# How Much Context Is Enough? Two Cases of Span-Conditioned Stem Allomorphy

*Jason Merchant*

Greek voice and aspect jointly condition verbal stem allomorphy, including suppletion. Negation and tense in English do likewise. These cases show that stem allomorphy cannot be restricted to cases where the conditioning element is structurally adjacent to the element that displays allomorphic variation. But neither is contextual allomorphy entirely free from locality constraints: allomorphy can be conditioned only by a *span*, a contiguous set of heads in an extended projection.

*Keywords:* allomorphy, Greek, English, span

The conditions on allomorphic variation, including suppletion, play a central role in debates about the nature of the interaction between phonology and morphology and between theories that are localist versus those that are globalist. One of the central arguments for one version of a localist architecture comes from a putative generalization that selection of allomorphs is strictly local, a claim I will call the *Node Adjacency Hypothesis*: in particular, that the appearance of a particular outward-sensitive allomorph $\mu$ can be conditioned only by morphosyntactic features of an element that is linearly adjacent to $\mu$. In this article, I present two cases of outward-sensitive allomorph selection that require access to morphosyntactic features of nodes that are not adjacent to the allomorph, from Greek and from English, and show that an alternative generalization using the notion of spanning, the *Span Adjacency Hypothesis*, can capture these cases without permitting a range of unattested allomorphic variation.

## 1 Voice and Aspect-Triggered Stem Allomorphy in Greek

It is a commonplace assumption that viewpoint (or ''grammatical'' or ''outer'') aspect (such as imperfective, perfective, progressive, habitual) is encoded by a head that takes a verbal projection as its complement, with the goal of giving a compositional semantics to such aspects (see Giannakidou 2009 for one set of proposals for Greek and references).

Thanks especially to Anastasia Giannakidou for extensive discussion of the Greek. I am also indebted to Karlos Arregi, Jonathan Bobaljik, Vera Gribanova, Greg Kobele, Jack Hoeksema, Andrew Nevins, and Peter Svenonius for valuable feedback. Thanks also to the reviewers for *Linguistic Inquiry*, whose comments and questions led to substantial improvements in argument and presentation.

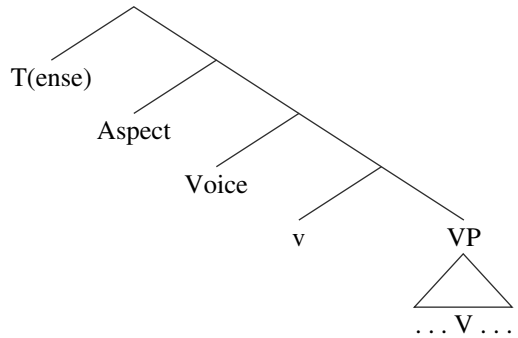
Linguistic Inquiry, Volume 46, Number 2, Spring 2015
273–303
© 2015 by the Massachusetts Institute of Technology
doi: 10.1162/ling_a_00182

(1) $[\![\text{vP}]\!] = \lambda e_v.P(e)$

(2) a. $[\![\text{PERFECTIVE}]\!] = \lambda P_{vt}.\lambda i_i.\exists e_v[P(e) \ \& \ \tau(e) \subseteq i]$
b. $[\![\text{IMPERFECTIVE}]\!] = \lambda P_{vt}.\lambda i_i.\exists e_v[P(e) \ \& \ \mathcal{Q}t(t \subseteq i)[t \subseteq \tau(e)]]$,
where $\mathcal{Q} = \forall$ (for the progressive reading) or GEN (for the habitual)

Such a semantics is designed to work with a syntax like the one schematized in (3).[1]

(3)




It is also well-known that many languages mark such aspectual distinctions morphologically on the verb, through prefixes (as in Slavic) or suffixes (as in Romance, Greek, and Slavic), through a stem alternation, or through a combination of these. This last pattern is found in Spanish, for example, where the verb *querer* 'to want' has *quis-* as its perfective stem[2] and *quer-* as its imperfective one; these stems combine with inflectional affixes that index person and number of the subject but also differ by tense, mood, and aspect (*-e* for 1sg perfective past indicative, and *-ía* for 1sg imperfective past indicative).

(4) a. Yo quise ir al circo.
I wanted.PERF.1SG go to.the circus
'I wanted to go to the circus.'
b. Yo quería ir al circo.
I wanted.IMPERF.1SG go to.the circus
'I {wanted/used to want} to go to the circus.'

Assuming a syntactic structure like the one in (3), accounting for the stem-selecting property of aspect is straightforward in a theory such as Distributed Morphology, as articulated for example in Embick 2010. In Spanish, either V-v-Voice forms a unit targeted by Vocabulary (or Lexical) Insertion (because these nodes are subject to the putative operation of Fusion, discussed in section 2 and indicated here with subscripts), or Voice, because it lacks exponence in Spanish, has been

[1] This tree includes a standard ordering of the functional projections in the clause, including T > Aspect > Voice (from Rivero 1990, the first work to my knowledge to have proposed a separate VoiceP) and a separation of Voice from v (following Collins 2005, Harley 2013, Merchant 2013, Alexiadou, Anagnostopoulou, and Schäfer 2014, and many others).

[2] It is a simplification to call *quis-* a perfective stem: it is the stem that the indicative perfective past is formed from, but it is also used in the subjunctive imperfective past and the subjunctive future. See Oltra-Massuet and Arregi 2005 for more about Spanish verb composition.

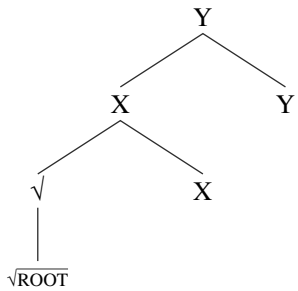
''pruned'' (using the operation defined in Embick 2010:59). Accordingly, I simply posit the following context-sensitive allomorphs:

(5) a. $\text{WANT}_{\text{V} + \text{v}(+\text{Voice})} \rightarrow$ kis- / ____ Aspect[+perf]
b. $\text{WANT}_{\text{V} + \text{v}(+\text{Voice})} \rightarrow$ kɛr-

This analysis, conditioning the allomorphy as it does by the features of the adjacent node, conforms to the constraints to this effect that have long been proposed in the literature; versions of this constraint are proposed in Allen 1978, Siegel 1978, Embick 2010, and Bobaljik 2012.[3] Bobaljik, for example, moots two versions of locality. The first, given in (6), bans allomorph selection in a head $\alpha$ by a head $\beta$ if $\beta$ is separated from $\alpha$ by the boundary of a maximal projection. The second version bans root allomorphy from being triggered by Y across X even when these heads form part of a single complex head, as in (7).

(6) a. $\alpha \ldots ]_{\text{X}^0} \ldots \beta$
b. $*\alpha \ldots ]_{\text{XP}} \ldots \beta$

(7)




Bobaljik (2012:13) suggests that the adjacency constraint holds only of root allomorphy, as here, not of affixal allomorphy, but in any case the Spanish examples satisfy the constraint.

Embick (2010) (see also Embick 2012 for application to Spanish agreement-triggered ablaut) presents a strong theory of contextual allomorphy based on how Vocabulary Insertion operates; he posits two conditions that will be of interest here. Condition A1 is essentially from Bobaljik 2000, and condition A2 makes use of Embick's notion of concatenation. (*Concatenation* is a term used in other ways in the literature, being sometimes defined over nonterminal nodes as well; for this reason, I will refer exclusively to linear adjacency instead.)[4]

[3] The literature on allomorphy is of course vast; see also Kiparsky 1996, Carstairs-McCarthy 2003, Ackema and Neeleman 2004, Bye and Svenonius 2010, Arregi and Nevins 2012, 2013, and Bermúdez-Otero 2013 for additional discussion and references. Note that I am concerned here only with morphosyntactically conditioned stem allomorphy, not with phonologically conditioned allomorphy of the kind discussed in Mester 1994 and elsewhere, nor with possibly nonlocal phonological effects such as harmony (see Walker 2014 for a defense of a globalist architecture for these).

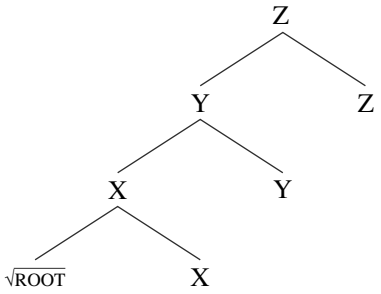
[4] The conditions in (8) and (9) are taken verbatim from Embick 2012:25, but the ideas are found in Embick 2010. For example, A1 is stated as follows in Embick 2010: ''Vocabulary insertion applies first to the most deeply embedded node in a structure and then targets outer nodes successively'' (p. 42). A2 is ''[A] morpheme can show contextual allomorphy determined by another morpheme only when these two pieces are linearly adjacent to one another'' (p. 15) (alternatively, ''Contextual allomorphy is possible only with elements that are concatenated,'' p. 16).

(8) *A1*
Insertion proceeds from the inside-out.

(9) *A2*
Contextual allomorphy requires concatenation (linear adjacency).

Embick (2012) illustrates the predictions of this theory schematically with reference to the complex head in (10a).

(10) a. *Complex head*




b. *Linearization*
$\sqrt{\text{ROOT}}$ – X – Y – Z

He writes:

> By (A1), V[ocabulary] I[nsertion] occurs first at *X*, then at *Y*, then at *Z*. Thus, . . . V[ocabulary] I[nsertion] at *Y* could in principle see either phonological or morphosyntactic features of *X* but can look ''outwards'' only to morphosyntactic features of *Z*; and so on. In short, a node may show *inward* sensitivity to either morphosyntactic or phonological features, but it may show *outward* sensitivity only to morphosyntactic features. . . . [B]y (A2) insertion at e.g. *X* could only be affected by $\sqrt{\text{ROOT}}$ or *Y*. The reason for this is that only the Root and *Y* are concatenated with *X*. (2012:26)

Embick shows that it is possible to analyze the well-known alternations involving diphthongization in certain Spanish stems (*pens-*, *piens-* vs. *tens-*, *tens-*) as a result of morphologically triggered but stress-conditioned phonological rules, and not as stem allomorphy at all (but see Bermúdez-Otero 2013 for a spirited rebuttal). Such an approach is unlikely to extend to the aspect-sensitive alternations (which are quite heterogeneous phonologically and lack any kind of phonological conditioning), but the analysis posited above does not seem to run afoul of the locality principles in any case, as the Aspect head is plausibly adjacent to the (complex) head that shows the allomorphy.

Such a simple analysis cannot, however, be extended to Greek.[5] Although Greek verbs have differing stems that are sensitive to aspect, Greek also has a synthetic active/nonactive voice distinction with an overt exponent. The selection of the stem depends on the *combination* of voice and aspect, precisely the situation ruled out by Embick's system.

[5] I deal here only with standard modern Greek. See Létoublon 1985 for Homeric and Attic Greek.

The morphology of the modern Greek verb is well-studied, and the verbal alternations are thoroughly identified in standard grammars, such as the comprehensive Holton, Mackridge, and Philippaki-Warburton 1997 (see also Galani 2005 and Spyropoulos and Revithiadou 2009 for theoretical treatments and references). The verbs fall into three classes for the purposes of our discussion: suppletive stem verbs, regular verbs, and irregular (but nonsuppletive) verbs.

Greek has three transitive verbs that show aspect/voice-conditioned suppletion: *troo* 'eat', *vlepo* 'see', and *le(ɣ)o* 'say'. These verbs, like irregular verbs, have three stems: for *troo*, for example, the stem *fa(ɣ)-* is the active perfective stem, *faɣo-* is the nonactive perfective stem, and *tro(ɣ)-* is used otherwise and is known as the imperfective stem.

