Visibility and Intervention in Allomorphy: Lessons from Modern Greek

Lefteris Paparounas

An often discussed dimension of the locality conditions on allomorphy is visibility: when do the trigger and target of allomorphy "see" each other? An equally important dimension is intervention: when do the trigger and target *stop* seeing each other? Through the lens of a detailed analysis of Greek verbal morphology, I examine the conditions under which intervention forces the insertion of a default exponent. On the basis of two case studies on affixal allomorphy and one on stem allomorphy, I argue that patterns of intervention are easily accommodated under adjacency-based theories of the locality of allomorphy, and mysterious under less restrictive alternatives.

Keywords: morphology, allomorphy, locality, Distributed Morphology, Modern Greek

1 Introduction

An adequate theory of morphology must encompass a *theory of contexts*, that is, a theory specifying what sorts of contextual interactions are countenanced by the grammar. Among the many issues that such a theory must address are the following two closely interlinked questions concerning the locality conditions on contextual allomorphy:

(1) a. What sorts of representations is allomorphic locality computed over?
b. How local must the trigger of allomorphy be to the target?

These questions are both general enough and important enough to transcend theoretical boundaries, and have been the topic of investigations going back at least as far as Siegel 1978 and Allen 1979. In this article, I approach these questions from the perspective of Distributed Morphology (DM; e.g., Halle and Marantz 1993, Harley and Noyer 1999, Embick and Noyer 2007, Embick 2010), a syntactic, piece-based, realizational theory of morphology.

Within DM, (1) has been the topic of much recent attention. The architecture of the theory is in principle compatible with different approaches to the mechanics of Vocabulary Insertion,

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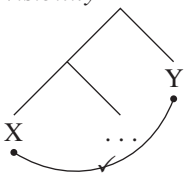
and different commitments on this issue yield different approaches to each of the questions in (1). For example, in Embick 2010 the targets of insertion are heads, and insertion takes place after linearization; hence, the insertion condition is sensitive to a linear relation, linear adjacency, and the proposed locality condition is quite strict, permitting only adjacent heads to interact (modulo the special case of null heads). Adjacency of a different sort, computed over hierarchical structures, has been separately invoked as a condition on allomorphic locality (e.g., Adger, Béjar, and Harbour 2003). In theories where the targets of insertion are *not* heads, different kinds of locality conditions are posited. For instance, in the context of a nonterminal insertion theory, Bobaljik (2012) proposes that suppletion cannot be conditioned across an XP boundary. In the theory of spanning, where insertion targets sets of contiguous nodes, notions of adjacency at the level of the span have been invoked (Merchant 2015).

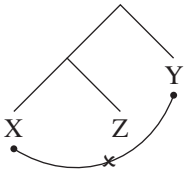
An important question is how the predictions of these different approaches can be teased apart. This type of comparison is not always straightforward, given that individual proposals will differ not only on the exact nature of the locality conditions assumed, but also on the nature of the units undergoing insertion, as just discussed.

Argumentation in this domain thus often begins from considerations of *visibility* (see (2)): arguments for or against particular locality conditions on allomorphy often take the form "Insertion at target X is apparently conditioned by trigger Y; therefore, our theories must allow for interactions within the minimal domain that includes X and Y" (e.g., Merchant 2015, Moskal and Smith 2016, Božič 2019, Ganenkov 2020). But an equally important dimension involves *intervention* (see (3)), whereby X and Y, which normally interact, cease to do so when a third element Z intervenes between them. (This usage of the terms *intervention* and *visibility* is borrowed from Embick 2010.)

(2) *Visibility*



(3) *Intervention*



The main goal of this article is to argue, on the basis of three case studies from Modern Greek, that considering intervention alongside visibility favors localist, adjacency-based approaches to (1b) over less restrictive alternatives. The analysis is couched in terms of approaches to (1a) that take linearized representations to be the domain over which allomorphic locality is calculated. By offering an analysis of Modern Greek verbal morphology guided by the question of "what

sees what when," I argue that the intricate patterns of intervention found in the Greek verb are neatly accommodated under head-adjacency-based theories, and left unexplained in less restrictive approaches.

The first two case studies discussed here illustrate what I refer to as *default by intervention*: a specific Vocabulary item loses the competition to a more general one because the context for insertion of the more specific exponent is present in the structure, but inaccessible. Such patterns follow naturally from adjacency-based theories of insertion, but seem mysterious under less restrictive theories such as spanning (Svenonius 2012, Merchant 2015).

Modern Greek has figured prominently in recent discussions of (1), as the language has been argued to instantiate a pattern of nonlocal stem allomorphy (Merchant 2015). In the third case study, I take up this issue as well. I show that the nonlocal nature of suppletion in Greek is only apparent, and that stem allomorphy in the language is in fact fully compatible with adjacency-based theories of insertion once the right analysis of the Greek verb is assumed. I thus argue that Greek does not, in fact, provide evidence in favor of the necessity of a spanning mechanism.

Viewed more broadly, the way of thinking about morphological intervention presented here provides insights on two issues central to morphological theory.

The first concerns how competition (in this case, between Vocabulary items) is adjudicated. The specificity-based ordering enforced by the Elsewhere Condition is frequently invoked here, and rightly. But the phenomenon of default by intervention, discussed here in detail, suggests that, alongside specificity, constraints involving *locality* also play a role in adjudicating competition in morphology (Embick 2010, Marantz 2013). This article thus offers a detailed look at the interplay of specificity and locality in determining the outcome of competition.

The second broad issue touched upon in the article concerns the role of zero exponents in allomorphic conditioning. The case studies considered here suggest that null nodes have a special status, insofar as only these nodes are capable of being transparent for the purposes of allomorphy, thereby enabling ostensibly nonlocal conditioning. This result accords with the conclusions (or assumptions, as the case may be) of earlier work (e.g., Embick 2003). But this article provides further technical insight on how transparency is achieved. Within DM, the transparency of null nodes has often been implemented by means of the operation of Pruning (Embick 2010), which removes null nodes from the structure. Important questions have arisen regarding when this operation applies and how exactly it proceeds. By carefully examining the ordering of operations coexisting with Pruning, I argue that Pruning must be conceived of in its purest form—namely, as a *destructive* operation, literally removing null heads from the representation. Weaker alternatives fail to capture the observation that applications of Pruning may bleed further conditioning by the removed null node, as illustrated over the course of the second case study.

These points of theoretical interest are made on the basis of a detailed morphological analysis of the Greek verb. The Greek verbal system occupies an uneasy position in recent morphological discussions: despite some amount of consensus on the functional categories involved (see (4) below), there is widespread disagreement on how phonological exponents are distributed among these categories, yielding a variety of subtly different competing segmentations. My aim here is not to provide merely another possible analysis of the morphology of the Greek verb. Instead, I

show how, armed with tools as simple as traditional node insertion and a sharpened understanding of Pruning, we can arrive at an approach to the exponence of the Greek verb that sheds light on the inner workings of competition, as revealed through the lens of intervention and visibility. As it happens, the resulting analysis of Greek verbal morphology also succeeds in capturing intricate patterns of affixal allomorphy, morphophonology, and Root suppletion.

In furnishing a decompositional analysis of the Greek verb, I take a stance sharply different from that of "portmanteaux-based" analyses of this system (Joseph and Smirniotopoulos 1993, replicated in some respects in Merchant 2015). So-called fusional systems of the Greek type, where individual affixes ostensibly realize multiple categories at once, have sometimes formed the basis for arguments against piece-based approaches to morphology. Seen against the analysis presented here, such claims are at best premature. Not only is the Greek system readily accounted for under piece-based theories; the appropriate decompositional theory also explains properties of the system that other theories leave unaccounted for. In developing the analyses of each case study, I also touch upon questions regarding the mechanics of spanning (Svenonius 2012) as they relate to issues of competition.

The article is structured as follows. Section 2 provides necessary background on the Greek verbal system. Sections 3–5 each present one of the case studies and accompanying theoretical discussion. Section 6 concludes.

2 Background on Greek Verbs

Descriptively speaking, the Greek verbal system is structured around three binary oppositions, in Voice (active vs. nonactive), Aspect (perfective vs. imperfective), and Tense (past vs. nonpast). Table 1 illustrates with the first person singular forms of the verb 'write', segmented to reflect

Table 1
First person singular forms of *ɣrafo* 'write'

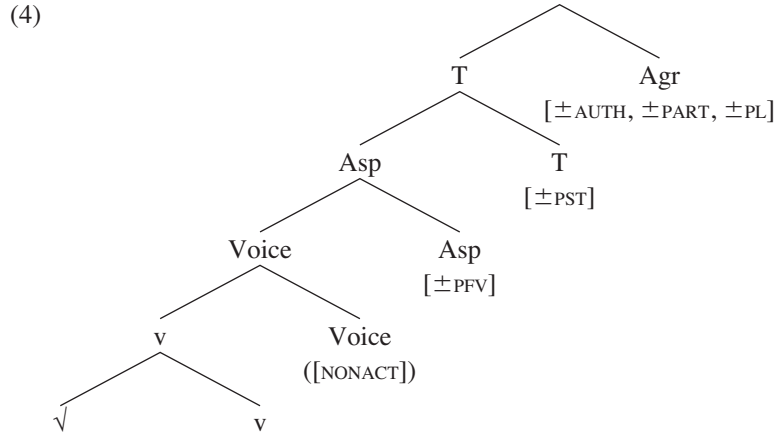
ACT.IPFV.NONPST	ACT.PFV.NONPST
ɣràf -o	ɣràf -s -o
√WRITE AGR	√WRITE ASP AGR
NONACT.IPFV.NONPST	NONACT.PFV.NONPST
ɣràf -ome	ɣraf -θ -ò
√WRITE AGR	√WRITE ASP AGR
ACT.IPFV.PST	ACT.PFV.PST
è- ɣraf -a	è- ɣraf -s -a
TNS √WRITE AGR	TNS √WRITE ASP AGR
NONACT.IPFV.PST	NONACT.PFV.PST
ɣraf -òmun	ɣràf -θ[a] -ik -a
√WRITE AGR	√WRITE ASP TNS AGR

[a] A regular phonological process of manner dissimilation changes /θ/ to [t] after fricatives; thus, forms like the nonactive perfective past of this table end up as *[ɣraf-t-ik-a]*. I "undo" this process and notate the affix as /θ/ throughout this article for the reader's convenience.

the decomposition argued for here (cf. Joseph and Smirniotopoulos 1993, Galani 2005, Merchant 2015, Christopoulos and Petrosino 2018).[1]

I take these forms to follow from an input to PF as in (4). Here, [NONACT] is a feature assigned postsyntactically to syntactic configurations lacking an external argument (see Embick 1998, 2004 and below); Asp and T bear binary [PFV] and [PST] features, respectively; and Agr is a dissociated morpheme hosting person and number features (see Adamson 2019 for detailed discussion of the mechanics of dissociation).

(4)



A few introductory notes are in order here. First, it can be seen from table 1 that the form of Agr varies depending on the features on Voice: one set of agreement endings (*-o* and *-a*) appears in active forms, another (*-ome* and *-òmun*) in some nonactive forms. Second, [PST] can be realized either as a prefixal *e-*, known as the augment, or as a suffix, *-ik.* The realization of Agr and T will form the basis of the discussion in sections 3 and 4, respectively.

In the analysis to be developed here, Voice is systematically null, but there is nonetheless good reason to posit Voice in the morphological structure of the Greek verb. That the agreement suffixes are sensitive to Voice features suggests that the latter must be present somewhere in the structure by the time insertion operates; that these features must be hosted on a dedicated Voice head is in turn suggested by the morphosyntax of Voice in the language.

Greek shows a well-known pattern of Voice syncretism (Embick 1998, 2004). As the following examples show, NONACT morphology expresses a range of distinct argument structure configurations, including passives, dispositional middles, reflexives, reciprocals, and (some) anticausatives:

[1] Glossing abbreviations: 1 = first person, 2 = second person, 3 = third person, ACC = accusative, ACT = active, AGR = agreement, ASP = aspect, AUTH = author, F = feminine, GEN = genitive, IPFV = imperfective, M = masculine, N = neuter, NMLZ = nominalizer, NOM = nominative, NONACT = nonactive, NONPST = nonpast, PART = participant, PFV = perfective, PL = plural, PST = past, SG = singular, TNS = tense, VBZ = verbalizer.

(5) To vivlio ðiavas- θ- ik- e apo to Jani.
the book √READ PFV.NONACT PST 3SG by the Janis
'The book was read by Janis.' *(passive)*

(6) I supa ka- ik- e (*apo ti Maria).
the soup √BURN PST.NONACT 3SG by the Maria
'The soup burned.' *(anticausative)*

(7) Afto to vivlio ðiavaz- ete efkola.
this the book √READ 3SG.NONACT easily
'The book reads easily.' *(dispositional middle)*

(8) I Maria pli- θ- ik- e.
the Maria √WASH PFV.NONACT PST.NONACT 3SG
'Maria washed.' *(reflexive)*

(9) I Maria ke o Janis aŋgalias- θ- ik- an.
the Maria and the Janis √HUG PFV.NONACT PST.NONACT 3PL
'Maria and Janis hugged.' *(reciprocal)*

As noted in Embick 1998 (cf. Marantz 1984, Lidz 1996), these syntactic configurations form a natural class with respect to one structural factor, namely, the absence of an underlying external argument.[2] In other words, morphological realization is sensitive to the fact that, although distinct in important ways, these syntactic configurations all exhibit "unaccusative syntax" (Embick 2004). One way of capturing this intuition is by means of the postsyntactic rule in (10), which assigns the feature [NONACT] to Voice whenever Voice lacks an external argument.[3]

[2] There exists a surface counterexample here, in the form of the language's deponent verbs, which show nonactive morphology but not unaccusative syntax.

