Narrow syntactic movement after Spell-out*

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1 Introduction

This paper discusses the properties and implications of head movement across a phase boundary. We provide evidence which shows that syntactic phase boundaries correspond to phonological boundaries at the word level. This claim necessitates certain assumptions. First, a non-lexicalist model such as Distributed Morphology (Halle and Marantz 1993) must be the engine behind word-formation. Morphologically complex words are formed in the narrow syntactic and post-syntactic modules of computation. Second, phonological form is mapped to syntactic elements only on the PF branch; vocabulary insertion must occur post-syntactically. Third, Spell-out to the PF and LF components occurs in cycles, or phases (Chomsky 2001, Nissenbaum 2000, Svenonius 2001, and many others). Finally, all syntactic transformations are driven by a need to check uninterpretable features, following a strict version of the Minimalist Program (Chomsky 1993). Analyses of the syntactic and phonological properties of phonologically sub-minimal affixes in Ojibwe, direct and indirect causatives in Malayalam and Malagasy, and alienable versus inalienable possession in Acholi lead us to make the following important claims regarding phases, among others: 1) phase boundaries correspond to event boundaries (or the final boundary at the end of the derivation), similar to Chomsky's (2001) equation of phases to propositions;[1] we additionally assume a parallel system in the nominal domain and that such phasal demarcations are presumably true of all languages; 2) the phasal distribution of syntactic heads has a direct effect on their phonological behavior; 3) the phase head is included in the Spell-out domain (see Michaels 2009); and 4) head movement out of a phase is possible both before and after Spell-out of that phase, depending on certain structural and featural syntactic characteristics (i.e. only heads that are phase-adjacent may extract from the phase before Spell-out, and only if they possess the relevant movement-inducing uninterpretable features). We further argue that derivational operations may manipulate constituents that have already undergone Spell-out, but that the phonological effects of such operations are highly constrained.

2 Word-internal phases without movement: the baseline

Piggott and Newell (2008) argue that syntactic phase boundaries play an important role in phonological processes at the word-level. They propose that vowel hiatus in Ojibwe (Algonquian; Northern U.S. and Canada) is resolved via *deletion* only when the offending morphemes are spelled out on the same phase cycle (1a) and that hiatus is unresolved if a phase boundary intervenes between two vowels in hiatus (1b). Note that each of the following examples represents a single word (Piggott and Travis 2010; boxed elements indicate a phase):

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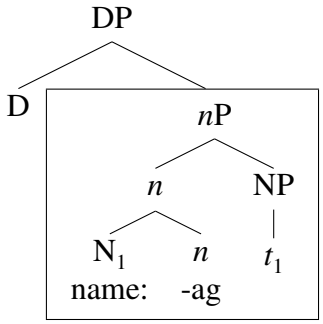
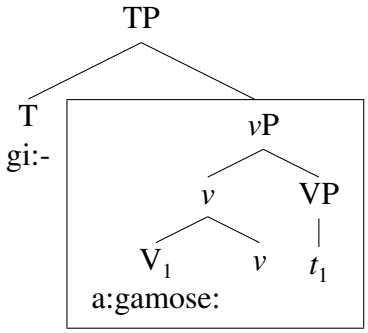
[1]Following Legate (2003), we assume, for example, that all *v*Ps are phases. See also Fox (1999), who provides semantic evidence for phases.

(1) a. name:-ag [name:g] V-deletion
sturgeon-PL
'sturgeons'



b. gi:-a:gamose: [gi:a:gamose:] no hiatus resolution
PAST-walk.in.snowshoes
's/he walked in snowshoes'



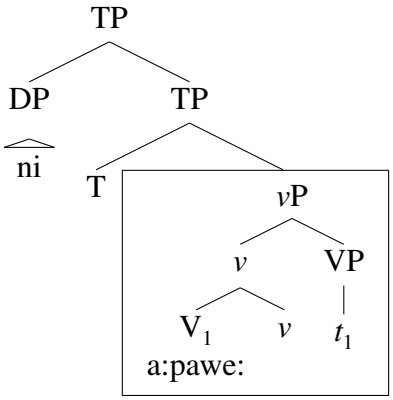
These patterns are attributed to the following condition:

(2) *Phase Integrity* (Piggott and Newell 2008)
Conditions on the well-formedness of prosodic categories are imposed on all elements that emerge within a phase α, if the elements are solely within α.