(11) *Greek suppletive stem verbs*

| Imperfective stem | Active perfective stem | Nonactive perfective stem + affix | Meaning |
|---|---|---|---|
| tro(ɣ)- | fa(ɣ)- | faɣo-θ- | 'eat' |
| vlep- | ð- | iðo-θ- | 'see' |
| le(ɣ)- | p- | lex-θ-/ipo-θ- | 'say' |

These stems combine with a regular set of endings to yield the full paradigm, illustrated here with *troo*.[6]

(12) *Greek suppletive stem verb* troo *'I eat'*

| ACTIVE.IMPERFECTIVE.NONPAST | | | | ACTIVE.PERFECTIVE.NONPAST | | | |
|---|---|---|---|---|---|---|---|
| 1sg | **tró**-o | 1pl | **tró**-me | 1sg | fá-o | 1pl | fá-me |
| 2 | **tro**-s | 2 | **tró**-te | 2 | fa-s | 2 | fá-te |
| 3 | **tró**-i | 3 | **tro**-n | 3 | fá-i | 3 | fa-n |
| NONACTIVE.IMPERFECTIVE.NONPAST | | | | NONACTIVE.PERFECTIVE.NONPAST | | | |
| 1sg | **tróɣ**-ome | 1pl | **troɣ**-ómaste | 1sg | faɣo-θ-ó | 1pl | faɣo-θ-úme |
| 2 | **tróɣ**-ese | 2 | **tróɣ**-este | 2 | faɣo-θ-ís | 2 | faɣo-θ-íte |
| 3 | **tróɣ**-ete | 3 | **tróɣ**-onde | 3 | faɣo-θ-í | 3 | faɣo-θ-ún |
| ACTIVE.IMPERFECTIVE.PAST | | | | ACTIVE.PERFECTIVE.PAST | | | |
| 1sg | é-**troɣ**-a | 1pl | **tróɣ**-ame | 1sg | é-faɣ-a | 1pl | fáɣ-ame |
| 2 | é-**troɣ**-es | 2 | **tróɣ**-ate | 2 | é-faɣ-es | 2 | fáɣ-ate |
| 3 | é-**troɣ**-e | 3 | é-**troɣ**-an | 3 | é-faɣ-e | 3 | é-faɣ-an |
| NONACTIVE.IMPERFECTIVE.PAST | | | | NONACTIVE.PERFECTIVE.PAST | | | |
| 1sg | **troɣ**-ómun | 1pl | **troɣ**-ómastan | 1sg | faɣó-θ-ik-a | 1pl | faɣo-θ-ík-ame |
| 2 | **troɣ**-ósun | 2 | **troɣ**-ósastan | 2 | faɣó-θ-ik-es | 2 | faɣo-θ-ík-ate |
| 3 | **troɣ**-ótan | 3 | **tróɣ**-ondan | 3 | faɣó-θ-ik-e | 3 | faɣó-θ-ik-an |

[6] The stem-final *ɣ* is dropped in certain combinations under conditions, at least partially register-based, that I will not investigate here; I also neglect to indicate regular allophonic variation in the realization of *ɣ*, which is palatalized before the front vowels. Here and throughout, I also ignore variant endings and omit discussion of the distribution of the past active augment, the stressed initial *é-*, which occurs when the stem + endings has no antepenult to bear stress, but which has an irregular form in a few verbs conditioned by aspect that deserve an investigation of their own (*θél-o* 'want', imperfective past *í-θel-a*, perfective past *θélis-a*; *ksér-o* 'know', *í-kser-a*, *í-kser-a*; *pín-o* 'drink', *é-pin-a*, *í-pi-a*; *vlép-o* 'see', *é-vlep-a*, *í-ð-a*; *lé-o* 'say', *é-leɣ-a*, *í-p-a*; and compare the vocalic augment verbs like *éx-o* 'have', *í-x-a*, *í-x-a*. See Spyropoulos and Revithiadou 2009 for an analysis of the augment in Distributed Morphology.

| ACTIVE.IMPERFECTIVE.IMPERATIVE | | | | ACTIVE.PERFECTIVE.IMPERATIVE | | | |
|---|---|---|---|---|---|---|---|
| 2sg | **tróɣ**-e | 2pl | **tróɣ**-ete | 2sg | fá-e | 2pl | fá-te |
| NONACTIVE.IMPERFECTIVE.IMPERATIVE | | | | NONACTIVE.PERFECTIVE.IMPERATIVE | | | |
| (formed periphrastically) | | | | 2sg | faɣó-su[7] | 2pl | faɣo-θ-íte |

Lexical insertion rules sensitive to these features can be provided as follows, assuming that the Elsewhere Principle will apply to prohibit (13c) from applying if either of (13a–b) can:

(13) a. $\sqrt{\text{EAT}} \rightarrow$ fa(ɣ) / ____ Voice[+act] Aspect[+perf]
b. $\sqrt{\text{EAT}} \rightarrow$ faɣo / ____ Voice[−act] Aspect[+perf]
c. $\sqrt{\text{EAT}} \rightarrow$ tro(ɣ)

Such context-sensitive rules clearly violate the locality conditions on contextual allomorphy as defined above: the environments for insertion make reference to an element that is not in the local—that is, immediately adjacent—context. It is impossible to correctly determine which stem should be used without access to the aspectual information given by the Aspect head, but this head is separated from the stem by the Voice head. This is not a problem in languages like Russian or Spanish, where the alternations are sensitive only to aspect, not to voice: the combined head V-v-Voice is adjacent to Aspect in those languages (or Voice is pruned), and so lexical insertion rules can be made appropriately sensitive to the value of the feature on Aspect (see Gribanova to appear for one approach to Russian secondary imperfective aspect consistent with the Node Adjacency Hypothesis). But in Greek, the nonactive perfective morpheme *-θ-* is overt, and thus trying to write equivalent rules for Greek leads to (13), *quod non erat demonstrandum*.

The strength of this argument depends, of course, on the correctness of the morphological analysis given by the segmentations in (12). A different segmentation might be proposed that would vitiate the argument against the Node Adjacency Hypothesis: if it in fact were the case that *-θ-* were part of the stem (a complex stem perhaps the result of a further operation), then the selection of that complex stem could be conditioned on simple adjacency to the aspectual head. In fact, what I have given in (11) in the third column as the nonactive perfective stem + affix, Holton, Mackridge, and Philippaki-Warburton (1997) give as a single combined stem: for example, *faɣoθ-*, *iðoθ-*, *lexθ-*/*ipoθ*. But conflating the stem with the affix like this obscures the perfectly regular nature of the affix. The only possible reason one might have for claiming it is part of the stem is that there is a small subset of verbs that lack *-θ-* in the nonactive, the athetic verbs, whose properties I discuss at greater length below. But such minority cases in no way obviate the fact that *-θ-* is otherwise a regular affix, any more than irregular past forms such as *sang* mean that *-d* is not the regular past tense affix in English. I therefore follow the vast majority of researchers in separating the *-θ-* from the stem.

The examples thus far are compatible with positing *-θ-* as a realization of the nonactive voice head Voice[−act] under Aspect[+perf]. The latter head, when occurring with Voice[−act]

[7] Treating *-su* as a portmanteau is not crucial here. It is traditional to segment this as *s-u*, with *-u* being the 2sg nonactive imperative suffix and *-s-* the perfective morpheme; this segmentation may well be right, but given that *-s-* appears in this form where the perfective does not otherwise show *-s-* (though see below for verbs that do), the usual simple segmentation requires additional justification.

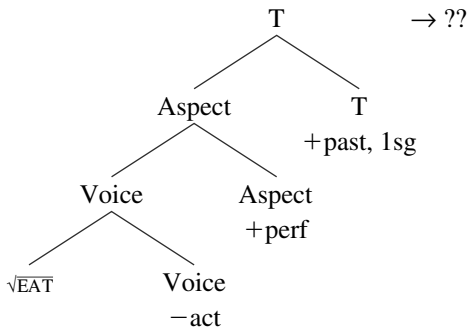
and T[+past], can then be analyzed, as Rivero (1990) does, as being realized in the nonactive by *-ik-*, leaving the past personal endings (*-a*, *-es*, *-e*, *-ame*, *-ate*, *-an*) as the contextually determined realizations of T(Agr) (these endings are the elsewhere endings; they are blocked in the nonactive imperfective by a set of more specific endings, as we will see below). Consistent with such an approach are the entries in (15), operating on a complex head resulting from V-movement into T as in (14).

(14) V(-v)-Voice-Aspect-T

(15) a. Voice[−act] → θ / ____ Aspect[+perf]
b. Aspect[+perf] → ik / Voice[−act] ____ T[+past]
c. T[+past, 1sg] → a  T[+past, 1pl] → ame
d. T[+past, 2sg] → es  T[+past, 2pl] → ate
e. T[+past, 3sg] → e  T[+past, 3pl] → an

The difficulty that this set of assumptions presents for Embick's constraints can be seen by attempting to follow them to the letter to generate a particular form. Take for example a putative step-by-step derivation of the nonactive perfective past 1sg form *faɣó-θ-ik-a* 'I was eaten' from (12). In (16), the output of successive-cyclic head movement from V to T yields an appropriate complex head with the requisite morphosyntactic feature bundles. By (8) (A1: ''Insertion proceeds from the inside-out''), Vocabulary Insertion must start at √EAT, selecting from among the three stems *tro(ɣ)-*, *fa(ɣ)*, *faɣo-*. But choosing the correct stem—the nonactive perfective *faɣo-*—would require that we access the features of both Voice and Aspect, and thus contravenes (9) (A2: ''Contextual allomorphy requires concatenation'').

(16) *Failed derivation: Output of V-to-T movement*




Perhaps the difficulty lies in assuming that Vocabulary Insertion accesses hierarchical representations like (16) at all. Another common assumption is that Vocabulary Insertion accesses a representation that has undergone Linearization (see Arregi and Nevins 2012 and Haugen and Siddiqi 2013a for detailed proposals). Linearization is the operation that maps the hierarchical geometry of an object like (16) to a simple ordered *n*-tuple of terminal nodes, as in (17). With such a representation, each of the contextually specified morphemes needed—*faɣo*, *θ*, *ik*, *a*—can be inserted in satisfaction of its required environment and of A2. But it is unclear then what content A1 has: how is the notion of ''inside out,'' which is defined on the geometry, to be

reconstructed on an *n*-tuple? It cannot be: the hierarchical information is by design *lost* in Linearization.[8]

(17) a. $\sqrt{\text{EAT}}$⌒Voice[−act]⌒Aspect[+perf]⌒T[+past, 1sg] → (Insert *faɣo-*)
b. faɣo⌒Voice[−act]⌒Aspect[+perf]⌒T[+past, 1sg] → (Insert *-θ-*)
c. faɣo⌒θ⌒Aspect[+perf]⌒T[+past, 1sg] → (Insert *-ik-*)
d. faɣo⌒θ⌒ik⌒T[+past, 1sg] → (Insert *-a*)
e. faɣo⌒θ⌒ik⌒a (*faɣoθika*)

One might try to rescue the Node Adjacency Hypothesis by making use of the fact that *-θ-* is adjacent to the stem and that this morpheme by itself only appears in nonactive perfectives. One could update the insertion rule for roots as follows, replacing (13b) by (18):

(18) $\sqrt{\text{EAT}}$ → faɣo / ____ θ

But this would clearly violate Embick's implementation of (A1), which bans outward-looking phonological sensitivity.