(i) I Maria metaiçirize- **te** ton eafto tis me aɣapi.
the Maria √TREAT 3SG.**NONACT** the self her with love
'Maria treats herself lovingly.'

(ii) *I Maria metaiçiriz- **i** ton eafto tis me aɣapi.
the Maria √TREAT 3SG.**ACT** the self her with love

However, the relevant verbs are not true counterexamples to the generalization: a great many of them are bona fide experiencer verbs (Zombolou and Alexiadou 2014; cf. Embick 1997), and the few that more closely resemble transitives in fact diverge from true transitives (and pattern with experiencer verbs) in systematically resisting passivization and reflexivization (see Paparounas in progress for details). The most complete account of deponency that I know of makes sense of these facts, with explicit reference to Modern Greek: Grestenberger (2018) argues that deponents (of the Indo-European type) are verbs with noncanonical agents, somewhat like experiencer verbs; in particular, the agents of deponents are merged below Voice. For Modern Greek–type languages, the absence of a filled Spec,Voice guarantees that the relevant verbs will be spelled out with NONACT morphology. The details are orthogonal to the present investigation: as long as the relevant verbs include [NONACT] in their structure (which they must on any reasonable account, since deponents participate in the Voice syncretism), the morphological calculus developed below in the text will treat deponents on a par with all other verbs spelled out with the same morphology.

[3] Jason Merchant (pers. comm.) asks how the context of (10) can be formalized. There are clearly different ways of achieving this—for example, using a structure-building feature [−D] on Voice to capture the absence of a specifier (Grestenberger 2019). Nothing crucial seems to hinge on this for present purposes.

(10) Voice → $\text{Voice}_{[\text{NONACT}]}$ / ___ No DP specifier
(Embick 2004, Alexiadou, Anagnostopoulou, and Schäfer 2015, Spathas, Alexiadou, and Schäfer 2015)

Given (10) and the facts it is intended to capture, the existence of a Voice head at both the syntactic and morphological levels becomes natural. The [NONACT] feature that Agr (and Asp; see below) makes reference to for the purposes of allomorphy arises from the absence of the external argument, and it is thus no surprise that the head that carries this feature is the head that normally introduces the external argument (Kratzer 1996, Pylkkänen 2008, Legate 2014). Thus, even though the [NONACT] feature on Voice is systematically null, its presence is necessary for the purposes of realization, and its syntactic origins are clear.

Moreover, crucial in what follows will be the realization of Asp—I thus devote the necessary attention to this issue here. Though imperfective Asp is always zero in the language,[4] perfective Asp is realized with two exponents. Its default realization is with the suffix *-s*, which appears in the active perfective forms. That *-s* has not always been recognized as a distinct exponent (e.g., Christopoulos and Petrosino 2018) may be due to its systematic disappearance after sonorant-final Roots, as can be seen in table 2.[5]

As can be seen in table 1, *-s* is systematically absent in *nonactive* perfective forms: here, in place of *-s*, we find the exponent *-θ*, the widely assumed analysis of which is shown in (11).

(11) $[\text{NONACT}]_{\text{Voice}} \leftrightarrow /\theta/$ / ___ $[+\text{PFV}]_{\text{Asp}}$
(Rivero 1990, Spyropoulos and Revithiadou 2009, Merchant 2015, Manzini, Roussou, and Savoia 2016)

Note now that the complementary distribution of *-s* and *-θ* is not incidental to table 1; these two exponents are complementary throughout Greek verbal morphology.[6] (11) fails to capture this fundamental fact: all things being equal, this Vocabulary item (VI), in tandem with the VI inserting

Table 2
Loss of *-s* after sonorant-final Roots

IPFV	ACT.PFV	Gloss
per-n-	par-(*s)-	'take'
fer-n-	fer-(*s)-	'bring'
stel-n-	stil-(*s)-	'send'

[4] This fact makes a privative treatment of Asp possible, whereby imperfective is simply the absence of an Asp head; see footnote 24 for some discussion of this possibility.

[5] The *-n* in the imperfective forms of table 2 is a verbalizer; see section 4 for more.

[6] Note that apparent Mirror Principle–violating cooccurrence of these exponents is illusory: in [sθ] clusters of the kind seen in perfective forms like *θa klis-θ-o* 'I will be closed', the /s/ is part of the Root, as evidenced by its presence in formations such as participles (*klis-tos*, *klis-menos* 'closed'; cf. *γra-(*s)-tos*, *γra-(*s)-menos* 'written'). See also footnote 25.

-s as the default on Asp, will incorrectly yield underlying /θ-s/ clusters. One possible solution is to specify the VI for *-s* as having "active Voice" in its context (Ralli 2003, Merchant 2015), but this move amounts to treating the complementary distribution of *-s* and *-θ* as a coincidence. These problems do not arise if the two exponents directly compete for insertion at Asp, with *-θ* being the more specified exponent.

The following VIs then summarize the treatment of Asp and Voice just defended:

(12) *VIs for Voice and Asp*
a. $[\text{NONACT}]_{\text{Voice}} \leftrightarrow \emptyset$
b. $[-\text{PFV}]_{\text{Asp}} \leftrightarrow \emptyset$
c. $[+\text{PFV}]_{\text{Asp}} \leftrightarrow /\theta/ \;/\; [\text{NONACT}]_{\text{Voice}}$ ——
d. $[+\text{PFV}]_{\text{Asp}} \leftrightarrow /\text{s}/$

3 Case Study 1: Voice-Conditioned Allomorphy

3.1 The Basic Analysis

The role of intervention in insertion can be illustrated first with reference to the interaction between Voice and Agr. As mentioned above, the realization of Agr in Greek is conditioned by the features on Voice. Descriptively, Agr can take the set of "active" endings (*-o* in the nonpast and *-a* in the past) or the set of nonactive endings (*-ome* in the nonpast and *-òmun* in the past).

Interestingly, however, the distribution of the two sets of endings is asymmetric; this becomes clear in table 3, which shows the forms of table 1 with the two classes of agreement suffixes shaded differently. The left column shows that, in the imperfective, the expected distribution is found: "active" agreement endings (in light gray) in the active forms, and nonactive ones (in dark gray) in the nonactive forms. But in the perfective, the "active" agreement endings are found throughout; the nonactive endings do not appear in the nonactive perfective forms (see also Joseph

Table 3
"Active" and nonactive Agr in the 1SG forms of 'write'

ACT.IPFV.NONPST	ACT.PFV.NONPST
ɣràf -o	ɣràf -s -o
√WRITE AGR	√WRITE ASP AGR
NONACT.IPFV.NONPST	NONACT.PFV.NONPST
ɣràf -ome	ɣraf -θ -ò
√WRITE AGR	√WRITE ASP AGR
ACT.IPFV.PST	ACT.PFV.PST
è- ɣraf -a	è- ɣraf -s -a
TNS √WRITE AGR	TNS √WRITE ASP AGR
NONACT.IPFV.PST	NONACT.PFV.PST
ɣraf -òmun	ɣràf -θ -ik -a
√WRITE AGR	√WRITE ASP TNS AGR

and Smirniotopoulos 1993, Leu 2020, Roussou 2009). We thus find *ɣraf-θ-ò* instead of expected **ɣraf-θ-òme*, and *ɣràf-θ-ik-a* instead of expected **ɣraf-θ-ik-òmun.*

Competition must be somehow implicated in the asymmetric distribution of agreement suffixes here. Descriptively, it looks as if the VIs inserting the nonactive endings "underapply"; why is the distribution asymmetric in this way?

A striking generalization is evident in table 3: Agr is only realized with the nonactive endings when all heads between Agr and Voice are null. This is the case in the imperfective nonactive forms, where Voice and Asp are null, and T, if overtly realized, is prefixal; but in the perfective nonactive forms, T and/or Asp are overt. This generalization follows straightforwardly if intervention is at work: the trigger of allomorphy, Voice, ceases to be visible to the target, Agr, when overt exponents intervene between the two.

To derive this generalization, I will make use of three ingredients.

First, it is necessary to set up the appropriate Vocabulary. Although the nonactive agreement endings are true contextual realizations of Agr sensitive to the features of Voice (13a–b), I will take it that the so-called active endings are in fact default realizations of Agr, with the VIs inserting them making no reference to Voice (13c–d).

(13) *VIs for Agr in the first singular*

a. $[+\text{AUTH}, +\text{PART}, -\text{PL}]_{\text{Agr}} \leftrightarrow$ /omun/ / $[\text{NONACT}]_{\text{Voice}}$ $[+\text{PST}]_{\text{T}}$ ___

b. $[+\text{AUTH}, +\text{PART}, -\text{PL}]_{\text{Agr}} \leftrightarrow$ /ome/ / $[\text{NONACT}]_{\text{Voice}}$ ___

c. $[+\text{AUTH}, +\text{PART}, -\text{PL}]_{\text{Agr}} \leftrightarrow$ /a/ / $[+\text{PST}]_{\text{T}}$ ___

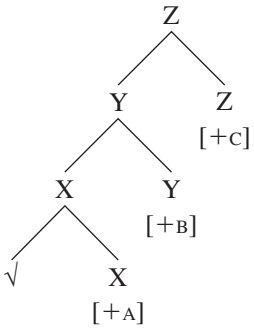
d. $[+\text{AUTH}, +\text{PART}, -\text{PL}]_{\text{Agr}} \leftrightarrow$ /o/

The second ingredient of the analysis of this intervention pattern is an adjacency-based theory of insertion. I adopt the linear adjacency-based model proposed by Embick (2010); in principle, the analysis may be made compatible with the assumptions of structural adjacency-based theories (see footnote 11). I will thus assume that a hierarchical structure of the kind in (14) is linearized into the statement in (15). (15) expresses a set of pairwise concatenation relationships: the Root is concatenated with X, X with Y, and so on. (15) is the representation over which insertion takes place,[7] constrained by (16). This guarantees that, all things being equal, in (15) the Root can only be conditioned by X, X can only be conditioned by the Root and Y, and so on.

[7] An anonymous reviewer raises the possibility of a form of circularity here: if VIs operate over linear representations, and if linearization were to make reference to VIs, the insertion mechanism could find itself in an "infinite loop" of sorts. Though circularity of this sort could very likely be a problem for some theories of insertion incorporating linearity, it does not arise under the present theory. This is because, in the theory developed here, there is no sense in which linearization makes reference to VIs. To be more specific: what is linearized in the present theory is exclusively abstract (= phonology-free) elements, with Vocabulary Insertion into these elements operating entirely postlinearization.

In this respect, the current theory takes a strong stance on the timing of linearization and insertion; compare, for example, Embick and Noyer 2001, where linearization is said to take place "at Vocabulary Insertion," with the precise relative timing of the two left largely open. In assuming a rigid ordering of linearization and insertion, the present theory thus shares much with early generative theories operating on the same assumption (e.g., Chomsky 1957, at least for the functional vocabulary). Importantly, however, none of what I have already said bears directly on the important question of how linearization itself takes place (i.e., what determines whether a given element is realized "prefixally" or "suffixally"); as the same reviewer correctly notes, the linear theory advanced here makes strong predictions regarding intervention by prefixes and suffixes, which should behave differently depending on the locus of insertion. The Greek verb is far from

(14)



(15) $\sqrt{}^{\frown}X_{[+A]}$, $X_{[+A]}{}^{\frown}Y_{[+B]}$, $Y_{[+B]}{}^{\frown}Z_{[+C]}$

(16) *Node Adjacency Hypothesis*
Allomorphy is only possible with elements that are concatenated.
(Embick 2010, 2012)

Unless augmented with an additional ingredient, (16) is too strong, effectively barring all long-distance interactions. The third ingredient required, then, is a device that effectively renders null nodes transparent for allomorphy, guaranteeing that apparent long-distance allomorphy is possible only across a null head. This is the role of the mechanism of Pruning in Embick 2010 (see also Embick 1995, 2003): Pruning removes null nodes from the linearization statement,[8] and its application triggers reconcatenation, such that two nodes that were previously separated by a null head are now adjacent. As an illustration of Pruning, consider (17), where (15) has undergone

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the ideal domain on which to test these predictions, and I am therefore unable to do justice to this important issue here; however, some first remarks are in order, with prefixation as an illustrative example.

The present theory offers at least two ways in which a given element may end up "prefixal," whose possibly distinct behaviors with respect to intervention for allomorphy deserve to be explored further in future work. Under one scenario, the linearization algorithm simply places the given (abstract) syntactic element in the relevant linear position. But there also exists a different scenario: the element in question can be suffixal at the level of insertion proper, but "displaced" at a later point, in the morphophonology. This is the analysis of the Greek augment sketched in section 4; its mirror image, where a morphologically stem-peripheral element gets morphophonologically displaced to an internal position, is also argued (glossing over many important details) to be the correct analysis of infixation in Kalin to appear.

