Matching domains: The syntax, morphology, and phonology of the verb in Sinhala

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Abstract

In this paper, we provide an in-depth case study of properties of the verbal domain in the Indo-Aryan language Sinhala across the different modules of grammar. Specifically, we investigate two seemingly independent grammatical phenomena (i) the phonological (under)application of umlaut and its relation to morphological structure and (ii) the syntactically conditioned choice of negation. As we argue, these phenomena strongly suggest respective analyses in terms of locality domains. Crucially, we find that locality domains in the syntax and the ones in phonology are essentially isomorphic. The set of constructions that we analyse as bi-domainal in the syntax corresponds exactly to the set of constructions that we analyze as bi-domainal in the phonology. This cannot be treated as accidental and we devise a model that derives these parallels in a systematic way. The model rests on the assumptions that (i) the syntax creates locality domains and inherits them to the morphology and the phonology and (ii) specific processes in these modules can manipulate the locality domains in a limited way. This allows us to maintain a restricted model of the syntax-morpho-phonology mapping that proves flexible enough to incorporate systematic exceptions. Such an approach paves the way to a more nuanced understanding of mismatches between different modules.

1 Introduction

The theoretical concept of *locality domains* is frequently employed in the research and the theoretical modelling of all core areas of grammar. Throughout all modules, the concept has proven effective to model the underapplication of grammatical rules. Whenever a grammatical rule does not affect a given element even though we might potentially expect it to, one possible analysis is that the rule applies to a different locality domain than the element in question belongs to. In other words, if we see that a rule does not apply to a given target, then the trigger of the rule and the target might be too far away from each other.

In the syntax, where locality domains are usually referred to as *phases*, they are, for example, used to limit the application of syntactic movement, case assignment or agreement phenomena of various types. In the morphology and the phonology, where locality domains are more often referred to as *levels*, *strata* or *word-internal phases*, they have similarly been used to model the underapplication of processes, such as suppletion or allomorphy, as well as stress assignment, vowel harmony, etc. Most current theories of morphology and phonology assume that all grammatical processes in these areas are restricted by a given locality domain.

However, despite the undeniable success of the theoretical concept itself, it is still very poorly understood how these different instantiations of locality domains relate to each other across modules. As the use of the same terms in the different grammatical modules shows, there is the underlying intuition that these locality domains should ideally map onto each other and that a locality

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domain in the phonology should not be completely independent from a locality domain in the morphology or the syntax.

And while earlier models have tried to unify the domains of phonology and morphology to a certain extent, only very recent developments in the study of the syntax-morphology interface have raised the question whether we can actually go one step further and try to develop a model where the locality domains of all three modules can be related or mapped onto each other. However, to this day, there is no general consensus as to whether this is empirically tenable. Whether word-internal locality domains as diagnosed by morphological and phonological processes and word-external locality domains as diagnosed in the syntax have anything to do with each other remains unclear at this point. Some researchers have argued that, for conceptual reasons, it would be desirable to unify these different types of locality domains. But so far, there is no, or very little, clear empirical evidence that would support this move.

In this paper, we set out to make a significant step forward in this area. We will present a case study from the Indo-Aryan language Sinhala which, we argue, strongly suggests that phonological locality domains and syntactic ones are correlated. The phonological locality domains will be diagnosed by an in-depth investigation of the (under)application of the process of umlaut in the verbal domain. The syntactic locality domains, on the other hand, will be diagnosed by looking at the realization of negation, which differs depending on whether it is located in the highest domain or in an embedded domain. Both of these phenomena could straightforwardly be derived by reference to module-specific locality domains (such as phases in the syntax and level 1/level 2-affixes in the morphology). However, as we will show, there is a strong correlation between the domains in the syntax and in the phonology. The syntax will treat some constructions as consisting of two locality domains and the phonology will treat exactly those verb forms characterizing these constructions as consisting of two locality domains as well. This correlation cannot, we argue, be treated as a coincidence. It strongly suggests that we entertain a model of grammar that allows us to map locality domains onto each other.

We develop such a model in which standard syntactic locality domains (i.e. phases) are inherited to a postsyntactic module, which in turn will then be mapped onto phonological locality domains. We will identify processes in each module that can manipulate the respective locality domains. This will allow us to account for imperfect mapping of locality domains between different modules in a systematic way.

The paper is structured as follows: In Section 2, we will offer a detailed study of the morphophonological process of umlaut in the verbal domain in this language. We will identify two asymmetries between two classes of umlaut-triggering morphemes and we will go on to show that these asymmetries strongly suggest an analysis in terms of locality domains. We will further offer a comparison with the purely morphological process of stem-suppletion to further refine the analysis of umlaut in the language. In Section 3, we will then move on to look at the syntax of the language, and in particular at the properties and the realization of negation in the language. We will show that negation allows us to diagnose syntactic locality domains and we will see that they match up (with some systematic exceptions) with the locality domains of the phonology. Section 4 will introduce an analysis that derives both the syntactic properties of negation as well as the morphophonological properties of umlaut by means of the same locality domains. Section 5 then takes a step back and discusses some of the broader implications of the previous discussion. Section 5.1 addresses the question what the consequences of our approach for the overall model of grammar are that we entertain. Section 5.2 offers a brief discussion about the diachrony of the verbal domain in Sinhala and argues that the diachronic processes that we can identify actually support the model that we adopt.

Before we proceed with this, we want to introduce the language under investigation in this paper. Sinhala is an Indo-Aryan language spoken on the island of Sri Lanka by roughly 16 million

speakers (Chandralal 2010). The language is characterized by a strong diglossia situation between the written and the spoken version of the language. Literary Sinhala differs in many respects from the colloquial language including an even more elaborate inventory of verbal affixes. While Literary Sinhala shows a fair amount of different subject agreement markers for example, the colloquial language shows no subject agreement at all anymore. Nonetheless, we will see that the inventory of verbal affixes as well as the number of grammatical categories expressed on the verb in Colloquial Sinhala is still fairly large. In what follows, we want to note that we will only be concerned with Colloquial Sinhala even though we will refer to the language as Sinhala from now on.

Sinhala differs from its Indo-Aryan relatives (apart from the other insular Indo-Aryan language Dhivehi (Fritz 2002)) both in terms of its lexicon but also in terms of its grammatical properties. As both Geiger (1938) and Chandralal (2010) discuss, this is, on the one hand, arguably due to the fact that Sinhala is geographically surrounded by Dravidian languages, most notably by Tamil, which is the other main language spoken in Sri Lanka. The other main factor that certainly had an influence on the language are the different periods of colonization by the Dutch, the Portuguese and the English since the 16th century.

Some of the areally and genealogically typical features that the languages displays include the basic head-final word order and the nominative-accusative alignment, differential object marking, as well as the frequent use of non-finite complementation structures.

As for the morphology, we find that the language displays a fair amount of (seemingly) non-concatenative processes including a lot of allomorphy and suppletion, subtractive morphology, exponence by gemination and reduplication as well as umlaut, the topic that will be the subject of the next section. This has lead researchers like Garland (2005) to classify the language as a non-concatenative or fusional language. As discussed in the next section, however, a detailed investigation of the verbal morphology will show that the language is, underlyingly, perfectly concatenative and that the aforementioned processes only obscure the morphological structure (but in a systematic way).

2   The Domains in Phonology: The limits of umlaut

In this section, we provide a detailed discussion of the phenomenon of umlaut in the verbal domain in Sinhala. Although we will offer some discussion about the properties of the umlaut process itself, the focus of the discussion throughout this section will be on the locality domains that the process is restricted by. We will proceed as follows: Section 2.1 introduces the basic pattern of umlaut in the language and introduces the umlaut-triggering morphemes that will play a role throughout this section. Section 2.2 will then go on to introduce two asymmetries between these triggering morphemes. In both cases, umlaut sometimes underapplies, i.e. it fails to appear even though we might expect it to. Section 2.3 offers an interim summary and gives a first attempt of an empirical generalization. Section 2.4 provides a closer look at the verbal class marker, which plays a crucial role in simplifying the empirical generalization. Section 2.5 offers a comparison of the phonological process of umlaut with the morphological process of stem-suppletion. Section 2.6 then concludes the discussion of umlaut and gives the final empirical generalization about the limits of umlaut in Sinhala.

2.1   The Basic Umlaut Pattern

Umlaut in Sinhala is characterized by a fronting of the vowel quality of the stem triggered by specific affixes. This process applies to all vowels on the stem and to all back vowels alike. Any /u/ is changed to /i/, any /a/ is changed to /æ/ and any /o/ is changed to /e/. The following exam-

ples illustrate this property in the nominal domain. The feminine affix /-i/ triggers fronting of all vowels.

(1) a. kurullu - ⃞i → /kirilli/
         bird   - FEM
         'female bird'[1,2]

     b. bal**ə**la - ⃞i → /bæləli/
         cat   - FEM
         'female cat'

     c. wanduru - ⃞i → /wændiri/
         monkey - FEM
         'female monkey'

     d. kolu - ⃞i → /keli/
         lad - FEM
         'lass'   Chandralal (2010)

Two notes are in order about the phonology here (based on discussions in Abhayasinghe 1973 and Letterman 1997). First, we note that the feminine suffix /i/ attaches to the vowel-final stems of the language, which then leads to deletion of the stem-final vowel. This is typical process in Sinhala to avoid vowel hiatus. The second comment concerns the schwa (/ə/) in examples like (1b), which does not seem to undergo fronting as it does not have a fronted counterpart.

Note that the umlaut process in Sinhala differs from processes like prototypical vowel harmony, as Sinhala allows for front/back mismatches in roots or root-affix combinations.[3]

(2) a. balaa-wi
         look-INFER
         'may/might look'

     b. de-nnam
         give-OPT
         '(hope to) give'

     c. gowi
         farmer
                    Chandralal (2010)

Umlaut is also very common in the verbal domain, which is the focus of this section. The patterns of umlaut described in this section and the following hold for all verbs of the language and have the same properties as for the nominal domain above: It affects all vowels on the stem and it affects each back vowel. Front vowels and the schwa remain unaffected.

In (3), we see the verb stem /bal/ ('look'), which contains a back vowel, followed by a class marker, a causative, a non-past and an indicative affix. None of these affixes is an umlaut-trigger, which is why the verb stem is realized with a back vowel. In (4), however, which only differs from (3) by replacing the causative with a passive affix, the stem is realized with a front vowel /æ/. The passive affix /-e/ is an umlaut trigger.[4]

(3) bal-ə-wə-nə-wa
     look-CL1-CAUS-NPST-IND
     'causes to look'

(4) bæl-∅-⃞e-nə-wa
     look-CL1-PASS-NPST-IND
     'is looked at'

Similar minimal pairs can be constructed with the difference between the non-past and the past affix. The latter is an umlaut trigger, the former is not.

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[1]Unless stated otherwise, all examples are from our own data collection and have been constructed or confirmed by a native speaker of Sinhala. The tasks involved either providing grammaticality judgements for examples we provided (which were based on published sources or constructed by us) or translations from English.

[2]In what follows, umlaut-triggering morphemes will be boxed in all examples.

[3]We are aware that there is wide variation among vowel harmony systems and ultimately, it might be the case that some of them have the properties of the process we are describing here. Since the main focus of this paper is the domains of application of the process and not its concrete technical implementation, we remain agnostic as to whether umlaut and vowel harmony can, on some level of abstraction, be unified.

[4]In the representations throughout this paper, we try to stay as close to the surface forms as possible but we want to note that, of course, there are a lot of phonological processes going on that we cannot discuss in complete detail in the paper. One important process that needs mentioning is that short vowels in non-stressed, open syllables are frequently reduced to schwa (see Letterman 1997). The causative morpheme, for example, surfaces as /-wə-/ in (3), because it occurs in an open syllable, and all examples below, but underlyingly it is /-wa-/ (Parawahera 1990, Letterman 1997). Similarly, the class marker often reduce to schwa in (3). For the discussion about the phonology of the class markers, the reader is also referred to Section 2.4.

(5) bal-ə-nə-wa
look-CL1-NPST-IND
'looks'

(6) bæl-∅-[u]-wa
look-CL1-PST-IND
'looked'

Other umlaut triggers include the perfect marker /-la/, the informal imperative marker /-pan/ and the progressive aspect marker, which is realized by a full reduplication of the verb stem. Consider the examples below, which involve the verb stem /ad-/ ('to pull'). In the regular imperative, which is not a trigger, the stem has a back vowel, but in the informal imperative in (8),[5] in the perfect in (9) and in the progressive in (10), the stem has been umlauted as each of these morphemes is an umlaut-trigger.[6]

(7) ad-i-nnə
pull-CL2-IMP
'Pull!'

(9) æd-ə-[la] tie-nə-wa
pull-CL2-PERF be-NPST-IND
'have pulled'

(8) æd-ə-[pan]
pull-CL2-INF.IMP
'Pull, my friend!'

(10) æd-ə [æd-ə] in-nə-wa
pull-CL2 RED.PROG be-PRS-IND
'be pulling'

The table below gives a selection of verbal affixes and classifies them into umlaut-triggers and non-umlaut-triggers.[7]

Non-Umlaut-triggers		Umlaut-triggers	
CAUS	*-wə*	PASS	*-e*
NPST	*-nə*	PST	*-u/-GEM*
IMP	*-nnə*	INF.IMP	*-pan*
COND	*-ot*	PERF	*-la*
FOC	*-e*	PROG	*-RED*

Table 1: Overview of the umlauting properties of Sinhala verbal affixes

What this table illustrates is that whether an affix is an umlaut-trigger cannot simply be reduced to its morphological or phonological properties. As for the morphology, we see that derivational affixes such as causative or passive differ as to whether they are triggers and the same holds for inflectional affixes such as non-past or past or the difference between the regular imperative and the informal imperative. As for the phonology, we can also see that it is, synchronically, no longer possible to attribute the property of being an umlaut-trigger to the phonological properties of the affix itself.[8] We see that some of the affixes that trigger umlaut are or contain back vowels themselves (such as one allomorph of the past tense marker, or the perfect). Similarly, we see that

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[5]There is also a derogatory imperative in the language, which Chandralal (2010) translates as something like '*Pull, you donkey!*' and which according to Chandralal (2010) behaves like the informal imperative with respect to its morphophonological properties but our consultant was not comfortable using these forms in our presence so we cannot make any claims about them.