These cases of suppletion also put paid to any possibility of entertaining the idea that true suppletion is limited to functional elements or categories, and is not found with lexical categories. This idea is stated by Embick (2010:84) as follows: ''Marantz [1995] . . . [has] emphasized that in a theory with some late insertion, restricting suppletion to the functional vocabulary is an important desideratum.'' (Compare also ''Roots are not (by hypothesis) subject to Vocabulary Insertion'' (Embick 2010:53) and ''. . . it is not possible for Roots to show *suppletion*'' (Embick and Halle 2005:65, emphasis in original).) Embick goes on to discuss *go*/*went* and *be*, claiming that such cases are ''light verbs'' and as such ''members of the functional vocabulary'' (p. 84). But no independent reason for classifying these as v and not as regular verbal roots is given, nor is any citation to any work that makes such an argument. (One could cite here Van Riemsdijk (2002), who however does not argue that *all* instances of *go* are ''light'' in his sense.) It is furthermore extremely unlikely that a compound verb like *undergo*/*underwent*, which shows the same suppletion in English, could plausibly be classified as a ''member of the functional vocabulary.''[9] See also Veselinova 2006, Corbett 2007, Siddiqi 2009, Bobaljik and Harley 2012, Haugen and Siddiqi 2013b, and Harley to appear for more discussion and numerous counterexamples.

[8] While Arregi and Nevins (2012) argue persuasively that there are Vocabulary items whose insertion contexts must be conditioned by linear adjacency of nodes, relaxing the Node Adjacency Hypothesis to be stated over such linearizations, not hierarchical structures, would still require access to the content of nonadjacent nodes.

[9] Interestingly, Greek lexical compounds formed from the suppletive verbs do not use the suppletive stems: *anti-leɣ-* 'argue against' (active perfective nonpast *anti-lek-s-*), *ðia-leɣ-* 'choose' (*ðia-lek-s-*), *ek-leɣ-* 'elect' (*ek-lek-s-*), *epi-leɣ-* 'select, cull' (*epi-lek-s-*), *pro-leɣ-* 'predict' (*pro-lek-s-*); *apo-vlep-* 'intend, aim' (*apo-vlep-s-*), *epi-vlep-* 'supervise' (*epi-vlep-s-*), *para-vlep-* '(negligently) fail to see' (*para-vlep-s-*), *pro-vlep-* 'predict' (*pro-vlep-s-*), *pros-vlep-* 'expect/hope for' (*pros-vlep-s-*). Transparent compounds, however, do: *para+le-o* 'exaggerate' (*para+p-*); *kata+tro(ɣ)-* 'eat up' (*kata+fa(ɣ)-*). It would be reasonable to attribute these differences to different heights of attachment of the prefixes: low attachment of a prefix in a lexical compound blocks suppletion, while high attachment in a transparent one allows it.

The second set of verbs in Greek that are problematic for the Node Adjacency Hypothesis are the irregular ones. These verbs show stems that display a variety of irregularities, including apophony, augmentation, truncation, and combinations of these: Holton, Mackridge, and Philippaki-Warburton (1997:169–175) list 132 such verbs from the first conjugation alone. Some selected examples drawn from their list are these:

(19) *Selected irregular 1st conjugation verbs in Greek, principal parts*

| Imperfective stem | Active perfective stem | Nonactive perfective stem + affix | Meaning |
|---|---|---|---|
| ðern- | ðir- | ðar-θ- | 'beat' |
| eɣir- | iɣir- | eɣer-θ- | 'erect' |
| efevrisk- | efevr- | efevre-θ- | 'invent' |
| fern- | fer- | fer-θ- | 'bring' |
| fevɣ- | fiɣ- | fefx-θ- | 'leave' |
| ksen- | ksan- | ksas-t-[10] | 'comb (wool)' |
| maθen- | maθ- | maθef-t- | 'learn' |
| parex- | parix- | parsxe-θ- | 'provide' |
| pern- | pir- | par-θ- | 'take' |
| pin- | pi- | pio-θ- | 'drink' |
| plen- | plin- | pli-θ- | 'wash' |
| proslamvan- | proslav- | proslif-θ- | 'comprehend' |
| prosval- | prosval- | prosvli-θ- | 'insult' |
| sern- | sir- | sir-θ- | 'drag' |
| steln- | stil- | stal-θ- | 'send' |
| tin- | tin- | ta-θ- | 'tend' |
| vaz- | val- | val-θ- | 'put' |
| vɣaz- | vɣal- | vɣal-θ- | 'take out' |
| vrisk- | vrik- | vre-θ- | 'find' |

These verbs raise the same issue that the suppletive verbs did above: the form of the stem is determined by the aspect of the verb, but by hypothesis, this aspectual node is not adjacent to the stem in the nonactive. While in the active perfective and in the imperfective, one could claim that Voice was pruned, making Aspect adjacent to the stem, such a move is not feasible in the nonactive perfective, given the overt exponent of Voice, *-θ-*.

One possibility that arises for analyzing these alternations that is not available for the suppletive cases would be to invoke morphophonological ''readjustment rules.'' For example, Embick (2010:99–100) posits a morphophonological readjustment rule to handle the unexpected appearance of the aorist morpheme *-se-* in place of *-sa-* in the Classical Greek optative active 2sg, 3sg,

[10] As a result of a more general manner dissimilation rule, *-θ-* is realized as *t* after a continuant, though in certain archaic forms, dissimilation does not occur.

and 3pl, which is triggered by a nonadjacent agreement affix. While it is obvious that there is no uniform morphophonological rule that would derive the alternations in (19), perhaps a slew of them could do the trick. But Embick fails to give any criterion for distinguishing between true allomorphy, analyzed with Vocabulary Insertion of competing morphemic exponents as in (13), and the effects of such putative ''readjustment rules.'' As Bobaljik (2012:140) refreshingly puts it, ''In theory, there is a sharp division of labor between rules of exponence and readjustment rules. . . . Of course, there is a difficult grey area for the analyst in establishing just where the boundary lies; alternations like *many – mo-re* could be treated formally as suppletion . . . or as the output of a very powerful readjustment rule, rewriting the syllable rime.'' (Bobaljik himself eschews readjustment rules entirely in his analyses of comparatives. See also Haugen and Siddiqi 2013a for a critical discussion of the explanatory power of readjustment rules, and compare the unmincing condemnation in Bermúdez-Otero 2013:83: ''DM [Distributed Morphology] routinely . . . resort[s] to devices, like the unconstrained use of readjustment rules, that blur the line between allomorphy and phonology, and destroy the empirical content of the theory.'') Without a criterion for deciding when a morphophonological readjustment rule is involved, and when simple allomorphy, the appeal to unspecified readjustment rules threatens to be no better than Justice Stewart's famous criterion for recognizing pornography (''I know it when I see it'') and becomes subject to Stainton's (2006:107) criticism (of elliptical repair effects): it becomes a ''get-out-of-counterexample-free card.''[11]

We can thus conclude, with Joseph and Smirniotopoulos (1993) and Holton, Mackridge, and Philippaki-Warburton (1997), that for these verbs at the least, three distinct stems must be posited.

For the regular verbs, Holton, Mackridge, and Philippaki-Warburton (1997) also claim that there are three stems involved, just as there are with the suppletive and irregular verbs. They list (pp. 156–158) 22 different patterns for the three stems for regular 1st conjugation verbs, and an additional 7 for 2nd conjugation verbs, for a total of 29 classes. These are given in (20), with the 1st conjugation verbs listed in rows 1–22, and the 2nd conjugation verbs in rows 23–29. With the exception of classes 14–19, the active perfective stem ends in the familiar *-s-*, inherited from the Ancient Greek sigmatic aorist, which I will follow Ralli (1998, 2003, 2005; cf. Philippaki-Warburton 1973) and many others (and as is also traditional, and as Holton, Mackridge, and Philippaki-Warburton themselves do on p. 18) in analyzing as a separate morpheme (the realization of Aspect[+perf] in the context of Voice[+act]).

[11] Note that I am not making the stronger claim that readjustment rules do not exist at all; as a reviewer points out, they may provide one insightful way to model analogical change that a total assimilation of irregular stems to suppletion may not (depending on how we wish to model analogy, of course). The important point for present purposes is simply that in terms of the theory presented in Embick 2010, potential appeal to readjustment rules makes the strong locality claims embodied in the Node Adjacency Hypothesis unfalsifiable.

(20) *Greek verb classes*

| Class | Imperfective stem | Active perfective stem + affix | Nonactive perfective stem + affix | Meaning |
|---|---|---|---|---|
| 1. | aku(ɣ)- | aku-s- | akus-t- | ‘hear’ |
| 2. | epenði- | epenði-s- | epenði-θ- | ‘invest’ |
| 3. | empne- | empnef-s- | empnefs-t- | ‘inspire’ |
| 4. | vaf- | vap-s- | vaf-t- | ‘paint’ |
| 5. | jatrev- | jatrep-s- | jatref-t- | ‘cure’ |
| 6. | ðesmev- | ðesmef-s- | ðesmef-t- | ‘bind’ |
| 7. | ðiðask- | ðiðak-s- | ðiðax-t- | ‘teach’ |
| 8. | plaθ- | pla-s- | plas-t- | ‘knead’ |
| 9. | anaptis- | anaptik-s- | anaptix-t- | ‘develop’ |
| 10. | eksetaz- | ekseta-s- | eksetas-t- | ‘examine’ |
| 11. | piraz- | pirak-s- | pirax-t- | ‘annoy’ |
| 12. | din- | di-s- | di-θ- | ‘dress’ |
| 13. | klin- | kli-s- | klis-t- | ‘close’ |
| 14. | krin- | krin- | kri-θ- | ‘judge’ |
| 15. | enθarin- | enθarin- | enθarin-θ- | ‘encourage’ |
| 16. | ksiren- | ksiran- | ksiran-θ- | ‘dry’ |
| 17. | trelen- | trelan- | trela-θ- | ‘make crazy’ |
| 18. | varen- | varin- | — | ‘become heavy’ |
| 19. | paθen- | paθ- | — | ‘suffer’ |
| 20. | xorten- | xorta-s- | — | ‘become satisfied’ |
| 21. | afksen- | afksi-s- | afksi-θ- | ‘increase’ |
| 22. | sokar- | sokari-s- | sokaris-t- | ‘shock’ |
| 23. | apand- | apandi-s- | apandi-θ- | ‘answer’ |
| 24. | krem- | krema-s- | kremas-t- | ‘hang’ |
| 25. | kal- | kale-s- | kales-t- | ‘call’ |
| 26. | epen- | epene-s- | epene-θ- | ‘praise’ |
| 27. | kit- | kitak-s- | kitax-t- | ‘look at’ |
| 28. | trav- | travik-s- | travix-t- | ‘pull’ |
| 29. | ksexn- | ksexa-s- | ksexas-t- | ‘forget’ |

While 10 of these classes also seem to require positing three stems (classes 1, 3, 8, 10, 13, 17, 22, 24, 25, 29), another 18 need only two stems (since the alternations *p*∼*f* and *k*∼*x* are regular), or even one (class 15).

For a regular two-stem verb such as *ðéno* ‘I tie’ then, there is an imperfective stem (*ðen-*) and a perfective one (*ðe-*).[12] The full paradigm is given in (21).

[12] Such stems are also used in the formation of other forms, including the gerund ***ðén**-ondas*, the active perfect participle ***ðé**-s-i*, the nonactive perfect participle ***ðe**-θ-í*, the resultative participle ***ðe**-ménos*, the result nominal ***ðé**-simo*, and the present participle, which does not exist for this verb, but would be formed from the imperfective stem by adding the endings *-on*, *-ousa*, *-on*.