[8] An anonymous reviewer asks whether Pruning may have an LF counterpart and observes that this putative counterpart would presumably have to operate over hierarchical representations. Indeed, as the reviewer points out, semantic "emptiness" has been argued to be relevant for the definition of locality domains for contextual allosemy (Anagnostopoulou and Samioti 2013, 2014, Marantz 2013).

But it seems that an LF counterpart to Pruning is not necessary, at least as far as some types of semantic transparency effects are concerned. Supposing that being semantically empty amounts to denoting an identity function (effectively $\lambda f.f$), the relevant nodes will be transparent in the sense that they effect no change to the semantic composition. This is in effect the understanding of semantic emptiness found in the most detailed deployment of this notion that I know of: in Wood's (2021) analysis of Icelandic complex event nominals, the presence of an identity function on nominalizers suffices to guarantee that the nominalizations have the same denotation as verbs and that certain arguments are left open, to be saturated by NP-level modifiers. Crucially, there seems no reason to assume a removal operation for these cases.

However, it remains to be seen whether a Wood-style toolkit is applicable to the considerations addressed in Anagnostopoulou and Samioti 2014 and Marantz 2013, which revolve around a rather different set of phenomena involving the triggering of "special" encyclopedic meanings on Roots.

insertion up to Y: the Root has been realized as some exponent /π/, X has received an exponent /α/, and Y is null. Pruning of Y is illustrated in (18): Y is removed from the structure, and Z and X become adjacent.[9]

(17) $\sqrt{}_{/\pi/} \frown X_{[+A]\ /\alpha/}$, $X_{[+A]/\alpha/} \frown Y_{\ [+B]/\emptyset//}$, $Y_{[+B]/\emptyset/} \frown Z_{[+C]}$

(18) $X/\alpha/ \frown Y/\emptyset/$, $Y/\emptyset/ \frown Z \rightarrow X/\alpha/ \frown Z$

An important question here concerns which zeroes are transparent. In a Pruning-based treatment, this question effectively translates into a need to specify the conditions under which Pruning applies. I will tentatively take it that Pruning is a last-resort operation, triggered just in case there exists a VI that demands access to a nonlocal node;[10] the VI in (19) is one particular subcase of such a VI (namely, a *hypercontextual* VI, in the terms of Moskal and Smith 2016). Whether this approaches a correct statement of the conditions on Pruning on a more general level is a question I leave open.[11]

(19) $[+C]_Z \leftrightarrow /\beta/ \ / \ [\ ]_X\ [\ ]_Y$ ___

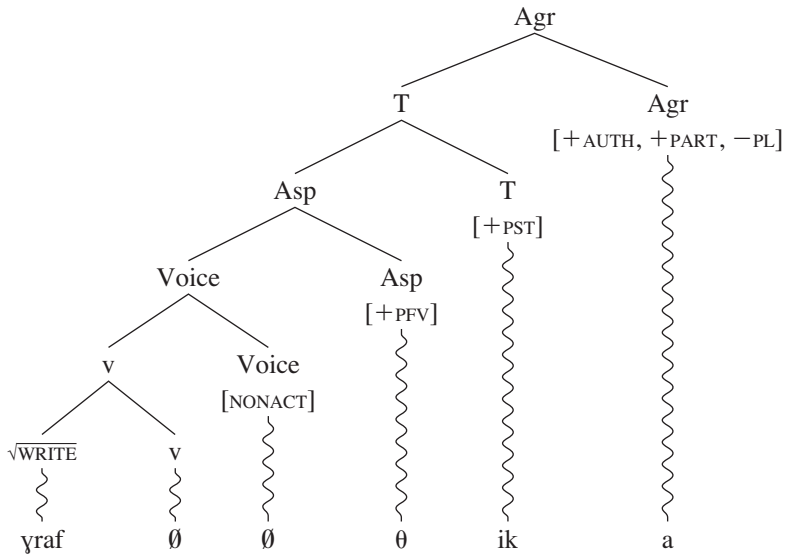
With these ingredients in place, we are now in a position to derive the asymmetric distribution of agreement endings noted above. I illustrate here with trees for the purposes of readability, reminding the reader that the targets of insertion are linear representations, not hierarchical ones. First, consider the derivation of a nonactive perfective past form such as *ɣraf-θ-ik-a* from table 3 (VIs from (13) repeated here for convenience).

[9] As two anonymous reviewers point out, Pruning is reminiscent, at least on the surface, of syntactic structure removal operations such as Exfoliation (Pesetsky 2021) and Remove (Müller 2017). While it is certainly meaningful to recognize in this way a family of structure-removing operations, there also exist important differences. In Embick 1995, 2003, 2010, Pruning is understood as a way of treating null nodes as transparent for certain linear relations; crucially, it is conceived of as a PF operation, and thus can feed allomorph selection and other pronunciation-related processes, but crucially not syntactic operations. In these ways, Pruning in the sense intended here diverges from Exfoliation and Remove, which are syntactic operations intended precisely as explanations of syntactic facts, at least in the works cited. In addition, PF Pruning targets only null exponents, whereas nullness is typically not part of the structural description of syntactic removal operations (and it is unclear what it would mean for only null elements to be syntactically removed, at least on a Late Insertion theory). In these ways, Pruning in Embick's sense is crucially different from its eponymous antecedent in Ross 1967. Like Exfoliation, Remove, and the S′ Deletion of Chomsky 1981, Pruning as conceptualized by Ross was a syntactic removal rule intended to derive syntactic facts regarding clause size and associated properties (see also Lasnik 2016 for the claim that Chomsky (1957) tacitly assumes a similar structure removal operation). Overall, PF Pruning seems to have crucially different properties from syntactic structure removal; as for Pruning at the other interface, it remains to be seen whether its postulation is warranted (see footnote 8).

[10] This idea has some precedent, notably in the discussion of *domain suspension* in Bobaljik and Wurmbrand 2013; thanks to Christos Christopoulos (pers. comm.) for pointing this out.

[11] Whether the analysis offered here is fully compatible with structural adjacency depends to some extent on what the equivalent of Pruning would be in a theory with structural adjacency; as an anonymous reviewer points out, one would have to invoke either a syntactic-structure-removing operation (see footnote 9) or, more likely, its PF analogue. It also seems that the specific notion of structural adjacency would itself have to be made precise: assuming a representation like (14), simple sisterhood will likely not give the correct result, given that, say, the sister of Z is not Y itself but a projection of Y that also contains X and the Root.

(20)



(13) *VIs for Agr*

a. $[+\text{AUTH}, +\text{PART}, -\text{PL}]_{\text{Agr}} \leftrightarrow$ /omun/ / $[\text{NONACT}]_{\text{Voice}}$ $[+\text{PST}]_{\text{T}}$ ___

b. $[+\text{AUTH}, +\text{PART}, -\text{PL}]_{\text{Agr}} \leftrightarrow$ /ome/ / $[\text{NONACT}]_{\text{Voice}}$ ___

c. $[+\text{AUTH}, +\text{PART}, -\text{PL}]_{\text{Agr}} \leftrightarrow$ /a/ / $[+\text{PST}]_{\text{T}}$ ___

d. $[+\text{AUTH}, +\text{PART}, -\text{PL}]_{\text{Agr}} \leftrightarrow$ /o/

Assume with Bobaljik (2000) (cf. Carstairs 1987, Carstairs-McCarthy 2003, Adger, Béjar, and Harbour 2003) that insertion proceeds from the Root outward,[12] and consider the stage of

[12] An anonymous reviewer observes that, for a linearity-based theory such as the one advocated here, the notion of Root-outward insertion must be guaranteed by some ancillary assumption. In a theory involving insertion into hierarchical structures, Root-outwardness can simply be stated as an instruction to begin insertion at the deepest level of embedding (which, by hypothesis, includes the Root). What would the analogue of this statement be in a theory such as the one advocated here? At a minimum, the relevant information provided by the prelinearization structure must be retained; effectively, once the hierarchical structure is flattened, a "stack" must be retained guiding the order of insertion, with the top of the stack being the most embedded node.

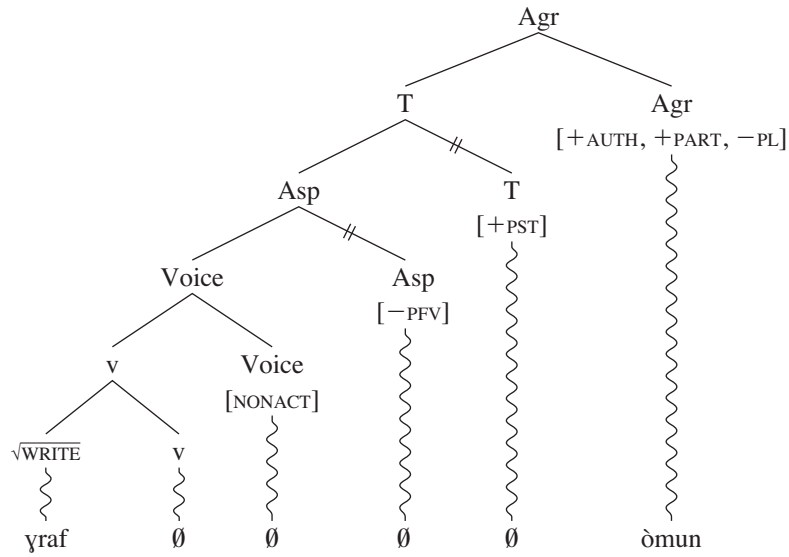
This view does not clearly amount to an enrichment of the theory, instead plausibly being an artifact of how linearization itself proceeds: if the first level to undergo linearization is the most embedded one (per cyclicity), then the first concatenation statement to be created, and thus to be inserted into, will involve the Root. On this view, the order of linearization guides the order in which elements are targeted by insertion, while the linear structure constrains what contexts insertion is able to refer to, in line with the claims in the main text. The important question that now arises concerns whether this conception of what Root-outwardness amounts to in a linear theory constitutes a meaningful difference to its counterpart in a hierarchical insertion theory. I would be inclined to say it does not. As Embick (2010: 42) points out, Root-outward insertion is an axiom: though it is certainly empirically well-motivated (most clearly in Bobaljik 2000), it does not clearly follow as a corollary of some other part of the core architecture of DM.

As such, it seems that Root-outwardness has the same status in both hierarchical and linear theories of insertion: while it is true that hierarchical theories trivially provide the notion "most deeply embedded" that can serve as an anchor for Root-outwardness (and that must be retained in linear theories, as just discussed), they do not straightforwardly explain *why* insertion must start at the most deeply embedded node, just as linearity-based theories also do not straightforwardly specify why linearization must start at the most deeply embedded node, thereby yielding the necessary ordering of insertion.

(20) where every node but Agr has undergone insertion. Of the candidate VIs in (13), the more specific (13a) and (13b) demand access to Voice. In demanding access to a nonlocal context, these VIs will trigger Pruning, but Pruning cannot apply; Agr is concatenated with T, which has been overtly realized as *-ik*. The context for (13a) and (13b) thus cannot be satisfied; the insertion mechanism will default to a more general VI, in this case, (13c), which demands reference to [+PST]. This VI will apply, correctly inserting the default exponent *-a*. In the corresponding *nonpast* form of table 1, *ɣraf-θ-o*, T can undergo Pruning but the overt exponent of Asp will intervene, again forcing Agr to retreat to a default realization.

By contrast, in an imperfective form such as nonactive imperfective past *ɣraf-òmun* in (21), no exponent will intervene between Agr and Voice. Asp and T, both null, will undergo Pruning, schematized here with a delink symbol; with Voice and Agr becoming adjacent, the most specific VI (13a) will apply.

(21)

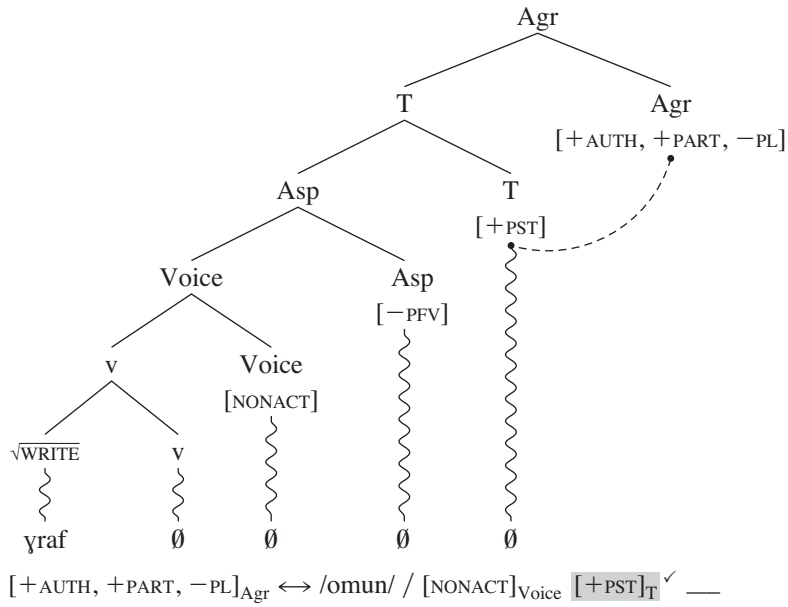


There is a timing-related intricacy connected with the derivation in (21): for Agr to gain access to Voice, T must be pruned, but the VI in (13a) is sensitive to the features on T. This creates an apparent paradox: viewed statically, this derivation requires both that T be present in the structure and that it be pruned. Under one conception of the timing of local conditioning, however, the paradox is only apparent.