[6]Perfect and progressive are both expressed by means of auxiliary constructions where tense and mood are realized on the copula.

[7]As noted above in footnote 4, the underlying forms of some of these morphemes are notably more abstract. We believe the schwas in the causative, non-past and the imperative to be underlyingly /a/. Letterman (1997) also argues at length that the allomorphy in the past tense can be attributed to a more abstract representation of the past tense affix, which she claims to be merely an empty mora. We would like to stay agnostic as to whether this is the correct analysis at this point.

[8]Historically, at least the strong umlaut-triggers (see next subsection) seemed to contain an /i/. See the discussion in Section 5.3 and Geiger (1938) as well as Fritz (2002) for the closely related language Dhivehi. However, these authors also note that, synchronically, this generalization cannot be maintained.

some affixes that are front vowels, do not trigger umlaut such as the verbal focus marker /-e/ (or the class marker for class 2 - see example (7) above). Furthermore, some of the umlaut-triggers do not even contain segmental material (such as the other allomorph of the past tense, which is marked by gemination, or the progressive, which is marked by reduplication).

What we take from these observations is that the property of being an umlaut-trigger is ultimately an arbitrary morphological property of specific morphemes or exponents. This conclusion is in line with the general consensus in the literature on Sinhala: Geiger (1938), Parawahera (1990), Letterman (1997) all note that a synchronic treatment of umlaut in Sinhala has to stipulate which affixes trigger umlaut and which ones do not. In what follows, we ascribe to that view and assume that some affixes (namely the ones on the right in the table above) carry some sort of diacritic that specifies them to be an umlaut-trigger; an intuition that is made precise in the analysis section 4.3.

While various sources have made the observation above, there was no attempt in the literature to fully describe or explain the asymmetries between the different umlaut-triggers we discuss in the following subsection.

2.2   Two asymmetries amongst the umlaut-triggers

In the preceding section, we have seen that the property of being an umlaut-trigger must, synchronically, be treated as an arbitrary property of certain morphemes or exponents. In this section, we will see that, amongst the morphemes that are umlaut-triggers, we seem to find two classes which we will, from now on, call strong umlaut-triggers and weak umlaut-triggers. Strong umlaut-triggers are the past tense marker and the passive marker and weak umlaut-triggers are the informal imperative, the perfect marker and the progressive marker. The difference between the weak and the strong umlaut-triggers manifests itself in terms of two asymmetries:

① **Intervention**: Some umlaut-triggers such as [PST] or [PASS] will trigger umlaut on the stem across intervening morphemes such as the causative. Other umlaut-triggers such as [PERF], [PROG] and [INF.IMP] will not.

② **Verb Classes**: Some umlaut-triggers such as [PST] or [PASS] will trigger umlaut in verb classes 1 and 2 whereas other umlaut-triggers such as [PERF], [PROG] and [INF.IMP] will only trigger umlaut in class 2 but not in class 1.

We will illustrate and discuss these two asymmetries in the two subsections below.
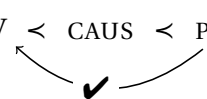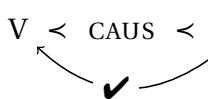
2.2.1   The intervention asymmetry: Umlaut at a distance

In this subsection, we illustrate the first asymmetry between the different umlaut-triggers. The first one we called intervention asymmetry and it concerns a configuration where the umlaut-trigger is not linearly adjacent to the stem that is affected by umlaut. The asymmetry is repeated below:
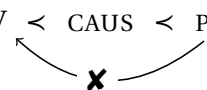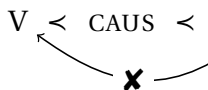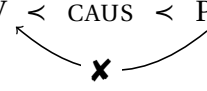
① **Intervention**: Some umlaut-triggers such as [PST] or [PASS] will trigger umlaut on the stem across intervening morphemes such as the causative. Other umlaut-triggers such as [PERF], [PROG] and [INF.IMP] will not.

In order to illustrate this we need to test a configuration, where a low affix linearly intervenes in between the verb stem and the umlaut-triggers. Of course, the intervener cannot be a trigger itself, otherwise we would not be able to test whether the outer morpheme had any effect on the stem. The ideal candidate for an intervener is the causative morpheme /wə/, which is not a trigger itself and which is close enough to the stem so that it can appear in between the stem and all the affixes we want to test.

Consider first the configurations in (11) and (12). In both cases, we have constructed a configuration where an umlaut-trigger (past tense in (11a) and passive voice in (12a)) attaches to a verb that already bears a causativizing morpheme. And in both cases we see that that verb stem does undergo umlaut as it shows a front vowel. The abstract representations in (11b) and (12b) indicate that the umlaut-property that comes from the past or the passive morpheme can reach the stem vowel despite an intervening causative.

(11) Past Tense:

    a. bæl-ə-wə-[u]-wa
        look-CL1-CAUS-PST-IND
        'made so. look'

    b. V ⤙ CAUS ⤙ PAST ✔

(12) Passive:

    a. bæl-ə-w-[e]-nə-wa
        look-CL1-CAUS-PASS-NPST-IND
        'is caused to look'

    b. V ⤙ CAUS ⤙ PASS ✔

Now consider the examples in (13), (14) and (15). On the surface, we have the exact same configurations as above. The respective umlaut-triggers, the perfect, the informal imperative and the progressive, are separated from the stem by an intervening causative. And even though we have seen that all three morphemes are umlaut-triggers in the basic forms (see examples (8), (9) and (10)), they do not trigger umlaut in the configurations at hand. The umlaut-property of these three morphemes cannot reach the stem across an intervening causative.

(13) Perfect:

    a. ad-ə-wə-[la]   tie-nə-wa
        pull-CL2-CAUS-PERF be-NPST-IND
        'have made so. pull'

    b. V ⤙ CAUS ⤙ PERF ✘

(14) Informal Imperative:

    a. ad-ə-wə-[pan]
        pull-CL2-CAUS-IMP
        'Make so. pull, my friend!'

    b. V ⤙ CAUS ⤙ INF.IMP ✘

(15) Progressive:

    a. and-ə-wə   [and-ə-wə] in-nə-wa
        paint-CL2-CAUS RED.PROG BE-NPST-IND

    b. V ⤙ CAUS ⤙ PROG ✘

So, what we see is that there seems to be a dichotomy of umlaut-triggers. Some of them can trigger umlaut at a distance (namely, PST and PASS), while others (namely, PERF, INF.IMP and PROG) cannot. The latter need to be adjacent to the verb stem in order to trigger umlaut. As noted above, we refer to these two classes of triggers as weak and strong umlaut-triggers. The umlaut-property of weak triggers (PERF, INF.IMP, PROG) cannot reach the stem across an intervener, while the umlaut-property of a strong trigger (PST and PASS) can.

2.2.2 The verb class asymmetry: Partial vs Complete Umlauters

In this subsection, we look at another asymmetry that also instantiates the split between the two types of umlaut-triggers we have seen above. This time, it concerns the application of umlaut in the two verb classes in Sinhala.

② **Verb Classes**: Some umlaut-triggers such as [PST] or [PASS] will trigger umlaut in verb classes 1 and 2 whereas other umlaut-triggers such as [PERF], [PROG] and [INF.IMP] will only trigger umlaut in class 2 but not in class 1.

According to standard descriptions (see e.g. Geiger 1938, de Silva 1960, Gair 1970, Chandralal 2010) Sinhala has three classes of verbs, which can be distinguished by the class markers. In what follows, we only focus on the first two verb classes.[9] The verb classes in Sinhala are most easily distinguished in the infinitive. The marker in class 1 shows up as /a/ (16a) and as /i/ in class 2 (17a). Note that in many examples, however, the underlying differentiation between the classes is neutralized because both vowels /a/ and /i/ are reduced to schwa in open syllables ((16b) and (17b)).

(16) a. bal-a-nnə   Class 1
          look-CL1-INF
          'to look'
      b. bal-ə-la
          look-CL1-PERF
          'look'

(17) a. ad-i-nnə   Class 2
          pull-CL2-INF
          'to pull'
      b. æd-ə-la
          pull-CL2-PERF
          'pulled'

Apart from the different realizations of the class marker, these verb classes behave differently with respect to a number of other processes including their property to undergo umlaut. Strong umlaut triggers (PST and PASS) will trigger umlaut in both verb classes while weak triggers (PERF, INF IMP, PROG) will only trigger umlaut in class 2. Consider first the behavior of PST and PASS in the examples below. PST in (18) and PASS in (19) will trigger umlaut on both verb classes. All the verb stems in (18) and (19) have undergone umlaut.

(18) Past Tense:
      a. bæl-∅-[u]-a   Class 1
          look-CL1-PST-IND
          'looked'
      b. æd-∅-[d]-a   Class 2
          pull-CL2-PST-IND
          'pulled'

(19) Passive:
      a. bæl-∅-[e]-nə-wa   Class 1
          look-CL1-PASS-NPST-IND
          'is looked at'
      b. æd-∅-[e]-nə-wa   Class 2
          pull-CL2-PASS-NPST-IND
          'was pulled'

Again, that can be contrasted with the behavior of weak umlaut-triggers PERF, INF.IMP and PROG in the examples below. In these examples, we see that the class 1 verb *bal-* ('look') does not undergo umlaut but the class 2 verb *ad-* ('pull') does.

(20) Perfect:
      a. bal-ə-[la]   tie-nə-wa   Cl 1
          look-CL1-PERF be-PRS-IND
          'has looked'
      b. æd-ə-[la]   tie-nə-wa   Cl 2
          pull-CL2-PERF be-PRS-IND
          'has pulled'

(21) Progressive
      a. bal-ə   [balə]   in-nə-wa
          look-CL1 RED.PROG be-PRS-IND
          'be looking'
      b. æd-ə   [ædə]   in-nə-wa
          pull-CL2 RED.PROG be-PRS-IND
          'be pulling'

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[9]What is usually referred to as the third class is a class that contains only intransitive verbs (including many verbs that also appear in classes 1 or 2 in a transitive version). The marker of this so-called class 3 is an /e/ and obligatorily triggers umlaut, which is why verbs of class 3 always come with a front vowel, which is why they are uninformative for our purposes. We want to note that the exponent of the so-called class marker in class 3 (/e/), is also the exponent of a passive marker, which we assume to not be a coincidence given that the class only contains intransitive verbs (see Beavers and Zubair (2012) for discussion).

(22) Informal Imperative:

a. bal-ə-$\boxed{\text{pan}}$ Cl 1
look-CL1-INF.IMP

b. æd-ə-$\boxed{\text{pan}}$ Cl 2
pull-CL2-INF.IMP

'Look, my friend!'

'Pull, my friend!'

So, as with the asymmetry concerning the intervention, we note that there is a difference in behavior between the umlaut-property of strong triggers and the umlaut property of weak triggers. Strong triggers will always trigger umlaut on a verb regardless of its class membership while weak triggers will only do so in class 2.

2.3 Interim Summary

In the two preceding subsections, we have seen two asymmetries that seemingly point to two types of umlaut in Sinhala. Umlaut triggered by strong umlaut-triggers can skip an intervening causative and affects both verb classes and umlaut triggered by weak umlaut-triggers is blocked by an intervening causative and only affects class 2.

An immediate question that this raises is whether we need to stipulate that there are two phonological umlaut processes in the language. We think that it would be highly unfortunate to stipulate two processes which have the same sort of morphophonological trigger (namely a diacritic) and the same phonological effect but slightly differ in their ability to skip intervening morphemes and in their ability to affect different verb classes. In Section 2.1, we were forced to acknowledge that the property of being an umlaut-trigger seems to be an arbitrary diacritic of a given morpheme. But if possible, we would like to avoid having to stipulate different types of morphophonological diacritics, especially if their effect is almost identical.

On the other side, we think that it is encouraging that both asymmetries above pick out the same sets of umlaut-triggers. In both cases, it seems to be a difference between PST and PASS on the one hand and PERF, INF.IMP and PROG on the other hand. It is fortunately not the case that both asymmetries refer to different sets of triggers.

	Strong Triggers		Weak Triggers		
	PASS	PAST	PERF	INF.IMP	PROG
Skips an intervening causative	✔	✔	✘	✘	✘
Affects both verb classes	✔	✔	✘	✘	✘

Table 2: Overview of the properties of umlaut-triggers

We take this as sign that there is systematicity, and that ultimately the two asymmetries have the same underlying cause. And, as a detour into the phonological properties of the class markers in the next section will show, this is indeed the case. We have good evidence that the two asymmetries can be reduced to one that, on a more abstract level, regulates both properties at the same time.