(21) *Greek 1st conjugation verb* ðeno *'I tie'*

| ACTIVE.IMPERFECTIVE.NONPAST | | | | ACTIVE.PERFECTIVE.NONPAST | | | |
|---|---|---|---|---|---|---|---|
| 1sg | **ðén**-o | 1pl | **ðén**-ume | 1sg | **ðé**-s-o | 1pl | **ðé**-s-ume |
| 2 | **ðén**-is | 2 | **ðén**-ete | 2 | **ðé**-s-is | 2 | **ðé**-s-ete |
| 3 | **ðén**-i | 3 | **ðén**-un | 3 | **ðé**-s-i | 3 | **ðé**-s-un |
| NONACTIVE.IMPERFECTIVE.NONPAST | | | | NONACTIVE.PERFECTIVE.NONPAST | | | |
| 1sg | **ðén**-ome | 1pl | **ðen**-ómaste | 1sg | **ðe**-θ-ó | 1pl | **ðe**-θ-úme |
| 2 | **ðén**-ese | 2 | **ðén**-este | 2 | **ðe**-θ-ís | 2 | **ðe**-θ-íte |
| 3 | **ðén**-ete | 3 | **ðén**-onde | 3 | **ðe**-θ-í | 3 | **ðe**-θ-ún |
| ACTIVE.IMPERFECTIVE.PAST | | | | ACTIVE.PERFECTIVE.PAST | | | |
| 1sg | é-**ðen**-a | 1pl | **ðén**-ame | 1sg | é-**ðe**-s-a | 1pl | **ðé**-s-ame |
| 2 | é-**ðen**-es | 2 | **ðén**-ate | 2 | é-**ðe**-s-es | 2 | **ðé**-s-ate |
| 3 | é-**ðen**-e | 3 | é-**ðen**-an | 3 | é-**ðe**-s-e | 3 | é-**ðe**-s-an |
| NONACTIVE.IMPERFECTIVE.PAST | | | | NONACTIVE.PERFECTIVE.PAST | | | |
| 1sg | **ðen**-ómun | 1pl | **ðen**-ómastan | 1sg | **ðé**-θ-ik-a | 1pl | **ðe**-θ-ík-ame |
| 2 | **ðen**-ósun | 2 | **ðen**-ósastan | 2 | **ðé**-θ-ik-es | 2 | **ðe**-θ-ík-ate |
| 3 | **ðen**-ótan | 3 | **ðén**-ondan | 3 | **ðé**-θ-ik-e | 3 | **ðé**-θ-ik-an |
| ACTIVE.IMPERFECTIVE.IMPERATIVE | | | | ACTIVE.PERFECTIVE.IMPERATIVE | | | |
| 2sg | **ðén**-e | 2pl | **ðén**-ete | 2sg | **ðé**-s-e | 2pl | **ðé**-s-te |
| NONACTIVE.IMPERFECTIVE.IMPERATIVE (formed periphrastically) | | | | NONACTIVE.PERFECTIVE.IMPERATIVE | | | |
| | | | | 2sg | **ðé**-su | 2pl | **ðe**-θ-íte |

We can then posit a lexical entry for *-s-* as the realization of Aspect[+perf] in regular verbs in the active voice, as in (22).[13]

(22) Aspect[+perf] → s / Voice[+act] ____

On the model of the lexical entries in (13), we have the following:

(23) a. $\sqrt{\text{TIE}}$ → ðe / ____ Voice Aspect[+perf]
b. $\sqrt{\text{TIE}}$ → ðen

If the conditioning environment in (23a) is correct,[14] then these forms also show that the Node Adjacency Hypothesis cannot be maintained: we have a V stem alternation that is conditioned in part by the morphosyntactic features of Aspect, separated from V-v by Voice.[15]

[13] Active perfective *-s-* could be argued to appear also after some irregular stems as well: *apelavn-*, *apila-s-*, *apela-θ-* 'deport'; *ðin-*, *ðo-s-*, *ðo-θ-* 'give'; *priz-*, *prik-s-*, *pris-t-* 'swell'; *soz-*, *so-s-*, *so-θ-* 'save'; *θet-*, *θe-s-*, *te-θ-* 'place' (this last could be classified as a two-stem verb if Grassmann's Law is assumed to be operative in the synchronic grammar).

[14] An even simpler statement, as pointed out by a reviewer, would be (i).

(i) $\sqrt{\text{TIE}}$ → ðe / ____ {s, θ}

But such a statement violates (8), which prohibits outward sensitivity to phonological features. Note that one could not replace *s*, *θ* in this statement by their morphosyntactic feature bundle equivalents (Voice[−act], Aspect[+perf]), since it is only *-θ-* that conditions *ðe-*, not Voice[−act] per se, which is also present in the nonactive imperfective.

[15] One could try to propose that aspect in fact is closer to the stem than voice, as Hamp (1961) and Warburton (1970) do, but this proposal would face several problems. First, it would be incompatible with standard compositional

(24) ðe- Ø- s- o
$\sqrt{\text{TIE}}$ Voice[+act] Aspect[+perf] T[−past, 1sg]

But this structure is isomorphic to the Spanish examples given in (5): if pruning is allowed, then we can prune the Voice node (or feature bundle), and the result reduces to the analysis of Spanish.

Notice that even Pruning does not help in the case of the nonactive perfective form *ðe-θ-o*. On the analysis mooted, this form would have the following structure:

(25) ðe- θ- Ø- o
$\sqrt{\text{TIE}}$ Voice[−act] Aspect[+perf] T[−past, 1sg]

Since the crucial node that conditions the alternation is the Aspect node, it cannot be pruned before it conditions the insertion of the perfective stem *ðe-*. The fact that it itself has a null exponent, making it eligible for Pruning, is entirely irrelevant to the computation: it must be present in order to condition the selection of the stem, and it is separated from that stem by the overt exponent of Voice, *-θ-*. This is precisely the configuration we saw above with respect to the verbs in (19) that posed a problem for the Node Adjacency Hypothesis. Thus, even the regular two-stem verbs invalidate the strong locality claim of A1 and A2, taken together.

While pairs like (24) and (25) might suggest that Greek Voice and Aspect nodes are in fact the same node in some way (given standard reasoning from their complementary distribution), and that collapsing the two nodes would provide a way to save the Node Adjacency Hypothesis (assuming counterfactually that we could ignore the implications for the compositional semantics that provide some of the best reasons for positing the articulated syntactic structure to begin with), there are reasons to doubt that such a solution is feasible. Recall that there are forms in which both the Voice node and the Aspect node have overt exponents: the nonactive perfective pasts in *-θ-ik-* illustrated in (17), for example, in which *-θ-* is the usual Voice[−act] and *-ik-* realizes Aspect[+perf]. It is worth noting that both elements occur independently. We have already seen forms in which *-θ-* occurs without *-ik-*; there are also verbs in which *-ik-* occurs without *-θ-*, the so-called athetic verbs.

---

semantic analyses. Second, it would seem to conflate viewpoint aspect with lexical aspect. Third, it would not ameliorate the difficulty for Embick's proposals; all it would do would be to reverse the two heads that are jointly needed to condition the alternations.

(26) *Greek athetic verbs (verbs that do not take* -θ- *in the nonactive)*

| Imperfective stem | Active perfective stem + affix | Nonactive perfective stem | Meaning |
|---|---|---|---|
| ke(ɣ)- | kap-s- | ka- | 'burn' |
| klev- | klep-s- | klap-[16] | 'steal' |
| kov- | kop-s- | kop- | 'cut' |
| pniɣ- | pnik-s- | pniɣ- | 'strangle' |
| stref- | strep-s- | straf- | 'turn' |
| trep- | trep-s- | trap- | 'turn' |
| tref- | θrep-s- | traf- | 'nourish' |
| vrex- | vrek-s- | vrax- | 'wet' |

These verbs take the expected perfective affix *-ik-* and the regular past endings, yielding for example the following forms for *kéo* 'I burn':

(27) *Greek athetic verb* kéo *'I burn'*

| ACTIVE.IMPERFECTIVE.NONPAST | | | | ACTIVE.PERFECTIVE.NONPAST | | | |
|---|---|---|---|---|---|---|---|
| 1sg | **ké**-o | 1pl | **ké**-me | 1sg | káp-s-o | 1pl | káp-s-ume |
| 2 | **ke**-s | 2 | **ké**-te | 2 | káp-s-is | 2 | káp-s-ete |
| 3 | **ké**-i | 3 | **ké**-ne | 3 | káp-s-i | 3 | káp-s-un |
| NONACTIVE.IMPERFECTIVE.NONPAST | | | | NONACTIVE.PERFECTIVE.NONPAST | | | |
| 1sg | **kéɣ**-ome | 1pl | **keɣ**-ómaste | 1sg | ka-ó | 1pl | ka-úme |
| 2 | **kéɣ**-ese | 2 | **kéɣ**-este | 2 | ka-ís | 2 | ka-íte |
| 3 | **kéɣ**-ete | 3 | **kéɣ**-onde | 3 | ka-í | 3 | ka-ún |
| ACTIVE.IMPERFECTIVE.PAST | | | | ACTIVE.PERFECTIVE.PAST | | | |
| 1sg | é-**keɣ**-a | 1pl | **kéɣ**-ame | 1sg | é-kap-s-a | 1pl | káp-s-ame |
| 2 | é-**keɣ**-es | 2 | **kéɣ**-ate | 2 | é-kap-s-es | 2 | káp-s-ate |
| 3 | é-**keɣ**-e | 3 | é-**keɣ**-an | 3 | é-kap-s-e | 3 | é-kap-s-an |
| NONACTIVE.IMPERFECTIVE.PAST | | | | NONACTIVE.PERFECTIVE.PAST | | | |
| 1sg | **keɣ**-ómun | 1pl | **keɣ**-ómastan | 1sg | ká-ik-a | 1pl | ka-ík-ame |
| 2 | **keɣ**-ósun | 2 | **keɣ**-ósastan | 2 | ká-ik-es | 2 | ka-ík-ate |
| 3 | **keɣ**-ótan | 3 | **kéɣ**-ondan | 3 | ká-ik-e | 3 | ká-ik-an |
| ACTIVE.IMPERFECTIVE.IMPERATIVE | | | | ACTIVE.PERFECTIVE.IMPERATIVE | | | |
| 2sg | **kéɣ**-e | 2pl | **ké**-te | 2sg | káp-s-e | 2pl | káp-s-te |
| NONACTIVE.IMPERFECTIVE.IMPERATIVE (formed periphrastically) | | | | NONACTIVE.PERFECTIVE.IMPERATIVE | | | |
| | | | | 2sg | káp-su[17] | 2pl | ka-íte |

[16] There is also a regular passive perfective stem *klef-t-*, but it has the nontransparent meaning 'elope'. This is an interesting reversal of the often-noted pattern of an irregular form maintaining or acquiring a narrower or unpredictable semantics, while the regular form is compositional (e.g., *brothers* vs. *brethren*, *older* vs. *elder*, *worked* vs. *wrought*).

[17] Most verbs that have a 2sg nonactive perfective imperative in fact form this imperative using the *active* perfective stem (e.g., *váp-su* 'paint yourself' (not **vaf-su*), *vrék-su* 'wet yourself' (not **vrax-su*)), although the 2pl nonactive perfective imperative uses the nonactive stem as expected (e.g., *vaf-t-íte* 'paint yourselves', *vrax-t-íte* 'wet yourselves'). This *-su* appears even with verbs that do not take *-s-* in the perfective past, such as *apomakrín-su* 'remove yourself' (cf.

For these stems, we could propose a null version of *-θ-* and introduce a diacritic on the stem that conditions it, as Embick (2010) does for distinguishing those French prepositions that show portmanteau forms with the definite article (*à + le > au*, *de + le > du*). As Svenonius (2012) points out, however, the relevant rules are extremely powerful, and as such bear a severe burden of proof over alternatives that might exist.

Similarly for the active perfective verb forms that lack *-s-*: recall that most of the irregular verbs, as well as the regular classes 14–19 and the suppletive verbs, do not cooccur with the morpheme *-s-*. On a traditional analysis, these verbs must be distinguished with a diacritic that blocks the insertion of *-s-*, or else we posit a null variant of Aspect[+perf] for them.