Consider in more detail how the insertion mechanism will evaluate (13a). Suppose that the insertion mechanism scans the VI it evaluates for insertion (selected by the Elsewhere Principle) right to left, comparing its conditioning environment with the structure undergoing insertion. The VI (13a) first encompasses an immediate context, T. T is adjacent to the target of insertion and bears the right feature value, so this first part of the conditioning environment is now satisfied, as visually schematized in (22). But the VI also encompasses a nonlocal context, namely, Voice; it is at this point that Pruning is triggered, removing the null T head. At this point, T has already

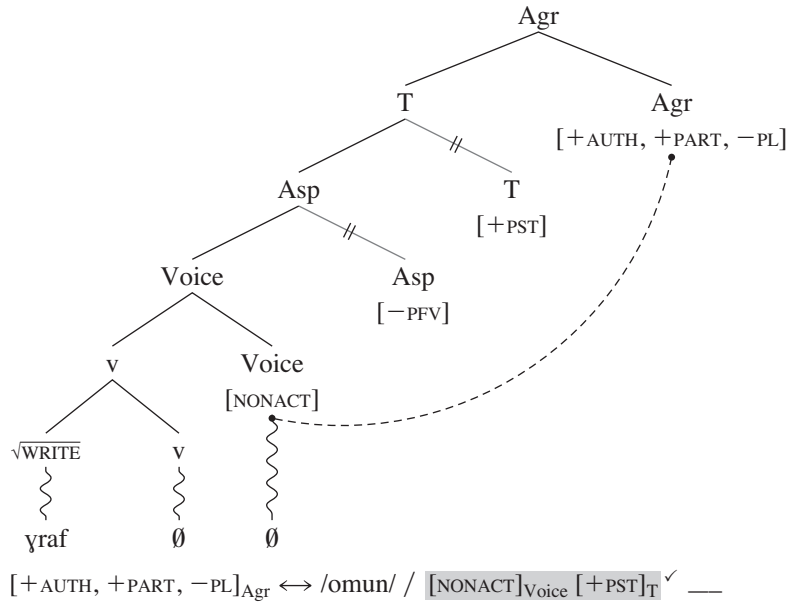
contributed to its conditioning environment (its features have been placed on the "stack" of the insertion mechanism). Once Asp is also pruned, Agr and Voice become adjacent and the entire context of the VI is satisfied, as schematized in (23). This serial right-to-left scanning of the contextual environment undeniably constitutes a fine-grained requirement on the order of operations here, but not an implausible one; for a case of a more involved ordering interaction with Pruning that supports this serial view of insertion, see section 3.3.[13]

(22) *Before Pruning: Agr and T are adjacent*



[13] I thank Jason Merchant (pers. comm.) for making me aware of the novelty of this incremental view of VI evaluation; its predictions vis-à-vis a less dynamic, "templatic scanning" mechanism certainly deserve to be explored further.

(23) *After Pruning: Agr and T are adjacent*



3.2 Comparison with Spanning

Under the theory underlying the analysis just developed, allomorphic conditioning is subject to a strict condition on linear adjacency, which can be circumvented only in the special case of null nodes. The Greek pattern just discussed is precisely what we would expect to find if the conditions on allomorphy were of this kind: Voice and Agr only interact when intervening nodes are "out of the way," and they stop interacting once at least one overt node intervenes, where noninteraction is signaled by the emergence of a default exponent on Agr.

That the facts discussed here are fully compatible with an adjacency-based theory is an important conclusion; it thus becomes crucial to examine the kind of analysis that a competing theory would offer. Here, I briefly review and discuss the spanning analysis of the same facts from Merchant 2015.

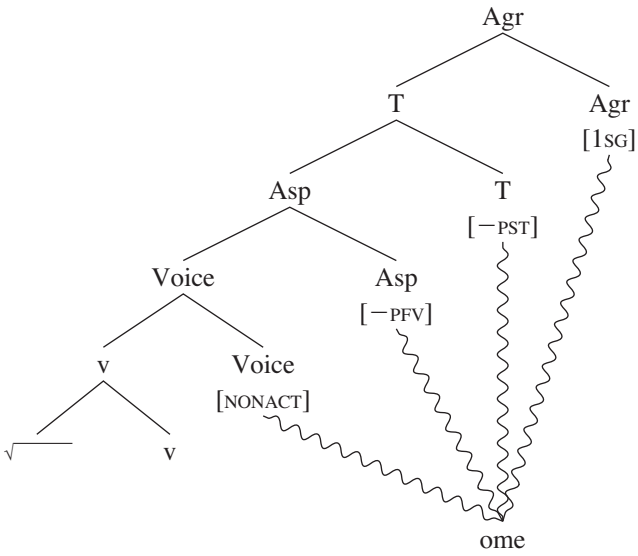
Under spanning, the targets and contexts of Vocabulary Insertion are not individual heads, but sets of contiguous nodes from the same extended projection, called spans (Bye and Svenonius 2012, Svenonius 2012, 2016). Taking spans as the objects relevant for insertion has important downstream consequences for the theory of contexts; concretely, Merchant (2015) proposes that allomorphy is constrained by *span adjacency*, whereby the target and trigger of allomorphy must be adjacent spans. Though this theory is nominally an adjacency-based one, it is deliberately less restrictive than the theory defended here; under spanning, nonlocal interactions of different kinds are predicted to be possible, as discussed in more detail in section 5.

For the purposes of the case study just discussed, it is clear that a spanning analysis is perfectly admissible in principle. One such analysis, based on remarks in Merchant 2015:292–294, is sketched here. The agreement endings in a nonactive imperfective form like *γraf-ome* and its corresponding perfective form *γraf-θ-ò* can be generated by means of the span-based VIs in (24).[14]

(24) a. $\langle \text{Voice}_{[\text{NONACT}]}\ \text{Asp}_{[-\text{PFV}]}\ \text{T}_{[-\text{PST}]}\ \text{Agr}_{[1\text{SG}]} \rangle \leftrightarrow$ /ome/
b. $\langle \text{T}_{[-\text{PST}]}\ \text{Agr}_{[1\text{SG}]} \rangle \leftrightarrow$ /o/

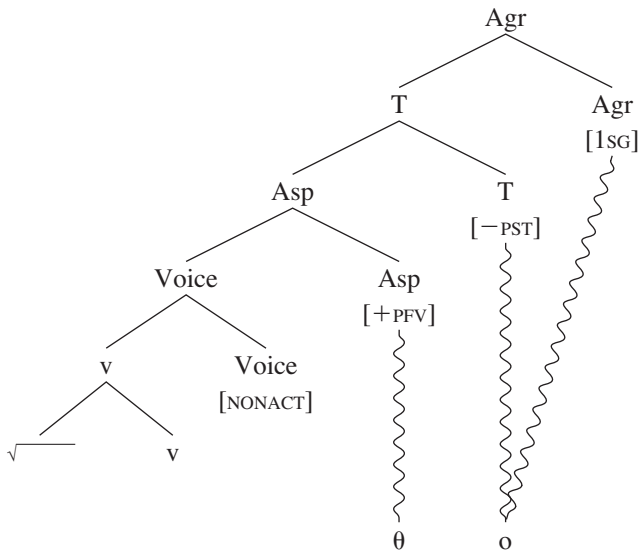
These VIs embody the intuition that "[a]s Joseph and Smirniotopoulos (1993) point out, these [nonactive agreement] endings are maximal portmanteaux" (Merchant 2015:293). They are meant to lead to representations like the following:

(25)



[14] Though no explicit VIs are given for the nonactive agreement endings in Merchant 2015, (24a) follows from (37) therein. Note also that Merchant does not posit a dedicated Agr head; rather, he takes subject agreement features to be hosted on T in the morphology. This approach is untenable if the exponent *-ik* is on T; see section 4.

(26)



It is clear that the relevant forms can be perfectly easily generated under a spanning analysis, but it seems far from clear that such an approach leads to a principled treatment of the intervention patterns. In particular, given (24a), the fact that Voice-sensitive agreement affixes such as *-ome* emerge only when Asp and T are not (independently) realized is treated as an accident. That *-ome* appears only in the imperfective must be written into the target of insertion for this exponent: *-ome* happens to target a span that includes [−PFV], and the same happens to be the case with the rest of the VIs inserting Voice-sensitive agreement affixes for other person/number combinations (see (27)). That the emergence of the "smaller" exponent *-o*, realizing just T and Agr, correlates with the independent realization of Asp as *-θ* is another accident of the Vocabulary. However, as just discussed, the patterning of the Greek system strongly suggests that such correlations are far from accidental. That the default agreement endings emerge when Asp and/or T are overt is a systematic fact recurring throughout the system: in the case at hand, it is a general fact about agreement endings and aspectual exponents generally, not about *-θ* and *-o* in particular. Such facts arguably deserve a mechanical explanation reducible to general properties of the grammar (here, locality constraints), as opposed to contingent encodings into the Vocabulary entries of particular items.

(27) a. $\langle \text{Voice}_{[\text{NONACT}]}\ \text{Asp}_{[-\text{PFV}]}\ \text{T}_{[-\text{PST}]}\ \text{Agr}_{[2\text{SG}]} \rangle \leftrightarrow$ /ese/
b. $\langle \text{Voice}_{[\text{NONACT}]}\ \text{Asp}_{[-\text{PFV}]}\ \text{T}_{[-\text{PST}]}\ \text{Agr}_{[3\text{SG}]} \rangle \leftrightarrow$ /ete/
c. . . .

More broadly, the use of spans is intended (at least in Merchant 2015) as a way of liberally enabling nonlocal conditioning; but the Greek intervention patterns suggest that nonlocal conditioning is only possible under a restricted set of circumstances. A spanning approach cannot easily capture the tight link we find between successful nonlocal conditioning and the nullness of intervening

heads; though the relevant forms are generated, the intervention patterns are arguably not explained, all things being equal.

The obvious counterargument at this point may be that all things are *not* equal—that is, that some other facet of the mechanics of span insertion can account for intervention in a principled way. For this to be the case, some elaboration of how competition is adjudicated in spanning would be necessary.

In particular, given overlapping spans eligible to be lexicalized (e.g., ⟨Voice Asp T Agr⟩ vs. ⟨T Agr⟩ above), how does the insertion mechanism decide which one should be targeted for insertion? For (26), one possibility is that, because Asp has formed its own trivial span, it cannot act as part of the bigger ⟨Voice Asp T Agr⟩ span (this perhaps following from a principle such as that in Haugen and Siddiqi 2016:369); and, because discontinuous spans are disallowed, the mechanism somehow defaults to the smaller ⟨T Agr⟩ span. This solution would amount to positing that a given head can only be a member of a single span per derivation, and that spans "persist" throughout cycles of insertion.[15]

But implementing this general idea in a consistent fashion seems far from straightforward. Besides making reference to the notion "head," which spanning is arguably meant to eschew for the purposes of insertion, the requirement for heads to enter a single span is often violated in practice: for example, in the analysis of Greek Root suppletion in Merchant 2015:289, Voice and Asp form a single span that conditions insertion at the Root, but act as separate trivial spans when insertion targets each of them (see section 5 for more). Similarly, as Grestenberger (2019) points out, in the analysis in Merchant 2015, Voice is realized in at least four different ways: as a trivial span ⟨Voice⟩ realized as -θ; as part of ⟨Voice Asp⟩; as part of ⟨√ v Voice⟩ (for the θ-less stems of athetic verbs, see section 3.3); or as part of ⟨Voice Asp T Agr⟩ (as in (25)). The point here is not that analyses of this kind, where the same head enters multiple spans, are undesirable a priori, but that such analyses seem incomplete without a theory of how the insertion mechanism adjudicates between VIs targeting overlapping spans.

At a minimum, then, further elaboration of the mechanics of competition and insertion in spanning would be needed to enable a more extensive comparison of approaches here. However, to the extent that the Greek facts suggest a crucial role for both the adjacency of heads and their overtness/nullness, they seem better captured in a theory that explicitly incorporates these parameters.

I postpone further discussion of issues with spanning to section 5. For now, we may wonder whether some of the intuitions underlying a spanning solution to this first case study may be worth preserving, even if a full-blown spanning solution seems undesirable. In particular, the general idea that certain nodes are *bundled together* for the purposes of insertion is worth exploring

[15] An anonymous reviewer points out that these requirements may jointly be equivalent to *replacive* insertion into spans: once a span is lexicalized, the features on the terminals making up the span can no longer be referred to, as phonological material has replaced said features, rather than having been added to them. If true, this equivalence raises further problems: replacive insertion of the kind assumed in early work in DM (e.g., Noyer 1992, Bobaljik 2000) incorrectly rules out inward-looking morphosyntactically conditioned allomorphy, which seems to be robustly attested across languages (see, e.g., Carstairs 1987:154–157, Gribanova and Harizanov 2017), certainly including Greek (in this section, for example, nodes as peripheral as Agr have been shown to be inward-sensitive to the features of Voice).

further; within DM, this idea of course predates spanning, going back at least to the operation of Fusion (Halle and Marantz 1993), which spanning is arguably meant to supplant. For the specific case of Greek, the pair of nodes that could plausibly be bundled together consists of Asp and Voice. Let us explore this possibility in more detail.

