
 ‘You.PL saw us’

[3] 3PL.SUs actually can trigger *–t* ‘PL’ in dative subject constructions (Tuite 1998). For this reason, the plural suffix must not be limited to marking just 1st or 2nd person plural arguments.

Any treatment of patterns like these will need a mechanism to distinguish bona fide cases of multiple exponence like (11) from ones like (12). I'll assume that all morphosyntactic features bear an index, indicated graphically by color, which is unique to the syntactic object it originates on, and which survives Agree and Vocabulary Insertion. So in (12), the subject DP *tkven* '2PL' is introduced into the syntactic structure bearing the feature [+PL], grey representing its index. $\#^0$ will probe this argument and copy [+PL], preserving its index/color. Postsyntactically, the [+PL] on $\#^0$ will be exponed by *–t* 'PL', which also inherits the index. The Vocabulary Insertion operation may be sensitive the particular color of this or other local vocabulary items, as we'll see in Section 5.

1st Subject Doubling cases like (12) are clear evidence that Georgian permits multiple exponence. However, the pattern does not obtain as often as we might expect. Take example (13). It shows us that a 2PL object can trigger agreement both at π^0 (*g–* '2.OB', expressing person only) and at $\#^0$ (*–t* 'PL', expressing number only).

(13) *man* *g-nax-a-t* *tkven*
3SG.ERG 2.OB-see-AOR:3SG-PL 2PL.ABS
'S/he saw you.PL'

1PL objects, though, trigger agreement only at π^0 (*gv–* '1PL.OB', expressing person and number); the plural suffix is ungrammatical on a 3SG>1PL verb (14). It's intuitively clear why—having both *gv–* '1PL.OB' and *–t* 'PL' here would convey redundant information about the object's number features. In other words, the presence of *gv–* '1PL.OB' blocks *–t* 'PL', thereby avoiding multiple exponence. Call this blocking pattern *Object Number Blocking*.

(14) *man* *gv-nax-a-(*t)* *čven*
3SG.ERG 1PL.OB-see-AOR:3SG-(*PL) 1PL.ABS
'S/he saw us'

Georgian also exhibits *Subject Number Blocking*. Example (15) demonstrates that a 2PL.SU can trigger agreement both at T^0 (*–e* 'AOR:1/2', exponing person) and at $\#^0$ (*–t* 'PL', number).

(15) *tkven* *nax-e-t* *is*
2PL.ERG see-AOR:1/2-PL 3SG.ABS
'You.PL saw him/her'

Change this to a 3PL.SU, and only a TAM suffix surfaces (16). The TAM suffix *–es* 'AOR:3PL' conveys a superset of what *–t* 'PL' does, making the latter redundant. Again, a blocking relationship between affixes prevents multiple exponence.

(16) *mat* *nax-es-(*t)* *is*
3PL.ERG see-AOR:3PL-(*PL) 3SG.ABS
'They saw him/her'

Finally, I argue that *Agreement Displacement* is also an instance of multiple exponence avoidance. It's possible for the person prefix and TAM suffix slots to register the same argument, as in (17)—that's 1st Subject Doubling. It's also possible for them to register distinct arguments, as in (18).

(17) *me* *v-nax-e* *is*
1SG.ERG 1.SU-see-AOR:1/2 3SG.ABS
'I saw him/her'

(18) *man* *g-nax-a* *šen*
3SG.ERG 2.OB-see-AOR:3SG 2SG.ABS
'S/he saw you'

But (19) shows that given the choice between overlapping and disjoint agreement, the system prefers the latter. Recall that, in principle, a 1>2 argument combination could yield a prefix for the subject (*v*– '1.SU') or the object (*g*– '2.OB'). However, since the TAM suffix (*–e* 'AOR:1/2') necessarily agrees with the subject, having a subject prefix here would lead to multiple exponence (19a). So even though it is possible for 1.SUs' features to be multiply exponed (11), (17), the Georgian morphological grammar only permits this if it has no other option.