Rivero (1990) gives a syntactic decompositional account of these alternations, with an independent one-to-one mapping of morpheme to syntactic head (see also Tsimpli 2006, Kallulli 2007, Alexiadou, Anagnostopoulou, and Schäfer 2014), but Joseph and Smirniotopoulos (1993; see also Ralli 1998) argue that such an approach fails to account for the complex interaction among aspect, tense, voice, and the stem we have just observed—in particular, the many patterns of allomorphy. They suggest instead that each verb realizes an unordered set of feature values, without a one-to-one mapping of syntactic or morphological nodes to morphemes.

But Embick and others are right in the suggestion that we do not want or expect a theory in which ''anything goes,'' as an unfettered morphological realizational theory of multiple exponence could allow (but see Stump 2001 for an inferential realizational theory and how constraints on such a theory could be stated). Detailed examination of allomorphic patterns has shown that there are locality constraints on allomorphy. One such is identified in Bobaljik's (2012) magisterial investigation of the allomorphy possibilities found in comparatives and superlatives: only a contiguous string of adjacent heads can be targeted for Vocabulary Insertion, and hence for allomorphy, including especially suppletion.

Bobaljik's (2012) analysis provides the first explanation for the fact that while there are regular morphological comparatives and superlatives (*tall*, *taller*, *tallest*; stem pattern: A A A) and suppletive ones (*bad*, *worse*, *worst*; pattern: A B B), including suppletion in all three forms (Latin *bonus*, *melior*, *optimus*; pattern: A B C), there are no attested forms that follow the pattern *A B A (e.g., *good*, *better*, *goodest*) or *A A B (e.g., *good*, *gooder*, *best*). This follows if the superlative is built on the comparative ([[[Adj] CMPR] SUP]), and only an adjacent span can be subject to suppletion.

But as Svenonius (2012) is right to insist upon, contiguity is still a relatively weak notion, potentially allowing all sorts of interactions that appear not to be attested.[18] He follows and

*apomákrin-a* [active.perfective.past.1sg]; *apomakrino* is a one-stem verb). This fascinating peculiarity and its implications for locality of stem selection, overwriting, and so on, deserve a fuller investigation: it appears that a node as far away as Mood is affecting stem selection.

[18] Such potential but unattested interactions might include a wide variety of actual contiguities, such as the form of an adjective being determined by an adjacent complementizer it selects (e.g., a hypothetical pair like *Abby is angry*$_1$ but *Abby is ungry*$_2$ *that it's raining*, where *angry*$_1$ and *ungry*$_2$ would be allomorphs) or a complementizer having a particular form depending on whether the adjacent determiner of the subject of its clause is definite or indefinite (e.g., *that*$_1$ *the man left* but *thut*$_2$ *a man left*). It is important to remember that contiguity is a relation that is defined over strings of elements, not just inside complex heads. See also Jenks 2012 for discussion.

expands on a hypothesis articulated in Williams 2003, Abels and Muriungi 2008 (where the relevant notion is labeled a ''stretch''), and Taraldsen 2010 (which gives further references for precursors to the idea, going back to McCawley 1968), that locality for purposes of lexical insertion is defined not by intervening heads per se or only by phase or phrasal boundaries but by *spans*. Svenonius (2012) defines a span as a ''complement sequence of heads . . . in a single extended projection'' (p. 1) and hypothesizes that ''morphological exponents are always associated with spans'' (p. 3). I formalize the notion of span in (28) and restate Svenonius's hypothesis as in (29).

(28) Let $T$ be an ordered $n$-tuple of terminal nodes $\langle t_1, \ldots, t_n \rangle$ such that for all $t \in T$, $t = t_1$ or $t$ is an element of the extended projection[19] of $t_1$.
   a. For all $k = 1 \ldots n$, $t_k$ is a span. (Every node is a trivial span.)
   b. For any $n > 0$, if $t_k$ is a span, then $\langle t_k, \ldots, t_{k+n} \rangle$ is a span.

(29) *Spanning Insertion Hypothesis*
   A *span* and only a span can be targeted for Vocabulary Insertion.

For example, consider the heads in the extended projection of V in Greek: V v Voice Aspect T (setting aside Mood and Neg (or Σ), which are only analytic and occur above T in Greek). Each of these, by (28a), is a span (a trivial, one-membered one). By (28b), the following are the nontrivial spans:

(30) *Spans in the verbal extended projection in Greek*

| | | | |
|---|---|---|---|
| ⟨V, v⟩ | ⟨v, Voice⟩ | ⟨Voice, Aspect⟩ | ⟨Aspect, T⟩ |
| ⟨V, v, Voice⟩ | ⟨v, Voice, Aspect⟩ | ⟨Voice, Aspect, T⟩ | |
| ⟨V, v, Voice, Aspect⟩ | ⟨v, Voice, Aspect, T⟩ | | |
| ⟨V, v, Voice, Aspect, T⟩ | | | |

Not every possible $n$-tuple formed from the set of heads in the extended projection of V is a span; for example, ⟨V, T⟩, ⟨V, v, Aspect⟩, ⟨Voice, T⟩, ⟨V, Aspect⟩, ⟨Aspect, Voice⟩ are not spans (see Svenonius 2012 for discussion of general constraints on lexicalizations).

Svenonius puts the Spanning Insertion Hypothesis as follows:

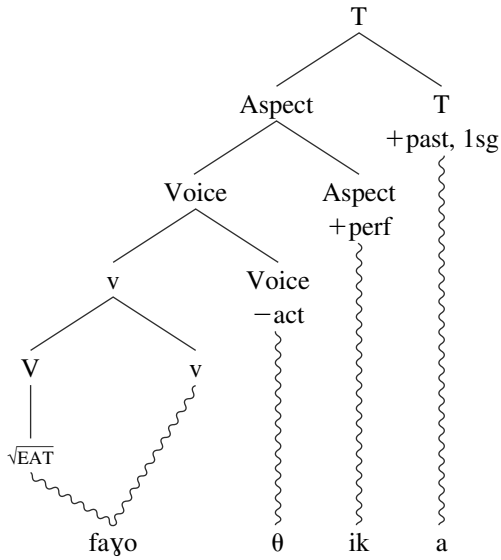
> [M]orphological exponents are always associated with spans, trivial or nontrivial. . . . A single morphological exponent (morpheme, for short) cannot spell out two heads (cannot ''span'' two heads) unless those heads are in a complement relation with each other. Thus, a single morpheme cannot spell out a head in an extended projection together with all or part of a specifier, nor can a single morpheme spell out a head in an extended projection together with all or part of an adjunct. (2012:3)

[19] See Grimshaw 2005 for details: an extended projection consists of a totally ordered set of projections, each of whose heads selects one of the other projections, except for the lexical head, and up to and including a determined highest projection. Familiar examples are PP, DP, NumberP, and NP in the nominal domain and TP, AspectP, VoiceP, vP, VP in the verbal domain. Abels and Muriungi (2008:719) are agnostic on whether spans should be any set of selecting heads, or only those within a single extended projection: ''We suggest that a morpheme can realize a *stretch* of functional heads; by a stretch we mean one or more heads that select each other's maximal projections.''

One intuition behind spans is similar to the one behind Relativized Minimality (Rizzi 1990): one effect of the theory is that an allomorph can be triggered by a distant head only if the allomorphy affects all intervening heads as well.[20] But while spans in some ways mimic possible paths of head movement, they do not require head movement, so the overt position of the verb in the extended projection is not relevant to the morphological spell-out that targets the span it is in: head movement may feed Vocabulary Insertion, but it need not. In Greek, where Alexiadou and Anagnostopoulou (1998) and Roussou and Tsimpli (2006) among many others (including Rivero (1990)) have argued that verbs move up to T, the resulting complex head is the input to Lexical Match (L-Match), indicated with wavy lines, and Vocabulary Insertion, as illustrated in (31).

(31) a. faɣo-θ-ik-a 'I was eaten'

b.



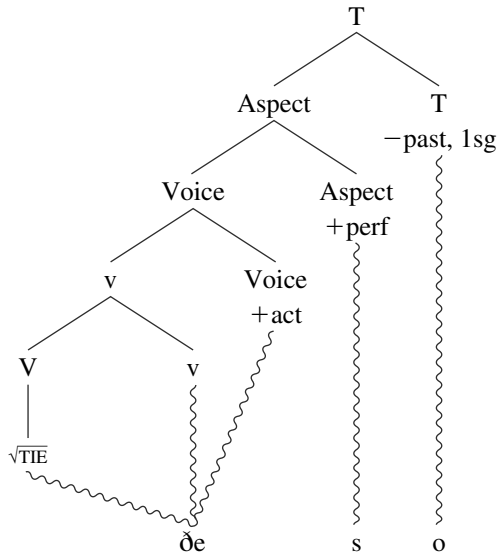

Note that the use of spans as insertion criteria does not alleviate the difficulty for the Node Adjacency Hypothesis: the Vocabulary item *faɣo-* in (31) is the nonactive perfective stem, and its appearance must be conditioned by the Voice[−act] and Aspect[+perf] nodes in combination.

Eschewing null nodes and Pruning, spanning allows us to posit structures like (32) for the active perfective nonpast, where *ðe-* could be posited to lexicalize the span V-v-Voice[+act].

[20] This effect can be achieved using the idea in Kobele 2012 for handling suppletion and morphological spell-out as well; in Kobele's proposal, contiguity of structure mirrors order of application of derivational operations, leading to similar predictions about constraints on allomorphy. Similarly, a strict version of Categorial Grammar applied to morphology, such as that in Hoeksema 1985, might make similar predictions.

(32) a. ðé-s-o 'I (will) tie'

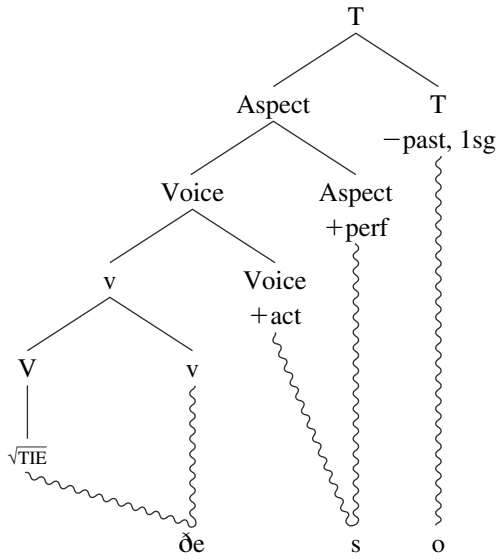
b.




While this representation does away with positing a null realization for Voice[+act], it does so at the expense of the simple two-stem solution for such verbs, since we would then also need to posit a separate Vocabulary item *ðe-* that would realize only $\sqrt{\text{TIE}}$ + v, in order to allow for its appearance in the nonactive perfective past: *ðé-θ-ik-a*. Since my goal here is not to present a theory of Vocabulary Insertion, but to illuminate the constraints on the conditioning environments of such insertions, I will not attempt to adjudicate between the two possibilities that arise: either we posit (as before) a null affix to realize Voice[+act] (yielding the familiar *ðe-Ø-s-o*, as above) or we posit that *-s-* itself realizes a span of Voice[+act]-Aspect[+perf], as in (33). Either option is compatible with my contention that the Greek facts show that the Node Adjacency Hypothesis is inadequate.

(33) a. ðé-s-o ‘I (will) tie’

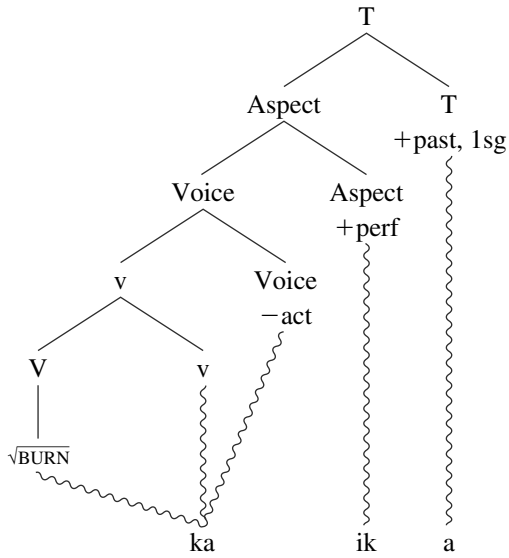
b.