Consider first that fusing Asp and Voice would not lead to any issues in terms of the exponence of these nodes: if the segmentation argued for here is correct, Voice is systematically null, and the aspectual VIs will thus realize the bundled head whenever it is overt. Based partly on this observation, Christopoulos and Petrosino (2018) propose that Asp and Voice form a single node in Greek. This proposal is meant to offer one way of accommodating the stem allomorphy patterns discussed in Merchant 2015 in a localist theory (see section 5 for discussion); of interest here is a different issue. If Asp and Voice form a single head at the point where Asp is targeted for insertion, the intervention patterns just discussed seem difficult to accommodate: Asp will no longer disrupt the Agr-Voice relationship, and the nonactive endings should be eligible for insertion, contrary to fact. The intervention pattern discussed here thus speaks against a solution whereby Asp and Voice are bundled. This conclusion is interesting from a methodological standpoint: this is one case where intervention has served as a diagnostic helping adjudicate between two competing analyses.

3.3 The Athetic Verbs

So far, all bodes well for the analysis developed in section 3.1. Before concluding this case study, I highlight one instance where the predictions made by this analysis are apparently wrong, and I argue that the tension is in fact resolved in a way that may provide interesting insights into the nature of the operation of Pruning.

The problematic case for the analysis of the agreement endings developed thus far involves the Modern Greek verbs traditionally called athetic; the relevant forms of these verbs are given in table 4. From a morphological perspective, the unifying characteristic of this set of verbs is the absence of the aspectual *-θ* in the nonactive perfective: for example, we find *ka-o* in place of expected **ka-θ-o* (compare the corresponding form of 'write', *ɣraf-θ-o*).

Table 4
Stems of the modern Greek athetic verbs, in the 1SG

IPFV	ACT.PFV	NONACT.PFV	Gloss
ke-o	kaf-s-o	ka-o	'burn'
pniɣ-o	pniɣ-s-o	pniɣ-o	'choke/drown'
klev-o	klef-s-o	klap-o	'steal'
kov-o	kof-s-o	kop-o	'cut'
stref-o	stref-s-o	straf-o	'turn'
trep-o	trep-s-o	trap-o	'turn'
tref-o	θref-s-o	traf-o	'feed'
vrex-o	vrex-s-o	vrax-o	'wet'

For Merchant (2015:285–287), this observation is important insofar as it militates against an analysis whereby the exponent *-ik* is potentiated by the presence of *-θ* by means of phonologically conditioned allomorphy: the past nonactive perfective form of 'burn' in the first singular is *ka-ik-a* (cf. **ka-θ-ik-a*).

For the purposes of the analysis here, a different concern arises. Since Asp is not realized by means of *-θ*, it is presumably null. If it is null, it should undergo Pruning. If Pruning applies, Agr should be able to gain access to Voice in the perfective, with just this set of verbs. Therefore, all things being equal, the analysis proposed above seems to incorrectly generate forms like **ka-ome*, where Agr is realized by means of the nonactive ending, as opposed to attested *ka-o*. I argue that, far from jeopardizing the analysis as it stands, this problem sheds light on the nature of Pruning.

Suppose, with Merchant (2015), that (at least some of) the athetic verbs lack *-θ* because they take a more specific (null) exponent of Asp, as in (28).

(28) $[+\text{PFV}]_{\text{Asp}} \leftrightarrow \emptyset \;/\; \{\sqrt{\text{FEED}}, \ldots\} __$

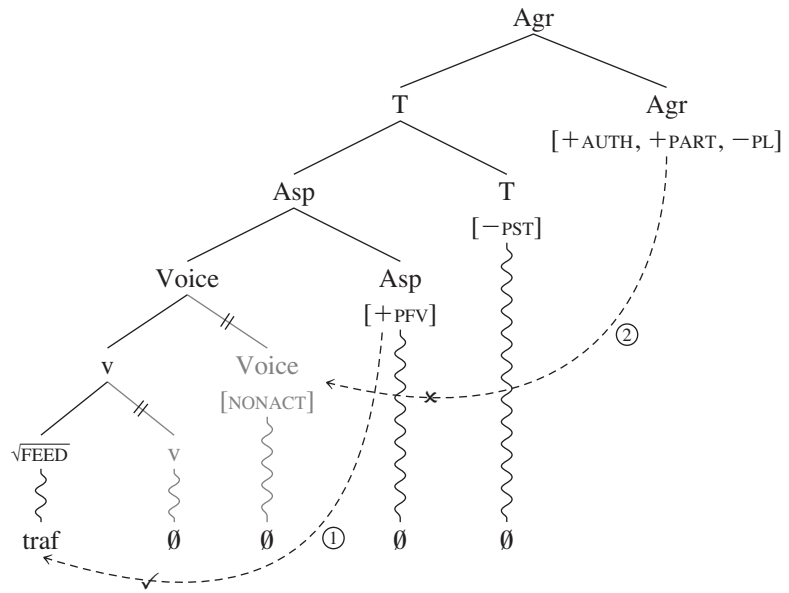
Importantly, this VI demands access to a nonlocal context. Given the assumptions on Pruning made above, (28) will trigger Pruning of any null nodes that intervene between the target Asp and the conditioning node √. There are two intervening nodes: Voice is systematically null, and the v that verbalizes these Roots is, too. Pruning will thus apply successfully, feeding the application of (28), which beats the more general VI (12c) that inserts *-θ*.[16]

Consider now what kinds of downstream consequences this application of Pruning can have. An important feature of the conception of Pruning outlined in section 3.1 is that this operation is *destructive*: it makes null nodes transparent by literally removing them from the linearized representation. Presumably, this removal is final: once a null node has been successfully pruned, it is absent from the structure for all subsequent cycles of insertion. This creates the possibility of bleeding interactions, whereby, to satisfy the demands of a VI at one cycle of insertion, Pruning removes the context required by a VI evaluated at a later cycle.

It is possible to invoke a bleeding effect of precisely this kind to explain the absence of nonactive agreement endings with the Roots on the List in (28). Schematically, the situation would be as in (29).

[16] Note that for (28) to win the competition over (12c), it must be the case that Lists count as more specific for the purposes of the Elsewhere Principle than (bundles of) syntacticosemantic features.

(29)



At an early cycle of insertion, marked ① here, the exponence of Asp will be evaluated. The most specific VI matching the feature on Asp is (28); because this VI demands access to a nonlocal context (namely, the Root), it will trigger Pruning, and Pruning will successfully remove the intervening v and Voice nodes, making Asp and the Root adjacent and allowing insertion of the zero allomorph into Asp. At a later cycle ②, the insertion mechanism will target Agr. The most specific VI compatible with the local context here is (13b). This VI demands access to Voice; but, even if T and Asp were pruned, reference to Voice cannot be made, because this node is simply not present, having been removed from the structure at cycle ①.[17] At this point, the insertion mechanism will retreat to a default VI, successfully deriving the absence of nonactive endings with the athetic Root √FEED.

Technical as this solution may be, it confers a few advantages. It is notable that bleeding interactions of this kind are precisely what we expect if all of the following holds: (a) Vocabulary Insertion is serial and proceeds from the Root outward; (b) Pruning is destructive, removing entire nodes (i.e., both features and their null exponents) from the linearized structure; (c) Pruning is obligatory when the conditions for its application are met (i.e., Pruning *must* apply at cycle ① above).

[17] An anonymous reviewer asks whether we should expect Voice to always undergo Pruning, given that, on the segmentation of the Greek verb advanced here, Voice is always null. In fact, by virtue of being null, Voice will always be available for Pruning, but whether it does or does not actually undergo Pruning depends on the VIs of the higher node undergoing insertion: Voice will only be pruned if some higher node demands access to a node to the left of Voice (see discussion of Pruning below (18)). The prediction of this view of Pruning, then, is that Voice will be pruned whenever a more peripheral morpheme requires access to an element to the left of Voice; the athetics confirm this prediction, as detailed in the main text.

Notably, the same analysis cannot be recast under a less radical understanding of why null nodes can be transparent for allomorphy: if Voice in (29) were present in cycle 2 and were "skipped" at cycle 1 through some means other than Pruning, we would have to seek a different explanation for the emergence of the default agreement endings here.

4 Case Study 2: Exponence of [+PST]

In the previous case study, the realization of Agr was shown to be sensitive to Voice, but this contextual conditioning was governed by intervention: Agr was only able to be conditioned by Voice when all intervening nodes were null. The realization of [+PST] in Greek reveals a similar intriguing pattern, one that also involves a morphophonological twist.

The standard realization of [+PST] in Greek is the prefixal *e-* that normally appears in active past forms, known as the augment. It is well-known that the appearance of the augment is sensitive to prosodic conditions: specifically, the augment seems to appear whenever a [+PST] form does not supply a syllable to host antepenultimate stress (Kaisse 1982, Galani 2005, Spyropoulos and Revithiadou 2009, Van Oostendorp 2012).

This prosodic sensitivity can be illustrated by comparing the shape of past forms of monosyllabic and disyllabic Roots. A monosyllabic Root like *ɣraf-* 'write' obligatorily surfaces with the augment in the past, as in (30a). But the past of a disyllabic Root like *ðjavaz-* 'read' is unaugmented (30b): here, the combination of disyllabic Root and syllabic affix ensures that an antepenult is already supplied, and the augment does not surface.[18] Further illustration of the neatness of this distribution is provided by the paradigm of the active past perfective forms of *ɣraf-* in (31). In the singular, the agreement affixes are monosyllabic and, since the Root is also monosyllabic, the augment is inserted to host antepenultimate stress; in the first and second person plural, insertion of the disyllabic agreement endings obviates augment insertion. In the third person plural, the agreement affix may or may not be monosyllabic; if the monosyllabic variant is chosen, the augment is inserted, while the disyllabic variant bleeds augmentation.[19]

[18] This is so for *standard* Modern Greek; in more conservative varieties, such as Cretan and Cypriot, the augment's distribution is not as intimately tied to antepenultimate stress. See Pavlou 2017 for Cypriot Greek.

[19] As an anonymous reviewer points out, when a pronominal proclitic appears, it may optionally bear antepenultimate stress itself, thereby optionally bleeding augmentation; hence, both forms in (i) are grammatical.

(i) /to = è- ɣraf- a/ → [toèɣrafa] ~ [tòɣrafa]
3SG.N PST √WRITE 1SG
'I was writing it.'

This phenomenon is orthogonal to the discussion of the morphophonology of the augment that follows. Optional contraction as in (i) is a fully regular process of Greek phonology, occurring with hiatuses across clitic boundaries more generally; see (ii) for an example with a present tense verb (hence no augment), and see Kaisse 1982 for details on the phonology. For the purposes of the analysis below, the point is that the morphophonology outputs a form like *è-ɣraf-a*; this form may subsequently undergo the optional contraction rule in the phonology, just like any other vowel-initial form prefixed with a clitic.

(ii) /me = aɣapài/ → [meaɣapài] ~ [maɣapài]
1SG.ACC love.3SG
'He/She loves me.'
(Kaisse 1982:61)

(30) a. **è**- ɣraf -a , *ɣràf-a
PST- √WRITE 1SG.PST
'I was writing.'

b. ***e**- ðjavaz -a , djàvaz-a
PST- √READ 1SG.PST
'I was reading.'

(31) *Active past perfective of* ɣraf-

1SG	**è**-ɣraf-a
2SG	**è**-ɣraf-es
3SG	**è**-ɣraf-e
1PL	ɣràf-ame
2PL	ɣràf-ate
3PL	**è**-ɣraf-an / ɣràf-ane

It is thus possible to relegate the conditions for the appearance of the augment entirely to morphophonology (Kaisse 1982): under such an approach, whenever we do not find the augment in a [+PST] form, as in the nonactive forms of table 5, it is because the prosodic shape of the Root and its affixes removes the conditions for augment insertion. At first glance, the complementary distribution of the augment and the exponent *-ik* can also be derived from the former's prosodic conditioning: for example, in Merchant 2015, *-ik* is taken to realize Asp, and, by being syllabic, its addition to a Root (along with the agreement affix) bleeds insertion of the augment.

But an interesting complication for this simple approach arises with a handful of Roots, exemplified by √FIND in table 6 (cf. table 5, and see also Spyropoulos and Revithiadou 2009: 118–119). The issue arises in the active perfective past form, which is an unaugmented disyllabic form. This is fully unexpected given the augment's prosodic conditioning just discussed: given

Table 5
Past first person singular forms of *yrafo* 'write'

ACT.IPFV.PST	ACT.PFV.PST
è- ɣraf -a	è- ɣraf -s -a
TNS √WRITE AGR	TNS √WRITE ASP AGR
NONACT.IPFV.PST	NONACT.PFV.PST
ɣraf -òmun	ɣràf -θ -ik -a
√WRITE AGR	√WRITE ASP TNS AGR

Table 6
Past first person singular forms of *vrisko* 'find'

ACT.IPFV.PST	ACT.PFV.PST
è-vrisk-a	vr-**ìk**-a
NONACT.IPFV.PST	NONACT.PFV.PST
vrisk-òmun	vre-θ-ik-a

Table 7
Special [+PST] exponents in the active perfective

ACT.IPFV.NONPST	ACT.IPFV.PST	ACT.PFV.PST	Gloss
vr-isk-o	è-vr-isk-a	vr-**ìk**-a	'find'
b-en-o	è-b-en-a	b-**ìk**-a	'enter'
vj-en-o	è-vj-en-a	vj-**ìk**-a	'exit'
per-n-o	è-per-n-a	pìr-Ø-a	'take'
pij-en-o	pìj-en-a	pìɣ-Ø-a	'go'

the above, we would expect **è-vr-ik-a* (in fact the antecedent Classical Greek form), contrary to fact.