Thus, hiatus only needs to be resolved *within* a phonological phase, not across a phase boundary.

There is one condition where vowel hiatus appears to be resolved across a phase boundary. According to Piggott and Newell, this resolution occurs when elements in the higher phase do not meet a phonological phase minimality condition: they are too small to project a Pwd. This resolution is achieved via epenthesis rather than deletion.

(3) ni-a:pawe: [ni**d**a:pawe:] C-epenthesis
1S-have.nightmares
'I have nightmares'



Note that the person marker *ni* and the verb are separated by the *v*P phase boundary. Because the morpheme *ni* is a light syllable, and thus cannot stand on its own as a prosodic element, it must merge *phonologically* to the adjacent phonological phase (via a process of string-vacuous Local Dislocation (Embick and Noyer 2001), or morpho-phonological merger). Compare this with (1b), in which the morpheme *gi:* is a heavy syllable, thus being able to stand on its own prosodically and therefore not requiring morpho-phonological merger and a subsequent phonological phase-internal hiatus resolution.

Because *ni* adjoins to the adjacent phonological phase, Phase Integrity now requires that vowel hiatus be resolved. However, it is crucial that this hiatus is resolved via epenthesis, not deletion. This analysis, in addition to other research (e.g Michaels 2009, Dobler 2009), supports a generalization on phonological phases, which we summarize as follows:

(4) *Prosodic Persistence Principle* (PPP)[2]
The well-formedness of a prosodic category is preserved throughout a derivation.

The PPP requires categories like syllables, feet, PWds, etc. to preserve their legitimacy after they are projected. Hence, a category that emerges at Phase X is preserved at all subsequent phases. The result of (4) is that phonological operations occurring between tautophasal morphemes will be more "destructive" than operations occurring across a phase boundary.

Now, consider ex. (1a) again. Both *name:* and *-ag* are assigned phonology on the same Spell-out cycle. We can assume that V-deletion occurs during this Spell-out cycle, as well. Note that Vocabulary Insertion (VI) occurs from the bottom-up (we call each iteration of VI a 'stage'):

(5) Spell-out of *n*P
VI Stage 1: [name:]
VI Stage 2: [name: $^\wedge$ ag] $\rightarrow$ [name:g] (V-deletion)
End of *n*P Spell-out cycle; resulting phonological form: **[name:g]**

However, in the case of (3), there are two syntactic phases —and thus two phonological phases—, giving the following order of operations:

[2]The hypothesis that Prosodic Persistence is an inviolable principle is consistent with the evidence available to us. However, we do not absolutely rule out the possibility that it is a violable constraint (in the OT sense). In the face of evidence for its violability, it can be readily reformulated as a parameter of variation.

(6) Spell-out of *v*P
VI Stage 1: [a:pawe:]
End of *v*P Spell-out cycle; resulting phonological form: **[a:pawe:]**

Spell-out of CP
VI Stage 1: [ni]
End of CP Spell-out cycle; resulting phonological form: **[ni]**

Local Dislocation of **[ni]** to **[a:pawe:]** due to minimality violation:[3]
[**[ni]** $^\wedge$ **[a:pawe:]**] $\rightarrow$ [**ni+a:pawe:**]

Phase Integrity applies ([ni] has moved into the phonological phase of [a:pawe:]);
Epenthesis preferred to deletion as a result of the PPP:
[**ni+a:pawe:**] $\rightarrow$ [**ni̲da:pawe:**]

In the final stage in (6), the features of the already spelled-out phonological phase **[ni]** are retained during the later process of hiatus resolution (i.e. deletion of phonological features does not occur). This adherence to the PPP will occur in all instances where vocabulary insertion occurs at separate stages of the derivation.

This analysis entails that the phonological boundary between string-adjacent morphemes that are contained in different phases is stronger than the phonological boundary between tautophasal morphemes; in fact, there appears to be no phonological boundary between tautophasal morphemes. Also, phonological processes occurring between non-tautophasal morphemes will alter the phonological form of those morphemes less than similar processes occurring between tautophasal morphemes; i.e. destructive processes such as coalescence and deletion of timing units are seen more frequently between tautophasal morphemes (see Michaels 2009), whereas processes that preserve phonological information relatively more, such as assimilation and epenthesis, occur between non-tautophasal morphemes.

