

Phase locality in Distributed Morphology and two types of Icelandic agent nominals*

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1. Introduction

Recent work in Distributed Morphology (DM) proposes an important role for phase theory in constraining special realization of morphemes at the interfaces in contextual allomorphy (Embick 2010) and polysemy resolution (Marantz 2013).¹ Our case study on verb-derived agent nominals (VAN) (1a) and root-derived agent nominals (RAN) (1b) in Icelandic supports this line of research and provides a novel type of argument by showing that Icelandic palatalization applies if and only if the undergoing morpheme is phase-local to the trigger. If our analysis is on the right track, any analysis of segmental phonology like palatalization potentially requires an understanding of syntax and semantics. The findings are interesting because they suggest that surface-oriented phonological processes within a word are constrained by the same universal principles as superficially unrelated phenomena like locality constraints on syntactic displacement; island constraints and palatalization may play by the same rules.

Our core data and their analysis are shown in (1). We examine Icelandic agent nominals with the *n*(ominalizer) *-and*, as in *leik-and-i* ‘actor’ (1a), and contrast them with other agentive nominalizers such as *-ar* in *leik-ar-i* ‘actor’ (1b). We crucially argue that *-and* is the phonological exponent of a nominalizer which merges outside a \emptyset *v*(erbalizer) even if other agent nominals in the language do not (always) involve a verbal layer.

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¹This current phase-theoretic approach is related to a general line of work which aims to capture the differences between interactions which are close to the root and further away from the root. See, for example, Harley (1995, 1996, 2008) on Japanese causatives and related work.

- (1) a. VAN: *leik-and-i* ‘actor’ b. RAN: *leik-ar-i* ‘actor’
- ```

 n
 / \
 n nInfl
 / \ |
 v n -i
 / \ |
v- PLAY -and
leik Ø

```

```

 n
 / \
 n nInfl
 / \ |
n- PLAY -i
leik -ar

```

It is crucial for our analysis that Icelandic agent nominals with *-and* always contain *v* as in (1a) and in this paper we will review several pieces of evidence in support of this proposal. However, it should be noted that it is not crucial for us that the absence of *-and* always entails the absence of *v*.<sup>2</sup> In (1), the nominal inflection element *nInfl* is analyzed as a dissociated morpheme on the nominalizer (PF adjoined, see Embick 1997). The analysis of *nInfl* is unimportant in the paper and everything we say is compatible with the alternative that our *nInfl* is a functional head on the nominal spine like Num(ber) (see Julien 2005). Our analysis will be elaborated below.

The paper has three main sections. Section 2 presents the theory of phase locality in Distributed Morphology. This theory is the theoretical basis of our study. Section 3 presents evidence for the *v*-layer in (1a) and section 4 shows how a generalization in terms of phase cyclicity accounts for the distribution of Icelandic palatalization. Section 5 concludes.

## 2. Phase locality in Distributed Morphology

We assume that syntactic structures are sent cyclically to the interfaces, by phase (Chomsky 2000, 2001). Phase boundaries are defined by specific heads in the syntax. In the Distributed Morphology framework, we assume that all syntactic heads are morphemes.

### (2) Phases

Category-defining heads, at least *v*, *n*, *a* (Marantz 2001, 2007), and *C*, and possibly others, trigger Spell-Out of their complements; they are the phase heads. These phase heads are often realized as “derivational morphemes”.