The issue is not confined to this Root. As shown in table 7, $\sqrt{\text{ENTER}}$ and $\sqrt{\text{EXIT}}$ are like $\sqrt{\text{FIND}}$ in taking *-ik* to form an unexpectedly unaugmented active perfective past form; $\sqrt{\text{TAKE}}$ and $\sqrt{\text{GO}}$ take a null exponent of T, but still form augmentless disyllabic past forms.

It is thus not the case that the augment freely appears whenever a [+PST] form lacks an antepenult. Instead, as the perfective past forms of table 7 illustrate, and as noted also in Spyropoulos and Revithiadou 2009, we need a layer of *morphological* competition capable of altogether obviating the process that evaluates whether the augment's morphophonological conditions are met.

To account for the relevant verbs, then, we may posit two more allomorphs of T, as in (32). One will insert *-ik* with the relevant set of Roots; another will insert a null allomorph of T with a disjoint set of Roots. Importantly, these two VIs compete with the default realization of T, namely, the VI inserting the null allomorph /Ø*/.

(32) *Some VIs for T*
a. $[+\text{PST}]_{\text{T}} \leftrightarrow$ /ik/ / $\{\sqrt{\text{FIND}}, \sqrt{\text{ENTER}}, \sqrt{\text{EXIT}}\}$ ___
b. $[+\text{PST}]_{\text{T}} \leftrightarrow$ /Ø/ / $\{\sqrt{\text{TAKE}}, \sqrt{\text{GO}}\}$ ___
c. $[+\text{PST}]_{\text{T}} \leftrightarrow$ /Ø*/

I take (32c) to be the allomorph that triggers prefixation of the augment. * is here intended as a diacritic to this end: the null allomorph in (32c) causes the form's prosodic profile to be evaluated in the morphophonology, after insertion has been completed. If the form has an antepenult, no operation occurs; but if the form lacks an antepenult, * triggers prefixation of *e-* to host stress. Though the exact details of the morphophonology are not central here, the general shape of the process is as follows. At the level of morphophonology, * triggers stress shift to the antepenult; in cases where the form resulting from Vocabulary Insertion already bears an antepenult, the process terminates, but if there is no antepenult, a default vocalic segment—namely, /e/—is inserted as a stress host. This basic idea is captured in an Optimality Theory framework in Spyropoulos and Revithiadou 2009, partly following Van Oostendorp 2012; see these works for more details on the morphophonology proper.[20]

[20] One might wonder why I have not taken (32c) to insert *e-* at T directly, perhaps accompanied by linearization of T to the left. Such a solution would not be compatible with serial inside-out insertion, assumed here. Recall that we want *e-* to surface only when the form will lack an antepenult; but, at the point where insertion targets T, this information on the eventual prosodic shape of the form is not yet available, because Agr has not yet been targeted for insertion.

The important aspect of (32) is that, whenever (32a) or (32b) applies, (32c), the augment-triggering VI, will have lost the competition. In other words, (32a) and (32b) will bleed insertion of the augment, because choosing one of these VIs entails not choosing the allomorph capable of inserting the augment.

Note now that, although (32) is necessary to account for the perfective past forms of table 7, it is not sufficient to account for other forms of this table. The issue we face is that the distribution of the "special" T exponents (*-ik* or Ø) is asymmetric: these exponents surface in the active perfective, giving forms like *vr-ìk-a*, but do not surface in the active imperfective. Given (32a), for example, we might expect the imperfective past of the relevant Roots to form forms like **vr-isk-ik-a*, since √FIND should condition insertion of *-ik*; but in fact the augment surfaces instead, giving forms like *è-vr-isk-a.*

As in the case of Agr allomorphy discussed in section 3, the most specific VI ostensibly underapplies: though the Roots that form the context for (32a) and (32b) are clearly present in both the imperfective and the perfective past forms of table 7, they only seem to successfully condition allomorphy of T in the perfective. Why, then, is Root-sensitive allomorphy only found in the perfective?

I argue that intervention is once again the culprit here. To see why, consider a striking generalization on the relevant verbs, summarized in table 8: these verbs all bear overt verbalizers (cf. Spyropoulos, Revithiadou, and Panagiotidis 2015),[21] but only in the imperfective. In the perfective, v is always null.

Table 8
Overt and null verbalizers and aspect

ACT.IPFV.NONPST			ACT.PFV.NONPST			Gloss
vr	**-isk**	-o	vr	**-Ø**	-o	'find'
√FIND	VBZ	AGR	√FIND	VBZ	AGR	
b	**-en**	-o	b	**-Ø**	-o	'enter'
√ENTER	VBZ	AGR	√ENTER	VBZ	AGR	
vj	**-en**	-o	vɣ	**-Ø**	-o	'exit'
√EXIT	VBZ	AGR	√EXIT	VBZ	AGR	
per	**-n**	-o	par	**-Ø**	-o	'take'
√TAKE	VBZ	AGR	√TAKE	VBZ	AGR	
pij	**-en**	-o[a]	pa	**-Ø**	-o	'go'
√GO	VBZ	AGR	√GO	VBZ	AGR	

[a] For some speakers, including myself, the active imperfective nonpast of √GO has an unverbalized variant *pa-o*, homophonous with the corresponding perfective form. This is orthogonal to the point made here on the realization of [+PST] T since, even for these speakers, the *past* imperfective form is always overtly verbalized.

[21] The segmentation here is novel, since previous literature on the topic does not seem to have recognized the status of *-(e)n* and *-isk* as verbalizers. Thanks to an anonymous reviewer as well as E. Phoevos Panagiotidis (pers. comm.) for this remark.

One could, of course, dispute the segmentation here; in particular, the facts are prima facie compatible with a treatment of *-(e)n* as the realization of [−PFV] Asp. The details of table 8 may be surprising in this light—in particular, we may expect the perfective to be marked relative to the imperfective, and not vice versa—but such an approach is possible in principle. It is, however, disfavored by empirical considerations. Alongside the verbs in table 8, *-(e)n* appears productively to form causatives.

(33) a. vaθ- is
√DEEP M.NOM
'deep'

b. vaθ- **en**- o
√DEEP VBZ 1SG
'to deepen'

(34) a. siop- i
√SILENCE F.NOM
'silence'

b. sop- **en**- o
√SILENCE VBZ 1SG
'to silence'

(35) a. zest- i
√WARM F.NOM
'heat'

b. zest- **en**- o
√WARM VBZ 1SG
'to warm up'

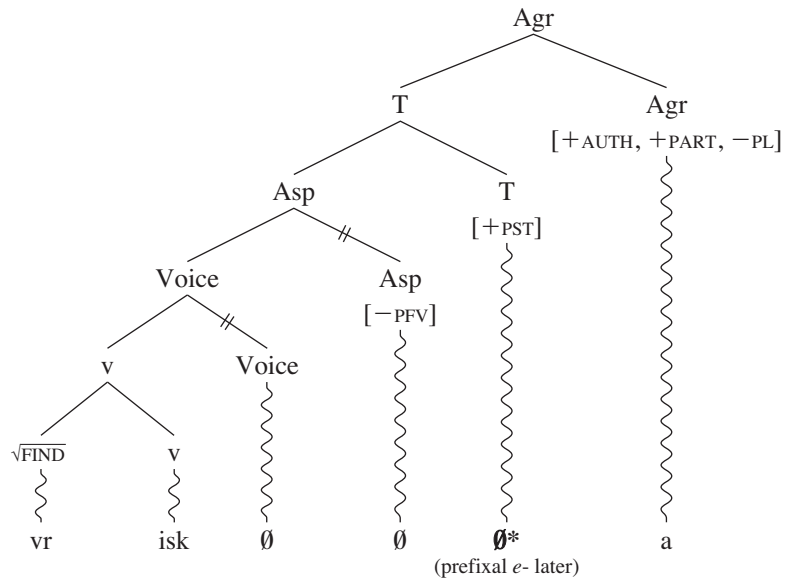
In the (b)-examples, the appearance of *-en* verbalizes the Root and introduces causative semantics (Giannakidou and Merchant 1999), a function also often associated with v (Pylkkänen 2008). For all intents and purposes, then, *-en* behaves like a verbalizer. Therefore, in table 8 what becomes null in the perfective is v; the same node is realized in the imperfective as *-n* after consonant-final Roots, *-en* after vowel-final Roots, and *-isk* after √FIND.

This generalization on the overtness of v is crucially relevant to the way in which the VIs in (32) will apply. Recall that the more specific VIs, (32a) and (32b), demand access to the Root. Given linear adjacency, T will only be able to access the Root if all intervening heads are null. For the relevant verbs, this may be possible in the perfective, where v, the node adjacent to the Root, is null; but in the imperfective, overt v will close off the Root, forcing T to be realized with the default allomorph in (32c).[22]

[22] Christopoulos and Petrosino (2018) make an interesting related observation, echoing Calabrese (2015a,b): no suppletive verb in Greek is overtly verbalized. This conforms to the predictions of a linear adjacency-based theory, whereby overt v would block access to the Root. Note, however, that this generalization is static, unlike the dynamic

As an illustration, consider first the derivation of a past imperfective form like *è-vr-isk-a* 'I was finding' in (36). For insertion at T, VI (32a) will be evaluated first; this VI demands access to the Root, so Asp and Voice, both null, will undergo Pruning. But this attempt to make T local to the Root will fail, because v, the last barrier, is overt and intervenes. T and the Root thus cannot be made adjacent, and T defaults to the elsewhere VI (32c). The augment-triggering /Ø*/ will thus be inserted and, in this case, lead to prefixation of *e-* in the morphophonology, given that the output of insertion is a disyllabic past form that bears *.

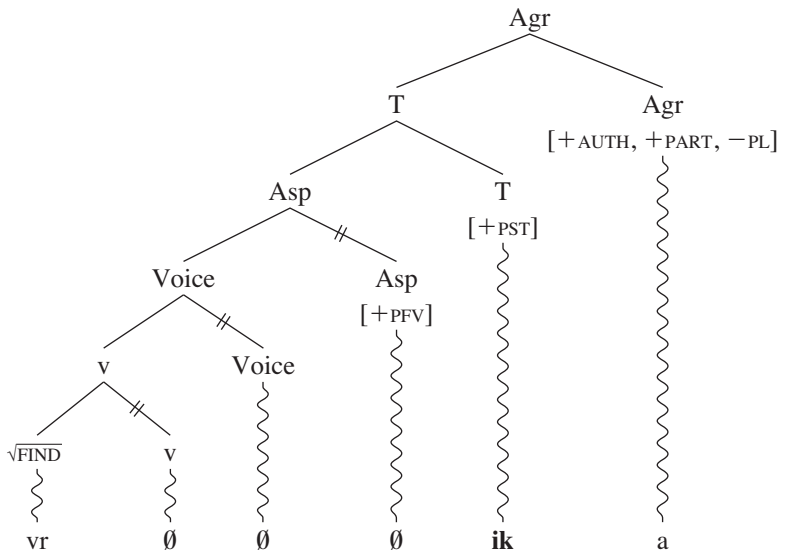
(36)



Now consider the derivation of the corresponding *perfective* form *vr-ìk-a* 'I found' in (37). The crucial difference is that, in this case, v is null—Pruning of all intervening nodes will thus make T adjacent to the Root. The context of (32a) is now met, and the more specific exponent *-ik* is inserted. Note that, because the augment-triggering (32c) has lost the competition, augmentation will not be triggered, yielding an unaugmented disyllabic past form.

pattern in table 8, where T takes different forms within the same "verb" depending on the presence/absence of overt v. This dynamicity is particularly important in light of the fact that the language only provides a small number of clearly suppletive verbs (see section 5), making the evaluation of Christopoulos and Petrosino's argument a subtle matter.

(37)



In other words, the interaction of the augment and *-ik* in the relevant set of verbs again instantiates the phenomenon of default by intervention. Here, a Root-sensitive VI for T ostensibly underapplies, because the Root is inaccessible; T thus defaults to its general realization. The pattern is thus structurally similar to that explored in case study 1; here, however, the asymmetric distribution of the default VI is even more striking because the contexts where the specific exponent *-ik* is inserted yield forms that ostensibly violate the augment's otherwise fully regular prosodic conditioning. Under a less restrictive theory of allomorphy, it may end up seeming accidental that the augment fails to appear whenever v is null; the localist theory advocated here, on the other hand, derives this connection in a principled way.

At this point, the morphology of Greek verbal affixes has provided us with two case studies on default by intervention, whose details favor strict adjacency-based locality conditions on allomorphic conditioning over less restrictive alternatives. The hallmark of the approach defended here is that conditioning is predicted to be impossible across an overt intervening node. The general conclusion to be drawn from the first two case studies is that the properties of theories designed to accommodate nonlocal conditioning, such as spanning, should be weighed against intervention patterns of the kind discussed here. In other words, while less restrictive theories may confer the apparent advantage of easily accommodating putatively nonlocal allomorphy, this may come at the cost of treating fine-grained patterns of intervention as accidents.