As argued by Michaels (2009), evidence from Malayalam (Dravidian; South India) causatives further supports the notion of the Prosodic Persistence Principle.[4] Malayalam has two forms of causatives: direct (7b) and indirect (7c) (data from Mohanan 2005:71).[5]

(7) a. booṭṭə muŋŋ-i
boat sink-PAST
'The boat sank.'

b. kuṭṭi booṭṭə mu-kk-i
child boat sink-CAUS-PAST
'The child sank the boat.'

Underlying representation (UR) of direct causative: /muŋŋ-kk-i/ (nasal deletion on stem)

c. kuṭṭi booṭṭə muŋŋ-icc-u
child boat sink-CAUS-PAST

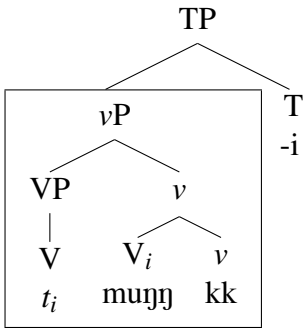
[3] A condition on phonological phase minimality can only be evaluated after VI on the entire phase is complete.
[4] See Marantz (2007) for more on similar word-level effects of syntactic phases.
[5] We avoid using the terms "lexical" vs. "syntactic", as we assume that all causatives are syntactic under DM. However, we do adopt the l-syntax vs. s-syntax distinction of Hale and Keyser (1993).

'The child caused the boat to sink.'

UR of indirect causative: /muŋŋ-kk-i/ (epenthesis of *-i-* between stem and affix)

Each is formed using the same affix, *-ikk*. The underlying representations of the morphemes of both the direct and indirect causative verbs are identical, but their overt surface forms differ in that fusion of the stem and affix only occurs in direct causatives. This distinction can be attributed to the fact that the indirect and direct causative morphemes are merged in a separate phase from the root, or in the same phase, respectively. Following Fodor (1970) and Shibatani (1972, 1976), an indirect causative consists of two separate events, whereas a direct causative consists of only one; the indirect causative morpheme is merged in the higher event, outside of the event containing the root, while the direct causative morpheme and the root are, necessarily, merged in the same, unique event. Recall that under our formulation of phases, event boundaries (represented here as *v*Ps) correspond to phase boundaries. Therefore, the direct causative morpheme is merged within the same phase as the stem. As a result, both morphemes are assigned phonology on the same Spell-out cycle. This allows them to be subject to destructive phonological processes such as fusion, based on the PPP.

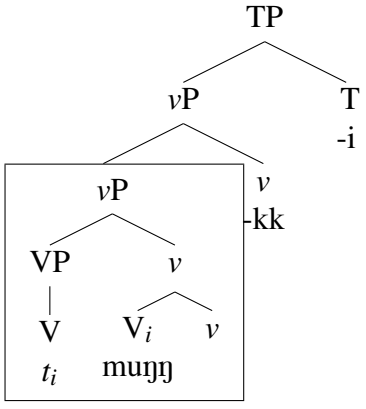
(8) *Direct causative*



Stem and affix are spelled out on the same cycle, allowing for destructive phonology—i.e. nasal deletion—on the stem, forming *mukki*.

The indirect causative morpheme, on the other hand, is merged in a different phase from the stem. The PPP therefore prohibits the indirect causative morpheme from bringing about phonologically destructive processes on the stem (relative to the processes available in the language).

(9) *Indirect causative*



Stem is spelled out on lower phase. Thus, its phonological form is maintained on subsequent Spell-out cycles—i.e., nasal deletion does not occur on the stem, which forms *muŋŋiccu* after epenthesis.[6]

3 Word-internal phases: post-Spell-out movement

In the last section we discussed the outcome of the word-internal Spell-out of phases in constructions where head movement does not (obviously) occur. In derivations that include head movement, there is potential for interaction between the operations of Spell-out and head movement. Below we offer evidence that there are two types of interactions that do occur and that these interactions are visible in the phonological output of a derivation.

Head movement may occur before Spell-out. We argue that this movement allows a head to escape Spell-out within the phase into which it is originally merged (contra Embick 2010). Consider a derivation [w[x[y[z]]]], */w/* and */y/* being phase heads, where */z/* moves to */x/*. In the resulting structure, [w[z-y-x[*y*[*z*]]]], both */y/* and */z/* escape Spell-out in the phase headed by */y/*. They, along with */x/*, are spelled out in phase */w/*.