(19) a. **me* *v-nax-e* *šen*
1SG.ERG 1.SU-see-AOR:1/2 2SG.ABS
Attempted: 'I saw you'

b. *me* *g-nax-e* *šen*
1SG.ERG 2.OB-see-AOR:1/2 2SG.ABS
'I saw you'

In summary, identifying patterns of multiple exponence gives clarity to a number of peculiarities in Georgian's complex agreement system. Having no fewer than three *φ*-probes, we might expect Georgian to display a great deal of multiple exponence—in many syntactic environments, a single argument is bound to serve as the goal for multiple probes. And while there is multiple exponence in certain corners of the paradigm, by and large the system actually goes out of its way to avoid it, via affix blocking relationships. In other words, a morphological conspiracy has emerged (20), albeit one with an exception (21). The next section argues that this pattern cannot be explanatorily derived with a rule-based theory of morphology like classical DM. The Georgian conspiracy against multiple exponence thus provides evidence in favor of an optimizing morphological grammar.

(20) a. *Object Number Blocking* = (14)
gv– ‘1PL.OB’ blocks *–t* ‘PL’ to avoid ME of the OB’s number features.

b. *Subject Number Blocking* = (16)
–es ‘AOR:3PL’ blocks *–t* ‘PL’ to avoid ME of the SU’s number features.

c. *Agreement Displacement* = (19)
–e ‘AOR:1/2’ blocks *v–* ‘1.SU’ if *g–* ‘2.OB’ is available, avoiding ME of the SU’s person features.

(21) *1st Subject Doubling* = (11)
Otherwise, *–e* ‘AOR:1/2’ and *v–* ‘1.SU’ can cooccur, resulting in ME of the SU’s person features.

4 Rules vs. constraints in morphology

It would not be hard to derive the blocking relationships described above in DM. The theory’s postsyntactic operations serve to modify feature bundles generated in the narrow syntax before being morphophonologized during Vocabulary Insertion. For example, to avoid multiple exponence in Number Blocking and Agreement Displacement configurations, one might use something like the following impoverishment rules (Bonet 1991) to remove the offensive features before they can be spelled out.

(22) a. $[+\text{PL}] \rightarrow \varnothing \;/\; \overset{\#^0}{\begin{bmatrix} +\text{SPKR} \\ \_\_\_ \\ \text{ACC} \end{bmatrix}}$ *Impoverish a 1PL.OB’s [+PL] feature on $\#^0$.*

b. $[+\text{PL}] \rightarrow \varnothing \;/\; \overset{\#^0}{\begin{bmatrix} -\text{PART} \\ \_\_\_ \\ \text{NOM} \end{bmatrix}}$ *Impoverish a 3PL.SU’s [+PL] feature on $\#^0$.*

c. $[+\text{SPKR}] \rightarrow \varnothing \;/\; \left[\overset{\pi^0}{\begin{bmatrix} +\text{PART} \\ \_\_\_ \\ \text{NOM} \end{bmatrix} \begin{bmatrix} +\text{PART} \\ -\text{SPKR} \\ \text{ACC} \end{bmatrix}} \right]$ *Impoverish a 1.SU’s [+SPKR] feature on π^0 given a 2.OB.*

Such an analysis captures the facts, but it has little explanatory power. The collection of impoverishment rules makes no reference to multiple exponence—it’s entirely coincidental that together they affect the paradigm in such a way to avoid the phenomenon. To put it another way, a rule-based analysis of Georgian agreement will inevitably suffer from the same problem that the rule-based analysis of Yawelmani sketched in (1) does: neither can capture conspiracies.

If rules alone won't do, what if we also appeal to the sort of inviolable surface constraints that Arregi & Nevins (2012) use to explain certain morphological conspiracies in Basque? They observe a number of processes—morpheme epenthesis, copying, and metathesis—that ensure that the auxiliary root (an exponent of T^0) is not linearized leftmost within its complex head. This motivates them to propose *T^0-Noninitiality* (Arregi & Nevins 2012: 276), a morphological well-formedness constraint active across Basque dialects which triggers various postsyntactic operations in various environments.