2.4 A closer look at the verbal class marker

In this subsection, we will take a closer look at the properties of the verbal class marker to get an idea why, at least with some umlaut-triggers, umlaut is restricted to class 2 verbs. We have seen above that the two verb classes we are interested in for the purposes of this paper can be distinguished by the theme vowels in the infinitive (16) and (17) above. But they can also be distinguished by looking at the exponents of the causative and the past tense morphemes (bolded):

(23) Class 1:
    a. aɳɖ-a-nnə
       cry-CL1-INF
       'to cry'
    b. aɳɖ-ə-**w**ə-nə-wa
       cry-CL-CAUS-NPST-IND
       'make so. cry' (causative)
    c. æɳɖ-∅-**u**-a
       cry-CL1-PST-IND
       'cried' (past tense)

(24) Class 2:
    a. ad-i-nnə
       pull-CL2-INF
       'to pull'
    b. ad-**d**ə-nə-wa
       pull-CAUS-NPST-IND
       'make so. pull' (causative)
    c. æd-∅-**d**-a
       pull-CL2-PST-IND
       'pulled' (past tense)

For class 1, the causative is realized as /-wə-/ and the past tense is realized with /-u-/. For class 2, however, the causative and the past tense involve gemination rather than a purely segmental exponent. Based on Abhayasinghe (1973), Letterman (1997) argues that this actually suggests that class 2 does not have a class marker underlyingly at all. According to her, the /i/ in the infinitive above as well as the /ə/ in class 2 in many of the other forms are merely epenthetic material.[10]

    To be concrete, Letterman (1997) argues that the past tense exponent is a more abstract element, an empty mora μ which is realized as /u/ when it is adjacent to a vowel and as gemination when it is adjacent to a consonant. In class 1 (25), the past marker will always be adjacent to a vowel since there is the class marker present. In class 2, however, according to Letterman (1997), there is no class marker and hence the empty mora that is the tense exponent will be next to the stem-final consonant, leading to gemination (see (26)).[11]

(25) Class 1 - Past:
    bal-ə   + μ ⟶ /bælu/
    look-CL1 + PAST

(26) Class 2 - Past:
    ad + μ ⟶ /ædd/
    pull + PAST

In Class 2 in the present tense where the tense exponent is an /nə/, the resulting consonant cluster requires the subsequent application of an epenthesis rule that inserts an /i/ in the position where usually the class marker would appear.

(27) Class 2 - Non-Past:
    ad + nə   ⟶ /adnə/ $\xrightarrow{\text{Epenthesis}}$ /adinə/
    pull + NPAST

The same conclusion that class 2 does not have a class marker is drawn by Geiger (1938) [12] on the basis of diachronic data. He shows that the vast majority of class 2 verbs are historically all part of the consonant-final verb class in Sanskrit. Further, he shows that older stages of Sinhalese often do not show the apparent /i/-class marker with class 2 verbs:

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[10]Letterman discusses various forms of hiatus resolution in the language, and shows that in both the nominal and verbal domain there is a high vowel that can be epenthesized. Note that it is not uncommon to have high epenthetic vowels in Indo-Aryan languages (so-called *svarabhakti*-vowels) (see e.g. Masica 1991, Jena 2006).
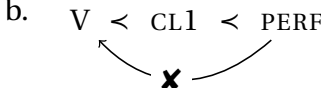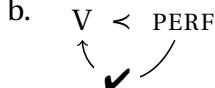
[11]Maybe it is a bit unusual to assume that the empty mora will be realized as a vowel when it is next to a vowel as this creates a marked phonotactic structure. We have the impression that the /u/ that is usually taken as the exponent of past tense in class 1 often also has more glide-like properties as it then appears in between the class marker vowel and the verb-final indicative marker /a/. In that sense what is transcribed as the past tense marker /u/ is a combination of the class marker schwa plus a back vowel glide. We leave this for future research.

[12]Geiger calls the /i/ in class 2 a *svarabhakti vowel* noting that (i) it was not present in older stages of the language and (ii) given its vowel quality and its position in the verb, it would be expected to trigger umlaut at the stage when umlaut was still triggered by the phonological properties of the affix itself.

(28) a. vad-i-nnə
      enter-CL2-INF
      'enter' (modern Sinhala)

    b. vadnā
      enter.INF
      (medieval Sinh. (7th-12th CE))
                        Geiger (1938:140)

This assumption by Geiger (1938) and Letterman (1997) that class 2 (unlike class 1) actually has no class marker patterns extremely well with our observation that class 2 is more likely to undergo umlaut as this allows us to reduce the both asymmetries to one which can simply be phrased in terms of locality. The reason that class 1 does not undergo umlaut with the weak umlaut-triggers is that it has a class marker intervening. We already saw that intervention of the causative blocks umlaut triggered by the weak triggers so it is not surprising that intervention by any other morpheme such as the class marker does the same thing. Class 2, on the other hand, does not have a class marker. The segment that looks like a class marker is merely epenthetic and, at the point when umlaut applies, it is not present and thus cannot intervene. In what follows, we will now no longer gloss the /i/ as the class marker for class 2 but rather gloss it as part of the stem.

Consider the representations in (29) and (30), both of which feature a verb with a weak umlaut-trigger. In (29), we have a class 1 verb, which comes with its class marker. Thus, the umlaut-property that is introduced by the weak trigger (PERF) cannot reach the stem because there is a morpheme intervening. In (30), we see a class 2 verb, which does not have a class marker. Therefore, when the weak umlaut-trigger attaches to it, there is no intervening morpheme and thus the umlaut-property of PERF can reach the stem as indicated in (30b). The schwa that is usually taken to be the reduced class marker is merely the result of subsequent epenthesis of /i/ plus additional vowel reduction.

Class 1:

(29) a. anɖ-a-la̅ ⟶ /anɖəla/
      cry-CL1-PERF
      'has cried'
    b. V ≺ CL1 ≺ PERF ✗

Class 2:

(30) a. ad-la̅ ⟶ /ædəla/
      pull-PERF
      'has pulled'
    b. V ≺ PERF ✔

In essence this means that the asymmetry between the two verb classes can be reduced to whether the class has an overt class marker or not. Class 1 does have a class marker and therefore is not affected by the umlaut-property of weak triggers. Class 2 does not have a class marker and therefore will be affected by weak triggers. What this means is that we managed to reduce the two asymmetries we saw in Sections 2.2.1 and 2.2.2 to one, given in (31):

(31) The Empirical Generalization:
    [PASS] and [PST] can trigger umlaut on the stem across intervening morphemes
    while [PERF], [PROG] and [INF.IMP] cannot.

This empirical generalization is essentially what we want to understand and derive in the remainder of this paper. As noted above in Section 2.3, if possible, we would like to avoid the assumption that the language has two different phonological umlaut processes. We would rather maintain the idea that there is a single umlaut process in the language that plays out differently depending on the morphosyntactic configuration it appears in. We will follow this path in the following but first, in Section 2.5, we want to take a small detour and compare umlaut to a purely morphological phenomenon, namely stem suppletion. This will help us understand the process of umlaut better and help us motivate that umlaut is an actual phonological process in the language.

2.5 The Comparison to Morphology: Patterns of Stem Suppletion

In the preceding section, we arrived at one coherent empirical generalization that explained the two asymmetries. In this section, we compare the process of umlaut to stem suppletion; a process that, on the surface, seems to have very similar properties. In both cases, it seems that an affix has the power to manipulate the surface form of the stem.

And, in fact, recent work by Embick and Shwayder (2017) has suggested that some umlaut patterns in Icelandic and German often have the properties of morphological stem suppletion. They argue that different umlaut patterns in these languages can either be phonological or morphological rules. It thus makes sense to take a closer look at the process of umlaut and compare it to purely morphological processes such as stem suppletion.

Fortunately, Sinhala, as any well-behaved Indo-European language, has a number of verbs that show stem suppletion that is governed by the specific tense and aspect configurations, in particular by past tense and perfect aspect. Since these two affixes are also amongst the umlaut-triggers, this allows us for a nice minimal comparison between the two processes.

Consider the two verbs '*ya-*' (go) and '*e-*' (come) in Sinhala, which both supplete for both past tense and perfect.[13] The verb '*ya-*' (go) changes to '*gi-*' in the past tense and to '*gihin*' in the perfect and the verb '*e-*' changes to '*aa-*' in the past and to '*æwit*' in the perfect:

(32)   a.   ya-nə-wa
             go-NPST-IND
             'go'
       b.   gi-a
             go.PST-IND
             'went'
       c.   gihin
             go.PERF
             'gone'

(33)   a.   e-nə-wa
             come-NPST-IND
             'come'
       b.   aa-wa
             come.PST-IND
             'came'
       c.   æwit
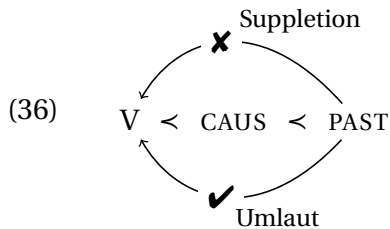   come.PERF
             'come'

Just as with umlaut, we can now test what happens if the trigger of the suppletion and the stem are separated by an intervening morpheme. The obvious candidate is of course the causative /wə/ and as we see in (34) and (35) below, the pattern is very clear. Each case of suppletion disappears.

(34)   a.   ya-wə-nə-wa
             go-CAUS-NPST-IND
             'make so. go'
       b.   yæ-w-w-a   (*gi-wə-w-a)
             go.PST.CAUS-PST-IND
             'made so. go'
       c.   ya-wə-la   (*gihi-wə-la)
             go-CAUS-PERF
             'have made so. go'

(35)   a.   e-wə-nə-wa
             come-CAUS-NPST-IND
             'make X come'
       b.   e-w-w-a   (*aa-w-w-a)
             come-CAUS-PST-IND
             'made X come'
       c.   e-wə-la   (*æwi-wə-la)
             go-CAUS-PERF
             'have made X come'

The stem in the examples in (35) does not undergo stem suppletion; in fact it does not change at all. It is realized as '*e-*' throughout. As the ungrammatical versions in brackets indicate, suppleted stems with a causative morpheme are not an option. This indicates that stem suppletion requires immediate adjacency and cannot be triggered across an intervening causative. Even more telling

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[13]There are a number of verbs of course that only supplete for one of these features (either past tense or perfect), and of course, with some verbs it is also not entirely clear where productive and semi-productive phonological processes end and where suppletion begins. We will thus restrict ourselves to the two verbs here as they strike us as uncontroversial examples of morphologically conditioned stem suppletion.

are the examples in (34) where we also see that suppleted versions are not possible. When coocuring with a causative, the verb stem cannot be realized as *gi-* or *gihin*. However, as shown in (34b), in the absence of stem suppletion, umlaut reappears. The verb stem suddenly appears with a fronted vowel. What this means is that one and the same affix fails to trigger suppletion in the same configuration but manages to trigger umlaut. This is illustrated in (36):

(36)

$$
\begin{array}{c}
\textbf{✗} \text{ Suppletion} \\
\text{V} \prec \text{CAUS} \prec \text{PAST} \\
\textbf{✔} \\
\text{Umlaut}
\end{array}
$$

We only observe this asymmetry between suppletion and umlaut with the past tense in (35b) of course and not with the perfect in (35c) because perfect is a weak trigger and its umlaut-property will be blocked by an intervening causative anyway. Note also, that we do not observe this reappearance of the umlaut in absence of suppletion with the verb *'e-'* as the stem of this verb is a front vowel to begin with.

What we take from this discussion is that the mismatch in examples like (34b), illustrated in (36), shows us that umlaut is, at least for the strong umlaut-triggers, fundamentally different from a purely morphological process such as stem suppletion. Umlaut can skip morphemes in some cases such as the class marker in class 1 or the causative while purely morphological processes cannot and we take this as an argument that umlaut is different from these morphological processes and that it is a productive phonological process in the language.

Weak umlaut-triggers, on the other hand, require immediate adjacency between the trigger and the target and, in a sense, this seems to indicate that they behave like suppletion. If we were to maintain that analysis, we would thus be forced to assume that there are two types of umlaut in Sinhala: Umlaut triggered by strong triggers is purely phonological as it can skip morphemes and umlaut triggered by weak triggers is morphological as it is blocked by intervening morphemes.[14] However, even though that might look appealing at first, we do not think that this is a tenable analysis. As we have seen, umlaut triggered by weak triggers has the exact same phonological effect as umlaut by strong triggers. Both types will change the vowel quality of the stems in exactly the same way. And they do so completely predictably: changing back vowels to front vowels of the same height. Also, we want to note that both processes are completely productive in the language and affect all verbs alike without exception. If is were to maintain an analysis according to which a morphological umlaut rule and a phonological umlaut rule have the same effect, it would require us to posit that for every single verb in the language, two alternating stems are stored, one with a front vowel one with a back vowel. The one with a fronted vowel is chosen specifically when it appears next to a weak trigger. The one with a back vowel can, however, undergo a phonological process that mysteriously happens to make the surface form look exactly like the independently stored fronted verb stem alternant. We take this to be a very undesirable result and an unnecessary burden for the lexicon as well as implausible from a learner's perspective. We therefore do not pursue this approach and continue to assume that there is one coherent phonological process of umlaut in Sinhala that plays out differently depending on the configuration it appears in.

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[14]Cf the analysis of different umlaut patterns in Germanic in Embick and Shwayder (2017).

2.6   Taking stock: The Domains in phonology

In the preceding subsections, we have arrived at a simple generalization that describes the limits of umlaut in Sinhala in a somewhat abstract but empirically accurate way.

(37)   The Empirical Generalization:
[PASS] and [PST] can trigger umlaut on the stem across intervening morphemes
while [PERF], [PROG] and [INF.IMP] cannot.

We argued that the different behavior of the umlaut-property with [PASS] and [PST] on one hand and [PERF], [PROG] and [INF.IMP] on the other should not be taken as evidence that Sinhala shows evidence for two fundamentally different umlaut-processes. Rather, we argued in depth that we can maintain a coherent notion of umlaut in the language and that the differences in behavior between the different affixes are derived from independent factors. Further, we argued in the previous subsection that the contrast between umlaut on the one hand and stem suppletion on the other strongly indicates that umlaut is indeed a productive phonological process in the language.