On the other hand, head movement may occur after Spell-out. Note that this option does *not* imply that head movement in the syntax may apply to phonological objects. Consider again the derivation [w[x[y[z]]]]. If, upon the merger of */y/*, */z/* does not undergo head movement, it will undergo Spell-out in the phase headed by */y/*. We assume in this case that both */y/* and */z/* are sent to PF. Here it is useful to clarify the details of the Spell-out operation. We propose that the operation of PF (and, although not discussed in depth in this paper, LF) interpretation is similar to the copy operation that occurs in the narrow syntax as a component of the operation Move. Therefore, the structure [y[z]] is copied to the PF branch, leaving its original structure intact in the narrow syntax. It is the PF copy that undergoes morphological and phonological operations. The narrow syntax consists always and only of structures built upon terminal nodes of syntactic feature bundles. This being the case, it is possible for heads in the narrow syntax to be targeted for movement operations after their copies have undergone PF interpretation. Therefore, in the derivation [w[x[Y[Z]]]], where small caps indicate heads that have already been copied to PF, should */x/* target /Z/ for movement, the resulting structure would be [w[Z-Y-x[Ɏ[Ƶ]]]]. At the Spell-out of the phase headed by */w/*, /Z/ and /Y/ will be subject to the PPP.[7]

3.1 Malagasy

The above analyses of Ojibwe and Malayalam demonstrate the phonological effects of Spell-out on tautophasal and non-tautophasal subparts of words, but we have not yet seen evidence that head movement can take place after a subpart of a word has been spelled out. In Malayalam causatives, there is no obvious syntactic evidence that the productive causative has undergone head movement. Malagasy (Austronesian: Madagascar), however, provides syntactic evidence that head movement can target spelled-out material.

As a first step, we note that Malagasy causative morphology shows some of the same effects as Malayalam morphology. Like in Malayalam, the causative morpheme is the same for the direct and the indirect causative, but triggers a different phonological process depending

[6]It is possible that the stem continues raising in this structure, though there is no irrefutable evidence to support this. We will see a case of the interactions of demonstrable movement and Spell-out in the following section.

[7]Movement after Spell-out may alter the syntactic address of a determined phonological form (i.e. its linear precedence relations with other syntactic units in the PF string) upon a later Spell-out cycle, as all overt syntactic movement may affect phonological order, but, as stated, this form is subject to the PPP.

on its function. Unlike Malayalam, Malagasy has a richer set of morphemes and a more articulated morpheme structure that provides further information as to the phrase structure of the productive causative.

Starting with the root *fatra* 'measure', we can see that either the causative morpheme *an-* or the unaccusative/reflexive morpheme *i-* can be added, resulting in the following meanings and forms.[8]

(10) *m-i-fatra* *mifatra* 'to be measured' Abinal and Malzac (1988: 158)
m-an-fatra *mamatra* 'to measure'

Note that the nasal of the causative and the *f-* of the root coalesce. To create an indirect causative, further material is added to these forms. First there is a morpheme *f-* which has been argued to occur in a head that indicates the edge of an event (see Travis 2000). Then an additional causative morpheme is added to introduce the causer argument, creating the following indirect causative of the direct causative.[9]

(11) *m-an-f-an-fatra* *mampamatra* 'to make measure' (RH, JJ, VR: July 2011)

Of note here is that when the indirect causative morpheme is attached to an *f*-initial stem, instead of fusion we have prenasalization. As in Malayalam, addition of the direct causative morpheme results in more destructive phonology than addition of the indirect causative. Unlike Malayalam, we can see evidence for both processes in one form. From these data, we hypothesize that there is a head, E, that demarcates the edge of an event and the edge of the first phase. This lower event is sent to Spell-out and material is subsequently added to this phonological phase edge.

Having established that Malagasy indirect causatives contain a phase boundary within them, indicating that a subpart of the word has been spelled out, we now turn to evidence that this head has undergone head movement subsequent to Spell-out. The relevant example is given below.[10]

(12) Ampamaran-dRakoto mpivarotra ny menaka.
AN-F-AN-FATRA-ANA-Rakoto seller/s DET oil
'Rakoto makes sellers measure the oil.' (oil = subject)
(VR: July 2011)

Here we have a form of the verb (Circumstantial Topic form) that allows the Theme of the embedded predicate to be the subject of the clause. As expected, the matrix Agent, the causer, appears adjacent to the verb. Guilfoyle et al. (1992) argue that the Agent has remained in its merged position (perhaps Spec,*v*P in present terms) and the verb has undergone head movement to a position in the inflectional domain of the clause.