The athetic stems in (26) might be better candidates for a representation along the lines of (32). This is illustrated in (34) for the nonactive perfective stem *ka-* ‘burn’.

(34) a. ká-ik-a ‘I was burned’

b.

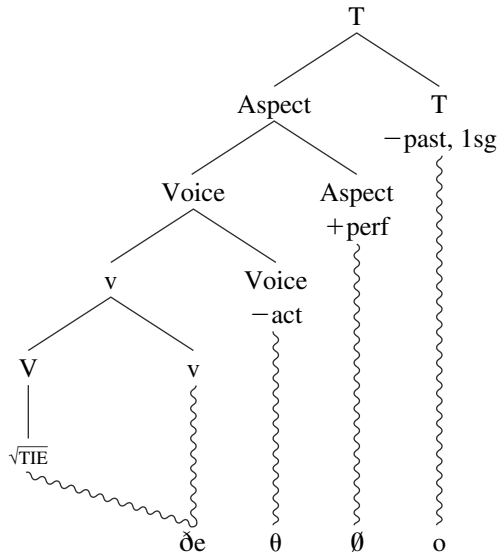



The result in these cases thus is something close to that mooted for Spanish in (5), either by Fusion (see the next section for discussion) or by Pruning of nodes that have no phonological material associated with them (devices the spanning analysis is designed to eschew). Recall that

the crucial case from regular two-stem verbs like *ðéno* 'I tie' came from nonactive perfective nonpast forms such as *ðe-θ-ó*, which has the structure in (35).

(35) a. ðe-θ-ó 'I (will) be tied'

b.




Note that one could assume, as mooted above for *-s-* in (33), that *-θ-* here lexicalizes the span Voice[−act]-Aspect[+perf], but doing so would run afoul of the same consideration that led us away from thinking *ðe-* could ever lexicalize Voice: we would have to posit two Vocabulary items with *θ* as their phonology, one for Voice[−act]-Aspect[+perf] here, and one for simple Voice[−act] when followed by the perfective past *-ik-* as in *ðé-θ-ik-a*.

The Spanning Insertion Hypothesis also allows us to account for the portmanteau inflectional morphemes used in Greek. While the Tense/Agreement portmanteau morphemes may seem to be too mundane to be commented on (they also exist of course in English, French, Spanish, German, and many other languages), one particular set clearly demonstrates the advantages of the theory. The nonactive imperfective endings come in two varieties: one set is used in the nonpast ('I am being eaten', etc.), and the other is used in the past ('I was being eaten', etc.).

(36) *Greek nonactive imperfective verbal desinences*

NONACTIVE.IMPERFECTIVE.NONPAST

| | | | |
|---|---|---|---|
| 1sg | -ome | 1pl | -ómaste |
| 2 | -ese | 2 | -este |
| 3 | -ete | 3 | -onde |

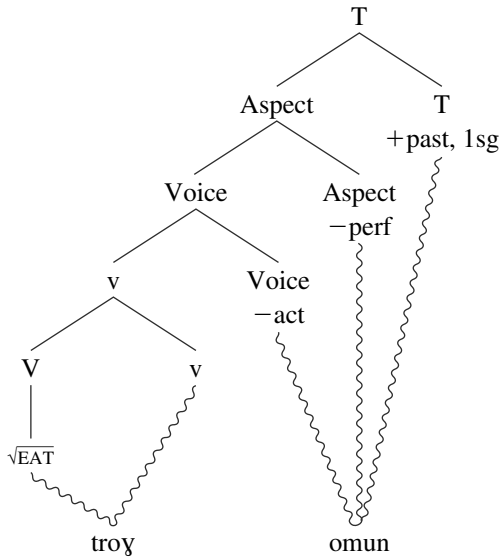
NONACTIVE.IMPERFECTIVE.PAST

| | | | |
|---|---|---|---|
| 1sg | -ómun | 1pl | -ómastan |
| 2 | -ósun | 2 | -ósastan |
| 3 | -ótan | 3 | -ondan |

As Joseph and Smirniotopoulos (1993) point out, these endings are maximal portmanteaux: they are specific to the imperfective, and indicate voice, tense, and the features of the subject. They lexicalize the span Voice-Aspect-T(Agr); crucially, as (37) shows, these nodes taken together do not form a constituent.

(37) a. troɣ-ómun 'I was being eaten'

b.




Such examples are also important in showing that the spanning theory of lexical insertion is not just another way of encoding insertion at nonterminal nodes, as in Neeleman and Szendrői 2007, Caha 2009, Radkevich 2010, and Haugen and Siddiqi 2013a. In such theories, which also have as one of their goals the elimination of operations such as Fusion and the positing of null morphemes, lexical insertion can target a nonterminal node if and only if the morpheme corresponds to all and only the features dominated by that node. In cases where the span includes the lowest node in a complex head (as in (31) and (34)), the empirical coverage will be the same as in spanning. But when the lowest node is not included, the difference in applicability of the two theories becomes apparent: spanning can target a sequence of nodes as in (37), but there is no nonterminal node that would qualify for insertion. This is because the highest node (dominating T) also dominates the root, but the root is not part of the portmanteau (though see Radkevich 2010 and Haugen and Siddiqi 2013a for attempts to address this point as well): the nodes spanned here do not form a constituent.

We can thus revisit the assessment of Joseph and Smirniotopoulos (1993:393–394): ''[S]uch an approach . . . is nothing more than a morphological solution masquerading as a syntactic one; in particular . . . what guarantees that the order of morphemes as they are realized is the same as their order of . . . addition?'' The answer to such criticisms is that constraints on syntactic verb movement—or, as here, on spans—are exactly what guarantees morpheme order and, crucially, the kinds of portmanteauism that can be found. Accounts like the one given in Joseph and Smirnio-

topoulos 1993 (see also Embick 2012 for further examples of such approaches), on which ''individual stems are available to be 'invoked' by inflectional rules that refer to an unordered set of particular morphosyntactic features'' (p. 396), are exactly the kinds of unconstrained accounts whose shortcomings authors from Embick and Bobaljik to Arregi, Nevins, and Svenonius are at pains to point out. It is, ultimately, an empirical question what morphosyntactic categories and feature sets a given language makes use of, and what kinds of morphological realization these will have in the language, including allomorphic variation. What an analysis using an ''unordered set of . . . morphosyntactic features'' cannot do is rule out any possible combination resulting in multiple exponence. For $n$ binary-valued features, we would potentially expect $2^n$ possible portmanteau morphemes, with any features that are not expressed in a nonmaximal portmanteau being expressed with potentially regular exponents. Constraints such as contiguity—or, as here, spanning—cannot be stated (or rather, they can be stated only as ad hoc feature cooccurrence restrictions; nothing about the geometry or structure of the features need inform such restrictions). At present, it does not seem that the considerable power of such a theory is warranted by the data.

But while important, whether or not spanning is the best way to capture the distribution of portmanteau morphemes or to regulate lexical insertion is not directly germane to the primary question addressed here. The present focus is on the *conditions* on allomorph selection, not on the mechanisms of allomorph insertion themselves: the Spanning Insertion Hypothesis is a hypothesis about which nodes can be targeted for lexical insertion or be realized by a single morpheme. But whether or not the Spanning Insertion Hypothesis in (29) is correct, it does not bear on the adequacy of the Node Adjacency Hypothesis, which is a hypothesis about which nodes may condition an allomorph. In other words, we need a constraint to replace the failed Node Adjacency Hypothesis. The notion of spanning gives us the requisite theoretical tool to state a more accurate, empirically adequate hypothesis, as in (38).

(38) *Span Adjacency Hypothesis*
Allomorphy is conditioned only by an adjacent *span*.

This hypothesis permits nonadjacent heads and their features to participate in the conditioning of an allomorph, but requires that such nonadjacent heads (or their features) form a span with heads (or their features), up to and including the head that is adjacent to the conditioned form.[21] This lets in a restricted amount of nonadjacency, yet meets the desideratum of not letting just any kind of nonadjacent head condition allomorphy. Allomorphy is indeed conditioned locally, but not, as the Node Adjacency Hypothesis had it, only by the features of adjacent nodes; rather, it is conditioned by features in adjacent spans, whether or not those spans are themselves lexicalized by Vocabulary items.

[21] See Bobaljik 2012:223n10 for a discussion of the Icelandic strong verbs, which suggest an ''adjacency-by-transitivity effect'' similar to the one seen here in Greek.

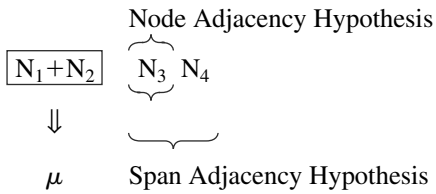
It may be helpful to visualize the competing hypotheses schematically. Consider a complex head or a span consisting of nodes $N_1$ $N_2$ $N_3$ $N_4$. The Spanning Insertion Hypothesis claims that the possible targets for lexical insertion are all and only the 10 groups given in (39); no other possible combinations ($N_1$ $N_3$, etc.) are licit targets for insertion.

(39) In a span $N_1$ $N_2$ $N_3$ $N_4$, the following are the only possible targets for lexical insertion:

1. $N_1$
2. $N_2$
3. $N_3$
4. $N_4$
5. $N_1$ $N_2$
6. $N_2$ $N_3$
7. $N_3$ $N_4$
8. $N_1$ $N_2$ $N_3$
9. $N_2$ $N_3$ $N_4$
10. $N_1$ $N_2$ $N_3$ $N_4$

The Node Adjacency Hypothesis (without Pruning) predicts that only adjacent nodes can condition insertion. For example, if $N_1$ and $N_2$ were to be jointly realized by a morpheme, only $N_3$, but not $N_4$, could influence the form of that morpheme. The Span Adjacency Hypothesis, on the other hand, would allow $N_3$ and $N_4$ to jointly condition the form realizing $N_1$ and $N_2$; it would also allow just $N_3$ to play such a role; it would ban $N_4$ from conditioning the form of $N_1 + N_2$ if the features of $N_3$ were not involved.[22] Schematically, where $\mu$ realizes $N_1$ and $N_2$, we have the following:

(40) *Possible conditioning environments for* μ *under the . . .*




The Span Adjacency Hypothesis is thus compatible with the Vocabulary Insertion rules in (13), repeated here, which posit three stems.

(41) a. $\sqrt{\text{EAT}} \rightarrow$ fa(ɣ)/____ Voice[+act] Aspect[+perf]
b. $\sqrt{\text{EAT}} \rightarrow$ faɣo/____ Voice[−act] Aspect[+perf]
c. $\sqrt{\text{EAT}} \rightarrow$ tro(ɣ)

[22] Including this constraint is important: without it, the 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 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.

The conditioning environments in (41a–b) consist of the span Voice-Aspect. Recall that at the point at which the rules in (41) apply, the nodes Voice and Aspect have not yet undergone lexical insertion. There are no morphemes in those nodes, only morphosyntactic feature bundles. It is the values of these features that jointly condition the stem allomorphy, not particular morphemes that may or may not realize Voice and Aspect. The *conditioning* span need not be the same as a span that is targeted for lexical insertion. Indeed, in this case, we can see clearly that the two are separate: Voice and Aspect are not jointly targeted for lexical insertion in the form *faɣo-θ-ik-a*, whose structure is given in (31).