However, there's a simple reason this tactic won't help us with the Georgian pattern: the conspiracy against multiple exponence has an exception, so inviolable constraints can't capture it entirely. We might imagine a filter like *Simple Exponence* (23), which bans multiple exponence outright (perhaps by triggering rules like (22), or by blocking Vocabulary Insertion itself).

(23) *Simple Exponence:* Prevent Vocabulary Insertion of a vocabulary item that would lead to multiple exponence of any feature.

But that would be too powerful, since it'd rule out 1st Subject Doubling. Perhaps we might revise the filter, so it is only sensitive to multiple exponence of number features (24).

(24) *Simple Number Exponence:* Prevent Vocabulary Insertion of a vocabulary item that would lead to multiple exponence of a number feature.

But that makes it too weak: some other mechanism would still be necessary to explain Agreement Displacement. We might amend the filter again to account for the behavior of 1>2 combinations, but doing so makes it unappealingly ad hoc: (25) does little more than restate the facts.

(25) *Simple Number-and-Sometimes-Person Exponence:* Prevent Vocabulary Insertion of a vocabulary item that would lead to either (i) multiple exponence of any number feature, or (ii) multiple exponence of a person feature in 1>2 argument configurations.

So a purely rule-based theory won't capture morphological conspiracies. It can't make reference to a particular marked structure that is being conspired against, thereby missing out on a key explanatory generalization. Introducing surface filters fares scarcely better: the fact that they're inviolable means there's no room for exceptions to conspiracies, so they either over- or under-generate.

Certainly we want a constraint which penalizes multiple exponence in Georgian—that would account for the fact that the language's agreement system again and again goes out of its way to avoid the phenomenon. But this constraint needs to be violable in certain circumstances, so as to admit 1st Subject Doubling. Violable constraints, of course, are a hallmark of Optimality Theory. The next section demonstrates the theoretical utility of an OT grammar for morphology. We'll see that a simple ranking—where a constraint against multiple exponence is ranked highly but not highest—accounts for Georgian's complex patterns of agreement. Before that, though, I lay out the proposed system, Optimal Vocabulary Insertion.

As its name suggests, OVI is a theory of Vocabulary Insertion: the operation that determines which affixes spell out which syntactic terminals. In standard DM, Vocabulary Insertion is governed the Subset Principle. This is a simple mechanism—at any node X^0, it chooses the vocabulary item that would expone the largest subset of the morphosyntactic features borne by X^0. OVI, on the other hand, is a more complex algorithm. It employs constraints sensitive to morphosyntactic features on terminals, vocabulary items, and correspondence relationships between them. These constraints are violable and ranked, and serve to filter out all but the most optimal candidate morpheme for insertion at a given node. A few such constraints are given below.

(26) MAX[F]: Assign a violation for every feature borne by a terminal X^0 which is not exponed by the vocabulary item inserted at X^0.
Express as many features from the input syntactic structure as possible.

(27) *MULTIPLEEXPONENCE (*MULTEXP): Assign a violation for pair of identical morphosyntactic features exponed in complex head which originate from the same argument (i.e., which bear the same index/color).
Avoid multiple exponence.

OVI is more complicated than the Subset Principle, but it comes with two major theoretical advantages. First, it provides an explanatory analysis of morphological conspiracies, even ones with exceptions. Second, it has the potential to pare down the morphological module of the grammar. Standard DM needs at least two submodules for its postsyntactic derivations: one for operations like impoverishment to modify morphosyntactic structure and feature bundles; a second for Vocabulary Insertion to take place. And in practice there may be more—for example, Arregi & Nevins (2012: 2) propose five crucially-ordered submodules preceding Vocabulary Insertion.