The construction in (12) suggests that there is post-Spell-out head-movement, but there is an alternative analysis that we need to rule out. Remnant XP movement can look in many ways like head movement (see e.g. Massam 2001) and Malagasy is a language known to have VP movement (Pearson 2000, Rackowski and Travis 2000). Malagasy, however, provides a test to

[8]The word initial *m-* is part of the tense/voice system.

[9]References show the initials of the consultants.

[10]The word order of Malagasy is V-Agt-O-S. When the Agent is not the subject, it is attached to the verb by a process called which Keenan (2000) terms N-bonding. There is a debate about the true status of the subject in Malagasy and related languages which is orthogonal to the discussion here (see e.g. Schachter 1976, 1996, Pearson 2005). Forms ending in *ka/tra/ana* undergo morpho-phonological processes when suffixed. *fatra+ana* → *farana* (see Erwin 1996).

distinguish between V and VP movement. Only V movement can leave behind an indefinite object. Movement over an adverb is assumed to be VP movement since the indefinite object must remain adjacent to the verb (see (13a) vs. (13b)).

(13) a. mamatra (ny) menaka foana ny mpivarotra.
m-an-fatra DET oil always DET seller/s
'The sellers always measure (the) oil.'

b. mamatra foana *(ny) menaka ny mpivarotra.

(RR, JJ, VR: July 2011)

Movement over the Agent in Spec,*v*P is assumed to be head movement since in this case, an indefinite object may be left behind.[11]

(14) amaran-dRakoto (ny) menaka ny mpivarotra
AN-FATRA-ANA-Rakoto DET oil DET seller/s
'Rakoto measures (the) oil for the sellers.'
(RR, JJ, VR: July 2011)

The indirect causative construction can be tested in a similar manner. In this case, an indefinite causee cannot be separated from a verb by an adverb (as in ((15)), but it can follow an Agent, the causer in this construction, as we saw in (12) above.

(15) mampamatra foana *(ny) mpivarotra ny menaka Rakoto.
M-AN-F-AN-FATRA always DET seller/s DET oil Rakoto
'Rakoto measures (the) oil for the sellers.'
(RR, JJ, VR: July 2011)

The phonology indicates that the indirect causative must be spelled out after the event edge morpheme *f-* is added. We know that this morpheme is added before the indirect cause morpheme and the causer argument are added to the structure. The result is that head movement over the causer must occur after the subpart of the indirect causative is spelled out, i.e. head-movement must be able to follow Spell-out.

3.2 Taking stock

The evidence from Ojibwe, Malayalam, and Malagasy supports the idea that syntactic Spell-out cycles have clear effects on phonological processes. Furthermore, these data suggest that movement out of a phase does not negate these effects. In other words, even if a head moves out of its phase after Spell-out, the phonological effects of the phase boundary persist.

The above analyses have some important implications for syntactic derivation and Spell-out. First, looking closely at the derivations above, it is clear that a phase head is included in the Spell-out domain of the phase, contra previous models under which only the complement of the phase head undergoes Spell-out (e.g. Chomsky 2001, Nissenbaum 2000). Second, movement after Spell-out occurs. This post-Spell-out movement does not destroy the operations performed on the PF branch at an earlier phase.

[11] In this example, the Circumstantial Topic form of the verb is used and a Benefactive argument is in the subject position.

The question to ask now is whether it is always the case that different phonological behaviours of identical morphemes correspond to a difference in the presence or absence of a phase boundary. We argue below, as above, that this is the case, but question whether head movement can mask the effects of a syntactic phase boundary. First, let us expand upon the correlation between phonological differences and syntactic complexity. Then we will reconsider the interaction of movement and phase boundaries.

3.3 Alienable vs. inalienable possession

Crosslinguistic data from alienable and inalienable possession suggest a correspondence between the amount of syntactic structure and differing phonological processes.