## 2 Affixal Negation and Tense in English

The conclusion that nonlocally triggered stem allomorphy exists can also be reached by examining the affixal negation of English, *n't* (see Zwicky and Pullum 1983). This can be seen for example in the forms *don't* [dont] and *won't* [wont], which appear in place of the expected *[dunt] (< *do* /du/ + *n't* /nt/) and *[wɪlnt] (< *will* /wɪl/ + *n't* /nt/).[23] But the most spectacular stem allomorphy triggered by negation comes in the behavior of negation with *be*. Many dialects of English have positive and negative variants of *be* (Bresnan, Deo, and Sharma 2007). This is well-known for the present tense, where suppletive *ain('t)* [en(t)] is the uniform negative form of *am*, *is*, *are*, *has*, *have* (e.g., *I ain't happy*; *They ain't had breakfast yet*), and in certain dialects, also of *did* (e.g., *I ain't know that*). The pattern is summarized in (42).

(42) *English dialectal positive and negative present tense forms of* be *and* have

| Positive | Negative |
|---|---|
| am | ain't |
| are | ain't |
| is | ain't |
| have | ain't |
| has | ain't |

There are also varieties that show this pattern in the past tense. These varieties, such as the one illustrated in (43),[24] show two forms of the past tense of *be*, depending on whether affixal negation is present or not.[25]

[23] Also the irregular forms *can't* [kænt], *shan't* [ʃænt], and *mustn't* [mʌsn̩t], as Zwicky and Pullum (1983) point out.

[24] I do not know the geographic or social distribution of these forms, but I have heard them from speakers in rural and urban areas of the American Midwest and parts of the Mid-Atlantic, at least.

[25] The negative past is sometimes written *wont*, as in Wolfram 2004b:332: ''The generalized past tense variant *wont* for *wasn't* and *weren't* in *I wont there yesterday*, found in some Southern vernacular varieties, is not typical of urban AAVE [African-American Vernacular English].''

(43) a. I/You/He/She/It/We/Y'all/They [wʌz] angry about it.
b. I/You/He/She/It/We/Y'all/They [wʌdn̩] angry about it.

This is similar to the pattern found in parts of the British Isles (Nevins and Parrott 2010) and in southeastern coastal American English from Maryland and Virginia to North Carolina (Wolfram 2004a:292). Trudgill (2004:145) gives the following paradigm for the dialect of East Anglia:[26]

(44) *East Anglia positive and negative past tense forms of* be

| | Singular | Plural |
|---|---|---|
| Positive | I wus | we wus |
| | you wus | you wus |
| | he/she/it wus | they wus |
| Negative | I weren't | we weren't |
| | you weren't | you weren't |
| | he/she/it weren't | they weren't |

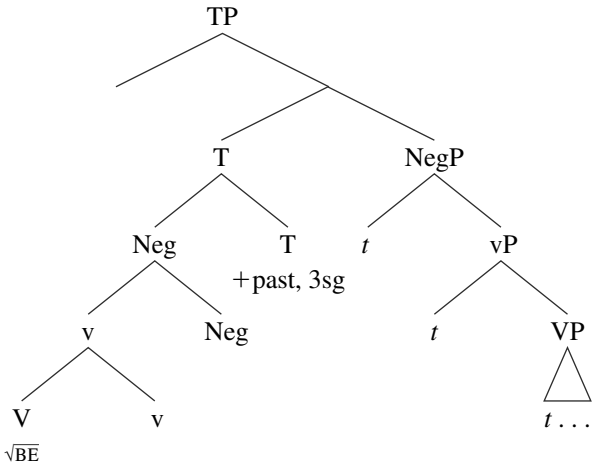
The main difference between the variety represented in (43) and those of East Anglia and elsewhere is that the latter show a leveling that can be modeled with Impoverishment (to the singular in the positive past, and to the plural in the negative past, and including more complex patterns), as proposed by Nevins and Parrott (2010). But while (43) shows a similar leveling in the positive past, the negative form is not obviously related to any plural form.[27]

One common syntactic analysis compatible with selection facts and with the ability of these forms to undergo Subject-Auxiliary Inversion is to assume that the v/V complex raises through Neg to T, yielding the structure in (45).

[26] Trudgill reports that the pronunciations of the ''plural'' past in East Anglia can vary among /wɜːnt/, /waːnt/, /wɔːnt/, and /wɒnt/.

[27] One could suppose [wʌdn̩] to be the result of a morphophonological rule of manner assimilation from a hypothetical /wʌz + n̩/ > [wʌdn̩]; such a rule would have to be morphophonologically restricted to occurring in this combination (and in the forms [ɪdn̩] (*isn't*), [dʌdn̩] (*doesn't*)), as the otherwise similar *dozen* /dʌzn̩/ surfaces as [dʌzn̩], not as *[dʌdn̩]. This would make the assimilation applying with negative affixation a derived environment effect. While I know of no particular evidence that favors or disfavors this route, it is clear that no such alternative analysis is possible for the suppletive *ain't.*

(45)

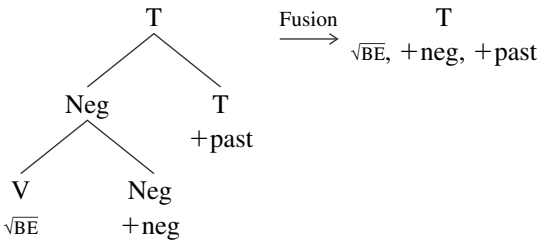



The nodes in the complex head T in (45) can then be spelled out using Vocabulary Insertion rules that are sensitive to the presence of Neg (or, equivalently, the value of the Neg feature on a polarity head such as Σ).

(46) a. $\sqrt{\text{BE}} \rightarrow$ [wʌz]/____ v + T[+ past]
b. $\sqrt{\text{BE}} \rightarrow$ [wʌdn̩]/____ v + Neg + T[+ past]

Such rules, however, violate locality as posited above. One analytical option to avoid this conclusion is to use Fusion,[28] an operation designed to map *n* nodes hosting *n* feature bundles onto a single node, as in (47).

(47)

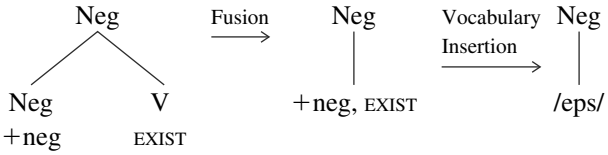



This option is proposed by Chung (2007) to handle a similar phenomenon in Korean (see also Nevins and Parrott 2010 for application to English). In Korean, the verbs *al-* 'to know' and *ess-* 'to be' have suppletive negative stems, *molu-* and *eps-*, respectively, and do not occur with

[28] Another possibility, which I will set aside here, would be to claim that /n/ is the Neg, which triggers manner-of-articulation assimilation on the final /z/, yielding /d/, as in footnote 27. Such an approach would not extend to the *weren't* replacement varieties; nor, assuming that T c-commands Neg, would it ameliorate the locality problem of interest here.

the usual preverbal short-form negator *an(i)-*.[29] Chung proposes (p. 134) that the Fusion of Neg and the V node precedes Vocabulary Insertion, as in (48).

(48)




(49) [+neg, EXIST] → /eps/

Chung argues that such an account better captures the scopal facts of negation (since semantically the negation can take wide scope, like clausal negation, over other elements; cf. German *kein*, Dutch *geen*), and similar facts can be adduced for the properties of the negative past copula in English. As Nevins and Parrott (2010), Radkevich (2010), and Haugen and Siddiqi (2013a) point out, however, Fusion accounts require a conspiracy amounting to look-ahead: the syntactic operation of Fusion must apply in the syntactic derivation just in case there is a Vocabulary item that can realize those features in the morphology (i.e., in order to block the otherwise regular expression of the nodes).

A second current kind of analysis proposed to handle such cases (as well as portmanteauisms) takes insertion of lexical material to be able to target nonterminal nodes (Neeleman and Szendrői 2007, Caha 2009, Siddiqi 2009, Radkevich 2010). These analyses do away with Fusion and do not suffer from look-ahead concerns. But as Haugen and Siddiqi (2013a) discuss, insertion at nonterminal nodes leads to what they call the ''containment'' problem: since a single Vocabulary item overwrites the node whose features it matches, including phrasal projections, the theory predicts that whenever this must occur, the root should allow for no internal arguments, a prediction that is clearly false, both for simple affixation (*solve-d the problem*, *proud-er of her analysis*), irregular stem changes (*understood the problem*), and suppletion (*underwent an operation*, *better at tennis*). (A reviewer notes correctly that this problem only arises on versions of nonterminal insertion theories that allow insertion at phrasal nodes; if the nonterminals are restricted to possibly complex heads, the ''containment'' problem does not arise.) A second problem for these analyses is that they provide no way to handle portmanteau morphemes that do not include the root (such as the Greek nonactive imperfective past endings above), a phenomenon that spanning, as we

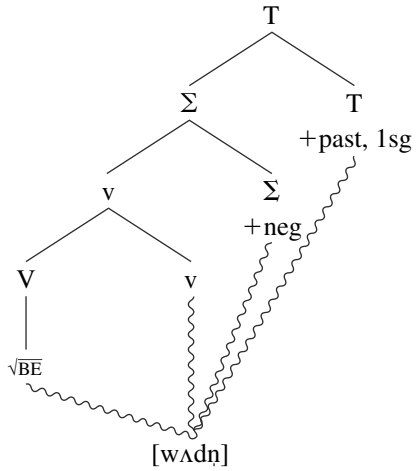
[29] Turkish shows this pattern for the existential predicate *var* 'there is', with suppletive negative *yok* 'there is not' (cf. regular affixal negation *-mA-*), as in (i).

(i) a. Ev-de karpuz var-dı.
house-in watermelon exist-PAST
'There was watermelon in the house.'
b. Ev-de karpuz yok-tu.
house-in watermelon not.exist-PAST
'There was no watermelon in the house.'

have seen, can easily accommodate. (See Radkevich 2010 and Haugen and Siddiqi 2013a for modifications to nonterminal insertion theories that attempt to address these issues, however.)

Spanning, on the other hand, can give the analysis in (50).

(50)




The facts from English affixal negation, therefore, implicate a more expansive notion of locality than mere adjacency, a conclusion that is in line with a number of recent works (Bermúdez-Otero 2013, Haugen and Siddiqi 2013a, Svenonius 2013) that reach similar conclusions on quite different grounds.[30]

## 3 Conclusion

Nonlocally conditioned stem allomorphy exists. But it only occurs conditioned by a span (a continuous sequence of heads in a single extended projection) and then only if the features of all the terminal nodes between the stem and the furthest terminal that conditions the allomorphy are implicated. The strong Node Adjacency Hypothesis is false, though the somewhat weaker Span Adjacency Hypothesis is compatible with the facts reviewed here.

[30] Jack Hoeksema points out to me that the distribution of the Dutch stem augment *-er-* with the stem *kind* 'child' in plurals may constitute another case of an allomorph being triggered by a nonadjacent morpheme. Although *-er* in modern Dutch has spread beyond its historical origin as a plural marker (being found in cases like *kind-er-lijk* 'childlike', *kind-er-achtig* 'childish', *kind-er-kleding* 'children's clothing'), with the noun *kind* itself, it occurs only in plurals. In particular, it does not occur before the diminutive suffix *-(t)je* unless that suffix itself is followed by the plural morpheme.

| | | |
|---|---|---|
| (i) a. | kind | kind-er-en |
| | child | child-*er*-PL |
| | | 'children' |
| b. | kind-je | kind-er-tje-s |
| | child-DIM | child-*er*-DIM-PL |
| | 'little child' | 'little children' |

Crucially, the singular form **kind-er-tje* is rejected by many speakers (some appear to accept it; the argument against the Node Adjacency Hypothesis can only be made on the basis of those speakers who lack the form).

## References


Abels, Klaus, and Peter Muriungi. 2008. The focus particle in Kîîtharaka: Syntax and semantics. *Lingua* 118:687–731.

Ackema, Peter, and Ad Neeleman. 2004. *Beyond morphology: Interface conditions on word formation.* Oxford: Oxford University Press.