The generalization in (37) requires an explanation and one of the most straightforward options that are on the table is one in terms of phonological domains. As noted in the introduction already, whenever a phonological process that we might expect to apply fails to do so, one of the possible explanations is one in terms of phonological domains. The intuition becomes clear if we, for a start, simply look at the minimal pairs with a weak umlaut-trigger appearing with or without in intervening causative (recall that the schwa in class 2 verbs are epenthetic, and are therefore represented as part of the verb stem in the examples):

With a causative:

(38)   a.   adə-wə-[la]
pull-CAUS-PERF
'have made so. pull'

b.   V < CAUS < PERF
✗

Without a causative:

(39)   a.   ædə-[la]
pull-PERF
'has pulled'

b.   V < PERF
✔

The intuition that we want to model is that underapplication of umlaut in (38) is due to its trigger being too far away from its target. In (38), the perfect morpheme is not local enough to trigger umlaut but in (39) it is. This is straightforward but in order to keep that assumption in line with the strong triggers, we need to assume that strong triggers (like [PST]) are always local enough to trigger umlaut regardless of whether they are separated from the stem by a causative.

In order to couch this intuition in a theoretical model of morphology, we could follow decades of level-based or stratal accounts of morphology,[15] and attribute the different behaviors to the difference between stem-level and word-level affixes. Strong triggers would then be stem-level affixes and weak triggers would be so-called dual level-affixes that are flexible with respect to their domain. They can either be stem-level affixes or word-level affixes. If they are adjacent to the stem, then they are stem-level affixes and if they are non-adjacent, they are word-level affixes.

Kiparsky (2005) discusses the famous case of English -*able*-affixation that seems to be able to attach to the stem level or to the word-level. In (40a), -*able* attached to the stem-level as diagnosed by the fact that the *in*-allomorph of the negation prefix is chosen. In (40b), -*able* attaches to the word level, as diagnosed by the *in*--allomorph of the negation prefix.

(40)   a.   inadmissable

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[15]For overviews of and arguments for level-based or stratal accounts including the discussion of dual-level affixes, see Giegerich (1999), Steriade (1999), Raffelsiefen (2004), Kiparsky (2005), Bermúdez-Otero (2018)

b. unadmittable (Kiparsky 2005, 518)

Whether *-able* attaches to the stem-level or to the word-level can be shown to have different phonological consequences (such as the change from /*mitt*-/ to /*miss*-/ in (40a)). The underlying intuition in Kiparsky's system is that *able* is, by default, a word-level suffix but can, in certain configurations be integrated into the stem-level. In a similar fashion, we could say that weak triggers such as the perfect are dual level-affixes as in (41)–(43), where the inner box represents the stem-level and the outer box represents the word-level. The perfect morpheme would thus be a word-level suffix but can be integrated into the stem-level if it is adjacent to the verbal root. If we then assume in addition that umlaut is restricted to the stem-level, the behavior of umlaut and in particular the underapplication of umlaut with weak triggers is accounted for.

(41) $\boxed{\boxed{\text{V} \ < \ \text{CAUS} \ < \ \text{PAST}}}$ (42) $\boxed{\boxed{\text{V} \ < \ \text{PERF}}}$ (43) $\boxed{\boxed{\text{V} \ < \ \text{CAUS}} \ < \ \text{PERF}}$

And while such an approach could arguably be made to work, it provides little insight into the nature of these levels or why the morphemes fall into the levels they are in. Is it simply an accident that passive and past have the same properties whereas perfect, progressive and the informal imperative have a different set of properties? The account in terms of strata or morphological levels does not provide very much of an answer to that question.

We think that the domain-based approach is essentially correct but we want to go one step further and look into the morphosyntax of the respective constructions to figure out whether it is an accident that the morphemes pattern together in the way they do. Recent developments in the study on interface between morphology and syntax have unearthed a number of interesting predictions about the way that syntactic locality domains and morphological and phonological ones can be mapped onto each other.[16] The underlying research question that we want to answer is the following: Kiparsky has the intuition that dual-level affixes are essentially affixes of the outer domain that are exceptionally integrated into the inner domain in a specific context. If that is true, and it is also true that the locality domains in syntax, morphology and phonology map onto each other, then we might find evidence in the syntax that constructions involving weak triggers such as perfect, progressive or informal imperatives involve two locality domains while constructions involving strong triggers such as passive or past tense do not. As we will see in the next section, this is borne out in a surprisingly straightforward way. The differences between weak and strong umlaut-triggers have a clear correlate in the way these respective constructions are negated.

3 The Domains in Syntax: The choice of negation

Based on the underapplication of umlaut in some cases, we arrived at what one might call a very rough sketch of an analysis that makes use of the theoretical concept of locality domains. Some verbal affixes, namely the strong umlaut triggers passive and past are always inside the innermost locality domain (i.e. the stem-level) with the verb stem while others (i.e. the weak triggers perfect, progressive and the informal imperative) are not. They are usually in an outer domain but they can be exceptionally integrated into the inner domain if they are adjacent to the verbal root. In this section, we will see that this classification of "mono-domainal" constructions and "bi-domainal" constructions finds an unexpected correlation in the syntax where it helps us solve a longstanding problem about the realization of negation in Sinhala.

The standard way to negate a sentence in Sinhala is to use the verbal particle *næ* (Gair 1970, De Abrew 1981, Slomanson 2008, Chandralal 2010). As shown in the minimal pair in (44), negation

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[16]See e.g. the discussion in Marvin (2003), Newell (2008), Embick (2010), Newell and Piggott (2014), D'Alessandro and Scheer (2015), Fenger (2020), Harðarson (2021), Kalin and Weisser (ta).

shows up in the clause-final position and the verb preceding the negation changes its form to the so-called focus form. The morpheme indicating the focus form replaces the indicative morpheme.

(44)   a.   Mamə anuraadəpure-e   indəla kaar-ekak gan-nə-wa.
            I   Anuradhpura-GEN from   car-INDEF take-NPST-IND
            'I taking the car from Anuradhpura.'
       b.   Mamə anuraadəpure-e   indəla kaar-ekak gan-n-e   **nææ**
            I   Anuradhpura-GEN from   car-INDEF take-NPST-FOC NEG
            'I am not taking the car from Anuradhpura.'   (Gair 1970, 130)

Gair (1970) treats the negation *nææ* as an auxiliary as it determines the verb form of the lexical verb. He also notes that *nææ* obligatorily replaces the copulas *innəwa/tiənəwa* in copula clauses:[17]

(45)   a.   lamea gedərə in-nə-wa
            child   home   be-NPST-IND
            'The child is home'
       b.   lamea gedərə **nææ**
            child   home   NEG
            'The child isn't home'   (Gair 1970, 130)

However, Sinhala shows another type of negation that does not use a clause-final particle but rather a verbal prefix *no-*. According to Gair (1970), De Abrew (1981) this type of negation mainly appears in dependent clauses. In (46a), we see that an embedded infinitive clause can be negated using *no-*, in (46b), we see a clefting structure, where the dependent embedded clause is negated with *no-*. In (46c), we see the cooccurrence of two negations, the auxiliary *nææ* in the matrix clause and the verbal prefix *no-* in the clause-initial adverbial clause.

(46)   a.   malli-ʈə   **no**-pene-nnə almaariyə uɖin araŋ   tiya-nnə
            brother-DAT NEG-see-INF   cupboard above take-PERF be-IMP
            'Put (it) on top of the cupboard so that the (younger) brother won't see it.'
       b.   miniha **no**-ya-nn-e   ee   gaməʈə.
            man   NEG-go-NPST-FOC that village
            'It's to that village that the man does not go to.'   (Gair 2003, 885)[18]
       c.   oyaa bat **no**-ka-nə-wa   nisaa, oyaa-ʈə sindu-ak   ki-u-e   nææ.
            2SG   rice NEG-eat-NPST-IND because 2SG-DAT song-INDEF say-PST-FOC NEG
            'Because you don't eat rice, I didn't sing you a song.'   (Slomanson 2008, p.1649)

We want to stress here that examples like (46c) clearly show that the use of *no-* is not due to non-finiteness but rather about embeddedness. The embedded verb in the adverbial clause in (46c) is fully finite as it bears tense and the indicative marker. It could – without the negative prefix – readily function as a matrix verb.

     Crucially, matrix clauses cannot be negated with the prefix *no-*.[19]

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[17]Given the treatment of *nææ* as an auxiliary, it might be surprising that it does not show any verbal affixes but we want to remark that there is a whole class of high auxiliaries such as the modals *puluwan* ('can') or *oonæ* ('should') which cannot be inflected at all. This class of uninflected high auxiliaries in Sinhala is sometimes also referred to as *quasi-verbs* (see e.g. Gair 2003).

[18]In (46a), we changed the glosses from DATIVE to INFINITIVE and IMPERATIVE on the respective verbs. We take this to be an oversight in the original source as the affixes in question do not resemble a dative in form nor in function.

[19]Our informant notes that examples of this sort are sometimes not perceived as ungrammatical because they can be forced to receive an embedded interpretation with the matrix verb elided. So, according to our consultant, (46) can possibly receive an interpretation like 'I think I didn't go.'. We take this as additional evidence that the distribution of *no-* is really governed by embeddedness.

(47) *Mamə **no**-giy-a.
      1SG   NEG-go.PST-IND
      'I didn't go'

One last thing that we want to note is that it is not a difference between embedded clauses vs matrix clauses but rather any embedded domain such as subclausal constituents can be negated with the prefix *no-*. We have already seen *no-* negating an infinitival clause above (46a) and we can add that the complement of the various modal auxiliaries such as *puluwan* ('can'), *oonæ* ('should') or *æti* ('might') can be negated with *no-*.

(48) mahattea **no**-ya-nə-wa   æti.
      gentleman NEG-go-NPST-IND might
      'The gentleman might not go.'   (Gair 1970, 156)

Following Gair (1970), we thus put forward the following generalization (see also De Abrew (1981)):

(49) Generalization about the distribution of the different negation morphemes in Sinhala:
      a. The auxiliary *næ̃æ* is used to negate in finite clauses.
      b. The verbal prefix *no-* is used to negate embedded domains (clausal or non-clausal).

Against the background of this generalization, De Abrew (1981), Foley and Gair (1993), Gair (2003) note however that there are some unexpected occurrences of *no-* in contexts that they do not view as embedded, including the perfect. (Gair 2003, 885) notes that the precise range of occurrences of *no-* remains unclear and leaves it open why perfect can be negated with *no-* but the past tense cannot. Our consultant confirms that matrix clauses can be negated with *no-* when they are in the perfect.

(50) a. Mamə **no**-gihin   tie-nə-wa.
          1SG   NEG-go.PERF be.NPST-IND
          'I haven't gone'
      b. Mamə **no**-andə-la   tiə-nə-wa.
   1SG   NEG-cry-PERF be-NPST-IND
          'I haven't cried'

Notably examples in the perfect can also be negated with the finite matrix clause negation *næ̃æ*.

(51) a. Mamə gihin   **næ̃æ**.
          1SG   go.PERF NEG
          'I have never gone there.'
      b. Mamə andə-la **næ̃æ**.
          1SG   cry-PERF NEG
          'I haven't cried'

This seems to suggest that perfect seems to, syntactically speaking, consist of two locality domains. When we negate the higher domain, the result will be the finite matrix negation *næ̃æ* and when we negate the lower embedded domain, we get the prefixal *no-* negation. This strongly contrasts with negation in the past tense, where negation with the prefix *no-* is impossible.[20]

---

[20]The contrast between bi-domainal structures for marked aspect configurations but mono-domainal structures for unmarked aspect configurations is not uncommon crosslinguistically. It has been argued for quite a number of languages that specific aspect configurations such as perfect or progressive involve traces of biclausality (see e.g. Comrie 1978, Bybee et al. 1994, Laka 2006, Coon 2010).
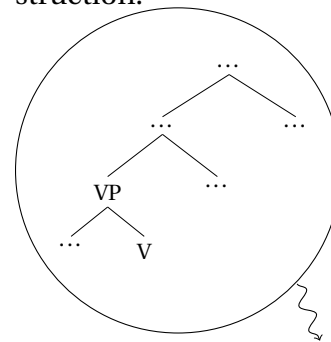
(52) Negation in a bi-domainal perfect con- (53) Negation in a mono-domainal past con-
     struction: struction:
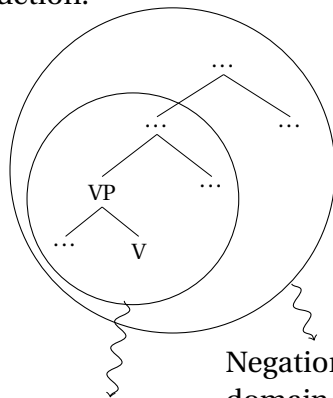
Negation of the in-
ner domain ⇒ /no-/

Negation of the outer
domain ⇒ /nææ/

Negation of the outer
domain ⇒ /nææ/

The contrast between perfect constructions consisting of two domains with past tense constructions only consisting of one domain is strongly parallel to the domains we had to assume to account for the limits of umlaut in the preceding section. However, the parallel even gets clearer when we take a closer look at the other weak umlaut triggers in the language. Just like the perfect, the progressive can be negated with the prefix *no-* as well as the informal imperative.[21]

(54) a. Mamə ka-kaa   in-nə-wa.
          1SG   eat-RED.PROG BE-NPST-IND
          'I am not eating right now.'
      b. Mamə **no**-ka-kaa   in-nə-wa.
          1SG   NEG-eat-RED.PROG BE-NPST-IND
          'I am not eating right now.'

(55) a. ædə-pan!
          pull-INF.IMP
          'Pull, my friend!'
      b. **no**-ædə-pan
          NEG-pull-INF.IMP
          'Don't pull, my friend!'