The operation Spell-Out causes the complement of a phase head to be pronounced and interpreted. Spell-Out deactivates the material which was spelled out. Deactivated material has no syntactic features and the rest of the derivation can only interact with such featureless material in very restricted ways. We say that a head *Y* is invisible to a head *X* if *Y* has been deactivated when the derivation is working on *X*. This invisibility effect is referred to as the Phase Impenetrability Condition (PIC) (Chomsky 2000). We assume the second

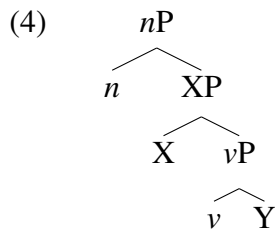
<sup>2</sup>The paper is concerned with the structural distinction in (1). There is much more to be said about various aspects of the structure of agent nominals within and across languages and many of the relevant issues are beyond the scope of the paper (see, for example, Grimshaw 1990, Alexiadou & Schäfer 2010, Roy & Soare 2013, 2014).

version of PIC (PIC2) from Chomsky (2001). According to this version, Spell-Out is triggered when the next higher phase head is merged. The visibility effects of PIC2 can be summarized as follows.

(3) **Phase locality (assuming PIC2)**

A phase head cannot see morphemes across the next phase head. A non-phase-head can see morphemes across (just) the next phase head.

The first part of (3) is equivalent under PIC and PIC2 and this is the only part our data bear on. However, PIC2 and the corresponding second part of (3) are required in the current theory because roots can in general interact with functional material above  $v$  on a morpheme-specific basis. For example, root-specific T(ense) allomorphy in English requires the root and T to be visible to each other (see Embick 2010 for details). The overall visibility effects of PIC2 can be further explained with an example.



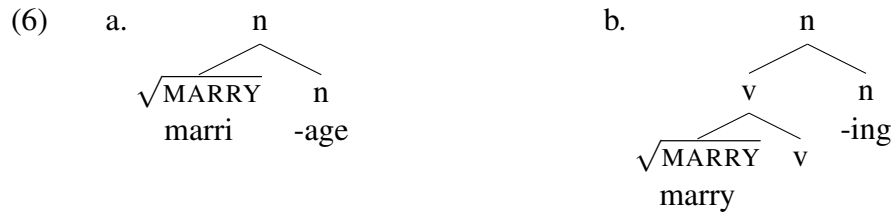
In 4,  $n$  and  $v$  are cyclic (phase) heads, whereas  $X$  and  $Y$  are not. Because of (3),  $n$  sees  $X$  and  $v$  but it does not see  $Y$ . In contrast,  $X$  sees  $v$  and  $Y$ .

We are interested in the effects of phase locality on morphology and meaning and we first consider contextual allomorphy. Contextual allomorphy refers to a situation where allomorph selection for a morpheme depends on the properties of another immediately local morpheme. For example, it is a case of contextual allomorphy that the English past T(ense) is pronounced as  $\emptyset$  in the context of the root  $\sqrt{\text{PUT}}$  but as  $-d$  in the context of  $\sqrt{\text{WALK}}$ . Contextual allomorphy depends on phase locality.

(5) **Phase locality and morphology** (Embick 2010)

Conditions on contextual allomorphy cannot be stated in terms of invisible (inactive) material.

The consequences of (5) can be observed in differences between gerunds and derived nominals in English. It is a well motivated analysis that gerunds like *marrying* are verbs on the inside but that no such verbal layer is present in a corresponding derived nominal like *marriage*. The evidence for  $v$  in a gerund includes compatibility with verb-adjoined adverbs and accusative objects (Chomsky 1970, Marantz 1997). In the current type of a theory, the two respective structures are as shown below.



According to (5), the root and the nominalizer can condition allomorphy on each other in a derived nominal (6a). In contrast, the nominalizer and the root cannot condition allomorphy on each other in a gerund (6b) because *v* is an intervening phase head. The prediction is borne out.

| (7) | (derived) nominal | gerund      |
|-----|-------------------|-------------|
|     | marri-age         | marry-ing   |
|     | destruct-ion      | destroy-ing |
|     | refus-al          | refus-ing   |
|     | confus-ion        | confus-ing  |

The table in (7) shows evidence of root-specific nominalization morphology in derived nominals. Gerunds are sharply different. They always show the *-ing* morphology. These facts support the view that contextual allomorphy depends on phase locality.

Having considered the morphological effects of phase locality, we turn to meaning. According to Marantz (2013), the phase heads are the locus of subset operations in polysemy resolution. The hypothesized empirical effect is as follows.