This degree of architectural articulation is unnecessary with OVI, since a single operation does the work of both DM's postsyntactic operations and the Subset Principle. For example, ranking a morphological markedness constraint like *MULTEXP above MAX[F] prevents the exponence of undesirable input features, which would otherwise need to be deleted before spell out. In other words, a constraint interaction can do the work of impoverishment. Of course, future research will be necessary to determine if a single-operation morphological grammar is tenable for a wide range of morphological phenomena, especially in those cases where morphological operations seem to operate opaquely. But at least for Georgian verbal agreement, OVI alone suffices.

Besides replacing the Subset Principle and postsyntactic operations with OVI, the framework I adopt here is otherwise similar to standard DM. The input to the morphological component is the output of the narrow syntax: morphosyntactic feature bundles, acquired upon first merge or via Agree, and formed into complex heads via head movement. The complex head is the domain of Vocabulary Insertion. OVI calculates the most optimal morphophonological structure; in competition are sets of vocabulary items in correspondence with the input morphosyntactic structure. Thus, as implemented here, OVI expones all terminals of a complex head in parallel.[4]

5 Analysis

A few syntactic assumptions are necessary to get our analysis of Georgian agreement off the ground. First, each of the φ-probes behaves slightly differently. Recall that TAM suffixes always track the subject—suggesting T^0 is a vanilla φ-probe satisfied by Agreeing with the first argument it finds.

The plural suffix, on the other hand, displays an omnivorous pattern. Following Béjar (2003) and Nevins (2011), I derive this by relativizing the probe: rather than searching for any φ-feature, $\#^0$ is only satisfied by the closest [+PL] argument. In PL>SG or PL>PL configurations, this will be the subject. But in a SG>PL environment, $\#^0$ will ignore the subject and Agree with the object instead.

As for the person prefixes, they indicate either the subject or the object. One way to account for this is to assume π^0 is an insatiable probe (Deal 2015): it always Agrees with both arguments, copying all their features and staring them in separate subbundles.[5] Since only a single vocabulary item can be inserted at a given terminal (because of a limitation of GEN, or an undominated constraint against fission), the morphological component will prioritize a bundle to expone.

The verb undergoes head movement, combining T^0, $\#^0$, and π^0 into the same complex head. I leave the precise hierarchical relationships between these probes underspecified; they are not crucial to my analysis.

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[4] It would also be possible to optimize Vocabulary Insertion cyclically, with a round of constraint evaluation for each terminal in a complex head. This would mirror the common assumption in DM that Vocabulary Insertion is inside-out cyclic (Bobaljik 2000, Embick 2010).

[5] An alternative would be Béjar & Rezac (2009)'s Cyclic Agree analysis of Georgian prefixal agreement. For them, the person prefixes spell out v^0, which is a probe relativized to [PART]. This derives the object agreement preference we observe in the simple transitive paradigm (7), since v^0 lies between the internal and external arguments: the probe will Agree downwards with the object if it's 1st or 2nd person, but if the object is 3rd person it must probe again upwards to the subject.

However, I do not adopt Béjar & Rezac's analysis here, since looking beyond ordinary transitive clauses, it analysis faces several empirical problems (Foley 2016, §2.3.3).

Finally, I give my definitions for relevant vocabulary items in (28).[6]

(28)

a. *v–* ‘1.SU’ ↔ $\overset{\pi^0}{\begin{bmatrix}\text{+PART}\\ \text{+SPKR}\\ \text{NOM}\end{bmatrix}}$

b. *gv–* ‘1PL.OB’ ↔ $\overset{\pi^0}{\begin{bmatrix}\text{+PART}\\ \text{+SPKR}\\ \text{+PL}\\ \text{ACC}\end{bmatrix}}$

d. *g–* ‘2.OB’ ↔ $\overset{\pi^0}{\begin{bmatrix}\text{+PART}\\ \text{–SPKR}\\ \text{ACC}\end{bmatrix}}$

e. *–e* ‘AOR:1/2’ ↔ $\overset{T^0}{\begin{bmatrix}\text{AOR}\\ \text{+PART}\end{bmatrix}}$