The example in (55b) is particularly striking because it shows that the perfect does not simply count as embedded because it has an auxiliary. The informal imperative also consists of two domains (in both the phonology and the syntax) even though it is not an auxiliary construction.

   What this means is that we do have a strong correlation between the limits of umlaut and the applicability of embedded negation. We assumed in the phonology that the class of morphemes we dubbed weak umlaut triggers (namely, the perfect, the progressive and the informal imperative) consisted of two phonological domains. In this section, we have seen evidence that exactly that set of morphemes characterizes syntactic constructions that, for completely independent reasons needed to be analyzed as consisting of two syntactic domains. This contrasts with strong triggers, passive and past tense, which were analyzed as always being one domain in the phonology. And since they are not compatible with embedded negation, this means that, syntactically speaking, they are one domain in the syntax as well. Expanding on the table that we used to summarize the properties of umlaut triggers in Section 2.3, we can illustrate the correlation as follows:

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[21]According to our consultant, the negated forms with *no-* in (54a) and (54b) are perceived as a bit archaic but there

	Pass	Past	Perf	Inf.Imp	Prog
Umlaut skips an intervening causative	✔	✔	✘	✘	✘
Umlaut affects both verb classes	✔	✔	✘	✘	✘
Is compatible with embedded negation	✘	✘	✔	✔	✔
Our explanation:	**1 Domain**		**2 Domains**		

Table 3: Overview of the properties of the morphemes under consideration

The empirical correlation between the two types of affixes is already very suggestive and, we think, can hardly be treated as an accident (especially in light of the historical evidence presented in Section 5.2). But the fact, that both of the asymmetries can straightforwardly be explained using the concept of locality domains makes the correlation even more striking.

Against the background of this discussion, we want to make the claim that this correlation is not an accident and should be compatible with the general architecture of grammar. As we noted towards the end of Section 3, we could simply derive the limits of umlaut with a simple reference to a difference between stem-level affixes and dual-level affixes. Similarly, we could derive the differences between the different realizations of negation in Sinhala by referring to syntactic locality domains such as phases. However, that would not tell us anything about the correlation. It would be a total coincidence that the bi-domainal structures in phonology correspond to bi-domainal structures in syntax. Rather, we want to assume that the isomorphism we note in the table above indicates a deep underlying principle of language, which we, for the time being, refer to as in (56).

(56)   The Mirror Principle of Domains:[22]
       Morphological and Phonological locality domains mirror the syntactic locality domains.

In the remainder of this paper, we therefore want to propose an analysis that derives the principle above from more general assumptions about the architecture of grammar. The underlying idea is that the locality domains can be inherited in a crossmodular fashion. Crucially, while the system should derive (56) as a principle of grammar, it must prove flexible enough to adapt to specific ways in which the syntax and the morphology can manipulate the formation of domains. As we have seen, both the syntax and the morphology have an impact on the formation of domains (e.g. whether the verb in a given configuration has a class marker or not) and so, we want to stress that the principle in (56) does not imply that the domains must always be completely isomorphic. As we will see in the next section, we assume that the "mirroring" of the domains can be slightly distorted in some configurations. But, crucially, we will argue that this distortion can be captured in a systematic way.

4   The analysis: How to match domains

In this section, we present the model that we envisage that accounts for all the data in a systematic way. As we have seen in the previous sections, both the morphophonological process of umlaut as well as the compatibility with embedded negation seem to indicate that they require a solution

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is still a clear contrast to ungrammatical examples where a past or a non-past matrix verb is negated with *no-*.

[22]As with the original Mirror Principle formulated by Baker (1985), we do not claim to be the first ones to have observed parallels in domain formation between different modules. As noted above, there is a long tradtion of level or strata-based accounts of morphology and phonology that aims to identify the domains for these two modules. Similarly, there is a growing body of research couched in Distributed Morphology that more or less explicitly assumes that something (56) must hold and explores the consequences of (56) for the architecture of grammar (see e.g. Pak 2008, Newell 2008, Embick 2010, D'Alessandro and Scheer 2015, Fenger 2020).

in terms of locality domains. And, as we have emphasized several times by now, these locality domains in completely different areas of grammar show a surprising amount of similarity. The affixes that constitute the set of weak affix triggers characterize exactly the constructions that are compatible with embedded negation. The intuition that we want to model in this section is that this is no coincidence and that it should follow straightforwardly from our model of grammar.

4.1 The analysis in a nutshell

The preceding sections have demonstrated the need to distinguish two classes of constructions. Moreover, we have seen a correlation between processes differing in terms of two logically independent dimensions. On the one hand we have seen a correlation between a syntactic process (i.e. the applicability of embedded negation) and a phonological process (i.e. the applicability of umlaut). On the other hand, we have seen a correlation between a word-internal process (i.e. the applicability of umlaut) and a word-external process, (i.e. the applicability of embedded negation). Since these are logically independent,[23] we derive them with two logically independent assumptions: The first assumption is that the syntax creates locality domains that are inherited to the morphology and the phonology (Marvin (2003), Arad (2003, 2005), Pak (2008), Newell (2008), Embick (2010), D'Alessandro and Scheer (2015), Fenger (2020)). This means that, in the unmarked case, these domains will be isomorphic between the different modules. The second assumption is that verb-movement, when it takes the phase head along, also extends the clausal phasal domains. This assumption, typically referred to as *phase extension* or *phase sliding* (see e.g. den Dikken (2007), Gallego and Uriagereka (2007), Fenger (2020)), explains why word-internal locality domains correlate with clausal ones.

Applied to our Sinhalese case study at hand, we assume that strong umlaut triggers (i.e. PST and PASS) are picked up by syntactic head-movement during the syntactic derivation and weak umlaut triggers (i.e. PERF, PROG and INF.IMP) are not. They attach to the verb at a later stage in the postsyntactic module. In a sense, this is our way of saying that strong triggers are very affix-like and weak triggers share some properties with clitic-like elements.

Crucially, the result is of this difference in word-formation is that the elements in question end up in different locality configurations. In regular, synthetic constructions (involving e.g. PASS and PST), all heads that are picked up on the way will be in the same locality domain as the verb stem. In constructions involving PERF, PROG and INF.IMP, we do not have head-movement up to the relevant heads so that the these heads will be located in outer locality domains. This will explain the different behavior of the given morphemes in the word-internal domain.

Since we follow recent approaches of phase-extension, we predict that there should also be correlates of head-movement in the clausal syntax. Sufficiently high head-movement up to T (or even higher) will result in a situation where there is only one phasal domain per clause. Affixes that are not attached to the verb via head-movement will result in a situation where the clause is divided into two (or more) phasal domains in a clause. And, as we have seen the choice of negation reflects the number of phasal domains in a clause inasmuch as negation with the *no*-prefix is only possible in cases where the negation is not in the highest domain.

We can thus derive the distinction between the different classes of morphemes/constructions, which finds its correlates both in the word-internal as well in word-external (clausal) processes. And crucially, since we assume that locality domains are inherited, we can also derive the correlation between the syntax and the phonology.

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[23]It is not hard to imagine syntactic domain effects correlating with clausal prosody but not word-internal prosody. Similarly, it is not hard to imagine a word-internal process (such as affix order) to correlate with a word-external process (such as binding, etc.)

4.2 Matching domains

This section contains the core ingredients of our analysis and illustrates how the model we set up generates the respective locality domains that then result in different patterns concerning the choice of negation as well as the limits of umlaut.

The model that we want to develop to account for this parallel is couched in a Y-model of grammar where the syntax draws on a very reduced (i.e. non-generative) lexicon. The elements the syntax draws from the lexicon are simple abstract features and feature bundles devoid of phonological and morphological content. The structures the syntax creates are eventually shipped off to PF and LF. At PF, the postsyntactic morphological module transforms these syntactic structures into linear strings in a stepwise fashion and, in the course of doing that, it also enhances them with morphological and phonological features; a process we will refer to as Vocabulary Insertion. After Vocabulary Insertion, morphophonological and ultimately purely phonological rules then apply.

The idea is that every module can have a limited effect on the formation of locality domains which will affect the modules later in the derivation. The effects of the syntactic derivation will affect the morphology and the phonology while the morphological derivation will only effect the phonology. Crucially the syntax remains completely unaffected by what is going on in the morphology. In what follows, we will go through the modules and the respective interfaces between the modules and illustrate how each module manipulates the locality domains.

4.2.1 The Matching of Domains from Syntax to Morphology

We begin with the syntax and in particular we focus on the question how the syntax creates locality domains that are relevant for processes in the subsequent modules. To begin with, we assume that some features (or heads) in the reduced lexicon are specified to be domain delimiters, or to use a more conventional term: phase-heads. To be more precise, we follow standard assumptions in the current literature and assume that v and C are phase-heads (Chomsky 2001, 2008). We stay agnostic as to whether this is a universal property of languages in general or whether this is specific to Sinhala at this point. We will from now on represent phasehood status with an asterisk (v*, C*).

(57)   v*, C*

In what follows, we will mainly be concerned with the phasehood-status of v since CPs will, by assumption, remain to be phases throughout.

The assumption that v is lexically specified as a phase-head does not necessarily mean that vP (or VP) will inevitably be the phasal domains, i.e. the locality domains that will be spellt out. Rather we follow works by (den Dikken 2007, Gallego and Uriagereka 2007, Bobaljik and Wurmbrand 2013, Bošković 2014, Fenger 2020, a.o.) in saying that phases can be defined contextually, which we implement by saying that head-movement of a phase-head extends the phasal domain. This means that head-movement of v* into the higher domain will mean that all affixes that end up in the same complex head will be in the same locality domain.

Consider the different derivations for a verb in the past tense as opposed to a perfect construction. As we already gave away in the previous subsection, we assume that, strong triggers such as passive or past tense are picked up via head-movement while weak triggers are not. In (58), we see a synthetic construction clause where the verb moves up to v*, which moves up to T, which moves up to C (head-movement indicated by the solid arrows).[24] We assume that the verbal class marker in class 1 is an instantiation of v and therefore a derivation as in (58) will result in a simple verb form such as (59).

---

[24]See Manetta (2019) on Hindi, a related language, and Rosmin (2015) on Malayalam, a close relatives of the immediate neighboring language Tamil, for an argument that the verb moves up all the way to C in this head-final language.

(58)
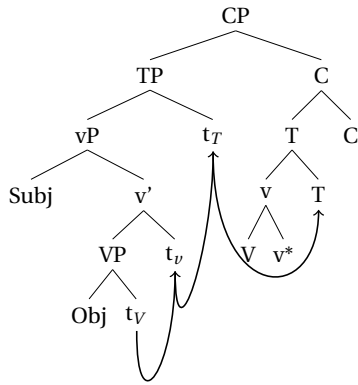
(59) bal- ə- nə-   wa
      V- v*- T[NPST]- C[IND]
      'looks'

In (61), we see a construction where an aspectual head, here Perf, intervenes between v* and T. Since Asp blocks head-movement, head-movement only applies from V to v* and stops there. The Asp head does not form a complex head with the verb in the syntax. It is only attached in the postsyntactic module through some later cliticization process.[25] (Cliticization indicated by the dotted arrow). In this configuration, T and C will be expressed by an auxiliary.
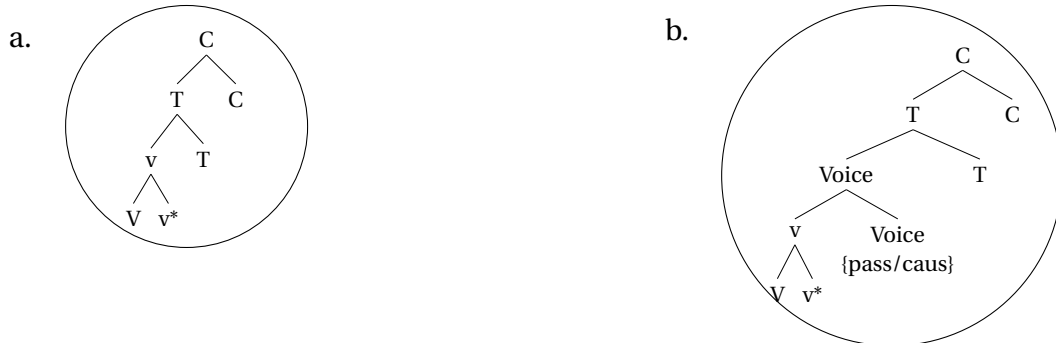
(60)
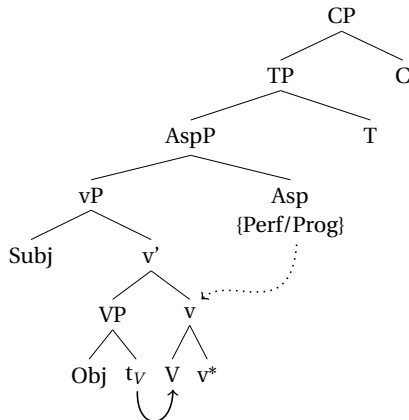
(61) bal- ə- la   tiə- nə-   wa
   V- v*- Perf   be- T[NPST]- C[IND]
      'has looked'

As a result of the derivation in (60), affixes like Tense (past or non-past) will always be in the same locality domain as the verbal root as indicated by the circle below. The same holds for instances of Voice (passive and/or causative), which, by assumption, can also be targeted by head-movement.
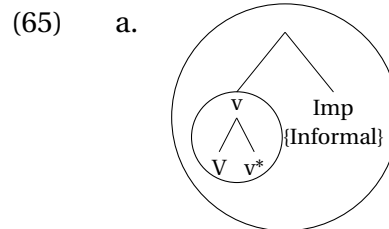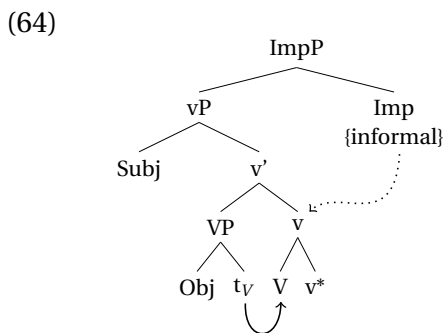
(62) a.

b.