- (8) **Phase locality and meaning** (Marantz 2013; see also Arad 2003, 2005)  
 A meaning of a root that has been excluded at an inner phase head is unavailable at an outer phase head.

The effect can be illustrated with an example from Marantz. The English root  $\sqrt{\text{GLOBE}}$  has (at least) the two interpretations below.

- (9) a.  $\sqrt{\text{GLOBE}}$  ‘abstract sphere, something spherelike’  
 b.  $\sqrt{\text{GLOBE}}$  ‘the world’

Recall that all category-defining heads are hypothesized to be phase heads. We can make the noun *globe* from  $\sqrt{\text{GLOBE}}$  by merging a nominalizer as in (10a). Both meanings are available for the nominalized structure. In contrast, the adjective *global* in (10b) only retains the ‘spherelike’ meaning. Once a particular interpretation of the root has been ruled out at a phase head, it cannot be brought back. This means that any structure derived from the adjective is restricted to the ‘spherelike’ meaning. The meaning of the verb *globalize* in (10c) is consistent with this prediction. It does not mean ‘make something spherelike’.

- (10) a. **Noun:**  
       ✓ ‘spherelike’  
       ✓ ‘world’  
            $n$   
        $\sqrt{\text{GLOBE}}$   $n$   
                    $-\emptyset$
- b. **Adjective:**  
       \* ‘spherelike’  
       ✓ ‘world’  
            $a$   
        $\sqrt{\text{GLOBE}}$   $a$   
                    $-al$
- c. **Adjective-derived:**  
       \* ‘spherelike’  
       ✓ ‘world’  
            $v$   
        $\sqrt{\text{GLOBE}}$   $a$   $v$   
                    $\sqrt{\text{GLOBE}}$   $a$   $-ize$   
                            $-al$

Formalizing the semantics, the root  $\sqrt{\text{GLOBE}}$  is compatible with a set of denotations and we can write this set as  $\{ \llbracket \sqrt{\text{GLOBE}}_1 \rrbracket, \llbracket \sqrt{\text{GLOBE}}_2 \rrbracket \}$ . At the LF interface, either one of (11) can be inserted for  $\sqrt{\text{GLOBE}}$ . At the root-level, anything goes in terms of denotation selection but surrounding structure is entropy reducing and the range of options is permanently reduced at Spell-Out to whatever is still compatible with the derivation.

- (11) a.  $\llbracket \sqrt{\text{GLOBE}}_1 \rrbracket = \lambda x . \text{spherelike}(x)$   
       b.  $\llbracket \sqrt{\text{GLOBE}}_2 \rrbracket = \lambda x . \text{world}(x)$

This mechanism for polysemy resolution at the root level resembles contextual allosemy for functional heads as developed by Wood (2015) and Myler (2014) and the mechanism is compatible with such a system. Our formalization, if adopted, can be viewed as an elaboration of the special case of roots in a semantics with late insertion at LF.

The system we have described in this section makes clear predictions about the consequences of phase heads for morphology and meaning. Having established our theoretical assumptions, we now turn back to the unpronounced  $v$  in Icelandic *-and* nominals which is the key element in our analysis.

### 3. The $v$ -layer in *-and* nominals

Our proposed structures are repeated in (12) below. As shown, we analyze the nominalizer *-and* as being outside a  $v$  and the nominalizer *-ar* as being the closest category-defining head to the root. The crucial property of the analysis is the presence of a  $\emptyset$   $v$ (erbalizer) inside agent nominals with *-and* morphology.<sup>3</sup> This section presents several pieces of evidence in support of this  $v$ -layer.<sup>4</sup>

<sup>3</sup>Our analysis is compatible with there being more functional structure in agent nominals (see Alexiadou & Schäfer 2010) as long as the added structure does not introduce phase heads other than  $v$  and  $n$ .