In languages that make the distinction, the phonological boundary between the possessive morpheme and the possessed noun is stronger in alienable possession than in inalienable possession. The following data from Acholi (Luo; Uganda) illustrate this distinction (Bavin 1996):[12]

(16) V-final stem: inalienable or alienable

obo-ni → [oboni]
lung-your
'your lung' (part of your body *or* an animal's organ that belongs to you)

(17) C-final stem: Inalienable (destructive phonology)

a. dog-na → [doga]
mouth-my
'my mouth' (part of my body)

b. tik-na → [tika] or [tixa]
chin-my
'my chin'

(18) C-final stem: Alienable (non-destructive phonology)

a. ot-na → [otna] or [odda]
house-my
'my house'

b. buk-na → [bukna] or [bukka], *[buxa]
book-my
'my book'

(19) C-final stem: Inalienable and Alienable

a. bad-na → [bada]
leg-my
'my leg' (part of my body)

b. bad-na → [badna]
leg-my
'my leg' (e.g. part of a slaughtered animal that I have been given)

[12]For similar patterns in other languages, see Dobler (2008).

We suggest here that inalienably possessed noun roots are spelled out on the same cycle as their possessors, whereas alienably possessed nouns are not. We argue that this is due to the presence of an additional functional projection in alienable possession that disallows the possessive morpheme and the root from being spelled out on the same cycle. Evidence from Ojibwe possession supports this claim. In this language, an additional overt possessive marker can only appear in alienably possessed nouns:

(20) *Alienable possession: Ojibwe*

a. ni-wa:bigon-**im**
1P-flower-POSS
'my flower'

b. ni-wa:bigon-∅
1P-flower-∅
'my flower'

(21) *Inlienable possession: Ojibwe*

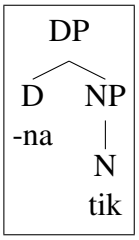
a. *ni-da:nis-**im**
1P-daughter-POSS
'my daughter'

b. ni-da:nis-∅
1P-daughter-∅
'my daughter'

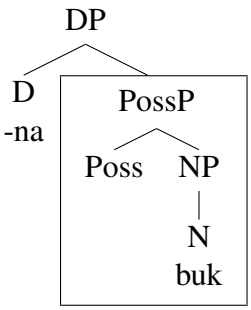
We represent this generally as follows (but note that we will revise this slightly in §4).[13]

(22) Acholi

a. *Inalienable: [tixa]* (destructive phonology)



b. *Alienable: [bukna]* (non-destructive phonology)



The availability of destructive phonological processes between morphemes corresponds with the absence of additional syntactic structure between those morphemes. Conversely, the presence of additional syntactic structure between morphemes corresponds with the

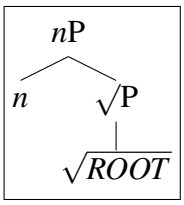
[13]We assume that the possessor is a *pro* in Spec,DP and that the suffix signals agreement with this argument.

unavailability of destructive phonological processes, i.e. the PPP.

4 A problem with multiple phases

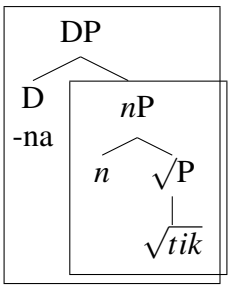
In the previous discussion, we have argued that a root+affix constituent may consist of two phases, with each morpheme being generated in a separate phase, or it may consist of one phase, with all morphemes being merged in the same phase. However, it has been argued by Newell (2008), following the work of Marantz (2007) and others, that the structures we are dealing with contain more phases than have been proposed here. For example, a categoriless root will be defined as a noun only by virtue of merging with an *n* phase head, as follows:

(23)



In the case of inalienably possessed nouns, there must therefore be two phases, where *n*P defines the root as a noun, and DP introduces the possessor. Given this, we might never expect destructive phonology to occur between a determiner and a noun root, contrary to our claim in the previous section. The following would be the structure of an inalienably possessed noun under this view (this tree does not reflect movement).