f. *–a* ‘AOR:3SG’ ↔ $\overset{T^0}{\begin{bmatrix}\text{AOR}\\ \text{–PART}\end{bmatrix}}$

g. *–es* ‘AOR:3PL’ ↔ $\overset{T^0}{\begin{bmatrix}\text{AOR}\\ \text{–PART}\\ \text{+PL}\end{bmatrix}}$

h. *–var* ‘PRES:1’ ↔ $\overset{T^0}{\begin{bmatrix}\text{PRES}\\ \text{+PART}\\ \text{+SPKR}\end{bmatrix}}$

i. *–t* ‘PL’ ↔ $\overset{\#^0}{[\text{+PL}]}$

With this in place, let’s first derive Object Number Blocking in a 3SG>1PL verb. The desired form is given in (29). During the syntax, T^0 will Agree with the subject, $\#^0$ with the object, and π^0 with both. The resulting complex head serves as the input to the OVI tableau in (30).

(29) *man* *gv-nax-a* *čven*
3SG.ERG 1PL.OB-see-AOR:3SG 1PL(.ABS)
‘S/he saw us’

MAX[F] prefers candidates that express as many features as possible. Thus is prefers **gvnaxat* (30a) to *gvnaxa* (30b), since the former expones all the feature the latter does in addition to the [+PL] on $\#^0$ left unexponed by *gvnaxa*. However, because it also expresses this very feature at π^0, (30a) accrues a fatal *MULTEXP violation. The offensive pair of features is enlarged and bolded for clarity. Subject Number Blocking would be derived through the same constraint interaction, with the *MULTEXP-violating pair of features at T^0 and $\#^0$.

Undominated, *MULTEXP would incorrectly filter out 1st Subject Doubling. An incentive for multiply exponing person features is necessary, so I rank MAX[PERS] (32) above *MULTEXP. The effects of this are shown in tableau (31): avoiding multiple exponence (31b) necessarily expresses fewer person features.

[6] For the sake of simplicity, I use case features to distinguish subject and object prefixes. See Foley (2016, §5.1) for discussion of the challenges of modeling these prefixes given the language’s TAM-based split ergativity (Harris 1981, Aronson 1995), and a potential solution involving a second, person-based ergativity split (Legate 2014). This would mean 1st and 2nd person pronouns always follow a NOM–ACC case alignment (one which is obscured by a paradigmatic syncretism), directly mirroring the NOM–ACC agreement pattern they trigger.

(30)

π^0 $\left[\begin{bmatrix}-\text{PART}\\-\text{SPKR}\\-\text{PL}\\\text{ERG}\end{bmatrix}\begin{bmatrix}+\text{PART}\\+\text{SPKR}\\+\text{PL}\\\text{ABS}\end{bmatrix}\right]$ • V^0 $\sqrt{see}$ • T^0 $\begin{bmatrix}\text{AOR}\\-\text{PART}\\-\text{SPKR}\\-\text{PL}\\\text{ERG}\end{bmatrix}$ • $\#^0$ $\begin{bmatrix}+\text{PART}\\+\text{SPKR}\\+\text{PL}\\\text{ABS}\end{bmatrix}$	*MULTEXP	MAX[F]
a. $\pi^0 \updownarrow$ *gv–* $\begin{bmatrix}+\text{PART}\\+\text{SPKR}\\+\textbf{PL}\\\text{ABS}\end{bmatrix}$ • $V^0 \updownarrow$ *nax* • $T^0 \updownarrow$ *–a* $\begin{bmatrix}\text{AOR}\\-\text{PART}\end{bmatrix}$ • $\#^0 \updownarrow$ *–t* $[+\textbf{PL}]$	1!	10
☞ b. $\pi^0 \updownarrow$ *gv–* $\begin{bmatrix}+\text{PART}\\+\text{SPKR}\\+\text{PL}\\\text{ABS}\end{bmatrix}$ • $V^0 \updownarrow$ *nax* • $T^0 \updownarrow$ *–a* $\begin{bmatrix}\text{AOR}\\-\text{PART}\end{bmatrix}$ • $\#^0 \updownarrow \varnothing$ [ ]	0	11