The derivation in (60) will however result in a different locality configuration. Since heads like Perf or Prog do not allow to be targetted head-movement, the resulting domains look as follows. In (63a), the aspectual head is not part of the innermost domain. The innermost domain only contains the verb and v*. If there is an additional Voice head in between, head-movement will target that Voice-head but stop there. The result are locality domains as in (63b).

---

[25]We assume this instance of cliticization to be an application of morphological merger (Marantz 1988, Embick and Noyer 2001, Georgieva et al. 2021) for the sake of concreteness.

(63) a.

v [V v*] Asp {Perf/Prog}

b.

Voice [v [V v*] Voice {pass/caus}] Asp {Perf/Prog}
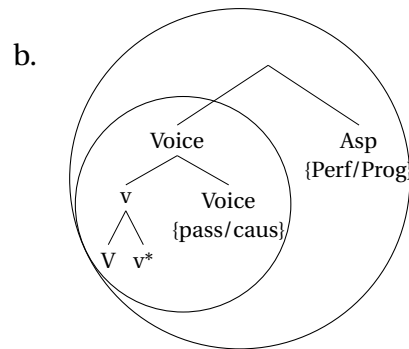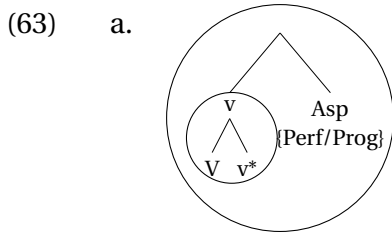
As for the informal imperative, we assume a similar structure as for the aspect configurations. Clearly, a more detailed investigation of the structures of the different types of imperatives in Sinhala is required but for now we assume that imperatives attach directly to a vP or a VoiceP but disallow head-movement of v* in very much the same way as the aspectual heads PROG and PERF do (see (64)). The result is a locality configuration as in (65) where the informal imperative head is outside of the innermost locality domain.[26]

(64)

ImpP
├─ vP
│   ├─ Subj
│   └─ v'
│   ├─ VP
│   │   ├─ Obj
│   │   └─ t_V
│   └─ v
│   └─ V v*
└─ Imp {informal}

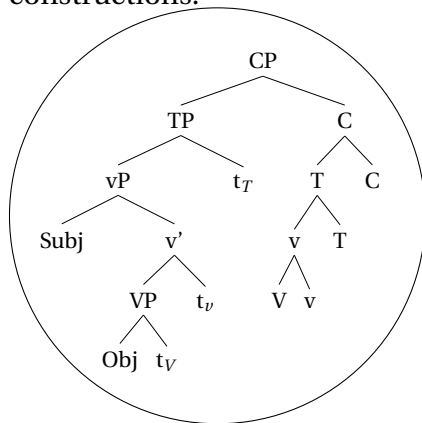(65) a.

v [V v*] Imp {Informal}

So, to sum up, we assume that the difference between the two classes of morphemes (i.e. strong vs weak triggers) is due to a difference in word-formation. Strong triggers will allow head-movement of v whereas weak triggers will not. They will attach to the verb at a later point in the derivation. These differences in the respective word-internal locality configurations will allow us to derive why some umlaut-triggers (i.e. PASS, PST) will always be able to trigger umlaut and others do not.
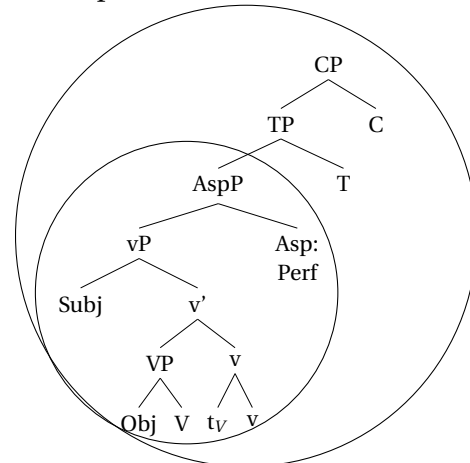
However, as we have seen, the differences between the two classes of morphemes also extends to the word-external domain. We thus follow (den Dikken 2007, Gallego and Uriagereka 2007, Bobaljik and Wurmbrand 2013, Bošković 2014, Fenger 2020, a.o.) in assuming that phases can be contextual, which we model through head-movement. What this means is that head-movement of the phase-head v* up to T or even higher, extends the phasal domains up to the final landing site of the head-movement. In essence, this means that configurations which involve head-movement up to C will contain only one phase per clause whereas configurations where head-movement stops at v* will contain two phases per clause. The former is shown in (66) with an exemplary structure for a regular analytic verb form. The latter is shown for a perfect clause but similar configurations are found with progressive or informal imperative structures.

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[26]The analysis for Sinhala is in line with observations regarding the structure of imperatives in other languages. On the one hand it has been argued, on the basis of affixation and negation, that for some languages the verb stays low (see for example discussion on English or Italian, Rivero and Terzi 1995, Lasnik 1995, Zeijlstra 2006, a.o.). On the other hand, it has been argued that, on the basis of the interaction of aspect, negation, and imperatives, in Serbian, that there might be a phasal boundary in imperatives (Despić 2020).

(66) One clausal domain in Past/Non-Past constructions:

```
                  CP
           _____|_____
          TP            C
       ___|___       ___|___
      vP      t_T   T       C
   ___|___       ___|___
  Subj   v'     v       T
      ___|___  _|_
     VP   t_v V   v
   ___|___
  Obj  t_V
```

(67) Two clausal domains in Perf, Prog or Inf.Imp constructions:

```
                  CP
             _____|_____
            TP          C
         ___|___
       AspP      T
     ___|___
    vP      Asp:
 ___|___    Perf
Subj   v'
    ___|___
   VP      v
 __|__    _|_
Obj V t_V  V
```

This difference in locality domains in the clausal syntax will give us a handle to derive why only the structures in (67) are compatible with *no*-negation.

4.2.2 The Matching of Domains from Morphology to Phonology

So far, we have devised a system where the syntax creates locality domains depending on the concrete syntactic configuration. Some heads such as Voice (CAUS or PASS) or Tense (NPST or PST) allow for head-movement and will thus always be inside the innermost domain of the verb. As a result, these heads will, if they are umlaut triggers, always be able to trigger the umlaut process.

Other heads such as the aspectual heads (PROG or PERF) as well as the informal imperative do not allow head-movement and will thus be located outside of the innermost domain of the verb stem. This is however not yet the result that we want because, given a simple implementation of the umlaut process as such, it would predict that these heads should never be able to trigger umlaut since they are not in the same domain. However, as we have seen, these heads can trigger umlaut in a specific configuration, namely when they are adjacent to the verb stem as no class marker or causative affix intervenes. Since we assume the class marker in class 1 to be a realization of v^*, this raises the question of what happens in class 2, where we argued in detail in Section 2.4 that no class marker is present in the morphological structure.

It has been observed for quite a while now that morphological processes usually do not seem to be interrupted by syntactic heads that have no morphophonological realization. Embick (2010), for example, observes that such heads do not interfere for instances of adjacency-conditioned allomorphy or suppletion. Calabrese (2015) observes in a striking parallel to our case at hand that certain morphological rules (such as the contextual stem allomorphy in (68a)) in Italian only apply with athematic roots, i.e. with roots that do not come with a class marker/theme vowel.

(68) a. perd -∅ -s -o ⟶ /perso/
        lose- (-TV) -PST.PART -M.SG
     b. part -i -t -o ⟶ /partito/
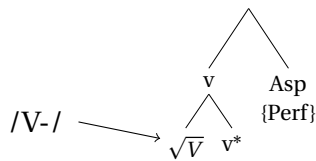   leave -TV -PST.PART -M.SG

Both Embick (2010) and Calabrese (2015) assume that syntactic heads that do not play a role in the morphology must be pruned away upon spell-out to facilitate Vocabulary Insertion and the potential application of morphological rules. We follow this assumption and assume that v^* is pruned in class 2. To be precise, we assume that once the verbal root is inserted, its class features

are accessible and Vocabulary Insertion is interrupted to prune out the v-head.[27] This pruning is conditioned by the presence of a verbal root exponent that belongs to class 2.

(69)   [v*] $\longrightarrow \varnothing$ / /V/ of Class 2

To illustrate the procedure, consider the trees below. In (70), we first insert the Vocabulary Item for the verbal root ($\sqrt{V}$ represents the verbal root and /V-/ represents the root's exponent). In the case at hand, the root we inserted is a class 2 root, namely *ad-* ('to pull'). Before VI continues, the rule in (69) will prune away v* leading to a situation where V and Asp are sisters.
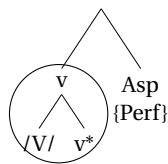
(70)   VI of the verbal root: (71)   Result after Pruning:

/V-/ $\longrightarrow$

v   Asp
      {Perf}

$\sqrt{V}$ v*

Pruning $\longrightarrow$
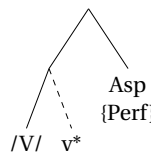
Asp
{Perf}

/V-/
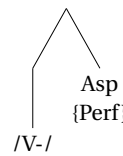
The question that now arises is what happens to the formation of domains if a phase-head is pruned away. What we have seen, empirically, is that precisely in the configurations where the phase-head is pruned (i.e. in class 2), the next higher head is exceptionally integrated in the domain in question. Following Fenger (2020), we thus assume that pruning of a phase-head simply inherits the property of being a domain delimiter one head up in the tree. The following trees illustrate the individual steps:
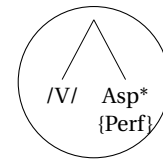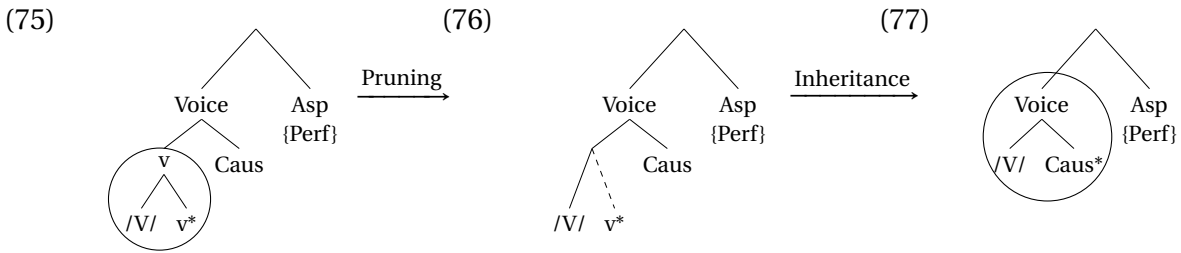
(72)   (73)   (74)

v   Asp
      {Perf}

/V/   v*

Pruning $\longrightarrow$

Asp
{Perf}

/V/   v*

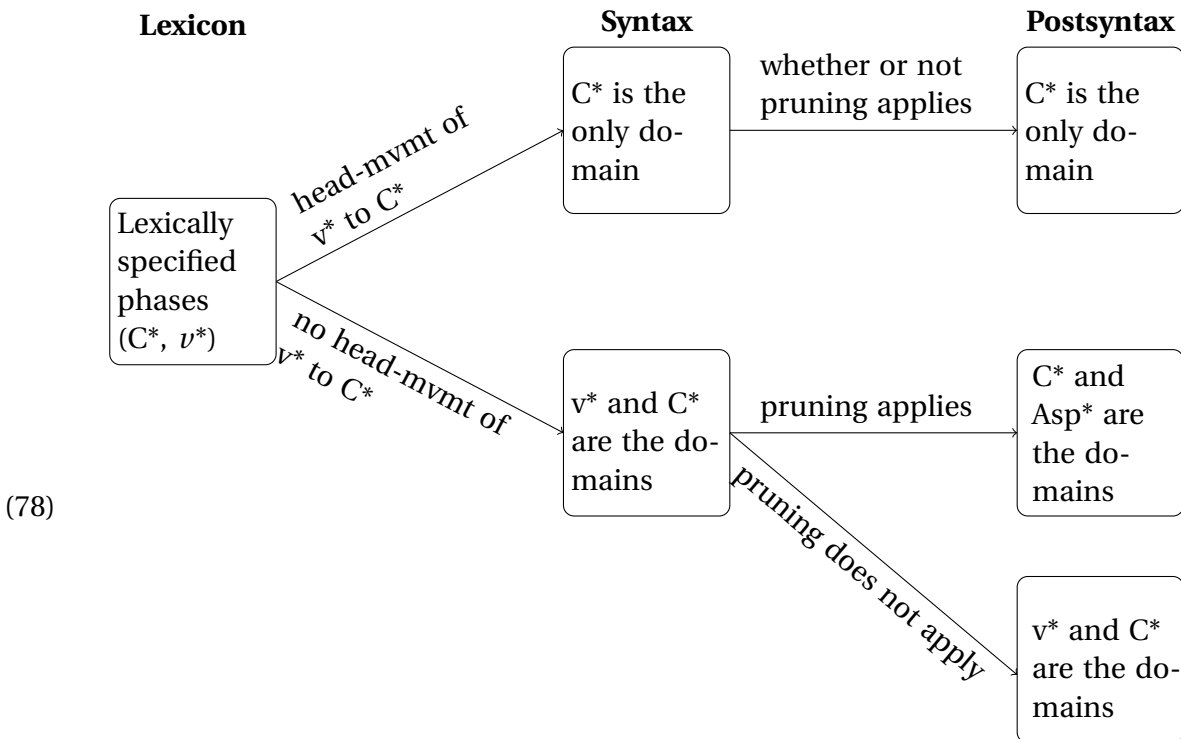Inheritance $\longrightarrow$

/V/   Asp*
       {Perf}

In Section 2.6, we already likened the behavior of the weak umlaut-triggers to the notion of dual-level affixes. These affixes are usually thought to be outside of the stem-level domain but can exceptionally be integrated into the inner domain in specific configurations. This is exactly the intuition that we modelled with the steps above. Weak triggers such as the perfect, the progressive or the informal imperative are usually outside of the innermost domain but can exceptionally be integrated into the domain if they are root-adjacent. If they appear next to a class 1 verb, then no pruning will take place and they will appear outside of the innermost domain, thus unable to trigger umlaut. That derives why weak triggers never trigger umlaut with class 1 verbs. Similarly, if they appear with class 2 verbs but with an intervening causative, then they will similarly not be able to trigger umlaut because it is only the next head up that will inherit the property of being a domain delimiter, which in this case will be the causative. This explains why weak triggers will not be able to trigger umlaut across a causative.