This type of thinking is bound to give rise to theoretical dilemmas: when faced with the choice between accommodating an apparent instance of nonlocal allomorphy, on the one hand, and giving a principled explanation of intervention patterns, on the other, something has to give. In what follows, I offer an attempt at reconciliation of this kind for the specific case of Greek, arguing that a well-known pattern of stem allomorphy in fact fully complies with linear adjacency, contra recent claims.

5 Case Study 3: Stem Allomorphy

5.1 No Nonlocal Suppletion

In an extremely careful article, Merchant (2015) provides an argument against adjacency-based theories and in favor of the less restrictive theory of spanning. According to Merchant, certain patterns of Root suppletion in Modern Greek verbs require reference to the features of a node that is not adjacent to the Root; crucially, the intervening heads are arguably *not* null. The proposed weaker theory of allomorphy capitalizes on Svenonius's (2012) notion of a span, discussed above: Merchant proposes that insertion both targets and is conditioned by spans, such that insertion at any span is conditioned by an adjacent span.

The argument for spanning from the Greek verb rests crucially on a range of decisions about how to segment the Greek affixes and distribute Root allomorphs, alongside architectural assumptions about the division of labor between morphophonology and Root allomorphy. I will focus here on the former point, showing that stem allomorphy in Greek does not, in fact, involve nonlocal conditioning; see footnote 27 for some notes on morphophonology vs. Root suppletion.

Merchant's argument can be exemplified with reference to the three clearly suppletive verbs of Greek, as well as verbs with less clearly suppletive stem changes. As an illustration of Merchant's analysis, consider first the clearly suppletive verbs, which are shown in table 9.[23]

In the analysis in Merchant 2015, the perfective allomorphs in (38a–b) demand access to Asp across the Voice node, which, under the segmentation proposed in (39), may be overt. These facts are then taken to necessitate a spanning analysis whereby ⟨Voice Asp⟩ conditions Root insertion, as schematized in (40).

Table 9
Greek suppletive verb stems

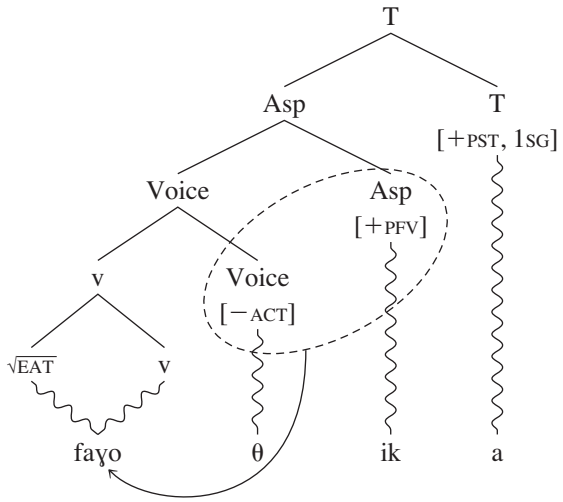
IPFV	ACT.PFV	NONACT.PFV	Gloss
tro-	fa(ɣ)-	faɣo-	'eat'
vlep-	ð-	iðo-	'see'
le(ɣ)-	p-	le(ɣ)- / ipo-	'say'

[23] Admittedly, that the alternations in table 9 constitute patterns of Root allomorphy is itself strictly speaking an assumption, not a self-evident fact. Indeed, Marantz (1995, 1997) conjectures that Root suppletion must be barred for reasons related to the (non)individuation of Roots, and the idea recurs in later work (Embick 2000, Embick and Marantz 2008, Borer 2014). But a recent focus on cases of apparent suppletion crosslinguistically (Haugen and Siddiqi 2013, Harley 2014b, Merchant 2015, Bobaljik and Harley 2017, Choi and Harley 2019, Adamson 2022) seems to support the existence of the phenomenon, and we may conclude, with Merchant (2015), that alternations like those in table 9 arguably suggest that Root suppletion must be countenanced by the theory after all. Note that, although some instances of apparent suppletion can be treated as involving functional material, such as the auxiliaries and copulas of many Romance languages and perhaps verbs with "light" properties like English *go*, the same case cannot be made as easily for the Greek Roots at issue here. The only outstanding possibility seems to be that, in alternations of the type in table 9, more than one Root is at play, and the relevant Roots appear in complementary environments (Borer 2014, but see Harley 2014a). Pending a deeper understanding of what it would mean for a Greek Root to occur only in, say, [+PFV] contexts, I leave this option open for the present case study, noting that the burden of proof seems to fall very much on the Roots-in-complementary-contexts side of the debate.

(38) *VIs for Root suppletion* (Merchant 2015:278)
a. $\sqrt{\text{EAT}} \leftrightarrow$ /fa(ɣ)/ / ___ $[+\text{ACT}]_{\text{Voice}}$ $[+\text{PFV}]_{\text{Asp}}$
b. $\sqrt{\text{EAT}} \leftrightarrow$ /faɣo/ / ___ $[-\text{ACT}]_{\text{Voice}}$ $[+\text{PFV}]_{\text{Asp}}$
c. $\sqrt{\text{EAT}} \leftrightarrow$ /troɣ/

(39) *VIs for the affixes* (Merchant 2015:278–279)
a. $[+\text{PFV}]_{\text{Asp}} \leftrightarrow$ /ik/ / $[-\text{ACT}]_{\text{Voice}}$ ___ $[+\text{PST}]_{\text{T}}$
b. $[-\text{ACT}]_{\text{Voice}} \leftrightarrow$ /θ/ / ___ $[+\text{PFV}]_{\text{Asp}}$

(40)



As Merchant (2015:277) himself notes, the argument for nonlocality here "rests on the correctness of the morphological analysis" that is assumed. It in fact emerges that, given an empirically more well-founded treatment of both affixes and Roots, this case of suppletion is fully local.

That this case of Root suppletion is nonlocal rests on two assumptions. The first is the treatment of the affixes *-θ* and *-ik* seen in (39). As argued here, these exponents are in fact best treated as realizing Asp and T, respectively; taking *-θ* to be in Voice leaves its complementary distribution with the clearly aspectual *-s* unexplained, and the same can be said for *-ik* and the augment. Assuming the empirically more appropriate segmentation has an important consequence: Voice is null even when nonactive, such that both (38a) and (38b) can now be made to comply with head adjacency via Pruning.

But the argument for nonlocality fails on a second, more interesting point as well. The second assumption underlying nonlocality in Merchant 2015 is that the elsewhere allomorph for the relevant verbs is the imperfective one, as suggested by (38). This assumption is left tacit and seems innocuous, but turns out to contravene the facts. In all Greek suppletive verbs, it is the perfective allomorph that is the default. This is evidenced by the fact that the perfective allomorph (or one of the two perfective allomorphs, if we follow Merchant in positing both *faɣ-* and *faɣo-*) clearly has the wider distribution, as shown for $\sqrt{\text{EAT}}$ in (41): it is the one appearing in participles, Root and event nominals, and Root and verbal adjectives.

(41) a. Participles: *faɣo-menos* ‘eaten’, *a-faɣo-tos* ‘uneaten’; cf. **tro-menos*, **tro-tos*
b. Root nominals: *faj-ito* ‘food’; cf. **tro-ito*
c. Event nominals:
To sixno faɣo-ma/*tro-ma ton niçon ipoðiloni aŋxos.
the frequent √EAT-NMLZ the.GEN nails.GEN suggests stress
‘Biting one’s nails frequently is a sign of stress.’
d. Deverbal adjectives: *faɣo-sim-os* ‘edible’; cf. **tro-sim-os*
e. Root adjectives: *faɣ-anos* ‘foodie’, *kalo-faɣ-as* ‘good eater’; cf. **tro-anos*, **kalo-tro-as*

In other words, the imperfective allomorph *tro-* appears in exactly one syntactic environment, namely, imperfective Asp, and the “perfective” allomorph appears in virtually every other conceivable context. Under any sensible criterion for choosing the elsewhere, then, (38) is untenable. The correct distribution of Root allomorphs is as in (42).

(42) a. $\sqrt{\text{EAT}} \leftrightarrow$ /troɣ/ / ___ $[-\text{PFV}]_{\text{Asp}}$[24]
b. ($\sqrt{\text{EAT}} \leftrightarrow$ /faɣo/ / ___ $[\text{NONACT}]_{\text{Voice}}$ $[+\text{PFV}]_{\text{Asp}}$)
c. $\sqrt{\text{EAT}} \leftrightarrow$ /faɣ/

Note that this distribution is not specific to $\sqrt{\text{EAT}}$; the same facts hold for the other verbs of table 9, as well as for the language’s many weakly suppletive verbs (on which see below). As an anonymous reviewer points out, (42c) correctly predicts that the “perfective” stem is the one used for word formation across Greek.[25]

Adopting the empirically justified (42) has an important consequence. Given this Vocabulary, the default Root allomorph appears in the perfective; this means that suppletion targets the *imperfective*, by (42a). Recall now that, under *any* treatment of the affixes, both Asp and Voice must be systematically null in the imperfective; thus, no locality issue arises for a theory with head adjacency. To see why, consider trees (43)–(45).

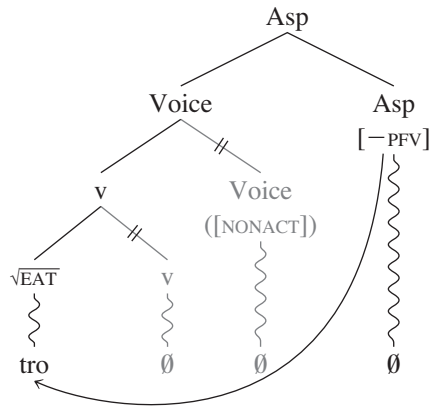
By (42a), the “special” Root allomorph is sensitive to [−PFV] Asp; in the imperfective, however, Voice is null (under any segmentation) and is thus eligible to be pruned. Once null v is pruned as well, Asp and the Root will be adjacent, as schematized in (43). In (45), the allomorph *faɣ-* is inserted by default; there is no conditioning at play, hence no locality issue. Note that a

[24] That this VI (like certain VIs later on; see (47a) and (48)) makes reference to the negative value of [PFV] is the main reason why I take this feature to be binary, thereby forgoing a privative treatment of Asp where imperfective aspect is simply the absence of this head. Nothing crucial rests on this, but it is worth considering some alternatives. As long as (42a) makes reference to Asp, the only way to make this VI compatible with privative Asp is to formulate the context for the VI as “/ No Asp”; the issue at hand would then reduce to whether this is a possible kind of contextual specification in a VI. Alternatively, as David Embick (pers. comm.) points out, it might be that the environment for insertion of *tro-* is in fact a different head—say, finite T. This seems promising; lacking the space to spell out the details of what finiteness corresponds to in Greek, I leave this option open.

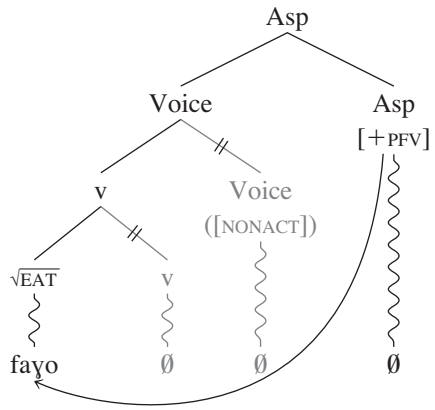
[25] As the same reviewer points out, this generalization is further supported by the behavior of Roots that can be overtly verbalized. As shown in table 8, verbalizers like *-(e)n* in Greek only surface in the imperfective; crucially, *-en* is absent from various derived forms, suggesting that word formation involves the “perfective” stem by virtue of its being the elsewhere Root allomorph. For example, imperfective verbal forms such as *fusko- n- o* ‘I inflate’ stand next to forms such as *fusko(*n)- tos* ‘inflated’ and *fusko(*n)- ma* ‘bloating’.

locality issue would not arise on the segmentation argued for here even if the Root were sensitive to an outer node, since Voice will be null and *-θ* realizes Asp; but even on a Merchant-style segmentation, the default status of *faɣ-* obviates the locality problem. To the extent that we choose to recognize a separate Root allomorph for the nonactive perfective (42b), Pruning will apply here as well, as in (44). However, it is worth noting that, in all three verbs of table 9, it is only the *imperfective* allomorph that is clearly phonologically dissimilar.

(43)



(44)



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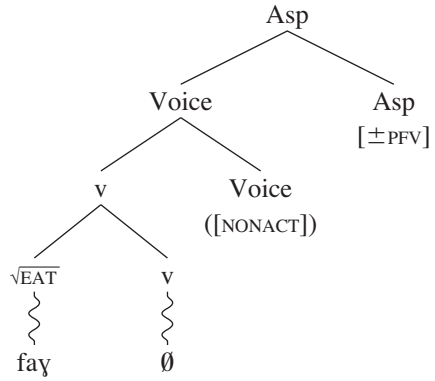


On closer inspection, then, Greek stem allomorphy does not exhibit nonlocal conditioning and does not furnish an argument in favor of spanning. Viewed in this light, the argument presented in Merchant 2015 is of a rather weak form. There are certainly *possible* analyses of the Greek verbal morphology that make stem allomorphy seem nonlocal. Crucially, however, once we adopt the analysis that is justified on independent empirical grounds, no locality problem arises.