(31)

π^0 $\begin{bmatrix}+\text{PART}\\+\text{SPKR}\\-\text{PL}\\\text{NOM}\end{bmatrix}$ • V^0 $\sqrt{stand}$ • T^0 $\begin{bmatrix}\text{PRES}\\+\text{PART}\\+\text{SPKR}\\-\text{PL}\\\text{NOM}\end{bmatrix}$ • $\#^0$ [ ]	MAX[PERS]	*MULTEXP	MAX[F]
☞ a. $\pi^0 \updownarrow$ *v–* $\begin{bmatrix}+\textbf{PART}\\+\textbf{SPKR}\\\text{NOM}\end{bmatrix}$ • $V^0 \updownarrow$ *dga* • $T^0 \updownarrow$ *–var* $\begin{bmatrix}\text{PRES}\\+\textbf{PART}\\+\textbf{SPKR}\end{bmatrix}$ • $\#^0 \updownarrow \varnothing$ [ ]	0	2	3
b. $\pi^0 \updownarrow \varnothing$ [ ] • $V^0 \updownarrow$ *dga* • $T^0 \updownarrow$ *–var* $\begin{bmatrix}\text{PRES}\\+\text{PART}\\+\text{SPKR}\end{bmatrix}$ • $\#^0 \updownarrow \varnothing$ [ ]	2!	0	6

(32) MAX[PERSON]: Assign a violation for every person feature borne by a terminal X^0 which is not exponed by the vocabulary item inserted at X^0. *Express as many person features from the input structure as possible.*

Finally, tableau (33) shows that the current ranking derives Agreement Displacement for free. As defined in (28), *v*– '1.SU' and *g*– '2.OB' expone the same number of features. Therefore candidates only differing by those person prefixes will tie on MAX[PERS] and MAX[F], as (33a) and (33b) do. The tie-breaking constraint is *MULTEXP, which only (33a) violates. This constraint interaction formalizes the observation that Georgian permits multiple exponence of person features only if there is no other option.

(33)

	Input / candidate	MAX[PERS]	*MULTEXP	MAX[F]
	π^0 [[+PART +SPKR –PL ERG] [+PART –SPKR –PL ABS]] • V^0 $\sqrt{see}$ • T^0 [AOR +PART +SPKR –PL ERG] • $\#^0$ [ ]			
a.	π^0 ↕ *v*– [**+PART** +SPKR ERG] • V^0 ↕ *nax* • T^0 ↕ *–e* [AOR **+PART**] • $\#^0$ ↕ ∅ [ ]	3	1!	8
☞ b.	π^0 ↕ *g*– [+PART –SPKR ACC] • V^0 ↕ *nax* • T^0 ↕ *–e* [AOR +PART] • $\#^0$ ↕ ∅ [ ]	3	0	8

6 Conclusion

This paper has had two major goals. First is to establish a generalization over a complex set of data—namely, that many of the idiosyncrasies of the Georgian verbal agreement system constitute a morphological conspiracy against multiple exponence. Second is to provide an analysis capitalizing on this generalization. In doing so I have introduced OVI, a theory of Vocabulary Insertion whereby ranked, violable constraints govern the spell out of morphosyntactic structure. Unlike a purely rule-based theory like DM, The interaction of these constraints allows us to straightforwardly and explanatorily account for morphological conspiracies. And as a corollary, adopting OVI lessens the need for DM's postsyntactic operations and the architectural articulation they entail. Future research in OVI may prove fruitful in paring down the machinery necessary to a theory of morphology.

References

Aronson, H. 1995. *Georgian: A reading grammar*. Columbus, Ohio: Slavica.

Arregi, K., & A. Nevins 2012. *Morphotactics: Basque auxiliaries and the structure of spellout*. Springer.