<sup>4</sup>It should be noted that the kinds of diagnostics which are available are constrained by the fact that we are analyzing agent nominals. Certain types of evidence for  $v$  in English gerunds are unavailable for our data, including verb-adjoined adverbs and accusative objects. We assume that the range of appropriate diagnostics is affected by independent differences between gerunds and agent nominals.

- (12) a. VAN: *leik-and-i* ‘actor’      b. RAN: *leik-ar-i* ‘actor’
- n

  n      nInfl

      -i

      v      n

      √PLAY    -and

      leik      ∅

n

  n      nInfl

      -i

      √PLAY    n

      leik      -ar

First, VAN inherit requirements for thematic objects from corresponding verbs even if agent denoting nouns do not in general impose such requirements. If a verb demands a thematic direct object and the object is not recoverable from the context, the corresponding VAN requires the object to be expressed somehow (by incorporation, a genitive, a PP, etc.). A verb like *selja* ‘to sell’ and a VAN like *selj-and-i* ‘seller’ are an example of this type of a verb-VAN correspondence. The verb *selja* ‘to sell’ requires a direct object theme which expresses the thing being sold. Therefore, omitting object incorporation is infelicitous in the VAN in (13a) (note that *-end* is the plural form of *-and*). In contrast, it is acceptable in (13b) to omit the incorporated object with *söllumenn* ‘salesmen’.

- (13) (Context: John answers the door when somebody rings the doorbell and then he brings his mother to the door and introduces her to the visitors. They were not expecting visitors and did not know in advance why the visitors are here.)
- a. Þessir #(bók-a-)selj-end-ur      vilja tala við þig.  
 these #(book-LM-)sell-NMLZ.PL-MASC.NOM.PL want talk with you  
 ‘These #(book) sellers want to talk to you.’
- b. Þessir (bók-a-)söllumenn      vilja tala við þig.  
 these (book-LM-)salesmen.MASC.NOM.PL want talk with you  
 ‘These (book-)salesmen want to talk to you.’

The examples above are evidence that Icelandic agent nominals with the *-and* nominalizer inherit thematic properties with corresponding verbs even if other nouns with a similar meaning do not necessarily pattern the same. It should be noted that the discourse context is important for the examples in (13). Recoverability from context correlates with the availability of implicit objects of verbs and the same holds for our VAN. If it is easy to guess what the object is, it is relatively easier to omit the object. For this reason, (14) is infelicitous out of the blue but more natural if Mary and John just walked into the office of a real estate agent.

- (14) Mary and John are here to sell.

Our context in (13) is supposed to guarantee that it is difficult to guess what is being sold in order to exclude situations in which implicit objects are natural. See Glass (2014) for references and an insightful empirical study of this effect.

Following Marantz (2013), we assume that phase heads, including the category-defining heads  $v$ ,  $n$ ,  $a$ , are the locus of subset operations over possible meanings (denotations) in polysemy resolution when determining the meaning of a lexical root in context. The  $\sqrt{\text{GLOBE}}$  examples in the preceding section are examples of such subset operations. We formalize the effect by saying that a denotation which is excluded at an inner phase head is unavailable at outer phase heads.

It is an important aspect of our analysis that the formal semantics explains the distribution of implicit themes. In the case of  $\sqrt{\text{SELL}}$ , the root is compatible with an explicit or an implicit object,  $\{\llbracket \sqrt{\text{SELL}}_1 \rrbracket, \llbracket \sqrt{\text{SELL}}_2 \rrbracket\}$ , shown in (15). The  $v$  head excludes (15b).

- (15) a.  $\llbracket \sqrt{\text{SELL}}_1 \rrbracket = \lambda x . \lambda e . \text{sale}(e) \ \& \ \text{theme}(e,x)$  (With explicit theme)  
 b.  $\llbracket \sqrt{\text{SELL}}_2 \rrbracket = \lambda e . (\exists x) \text{sale}(e) \ \& \ \text{theme}(e,x)$  (With implicit theme)

Our formal semantics explains why an outer  $n$  in (13a) requires the theme argument to be expressed overtly or supplied by context whereas it can be left implicit in (13b). In effect, we propose that the same mechanism is responsible for canonical polysemy resolution and thematic requirements associated with roots.