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[27]This modelling of pruning is only one of various possibilities. One of the alternatives is to assume that Vocabulary Insertion of a null-allomorph has the effects of impoverishment in the sense of Trommer (2003, 2012). In that case, no pruning rule would be needed in the first place. Trommer (2012) notes that, under that interpretation, zero-morphemes are never part of the actual phonological string and thus cannot block umlaut. We take this to essentially be an empirical question as to whether zero-morphemes can sometimes act as interveners for morphophonological processes. The second alternative that we want to mention stems from works in Nanosyntax where the difference between inflectional classes is typically conceived of as exponents realizing different sizes of subtrees (see e.g. Caha et al. 2019). Under that interpretation, we could simply say that class 2 verbs expone the verbalizing head *v** together with the root. As a result, the exponent of the root would automatically be adjacent to the aspectual head in class 2, which explains why that class can undergo umlaut in the perfect and the progressive. Note that both of these alternatives would need to say something in addition about the property of domain inheritance we discuss below.

(75) ... (76) ... Pruning ... (77) ... Inheritance ...

(Tree diagrams (75), (76), (77) showing Voice/Asp{Perf}/v/Caus/V/v* structures with Pruning and Inheritance arrows)

These are the domains that are ultimately sent to the phonology where the application of umlaut is determined. Only a morpheme in the same domain as the stem is able to trigger umlaut on the stem. Since strong triggers are picked up by syntactic head-movement, they will always be in the same domain as the stem and thus they will always be able to trigger umlaut. Weak triggers on the other hand are not in the stem domain. They can exceptionally be integrated by the inheritance property of pruning if the v* is pruned and if there is no a causative intervening. The following derivational decision tree illustrates the domain formation in the verbal domain in Sinhala:

(78)

Lexicon — **Syntax** — **Postsyntax**

Lexically specified phases (C*, v*)

— head-mvmt of v* to C* → C* is the only domain — whether or not pruning applies → C* is the only domain

— no head-mvmt of v* to C* → v* and C* are the domains — pruning applies → C* and Asp* are the domains

— v* and C* are the domains — pruning does not apply → v* and C* are the domains

Having established the formation of domains across modules, we now have the tools to provide a comprehensive analysis for the data we observed in Sections 2 and 3. Before we show the concrete derivations, we need to introduce some preliminary assumptions about how to model umlaut as well as on how to derive the behavior of negation. This is done in the next two subsections.

4.3 The analysis of Umlaut

In Section 2.5, we have already taken a closer look at operation that is umlaut, and we concluded that it is substantially different from morphological operations for a number of reasons: (i) Umlaut is exceptionless inasmuch as it applies to every verb in the language. (ii) It triggers a completely predictable phonological change in all of these verbs and (iii) it obeys different locality domains than purely morphological processes such as suppletion: While suppletion requires immediate adjacency, umlaut does not, but umlaut requires being in the same locality domain.

We concluded from these facts that umlaut is a phonological process. Accordingly, we model it as such and we follow most of the literature on umlaut in German(ic) by Lodge (1989), Yu (1992),

Lieber (1992), Wiese (1996), Trommer (2021), and the treatment of umlaut in Sinhala in Parawahera (1990). We treat it as a floating feature that determines the quality of an underspecified vowel on the stem.

To be precise we adopt the following assumptions: First, vowels in Sinhala are either positionally specified for [–back] or underspecified. Abstracting away from the complications of the schwa in the language, we thus arrive at the following specifications of the six vowels in Sinhala:

(79)   Featural Specification of Vowels in Sinhala:

/i/: [+high,–low,–back]	/u/: [+high,–low]
/e/: [–high,–low,–back]	/o/: [–high,–low]
/æ/: [–high,+low,–back]	/a/: [–high,+low]

The vowels /u/, /o/ and /a/ are underspecified for the feature [±back]. In what follows, we will represent underspecified vowels in upper case. When they remain underspecified until the end of the given phonological cycle, then the vowel is fixed as the default back vowel. This is shown in (80). Here we see a class 1 verb *anɖənəwa* ('cry') that bears the respective class marker, the non-past marker and the indicative marker. Underlyingly, we assume that the vowel of the verb is underspecified for backness (hence capital A). Since none of the affixes in this configuration is an umlaut trigger, the vowel will be specified as [+back] by default yielding the correct surface form.

(80)   V   - CL - NPST - IND
        /Anɖ/ - /ə/ - /nə/   - /wa/   ⟶ /anɖənəwa/

The second crucial assumption is that some suffixes bear a floating umlaut feature, which we will represent as a superscript [–back]. This feature will associate with all underspecified vowels in a given domain and cause them to be realized as [–back]. In (81), we have a minimally different configuration as in (80) above. The only difference here is that we have a past tense marker, which introduces the floating umlaut feature. This feature will associate with the underspecified vowel and result in a fronted vowel on the stem.[28]

(81)   V   - CL - PAST   - IND
        /Anɖ/ - /ə/   - /u[-back]/ - /wa/   ⟶ /ænɖuwa/

We want to emphasize here that the association of a floating feature with an underspecified vowel is constrained by the locality domains we set up in the preceding sections. If a stem with an underspecified vowel is located in a domain that does not contain a floating feature, its vowel quality will be fixed to default back. Potential floating [–back]-features in subsequent cycles will not be able to change that anymore.

4.4 The analysis of negation

In this section, we briefly introduce our necessary assumptions about the analysis of negation in Sinhala. We will focus only on the use of the negation prefix *no-* as the compatibility with the *no*-prefix was the crucial factor distinguishing between the two types of constructions. We will therefore leave a discussion of the verbal auxiliary negation *næ�æ* for future research.

In Section 3, we ended up with the following generalization about the distribution of *no-*.

(82)   The verbal prefix *no-* is used to negate embedded domains.

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[28] Note that the class marker schwa in (81) and is deleted to avoid vowel hiatus. Note also that we are not representing the /a/ in the indicative as underspecified here which is a slight simplification. As will become clear in the derivations in Section 4.5, we assume that association of the [–back] with the /a/ in the indicative is counterfed by the late insertion of the indicative exponent. The indicative simply comes to late to be associated with the floating feature.

As we have seen, the prefix *no-* can negate finite and non-finite subordinate clauses, infinitival clauses as well as complements of modal auxiliaries. It is also compatible with constructions in the perfect, the progressive and the informal imperative. We thus take it that it can (at least) attach to extended vPs and CPs. In addition, we assume that unlike the verbal particle *nææ*, which has many auxiliary-like properties, *no-* is adjoined to the category it attaches to. This explains, for example, why *no-* does not change the verbal morphology of the lexical verb while *nææ* does for example (see Georgieva et al. (2021) for similar argumentation for the adjunct-status of constituent negation in the Finno-Ugric language Mari).

To account for the fact that *no-* is a bound morpheme, we assume that it lowers onto the head of its verbal complement. Given what we have said about domains in the preceding sections, this predicts that just like a perfect morpheme for example, *no-* is outside of the innermost stem domain, an assumption that is supported by the fact that *no-* does not undergo umlaut when it is followed by a strong umlaut-trigger. Even though *no-* contains a back vowel that could possibly front in umlaut contexts, it does not. Despite the fact that we have a past verb form, the form of the negation does not front and change to **ne-*. This suggests that negation is in an outside domain or at least too high to be affected by umlaut induced by the past-tense marker.

(83) ee   no-æɳɖ-u-we   putgələya-i
      this NEG-cry-PST-FOC man-AM
      'This is the man who didn't cry'[29]

We thus assume that the structures for *no*-negation are like the following. In (84), we see a structural configuration where a negation is adjoined to a vP. Similar to the aspectual heads, it lowers onto the head of its complement creating a complex head as in (85). Unlike aspect and the informal imperative, negation is a exceptionally specified to be a proclitic rather than an enclitic.[30]

(84)
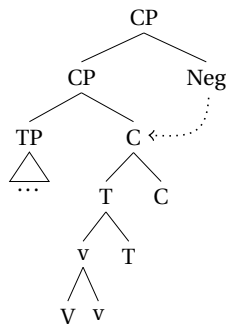
(85)
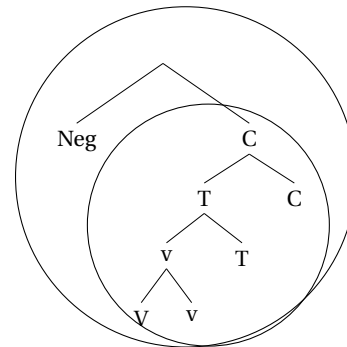
However, this cannot be all there is to it since we saw that *no* is incompatible with main clauses with an analytic past or non-past tense verb:

(86) *Mamə no-giy-a.
      1SG   NEG-go.PST-IND
      'I didn't go'

In order to derive this distribution, we make the additional assumption that negation probes for the root clause feature and *no-* is only licensed in [–R]-contexts. If it finds a C-head that is non-

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[29]Glossed as AM is the so-called assertion marker that is found on non-verbal predicates (see Chandralal 2010).

[30]At this point, we simply take this to be a morpheme-specific linearization constraint. It is noticeable though that negation consistently shows up as a prefix even in almost exclusively suffixing, head-final languages such as Sinhala or Mari (Georgieva et al. 2021) or even in English. Ultimately, this is probably to be connected to Horn's (1989) *Neg-first*-principle which is intended as a meta-principle of languages that is behind several syntactic and morphological phenomena such as Neg-Raising or Negative Inversion.

finite, it will be valued for [–R]. Crucially, if it cannot find a [±R]-feature, the probe will remain unvalued. In that case, the feature will default to [–R].[31]

(87)   [Neg, –R] ↔ /no-/

Consider briefly, the two configurations below. In (88), on the left-hand side, we see a regular synthetic verb form in the past. Here, there is only one clausal domain spanning all the way up to C. If that C is the head of a root clause, it bears the feature [+R] and thus values the probe on the negation with [+R] and the no-negation is not possible. If it is an embedded C, it will value the probe negatively, and *no-* is possible. In (89), we see the negation attaching to a lower domain (a vP by assumption). In this case, the probe on Neg will not find the [±R] feature as that is contained in another domain and it will thus remain unvalued. Since the unvalued probe will thus default to [–R], *no-* can be inserted. The result is that *no-* is always possible with two domains in the clause as it can then attach to the lower one where its probe will be unable to see the root feature on C.

(88)   One clausal domain: (89)   Two clausal domains:
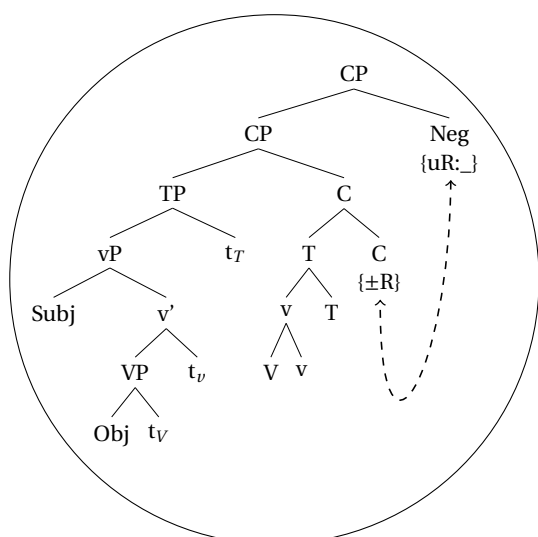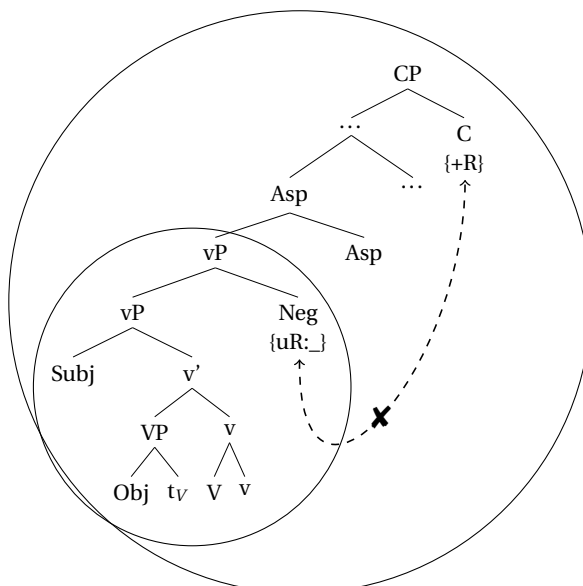
We now have all ingredients in place to derive the data patterns observed in Sections 2 and 3. In the next section, we will illustrate some selected derivations to show how the system works and that the formation of domains makes the right predictions for the crucial configurations.