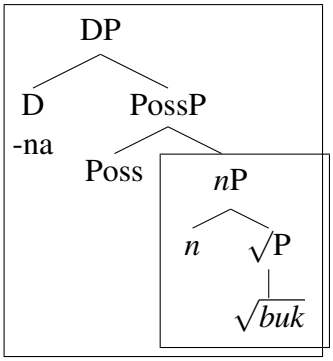
(24) [*tixa*] 'my chin' (inalienable)



The presence of a phase boundary in (24) predicts that destructive phonology between the root and affix is impossible, contrary to fact. This problem is resolved if D, rather than *n*, is the category-defining head in cases of inalienable possession–as there would again be only one phase, but here we will explore the possibility that the structure in (24) is the correct one. We must therefore allow for some mechanism by which the root and the affix are spelled out on the same cycle.

Given the structure in (24), the only possible way to derive this is if the root can escape Spell-out of the *n*P phase. Recall that we have argued for more syntactic structure in those cases that display less destructive phonology. Maintaining this view, we propose the structure in (25) for an alienably possessed noun, following the model currently under consideration (again, no movement is represented):

(25) [*bukna*] 'my book' (alienable)



The problem here is that, in both (24) and (25), the possessive morpheme in D is contained in a separate phase from the root.[14] Under our analysis there should be no difference in the phonological interaction of the root and D in these two structures.

4.1 Triggered Spell-out

In this section we will propose a solution to the above problem. If pre-Spell-out head movement is permitted, a morpheme could escape Spell-out within the phase in which it is merged. Also, we would need to offer a principled distinction between those derivations in which post- and pre-Spell-out movement occurs.

Note that D takes the *n*P phase as its complement in inalienable (24), but not in the alienable (25) constructions. Let us assume that D consistently targets the noun for movement in both (24) and (25). If D were to target its nominal complement for movement before *n*P underwent Spell-out, but had restrictions on locality, we would see a difference in the phase Spell-out patterns between alienable and inalienable constructions. In this vein, we posit the following model of Spell-out:[15]

(26) *Triggered Spell-out*
A phase *n* only begins the process of Spell-out once a head from phase *n+1* is merged or the end of derivation is reached. No other head is merged until Spell-out of phase *n* is complete.

A head that merges directly with a phase—what we term a "Spell-out trigger" (Skinner 2009)—may extract a head from that phase in a feature-checking operation before the phase undergoes Transfer to the PF branch.

4.2 Alienable vs. inalienable possession revisited

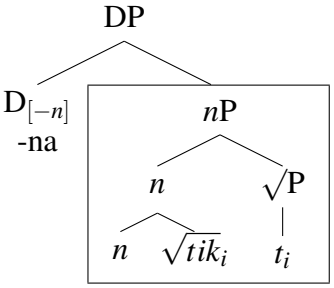
In the case of inalienable possession, the possessive morpheme in D merges directly with the *n*P phase as follows (we here represent standard root-to-*n* movement):

(27) [*tixa*] 'my chin' (inalienable) → *movement before Spell-out*

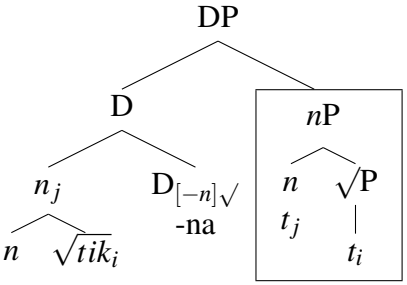
a. D merges with *n*P, triggering *n*P for Spell-out

[14] It is now unimportant whether PossP itself constitutes a phase in (25) (for the examples under consideration here), since this would simply create a second phase boundary between the overt morphemes [*buk*] and [*-na*].

[15] Note that Svenonius (2004) also proposes a triggering model of Spell-out. While the model proposed here differs somewhat from his, it is possible that the two can be made compatible.



b. D raises *n* for feature-checking before *n*P is transferred to PF



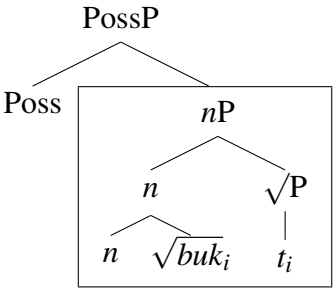
PF representation of *n*P after Spell-out: ∅

In (27), the root [*tik*] escapes the Spell-out cycle of *n*P, and so will be assigned phonology on the same Spell-out cycle as the affix, thus allowing for destructive phonology. In this way, movement before Spell-out can negate the phonological effects of a syntactic phase boundary.