Our second piece of evidence comes from the fact that for each VAN there exists a corresponding verb (such as *leik-a* ‘to play’ for *leik-and-i*). That is indeed what our analysis of *-and* nominals being verb-derived predicts. If a structure is derived from a verb, then that verb must exist. A corresponding verb exists for many of the RAN (e.g., *leik-a* for *leik-ar-i*), but that is not always the case, see (16):

| (16) | RAN                           | Non-existing verb | Noun with the same root  |
|------|-------------------------------|-------------------|--------------------------|
|      | <i>apótekari</i> ‘pharmacist’ | * <i>apóteka</i>  | <i>apótek</i> ‘pharmacy’ |
|      | <i>borgari</i> ‘citizen’      | * <i>borga</i>    | <i>borg</i> ‘city’       |
|      | <i>pönkari</i> ‘punk rocker’  | * <i>pönka</i>    | <i>pönk</i> ‘punk music’ |
|      | <i>sjóari</i> ‘seaman’        | * <i>sjóa</i>     | <i>sjór</i> ‘sea’        |

The examples show that a nominalizer with the form *-ar* is used in, for example, *apótek-ar-i* ‘pharmacist’ and *pönk-ar-i* ‘punk rocker’, but no corresponding verb exists, \**apóteka*, \**pönka*. However, we find these roots,  $\sqrt{\text{APÓTEK}}$  and  $\sqrt{\text{PÖNK}}$ , in other nouns such as *apótek* ‘pharmacy’ and *pönk* ‘punk’.

The third piece of evidence comes from root allomorphy. The form of the root in VAN is always identical to the verb root, as in *leik-and-i* for *leik-a* ‘to play’. In RAN, on the other hand, the root can have the same form, as in *leik-ar-i*, but it can also be different as in *söngv-ar-i* ‘singer’ vs. *syngj-a* ‘to sing’. This allomorphy contrast is expected in Embick’s (2010) system: by (the 2nd version of) the Phase Impenetrability Condition (Chomsky 2001), the root and  $n$  are not phase-local to each other in VAN like *leik-and-i* and cannot make reference to each other when determining their form. Like English gerunds, Icelandic *-and* nominals are verbs on the inside, and the root and the phase head  $n$  do not see each other in verb-derived nouns. Therefore, the root will always be realized at PF with the same allomorph as the corresponding verb. This is different for RAN as they do not have a verbal layer under our analysis and then the root and  $n$  are phase-local to each other.

In each of the following examples, we see a verb in the infinitive. For some of these verbs there exists an *-and* nominal (VAN); these are shown next to the verb. As predicted, the verb and the *-and* nominal have the same root allomorph. In the next line below each verb, we see a noun with a distinct noun allomorph of the same root, and also a root-derived *-ar* nominal (RAN). These *-ar* nominals do not pattern with the verbs in their morphology.

- (17)
- a. v. *drep-a* ‘kill’  
n. *dráp* ‘killing’ – n. *dráp-ar-i* ‘killer’
  - b. v. *gef-a* ‘give’ – n. *gef-and-i* ‘giver’  
n. *gjöf* ‘gift’ – n. *gjaf-ar-i* ‘giver’
  - c. v. *kvelj-a* ‘torment’  
n. *kvöl* ‘torment’ – n. *kval-ar-i* ‘tormentor’
  - d. v. *leys-a* ‘solve, untie, loosen’ – (leys-and-i ‘solver’)  
n. *lausn* ‘liberation’ – n. *lausnari* ‘redeemer, liberator’
  - e. v. *ljúg-a* ‘lie’  
n. *lyg-i* ‘lie’ – *lyg-ar-i* ‘liar’
  - f. v. *svíkj-a* ‘betray’  
n. *svik* ‘betrayal’ – n. *svik-ar-i* ‘traitor’
  - g. v. *syngj-a* ‘sing’  
n. *söng-ur* ‘song’ – *söng-v-ar-i* ‘singer’
  - h. v. *syrgj-a* ‘mourn’ – n. *syrgj-and-i* ‘person who mourns’  
n. *sorg* ‘sorrow’ – n. *sálu-sorg-ar-i* ‘lit. soul-sorrow-er; priest, a person who helps others when they mourn or are in trouble’