Béjar, S. 2003. Phi-syntax: A theory of agreement. PhD dissertation, University of Toronto.

Béjar, S., & M. Rezac 2009. Cyclic agree. *Linguistic Inquiry* 40: 35–73.

Blix, H. 2016. South Caucasian agreement: A Spanning account. MA Thesis, University of Vienna.

Bobaljik, J. 2000. The ins and outs of contextual allomorphy. In *University of Maryland working papers in linguistics 10*, eds. K. Grohmann & C. Struijke, 35–71. University of Maryland.

Bonet, E. 1991. Morphology after syntax: Pronominal clitics in Romance. PhD dissertation, MIT.

Caballero, G., and A. Harris. 2012. A working typology of Multiple Exponence. In *Current issues in morphological theory: Irregularity, analogy and frequency*, 163–188.

Caballero, G., and S. Inkelas. 2013. Word construction: tracing an optimal path through the lexicon. *Morphology* 23: 103–143.

Deal, A. R. 2015. Interaction and satisfaction in φ-agreement. Handout from a colloquium talk at the University of Geneva, September 2015.

Embick, D. 2010. *Localism versus globalism in morphology and phonology*. MIT Press

Foley, S. 2016. Georgian agreement: Morphological conspiracies and the nature of Vocabulary Insertion. Ms., University of California Santa Cruz.

Halle, M. 1997. Distributed morphology: Impoverishment and fission. In *MIT Working Papers in Linguistics 30: Papers at the Interface*, eds. B. Bruening, Y. Kang & M. McGinnis, 425–449. Cambridge, Mass.: MITWPL.

Halle, M., and A. Marantz. 1993. Distributed morphology and the pieces of inflection. In *The view from Building 20: Essays in linguistics in honor of Sylvain Bromberger*, eds. K. Hale and S. J. Keyser, 111–176. MIT Press.

Harris, A. 1981. *Georgian syntax: A study in relational grammar*. Cambridge University Press.

Hewitt, B. G. 1995. *Georgian: A structural reference grammar*. John Benjamins Publishing.

Kiparsky, P. 2003. Blocking and periphrasis in inflectional paradigms. *Yearbook of Morphology 2004*, 113-135.

Kisseberth, C. W. 1970. On the functional unity of phonological rules. *Linguistic Inquiry* 1, 291–306.

Lomashvili, L., and H. Harley. 2011. Phases and templates in Georgian agreement. *Studia Linguistica* 65(3), 233–267.

Legate, J. A. (2014). Split ergativity based on nominal type. *Lingua* 148. 183–212.

McGinnis, M. 2013. Agree and fission in Georgian plurals. In *Distributed Morphology today: Morphemes for Morris Halle*, eds. O. Matushansky and A. Marantz. MIT Press, 39–58.

Nevins, A. 2011. Multiple agree with clitics: Person complementarity vs. omnivorous number. *Natural Language and Linguistic Theory* 29: 939–971.

Preminger, O. 2009. Breaking agreements: Distinguishing agreement and clitic doubling by their failures. *Linguistic Inquiry* 40, 619–666.

Prince, A., and P. Smolensky. 1993/2004. Optimality Theory: Constraint Interaction in Generative Grammar. Oxford: Blackwell. Available as ROA-537 from the Rutgers Optimality Archive.

Trommer, J. 2001. Distributed optimality. PhD dissertation, University of Potsdam.

Tuite, K. 1998. Kartvelian Morphosyntax. Number agreement and morphosyntactic orientation in South Caucasian Languages. *Studies in Caucasian Linguistics, vol. 12*. LINCOM Europa, München.

Wolf, M. 2008. Optimal interleaving: Serial phonology-morphology interaction in a constraint-based model. PhD dissertation, UMass Amherst.

Xu, Z., and M. Aronoff. 2011. A realization Optimality Theory approach to blocking and extended morphological exponence. *Journal of Linguistics* 47: 673–707.