In the case of alienable possession, the features do not change, but it is the additional Poss head that is the Spell-out trigger for *n*P, as follows:

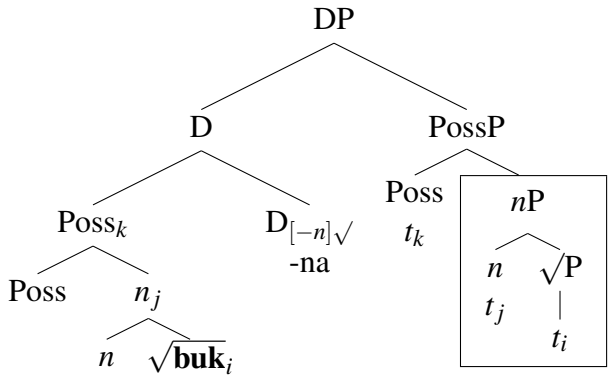
(28) [*bukna*] 'my book' (alienable) → *movement after Spell-out*

a. Poss merges with *n*P, triggering *n*P for Spell-out; Poss has no features to check, and so *n* remains *in situ* during Spell-out of *n*P



PF representation of *n*P after Spell-out: [**buk**]

b. Spelled-out head later moves to D once it is merged; PPP applies to stem



The scenario in (28) illustrates movement after Spell-out. As D is not the Spell-out trigger, the Spell-out cycle of *n*P is complete before D merges and raises the noun. Therefore, though D may target the phase head *n* for movement in (28), it may only do so after phonological features have already been mapped to the morpheme(s) in *n*.

There is data from Tawala (Austronesian: Papua New Guinea) that supports our conclusion that inalienable possession is associated with head movement. As we can see in (29a) and (29b) below, when the head noun in a possessed construction is alienably possessed (29a), it is preceded by a separate particle that agrees with the possessor. When the noun is inalienably possessed (29b), the agreement marker appears as a suffix on the head.[16]

(29) a. Peuka a wam
Peuka his boat
'Peuka's boat'

b. Yailo natu-na
Yailo child-his
'Yailo's child'

(From Ezard 1997: 150)

The following table makes the relationship between the particle and the suffix clear:

(30)

PERSON/NUMBER	POSSESSIVE PRONOUNS	POSSESSIVE ENCLITICS
1SG	*u*	*-u/-we*
2SG	*om/am*	*-m*
3SG	*a*	*-na*
1.PL.INC	*ata/ita*	*-ta*
1PL.EXC	*i*	*-(i)yai*
2PL	*omi*	*-mi*
2PL	*hai*	*-ni*

Ezard 1997: Table 3

[16]Ezard (1997) gives other cases where there is an alternation, notably in the difference between internal and external arguments ('his love' = someone's love for him vs. his love for someone; '*x*'s preaching' = preaching about *x* vs. *x*'s preaching about *y*). While this might suggest that inalienables are internal arguments that have not moved out of the phase, we take this evidence in a different direction. We conclude that internal arguments are similar to inalienable possessors in that they are true arguments of head nouns and, when in Spec,DP position, they require movement of the head noun to D.

We propose that the two constructions are related by head movement. Adapting a schema from Ezard's grammar for our own purposes, we assume that the two structures have the following analysis where there is head movement in the inalienable construction.

(31)

ALIENABLE:	(POSSESSOR NP)	AGR	POSSESSED NOUN
INALIENABLE:	(POSSESSOR NP)	POSSESSED NOUN-AGR	<POSSESSED NOUN>

To summarize, only a head that triggers Spell-out may raise a phase head before that phase head is assigned phonological features. In this case, the PPP does not apply to the phase head, and so destructive phonological processes may apply to that head. A non-triggering head may raise a phase head after Spell-out, but the PPP applies to the morphemes in the phase head that has already undergone Spell-out.

5 Conclusion

The above discussion and analysis raises interesting questions for the syntax-phonology interface at the word level, as syntactic phase cycles have a direct effect on word-internal phonology. We argue that phonological distinctions reflect neither a tendency for phonology to be unprincipled with regard to syntactic structure, nor a lexical/syntactic divide. Phonological effects like those seen here can help us to better refine the architecture of syntactic derivation and Spell-out. Knowing the structure and featural makeup of the morphemes in a derivation allows us to predict phonological phenomena. Equally, once it is clear that phonology and syntax mirror each other in this way, we can use phonological output as a window into syntactic structure.

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