These examples show that agent nominals with the *-ar* exponent are often realized with the noun form of the root and not the verb form. For example, in (17e), we see the root allomorph *lyg-*, found in the noun *lygi* ‘lie’ and in the *-ar* nominal *lyg-ar-i* ‘liar’ (but not *\*ljúg-ar-i* as in the verb *ljúg-a* ‘lie’). In contrast, an *-and* nominal contains the verb allomorph. For example, *gef-and-i* ‘giver’, in (17b), has the same root allomorph, *gef-*, as the verb *gef-a* ‘give’.

A few comments on the availability and status of VAN-RAN doublets are in order at this point. The *-and* nominals are derived from verbs in our system by a general mechanism and therefore we predict that many VAN-RAN doublets are grammatical. Our *leik-and-i* and *leik-ar-i* in (12) are an example of this. In principle, it is possible to form an *-and* nominal from any verb. However, there is a general tendency in language to avoid doublets in linguistic usage if the relevant pair of elements occupies exactly the same semantic space. For this reason, the pair *cook-er* and *chef* in English is most naturally available if *cook-er* refers to something which is not a *chef*, for example a rice cooker, a type of a kitchen appliance. The same tendency holds for VAN-RAN in Icelandic and that means that in some cases only one of the two structures may be used in everyday language, even



if both can be derived by the grammar. In cases where a RAN already expresses what a VAN would express, the VAN may come across as redundant, even if it is well formed.

Finally, the effect of phase visibility is the same for root-conditioned allomorphy as it is for root allomorphy. As in English derived nominals, the phonological exponent of agentive *n* can be conditioned by the root when the root and *n* are phase-local to each other.

(18)

| Root-derived                                                      | v-derived                                                      |
|-------------------------------------------------------------------|----------------------------------------------------------------|
| <b>leik-<u>ar</u>-i</b><br>play-NMLZ-MASC.NOM.SG<br>'actor'       | <b>leik-and-i</b><br>play-NMLZ-MASC.NOM.SG<br>'actor'          |
| <b>lækn-<u>ir</u></b><br>heal-NMLZ-MASC.NOM.SG<br>'doctor'        | <b>lækn-and-i</b><br>heal-NMLZ-MASC.NOM.SG<br>'doctor, healer' |
| <b>morð-<u>ing</u>-i</b><br>murder-NMLZ-MASC.NOM.SG<br>'murderer' | <b>myrð-and-i</b><br>murder-NMLZ-MASC.NOM.SG<br>'murderer'     |
| <b>hugs-<u>uð</u>-ur</b><br>think-NMLZ-MASC.NOM.SG<br>'thinker'   | <b>hugs-and-i</b><br>think-NMLZ-MASC.NOM.SG<br>'thinker'       |

The table shows that the agentive nominalizer can be realized with a number of different phonological exponents, including the underlined *-ar*, *-ir*, *-ing* and *-uð*. Such root-conditioned allomorphy is parallel to *-age*, *-ion* and *-al* in English *marriage*, *destruction* and *refusal*. Because the goal of this section is only to establish the existence of *v* in *-and* nominals, we will not comment further on other phonological exponents of agentive *n*.

To sum up, we argued in this section that *-and* agent nominals are verb-derived and we contrasted them with agent nominals which are root-derived. The evidence is threefold:

1. *-and* nominals inherit requirements for thematic objects from corresponding verbs. Root-derived agent nominals do not.
2. For every *-and* nominal, there exists a corresponding verb. This is not always the case for root-derived agent nominals.
3. The form of the root is always identical to the verb-root in *-and* nominals, but this is not always the case for root-derived agent nominals.