Alexiadou, Artemis, and Elena Anagnostopoulou. 1998. Parametrizing Agr: Word order, V-movement and EPP-checking. *Natural Language and Linguistic Theory* 16:491–539.

Alexiadou, Artemis, Elena Anagnostopoulou, and Florian Schäfer. 2014. *External arguments in transitivity alternations: A layering approach.* Oxford: Oxford University Press.

Allen, Margaret. 1978. Morphological investigations. Doctoral dissertation, University of Connecticut, Storrs.

Arregi, Karlos, and Andrew Nevins. 2012. *Morphotactics: Basque auxiliaries and the structure of Spellout.* Berlin: Springer.

Arregi, Karlos, and Andrew Nevins. 2013. Contextual neutralization and the Elsewhere Principle. In *Distributed Morphology today: Morphemes for Morris Halle*, ed. by Alec Marantz and Ora Matushansky, 199–221. Cambridge, MA: MIT Press.

Bermúdez-Otero, Ricardo. 2013. The Spanish lexicon stores stems with theme vowels, not roots with inflectional class features. *Probus* 25:3–103.

Bobaljik, Jonathan David. 2000. The ins and outs of contextual allomorphy. In *University of Maryland working papers in linguistics 10*, ed. by Kleanthes K. Grohmann and Caro Struijke, 35–71. College Park: University of Maryland, Department of Linguistics.

Bobaljik, Jonathan David. 2012. *Universals in comparative morphology.* Cambridge, MA: MIT Press.

Bobaljik, Jonathan David, and Heidi Harley. 2012. Suppletion is local: Evidence from Hiaki. Ms., University of Connecticut, Storrs, and University of Arizona, Tucson.

Bresnan, Joan, Ashwini Deo, and Devyani Sharma. 2007. Typology in variation: A probabilistic approach to *be* and *n't* in the *Survey of English Dialects. English Language and Linguistics* 11:301–346.

Bye, Patrik, and Peter Svenonius. 2010. Exponence, phonology and nonconcatenative morphology. Ms., University of Tromsø, CASTL.

Caha, Pavel. 2009. The nanosyntax of case. Doctoral dissertation, University of Tromsø.

Carstairs-McCarthy, Andrew. 2003. Directionality and locality in allomorphy: A response to Adger, Béjar, and Harbour. *Transactions of the Philological Society* 101:117–124.

Chung, Inkie. 2007. Suppletive negation in Korean and Distributed Morphology. *Lingua* 117:95–148.

Collins, Chris. 2005. A smuggling approach to the passive in English. *Syntax* 8:81–120.

Corbett, Greville G. 2007. Canonical typology, suppletion, and possible words. *Language* 83:8–42.

Embick, David. 2010. *Localism versus globalism in morphology and phonology.* Cambridge, MA: MIT Press.

Embick, David. 2012. Contextual conditions on stem alternations: Illustrations from the Spanish conjugation. In *Romance languages and linguistic theory 2010: Selected papers from 'Going Romance' Leiden 2010*, ed. by Irene Franco, Sara Lusini, and Andrés L. Saab, 21–40. Amsterdam: John Benjamins.

Embick, David, and Morris Halle. 2005. On the status of stems in morphological theory. In *Romance languages and linguistic theory 2003: Selected papers from 'Going Romance' 2003*, ed. by Twan Geerts, Ivo van Ginneken, and Haike Jacobs, 59–88. Amsterdam: John Benjamins.

Galani, Alexandra. 2005. The morphosyntax of verbs in Modern Greek. Doctoral dissertation, University of York.

Giannakidou, Anastasia. 2009. The dependency of the subjunctive revisited: Temporal semantics and polarity. *Lingua* 119:1883–1908.

Gribanova, Vera. To appear. Exponence and morphosyntactically triggered phonological processes in the Russian verbal complex. *Journal of Linguistics.*

Grimshaw, Jane. 2005. Extended projection. In *Words and structure*, ed. by Jane Grimshaw, 1–73. Stanford, CA: CSLI Publications.
Hamp, Eric. 1961. To ríma en ti simeriní omiluméni elinikí glósa. *Athiná* 65:101–128.
Harley, Heidi. 2013. External arguments and the Mirror Principle: On the distinctness of Voice and v. *Lingua* 125:34–57.
Harley, Heidi. To appear. On the identity of roots. *Theoretical Linguistics.*
Haugen, Jason D., and Daniel Siddiqi. 2013a. On double marking and containment in Realization Theory. Ms., Oberlin College, Oberlin, OH, and Carleton University, Ottawa, ON.
Haugen, Jason D., and Daniel Siddiqi. 2013b. Roots and the derivation. *Linguistic Inquiry* 44:493–517.
Hoeksema, Jack. 1985. *Categorial morphology.* New York: Garland.
Holton, David, Peter Mackridge, and Irene Philippaki-Warburton. 1997. *Greek: A comprehensive grammar of the modern language.* London: Routledge.
Jenks, Peter. 2012. Definite spans and blocking in classifier languages. Ms., University of California, Berkeley.
Joseph, Brian D., and Jane C. Smirniotopoulos. 1993. The morphosyntax of the modern Greek verb as morphology and not syntax. *Linguistic Inquiry* 24:388–398.
Kallulli, Dalina. 2007. Rethinking the passive/anticausative distinction. *Linguistic Inquiry* 38:770–780.
Kiparsky, Paul. 1996. Allomorphy or morphophonology? In *Trubetzkoy's orphan*, ed. by Rajendra Singh and Richard Desrochers, 13–31. Amsterdam: John Benjamins.
Kobele, Gregory M. 2012. A derivational approach to phrasal spellout. Slides from a presentation at Brussels Conference on Generative Linguistics 7, Brussels.
Létoublon, Françoise. 1985. *Il allait, pareil à la nuit. Les verbes de mouvement en grec: Supplétisme et aspect verbal.* Paris: Klincksieck.
Marantz, Alec. 1995. A late note on late insertion. In *Explorations in generative grammar*, ed. by Young-Sun Kim et al., 357–368. Seoul: Hankuk.
McCawley, James D. 1968. Lexical insertion in a transformational grammar without deep structure. In *Papers from the Fourth Regional Meeting of the Chicago Linguistic Society*, ed. by Bill J. Darden et al., 71–80. Chicago: University of Chicago, Chicago Linguistic Society.
Merchant, Jason. 2013. Voice and ellipsis. *Linguistic Inquiry* 44:77–108.
Mester, R. Armin. 1994. The quantitative trochee in Latin. *Natural Language and Linguistic Theory* 12: 1–61.
Neeleman, Ad, and Kriszta Szendrői. 2007. Radical pro-drop and the morphology of pronouns. *Linguistic Inquiry* 38:671–714.
Nevins, Andrew, and Jeffrey K. Parrott. 2010. Variable rules meet Impoverishment theory: Patterns of agreement leveling in English varieties. *Lingua* 120:1135–1159.
Oltra-Massuet, Isabel, and Karlos Arregi. 2005. Stress-by-structure in Spanish. *Linguistic Inquiry* 36:43–84.
Philippaki-Warburton, Irene. 1973. Modern Greek verb conjugation: Inflectional morphology in a transformational grammar. *Lingua* 32:193–226.
Radkevich, Nina V. 2010. On location: The structure of case and adpositions. Doctoral dissertation, University of Connecticut, Storrs.
Ralli, Angela. 1998. On the morphological status of inflectional features: Evidence from modern Greek. In *Themes in Greek linguistics II*, ed. by Brian D. Joseph, Geoffrey C. Horrocks, and Irene Philippaki-Warburton, 51–74. Amsterdam: John Benjamins.
Ralli, Angela. 2003. Morphology in Greek linguistics: The state of the art. *Journal of Greek Linguistics* 4: 77–129.
Ralli, Angela. 2005. *Morfologia.* Athens: Patakis.
Riemsdijk, Henk van. 2002. The unbearable lightness of GOing: The projection parameter as a pure parameter governing the distribution of elliptic motion verbs in Germanic. *Journal of Comparative Germanic Linguistics* 5:143–196.

Rivero, María-Luisa. 1990. The location of nonactive voice in Albanian and modern Greek. *Linguistic Inquiry* 21:135–146.
Rizzi, Luigi. 1990. *Relativized Minimality.* Cambridge, MA: MIT Press.
Roussou, Anna, and Ianthi M. Tsimpli. 2006. On Greek VSO again. *Journal of Linguistics* 42:317–354.
Siddiqi, Daniel. 2009. *Syntax within the word: Economy, allomorphy, and argument selection in Distributed Morphology.* Amsterdam: John Benjamins.
Siegel, Dorothy. 1978. The Adjacency Constraint and the theory of morphology. In *Proceedings of NELS 8*, ed. by Mark J. Stein, 189–197. Amherst: University of Massachusetts, Graduate Linguistic Student Association.
Spyropoulos, Vassilios, and Anthi Revithiadou. 2009. The morphology of past in Greek. In *Studies in Greek linguistics 29*, ed. by Melita Stavrou, Despina Papadopoulou, and Maria Theodoropoulou, 108–122. Thessaloniki: Instituto Neoelinikon Spuðon (Iðrima Manoli Triandafiliði).
Stainton, Robert. 2006. Neither fragments nor ellipsis. In *The syntax of nonsententials*, ed. by Ljiljana Progovac, Kate Paesani, Eugenia Casielles, and Ellen Barton, 93–116. Amsterdam: John Benjamins.
Stump, Gregory T. 2001. *Inflectional morphology: A theory of paradigm structure.* Cambridge: Cambridge University Press.
Svenonius, Peter. 2012. Spanning. Ms., University of Tromsø, CASTL.
Svenonius, Peter. 2013. Look both ways: Outward-looking allomorphy in Icelandic participles. Ms., University of Tromsø, CASTL.
Taraldsen, Knut Tarald. 2010. The nanosyntax of Nguni noun class prefixes and concords. *Lingua* 120: 1522–1548.
Trudgill, Peter. 2004. The dialect of East Anglia: Morphology and syntax. In *A handbook of varieties of English*, ed. by Bernd Kortmann, Kate Burridge, Rajend Mesthrie, Edgar W. Schneider, and Clive Upton, 142–153. Berlin: Mouton de Gruyter.
Tsimpli, Ianthi M. 2006. The acquisition of voice and transitivity alternations in Greek as native and second language. In *Paths of development in L1 and L2 acquisition*, ed. by Sharon Unsworth, Teresa Parodi, Antonella Sorace, and Martha Young-Scholten, 15–55. Amsterdam: John Benjamins.
Veselinova, Ljuba N. 2006. *Suppletion in verb paradigms.* Amsterdam: John Benjamins.
Walker, Rachel. 2014. Nonlocal trigger-target relations. *Linguistic Inquiry* 45:501–523.
Warburton, Irene. 1970. *On the verb in modern Greek.* Bloomington: Indiana University Press.
Williams, Edwin. 2003. *Representation Theory.* Cambridge, MA: MIT Press.
Wolfram, Walt. 2004a. Rural and ethnic varieties in the Southeast: Morphology and syntax. In *A handbook of varieties of English*, ed. by Bernd Kortmann, Kate Burridge, Rajend Mesthrie, Edgar W. Schneider, and Clive Upton, 281–302. Berlin: Mouton de Gruyter.
Wolfram, Walt. 2004b. Urban African-American Vernacular English: Morphology and syntax. In *A handbook of varieties of English*, ed. by Bernd Kortmann, Kate Burridge, Rajend Mesthrie, Edgar W. Schneider, and Clive Upton, 319–340. Berlin: Mouton de Gruyter.
Zwicky, Arnold M., and Geoffrey K. Pullum. 1983. Cliticization vs. inflection: English *n't. Language* 59: 502–513.

*Department of Linguistics*
*University of Chicago*
*1115 E. 58th St.*
*Chicago, IL 60637*

*merchant@uchicago.edu*