5.2 Further Notes on Spanning

To further buttress this last point, consider an additional aspect of Merchant 2015. The analysis presented therein, where Voice and Asp jointly condition allomorphy of the Root, is not intended to apply just to the clearly suppletive verbs in table 9; rather, it is extended to the language's numerous verbs that show stem allomorphs with clear phonological relationships, some of which are called "irregular" in descriptive grammars (e.g., Holton, Mackridge, and Philippaki-Warburton 2012). As an example, consider the verbs in table 10.

It is noteworthy that this mode of presentation may exaggerate the "irregularity" of the alternations under consideration:[26] for example, simply recognizing the verbalizers *-(e)n* and *-isk*, as in section 4, makes many of these alternations (with the verbs 'beat', 'invent', 'bring', 'learn', 'take', and 'drink') much less unpredictable than they initially seem. The residue consists mainly of stem-internal vocalic alternations (e.g., *ðer-* ∼ *ðir-* ∼ *ðar-* for 'beat'). The general question, then, concerns how such alternations should be treated.

In Merchant 2015, the various surface shapes of a Root like √BEAT are derived in the same way as those of the Root √EAT—that is, by means of the Vocabulary in (46) (reflecting the correct choice of default; see the discussion of (42)). On the basis of the descriptive classification in

Table 10
Some Greek irregular verb stems (adapted from Merchant 2015:281)

IPFV	ACT.PFV	NONACT.PFV	Gloss
ðern-	ðir-	ðar-θ-	'beat'
ejir-	ejir-	ejer-θ-	'erect'
efevrisk-	evefr-	efevre-θ-	'invent'
fern-	fer-	fer-θ-	'bring'
apofevɣ-	apofiɣ-	apofevɣ-θ-	'avoid'
maθen-	maθ-	maθef-t-	'learn'
pern-	par-	par-θ-	'take'
parex-	parex-	parasxe-θ-	'provide'
pin-	pi-	pio-θ-	'drink'

[26] Table 10 is an abridged and corrected version of a similar table in Merchant 2015:281. The original table unfortunately displays a few errors that together give the appearance of further complexity. Some are purely typographical (e.g., listing the NONACT.PFV of 'provide' as **parsxe-*); some reflect segmentation errors (e.g., taking *-ik* as part of the stem of √FIND; cf. table 7 above); and some are ameliorated once we consider the language's regular phonology (e.g., the NONACT.PFV of 'avoid' is listed as *fefx-θ*, but this merely reflects successive instances of regular regressive devoicing of /fevɣ/ triggered by affixation of voiceless *-θ*).

Holton, Mackridge, and Philippaki-Warburton 2012, the conclusion drawn in Merchant 2015 is that a very large number of Greek verbs will require more than one Root allomorph, with the relevant allomorphs sharing much of their segmental material (unlike the three verbs of table 9).[27]

(46) a. $\sqrt{\text{BEAT}} \leftrightarrow$ /ðer/ / ___ $[-\text{PFV}]_{\text{Asp}}$
b. $\sqrt{\text{BEAT}} \leftrightarrow$ /ðir/ / ___ $[\text{NONACT}]_{\text{Voice}}$ $[+\text{PFV}]_{\text{Asp}}$
c. $\sqrt{\text{BEAT}} \leftrightarrow$ /ðar/

In fact, Roots like $\sqrt{\text{BEAT}}$, which, like $\sqrt{\text{EAT}}$, arguably necessitate three Root allomorphs, instantiate the rare case in Greek. Far more common are two-stem verbs where, if the relevant alternations are to be treated by means of Root allomorphy, one need only postulate *two* Root allomorphs, differentiated from each other with reference to Asp. $\sqrt{\text{TAKE}}$ in table 10 is one such example.

(47) a. $\sqrt{\text{TAKE}} \leftrightarrow$ /per/ / ___ $[-\text{PFV}]_{\text{Asp}}$
b. $\sqrt{\text{TAKE}} \leftrightarrow$ /par/

In an adjacency-based theory, inserting the specific Root allomorph /per/ requires reference only to Asp, enabled by Pruning of null Voice, as in (47a). But in a spanning theory, a VI like (47a) would be supplanted by a VI making reference to Voice, as in (48). This move is necessary if insertion obeys span adjacency: given that spans cannot be discontinuous, any conditioning environment for Root insertion that includes Asp must also include Voice.

(48) $\sqrt{\text{TAKE}} \leftrightarrow$ /per/ / ___ $[\alpha\text{ACT}]_{\text{Voice}}$ $[-\text{PFV}]_{\text{Asp}}$

The necessity of including Voice here is a symptom of a general issue that arises with spanning, which I dub the *problem of otiose nodes.* The problem lies in the observation that Voice in (48) is (to use Merchant's term) otiose, that is, superfluous outside the analysis itself: Voice is included

[27] For the remainder of the discussion, I assume for the sake of argument that alternations like those seen with $\sqrt{\text{BEAT}}$ represent Root suppletion. I thus effectively set aside the important but difficult question of whether Root allomorphy or morphophonological ("readjustment") rules are appropriate here.

Analyses like (46) generalize Root suppletion to the extreme, completely eschewing the use of morphophonological rules (see also Svenonius 2012, Bermúdez-Otero 2013, Haugen and Siddiqi 2013, Haugen 2016). An apparent virtue of this approach is that it circumvents the need to delimit the domain of application of morphophonological readjustment, a persistent challenge for analyses employing readjustment. This apparent virtue comes at the cost of potentially missing significant morphophonological generalizations (a point made most forcefully in Embick and Halle 2005; see also Petrosino 2019). From a conceptual point of view, the cost-benefit ratio here does not seem decisive, and empirical arguments once again seem necessary.

One such argument is provided in Embick 2012, where locality is argued to be one factor capable of distinguishing between Root alternant listing and morphophonology: contextual allomorphy is (expected to be) subject to stringent locality conditions, morphophonological readjustment less clearly so. The general intuition seems promising: on the analysis advanced here, for example, Root suppletion conditioned by an outer node requires a very particular morphological constellation (namely, all intervening nodes must be null), and the presumed rarity of such configurations could be taken to account for the relative rarity of "strong" suppletion intralinguistically (in Greek, just the three verbs of table 9 manifest clearly suppletive alternations) and crosslinguistically.

Unfortunately, however, the proposed criterion is difficult to deploy: in practice, readjustment rules are often taken to be triggered by morphemes local to the target (e.g., $[+\text{PST}]_{\text{T}}$ triggering ablaut of the stem in *sing* ~ *sang* as in Halle and Marantz 1993:124ff.). These difficulties remain, and I thus avoid taking a strong stance on the appropriateness of stem listing here.

in the conditioning environment not because the realization of the Root is actually sensitive to its features, but purely for the purpose of gaining access to the higher node Asp.

Merchant (2015:295n22) is aware of this weakness in the mechanism. He writes:

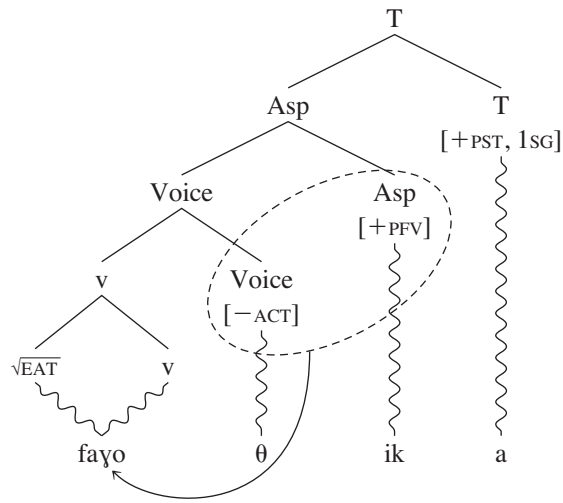
> [T]he Span Adjacency Hypothesis could easily be vacuously satisfied by the inclusion of multiple intervening nodes that play no role at all in conditioning the allomorphy. The constraint [that precludes this unwanted possibility] must be that no otiose nodes are included, that every node in the conditioning span is required, and that no conditioning environment can be stated that includes less information.

How this constraint is to be implemented is left unspecified, and the analysis in Merchant 2015 does end up positing otiose Voice, as pointed out by Christopoulos and Petrosino (2018).

The upshot comes in the form of a concerning conclusion: a spanning analysis does not seem easily able to distinguish between the case where a node is sensitive to the features of both Asp and Voice and the case where it is sensitive just to the features of Asp. More generally, for any sequence of nodes X-Y-Z where the realization of X is sensitive to Z, span adjacency necessitates that Y be included in the conditioning environment of the relevant VI.

Alongside this observation, consider a further property of spanning analyses: spans can be *nonpersistent.* To see this, review once more the representation in (40), repeated here.

(40)



The central point of such representations is meant to be that Voice and Asp jointly condition insertion at the Root. Consider this facet of the analysis in more detail. It amounts to the claim that, when insertion operates on the Root, the two nodes are treated as a unit. However, when the time comes to determine the exponents of these heads themselves, Voice and Asp are treated separately, each being realized by a different exponent in (40). In other words, given spanning, the two nodes behave differently at different stages of insertion. In this case, then, spans are not persistent: Voice and Asp form a single span at one cycle of insertion, and distinct trivial spans at later cycles.

This observation is not peculiar to this particular analysis; after all, as argued above, there are reasons to think that Greek suppletion does not operate in the way suggested in (40), and that

the affixes shown there are in fact in different positions. The point is instead that no aspect of (common formulations of) spanning enforces the requirement that spans be persistent across cycles; and situations of the type in (40) are thus predicted to arise.

Of interest here is the observation that (non)persistence is an important difference between spanning and Fusion. If Voice and Asp were fused prior to Vocabulary Insertion, they would be treated as a single entity for all subsequent operations; in other words, they would be predicted not only to jointly condition allomorphy of the Root, but also to be realized together by a single VI. Spanning, on the other hand, is in this case apparently equivalent to fusing the two nodes such that Root allomorphy can use them as a trigger, and then defusing them in time for them to be realized by separate exponents.

As already emphasized in section 3.2, nonpersistence is not by itself a problem: it is certainly possible in principle for Vocabulary Insertion to dynamically recalculate the spans undergoing insertion between cycles. The crucial question concerns what predictions such an account would make; the contribution here is the conjecture that these predictions may well diverge from those made by a Fusion account, which seems more restrictive than spanning in this respect. Although modest, this contribution seems to be in the right direction, since comparisons between spanning and Fusion often stay at the conceptual level (see, e.g., Radkevich 2010, Haugen and Siddiqi 2013, Merchant 2015).[28] Once again, if the conceptual scales turn out not to lean in either direction, we may need to look for empirical arguments for or against particular analyses—it is hoped that future work will take up the challenge of exploring predictive differences between spanning and Fusion, including the one just identified.

6 Conclusion

I have presented three case studies on morphological intervention from the Modern Greek verbal system. In the first two cases, the realization of a head may be conditioned at a distance, but only when all intervening heads are null; overt interveners cause the target of allomorphy to retreat to a default realization.

I have argued that these facts follow under a strict adjacency-based approach to the locality of allomorphy, one whereby apparently nonlocal conditioning is possible only across null nodes. The Greek facts do not seem amenable to a less restrictive approach such as one based on spanning. This conclusion leads to a reexamination of apparent evidence in favor of spanning from the same language: upon closer examination, Root suppletion in Greek is not nonlocal.

With respect to (1b), repeated here, I have argued that the target and trigger of allomorphy must be (linearly) adjacent; with respect to (1a), the crucial notion has been taken to be head adjacency, rather than adjacency of larger stretches of structure.

[28] More specifically, a recurring criticism of Fusion concerns lookahead: nodes fuse just in case there exists a VI that can realize the fused node. It is worth noting that no aspect of the formal statement of Fusion operations actually necessitates this type of lookahead. However, as an anonymous reviewer correctly notes, the concern is best understood as one regarding acquisition: how does a learner determine which nodes should be fused in a representation? I consider this open question important not just for Fusion, but also for spanning: what sorts of cues motivate the learner to chunk the syntactic structure into the right contiguous sequences?

(1) a. What sorts of representations is allomorphic locality computed over?
b. How local must the trigger of allomorphy be to the target?

The idea that null exponents are transparent for the purposes of allomorphic adjacency recurs throughout this article. I have defended an understanding of this transparency that crucially implicates the operation of Pruning operating over linearized structures. I have argued that the details of the case studies presented here favor a particular conception of Pruning, whereby this operation is destructive, completely removing nodes from the representation, over weaker implementations of the idea that null nodes are transparent.

At various points, questions have arisen on the specifics of the mechanism of spanning. An important question concerns how competition is adjudicated in this theory in cases where partially overlapping spans can be targeted for insertion. I have also highlighted two common features of spanning analyses, which I have dubbed the *problem of otiose nodes* and *nonpersistent spans.* I showed that the former constitutes a potentially serious problem, and the latter a feature whose predictions deserve to be compared empirically with those of Fusion. It is hoped that future discussion of these issues will enable more fine-grained theory comparison.

As in any domain of inquiry, arguing for or against different theories is a process that takes place at a level that includes, but is not limited to, consideration of individual case studies. How well the present arguments generalize depends to some extent on whether cases of intervention of the kind discussed here obtain more broadly. This question is left for a more systematic crosslinguistic discussion; here, I have tried to argue on the basis of Greek that advancing our understanding of the locality conditions on allomorphy requires focus not only on visibility, but also on intervention. This type of focus should help sharpen our understanding of how specificity and locality interact to give rise to constraints on allomorphy.

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