We have now seen evidence that *-and* nominals are verbs on the inside and the evidence has been examined in the context of the theoretical framework which we presented in the preceding section. The findings are consistent with the theory. The following section builds on the present conclusion that *-and* nominals are built from verbs and investigates the consequences of this analysis in segmental phonology.

#### 4. Phase-cyclic palatalization

The main point of the final part of the paper is to show that a generalization in terms of phase theory explains the distribution of Icelandic palatalization in a well-motivated way. The core data of the section are drawn from the plural form of Icelandic *-and* nominals. In VAN like *leik-and-i*, the *n* morpheme whose phonological exponent is *-and* in the singular is *-end* in the plural. We show the declension of *leikandi* in the singular and the plural for all four cases in (19) below. The plural form of the nominalizer is underlined.

(19) Realization of Root-n-nInfl in *leikandi* ‘actor’

|     | SING       | PLUR                 |
|-----|------------|----------------------|
| NOM | leik-and-i | leik- <u>end</u> -ur |
| ACC | leik-and-a | leik- <u>end</u> -ur |
| DAT | leik-and-a | leik- <u>end</u> -um |
| GEN | leik-and-a | leik- <u>end</u> -a  |

Rögnvaldsson (1990) points out a puzzle that the *n*-initial /e/ never triggers palatalization (20) even though /e/ and /i/ are robust palatalizers in the language. In other environments, /k/ is pronounced [c] when immediately followed by /e/.

- (20) a. lei[k]-end-ur ‘actors’  
 b. dýr[k]-end-ur ‘worshippers’  
 c. þáttta[k]-end-ur ‘participants’

The diversity of the environments for palatalization can be illustrated by Indriðason’s (1994) Lexical Phonology classification of triggering environments (21).

- (21) a. [c]efa ‘give’ vs. [k]af ‘gave’ (Morpheme internal)  
 b. ví[c]-ing-ur ‘viking’ vs. ví[k] ‘bay’ (Level I Suffix)  
 c. fan[c]-elsi ‘prison’ vs. fan[k]-ar ‘prisoners’ (Level I/II Suffix)  
 d. bó[c]-in ‘book-the’ vs. bó[k] ‘book’ (Suffixed Definite Article)

In the above examples, /k/ alternates between [c]/[k] as determined by the palatalization process. One exception is that recent loanwords occasionally resist palatalization. For example, the word *dis[k]etta* ‘diskette (an obsolete type of electronic storage)’, did not stay in the language long enough to fully adapt to the native phonology. It is reasonable to assume that those are facts about loanwords rather than palatalization. When we have taken loanword phenomena into account, the generalization is that palatalization is triggered by any suffix with *-el-i* which is not *-end*. The process is *wug*-productive and there is neurolinguistic evidence of its productivity from a patient who suffered a stroke which damaged his ability to palatalize as reported in the Icelandic medical journal (Magnúsdóttir & Sighvatsdóttir 2009).

Our analysis is that Icelandic palatalization requires the undergoer to be phase-active, explaining its underapplication in VAN. This hypothesis is interesting and useful because it accounts for the palatalization facts based on locality conditions which are independently motivated.

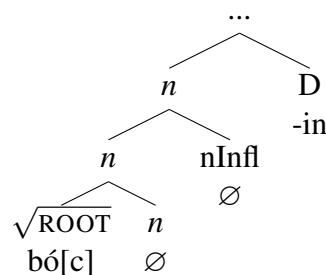
(22) **Analysis**

Palatalization requires phase locality.

The idea behind the analysis is not that all phonological processes operate in terms of locality over a representation which requires phase activity, each potential case must be evaluated empirically. There are many cases in language of phonological interactions between pieces which are not phase-local to each other. For example, contracted auxiliaries in English interact with their host even if the host is clearly spelled out in a different phase cycle (see MacKenzie 2012 for a detailed up-to-date investigation of contraction). Ideally, the part of the phonology which must obey phase locality will have clearly distinguishable properties and the traditionally cyclic phonology is a prime candidate, see Embick (2014) on different types of cycles.

We will now address one apparent counterexample to our analysis. Our analysis accounts for the Icelandic facts as long as the suffixed article in Icelandic is not the phonological exponent of a phase head. The definite suffix on nouns is a challenge for the analysis if it realizes D and if D is a phase, because that would incorrectly predict the absence of palatalization in configurations like (23), e.g., *bó[c]-in* ‘book-the’.

(23)



Why might the definite suffix not be a phase? We believe there are a number of plausible reasons for why it might not. Here are a few suggestions. One possibility is that the definite suffix is expressing a subpart of the meaning of the definite article, perhaps specificity. This option is in line with analyses which decompose the definite article. Work on double definiteness in the closely related mainland Scandinavian languages develops promising avenues along these lines (see Julien 2005). In that case, Icelandic has a D phase but the definite suffix is not itself a realization of a D head. A second possibility is that the definite suffix is a concord morpheme. Definiteness concord is independently needed for adjectives in Icelandic. Again, Icelandic has a D phase, but the definite suffix does not realize D. A third possibility is that Icelandic noun phrases have less phase structure than languages like English, as perhaps reflected in extraction possibilities of type (24), cf. Bošković 2005 on Slavic.

- (24) Rosalega<sub>i</sub> er hún [t<sub>i</sub> góður málfræðingur].  
 extremely is she t good linguist.  
 ‘She is an extremely good linguist.’

These types of effects are admittedly limited in Icelandic but at least certain adverbs can be extracted out of predicative noun phrases. This is a real difference between Icelandic and English and this difference may reflect differences in phase structure. Work by Talić (2015) which relies on insights about agreement suggests ways of uncovering the status of such extraction in Icelandic. A fourth possibility is that D and *n* are phase-local because *n*P moves to Spec,DP.<sup>5</sup> Movement which fits that analysis takes place at least some of the time but the full picture of word order facts in the Icelandic noun phrase is nuanced and beyond the scope of this paper.

These four possibilities demonstrate that it is plausible that the definite suffix is not the exponent of a phase head and more importantly they highlight the fact that our phase-theoretic generalization for Icelandic palatalization has independent consequences which interact with other phenomena and can be pursued empirically. We could, if we wanted, derive the lack of palatalization in *-and* nominals by appealing to a phonological diacritic or by saying that *-and* is the only potentially palatalizing suffix in the language which is Level II;<sup>6</sup> see for example Indriðason’s (1994) levels-based approach to Icelandic phonology. However, we believe our phase-theoretic account is more useful because the tools of phase theory are available to anyone who wishes to prove us wrong. Arbitrary idiosyncratic switches do exist in language and we should be concerned about them. Nevertheless, in cases where the evidence is compatible with strong hypotheses about deep and unifying explanations, such hypotheses are useful to entertain.

To summarize the section: Our generalization in terms of phase-cyclic palatalization explains where the palatalization process can and cannot apply, based on amply motivated phase structure. Any analysis which does not admit phase locality misses this generalization. The section therefore provides an argument that in some cases a well-informed analysis of segmental phonology may need to examine evidence for syntactic phases.

## 5. Conclusion

Our findings support the view from DM that phases constrain contextual allomorphy and polysemy resolution. Furthermore, we show that amply motivated phase structure accounts for palatalization facts in Icelandic, and any analysis which fails to admit phase locality at PF will therefore miss an important generalization. Phase structure matters in the realization of morphemes at the interfaces.

<sup>5</sup>Thanks to Jim Wood for discussing this point with us.

<sup>6</sup>Thanks to David Pesetsky for commenting on the issue of levels-based analyses.

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