4.5 The Derivations

In the previous sections, we have basically explained all necessary pieces required to explain the data observed in Sections 2 and 3. Moreover, we have sketched a model that offers a principled explanation for the correlations that we have seen. On the one hand we had the correlation between word-internal domains and word-external domains and on the other hand we had the correlation between the syntax and the phonology. The former correlation was derived by building on the established mechanism of phase-extension: the domains in the clausal syntax mirror the

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[31]We adopt this implementation of the requirement of *no-* to appear in non-root domains for the sake of explicitness but we want to note that there are probably more elegant ways to capture the distinction between root domains and non-root domains (see a.o. Emonds 1970, 1976, Heycock 2006 as well as Aelbrecht et al. 2012 and papers therein). The literature contains a fair amount of discussion as to how root-contexts are featurally or structurally different and how that translates into the various phenomena restricted to root clauses/domains. We could probably adopt most of these approaches as long as they allow us to negatively specify that *no-* can occur in *non*-root clauses.

word-internal domains. The latter correlation was derived by assuming a model of grammar where domains are inherited from the syntax into the morphology and the phonology.

In what follows, we go through some selected derivations to sketch how the individual puzzle pieces fit together. To be precise, we will focus on derivations of class 2 verbs as this is the class where the crucial interactions between domain formation and pruning, etc happen. Class 1 verbs can be nonetheless be derived straightforwardly. Subsection 4.5.1 begins with simple mono-domainal tense forms where both the clausal syntax and the word-internal structure consist of only one domain. Subsection 4.5.2 then moves on to the more complicated cases where we have two domains, word-internally as well as word-externally.

4.5.1 Mono-domainal structures

In order to introduce the system as well as the notation we are using for the domains, we start with a simple synthetic verb form of a class 2 verb such as the one in (90):

(90)　Mamə adi-nə-wa.
　　　1SG　pull-NPST-IND
　　　'I pull'

As in all simple tenses, we assume head-movement of the verb all the way to C which has the consequences that there will be only domain both word-internally and word-externally. As a result, the sentence in (90) cannot be negated using *no-*. Even if the negation-head was adjoined to vP, it would be able to agree with the [+R]-feature on C as there is only one domain. The one domain is then shipped off to the postsyntax, where v is pruned since the verb is a class 2 verb and v remains unexponed in class 2. Since C/CP is the only domain in this case, pruning of v has no effect on the domain formation. Then Vocabulary Insertion (VI) applies. Following standard practice,[32] we assume that VI applies bottom-up starting with the most deeply embedded node. Similarly, we assume that some cyclic phonological rules apply after every step of VI but some postcyclic rules apply after all VIs in a given domain are inserted. Of particular interest for our discussion here are the postcyclic rules in the table below. The first one, called cluster resolution, here inserts the epenthetic /i/ after consonant-final stems. The second rule, here called default to [+back] assigns all underspecified vowels to their default feature [+back].[33]

So, let us begin to look at the derivations with a simple synthetic verb form of class 2 such as the one in (90).

(91)　a.　Syntax: Head-movement to C ⟶ C is the only domain
　　　b.　Postsyntax: Pruning of v ⟶ C remains the only domain
　　　c.　Vocabulary Insertion:

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[32]See amongst many others Bobaljik (2000), Paster (2006), Starke (2009), Embick (2010), Myler (2017), Kalin (ta), Kalin and Weisser (ta).

[33]Note that in the representations below we will abstract from some of the phonological processes we discussed in section 2, as they do not bear on deriving the generalization. The first process we do not discuss is reduction of short vowels in open syllables (e.g., /wa/ reduces to /wə/). We also abstract away from the representation of past tense, and whether it is in fact a more abstract underlying form, as discussed in section 2.4.

Complex Head	V	-T[NPST]	- C[IND]
Morphology			
VI of Root	/Ad/	-T[NPST]	-C[IND]
VI of T	/Ad/	/nə/	-C[IND]
VI of C	/Ad/	/nə/	/wa/
Postcyclic Phonology			
Cluster resolution	/Ad/ /i/	/nə/	/wa/
default to [+back]	/ad/ /i/	/nə/	/wa/
Surface Form	/adinəwa/		

A few words on the notation of the table in (91c). We give the hierarchical input structure in the first line and then every line indicates one step of VI. They shaded cells per line indicate the respective changes. First, we insert the root, which at this point contains an underspecified vowel /A/. Then, we insert the non-past morpheme /nə/ and finally, the indicative mood morpheme on C. In the postcyclic phonology, the epenthetic vowel /i/ is inserted to avoid the consonant cluster and the underspecified vowel defaults to [+back] since it has not associated with a floating [–back]-feature at that point.

Let us move on to the next derivation that also depicts an analytic verb form of the same class 2 verb. This time, we include a causative voice head and a past tense morpheme instead of a non-past morpheme.

(92) Mamə æd-də-u-wa.
      1SG   pull-CAUS-PST-IND
      'I made to pull'

Again, we have head-movement all the way up to C, which yields only one domain, which in turn predicts correctly that *no*-negation is not possible in these cases. Since we are dealing with a class 2 verb, again pruning v applies but that, again, has no effect on the formation of domains.

(93)   a.   Syntax: Head-movement to C $\longrightarrow$ C is the only domain
        b.   Postsyntax: Pruning of v $\longrightarrow$ C remains the only domain
        c.   Vocabulary Insertion:

Underlying Form	V	-Voice[CAUS]	-T[PST]	- C[IND]
Morphology				
VI of Root	/Ad/	-Voice[CAUS]	-T[PST]	-C[IND]
VI of Caus	/Ad/	/wə/	-T[PST]	-C[IND]
VI of T	/æd/	/wə/	/u[-back]/	-M[IND]
VI of C	/æd/	/wə/	/u/	/wa/
Postcyclic Phonology				
Cluster Resolution	/æd/	/də/	/u/	/wa/
Surface Form	/æddəuwa/			

First, we insert a stem with an underspecified vowel /A/. Then, we insert the causative voice morpheme. Then, we insert the past tense morpheme /u[-back]/. The floating feature immediately associates with the underspecified vowel in the root leading to fronting of that vowel. Finally, we insert the indicative mood morpheme. In the postcyclic phonology, we again employ a rule to avoid the consonant cluster. However, this time, the effect of the rule is one of gemination (due to the respective qualities of the underlying consonants in the cluster). Since there are no underspecified vowels in this derivation anymore, the *default to [+back]*-rule does not apply (or applies vacuously).

Derivations of simple tenses always involve head-movement to C and as a result only one domain (both in the word-internal and the word-external structure). As a result, *no*-negation is (in matrix contexts) disallowed and a floating feature on any of the affixes inside the verbal complex will always be able to associate with an underspecified stem vowel.

4.5.2 Bi-domainal structures:

In this subsection, we will discuss two derivations that involve two perfect configurations resulting in two domains. We begin a causative perfect construction as in (94).

(94) Mamə ohu-ʈə adə-wə-la   tiə-nə-wa.
      1SG   3SG-DAT pull-CAUS-PERF be-NPST-IND
      'I have made her/him pull'

We have a syntactic derivation where the verb moves up to v and both move up to the causative Voice-head. But since Asp blocks head-movement, we get two clausal domains, one being VoiceP, and one being CP. As a result, *no*-negation is possible since we can negate the lower domain. In the postsyntax, the v is pruned but since we have had head-movement to Voice, the phasal domain is already on VoiceP anyway. As a result the aspectual head is outside of the domain. The two tables below illustrate the cyclic derivation.

(95) a. Syntax: Head-movement only to Voice ⟶ Voice and C are the domains.
      b. Postsyntax: Pruning of v ⟶ Voice and C remain the domains.
      c. Vocabulary Insertion of the Voice cycle:

Underlying form	V		-Voice[CAUS]	]
Morphology				
VI of Root	/Ad/		-Voice[CAUS]	]
VI of Caus	/Ad/	/wə/		
Postcyclic Phonology				
Cluster Resolution	/Ad/	/ə/	/wə/	
default to [+back]	/ad/	/ə/	/wə/	
Output	/adəwə/			

      d. Vocabulary Insertion of the C cycle:

Input form	adəwə	]	-Asp[PERF]
Morphology			
VI of Perf	adəwə	]	/la[-back]/
Surface form	/adəwəla/		

Vocabulary Insertion starts bottom up in the inner domain (i.e. the domain delimited by Voice). We first insert the root and then the causative voice head. In the postcyclic phonology, we insert an epenthetic vowel[34] and crucially, the underspecified vowel on the stem is now assigned the default value [+back] since none of the exponents in this cycle came with a floating [–back]-feature. The output of the first cycle is then used as the input to the second cycle and then only the aspect head is inserted. The exponent for the perfect head does have a floating [–back]-feature but since there are no underspecified vowels here, it will not be able to associate. The result is that perfect cannot

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[34]We assume that the epenthetic vowel here is /i/ as well but that another postcyclic rule of vowel reduction to schwa applies in this case as well. We have abstracted away from this in this depiction.

trigger fronting across a causative. None of the crucial postcyclic phonological rules apply in the second cycle and the surface form is /adəwəla/.

So, let us come then to the final derivation that we want to talk about, namely the crucial derivation where the perfect *can* actually trigger umlaut on a verb stem. We will again take a class 2 verb but this time there is also no causative voice head in the derivation.

(96)   Mamə ædə-la   tiə-nə-wa.
         1SG   pull-PERF be-NPST-IND
         'I have pulled'

In this derivation, we have head-movement of the verb to v but since the next head higher up (Asp) does not allow it, the verb ends in v. The syntactically generated domains are vP and CP, which correctly predicts that *no*-negation should be possible. In the postsyntax, Asp then cliticizes to the verbal complex. Then, pruning of v applies, leading to inheritance of the domain one step up. This results in the exceptional configuration that Asp is now integrated into the first cycle after all.

(97)   a.   Syntax: Head-movement only to $v \longrightarrow$ v and C are the domains.
       b.   Postsyntax: Pruning of $v \longrightarrow$ Asp and C are the domains.
       c.   Vocabulary Insertion of the Asp cycle:

Underlying form	V		-Asp[PERF]
Morphology			
VI of Root	/Ad/		
VI of Perf	/æd/		/la$^{\text{[-back]}}$/
Postcyclic Phonology			
Cluster Resolution	/æd/	/ə/	/la/
Surface form		/ædəla/	

These derivations conclude the analysis section, in which we have shown the derivations for all crucial verb structures involving class 2 verbs. Derivations in class 1 will not involve pruning and as a result, the phonological cycles match up perfectly with the ones generated in the syntax. In the derivations above, we have shown how the interplay between the syntactic domain formation, the morphological pruning rule and our assumptions about the concrete analysis of umlaut as well as *no*-negation derives the data we have seen in Sections 2 and 3 in a systematic way. The following section takes a step back and offers a discussion of our core points from a more general perspective.

5 Discussion

5.1 Consequences for the model of grammar

In this paper, we discussed two seemingly independent grammatical phenomena in the Indo-Aryan language Sinhala, the limits of umlaut and the limits of using embedded negation. As noted above, both phenomena can straightforwardly be derived individually with models that are already out there and have been out there for decades. As for the syntactic facts about embedded negation, there are many licensing accounts for instances of low negation (see e.g. Zeijlstra (2004), Penka (2007)), and it is not hard to imagine this kind of licensing being sensitive to any system of syntactic locality domains in very much the same way as we did. As for the phonology of umlaut, in Section 2.6, we already hinted at the fact that the empirical facts about the limits of umlaut in Sinhala could be captured by a stratal account to morphology that allows for the concept of dual-level

affixes (see e.g. Giegerich 1999, Raffelsiefen 2004, Kiparsky 2005, Bermúdez-Otero 2018). Assuming that umlaut is a phonological stem-level process, the class of morphemes we called the weak umlaut triggers could be treated as word-level affixes, which are, exceptionally integrated into the stem-level if they are stem-adjacent. That would do the trick.

The main contribution of this paper is – apart from the comprehensive description of two empirical phenomena in an understudied language – the observation that the locality domains we observe in both modules are essentially isomorphic and a concrete proposal about the modular architecture suited best to derive this isomorphism. We argued at length that the parallelism between the syntax and the phonology should not be treated as accidental and we will offer another argument to that conclusion from the diachrony of the verbal morphology in Section 5.2.

Crucially, if we opted to derive the facts about umlaut in Sinhala with a stratal approach, then the isomorphism between the locality domains in the syntax and those in the morphophonology would necessarily remain a coincidence. Stratal approaches to morphology and phonology (or lexicalist approaches in general) typically do not adopt that word-internal locality domains (such as the respective strata such as word-level or stem-level) have any systematic correlate in the syntax. In other words, if we want to have a handle on deriving these correlations, then we necessarily need to entertain a model that allows us to inherit the locality domains from one module to the other.

Thus, the model we put forward in order to derive the above-mentioned isomorphism rests on the assumption the locality domains in syntax, morphology and phonology are systematically related. In that respect, our paper is part of a growing body of work that investigates the mapping of domains from syntax to morphology and phonology (see amongst many others Kratzer and Selkirk 2007, Pak 2008, Newell 2008, Embick 2010, Selkirk 2011, Newell and Piggott 2014, D'Alessandro and Scheer 2015, Bennett et al. 2016, Cheng and Downing 2016, Bennett and Elfner 2019). All of these works investigate how direct the mapping from syntax to morphology is and what we think we can contribute to this discussion is that we provide a detailed case study where the word-external syntactic domains and the word-internal phonological domains are clearly correlated. Such a case study allows us to precisely map out the different variables in all three modules that can obscure a straightforward direct mapping from syntax to morphology and to phonology. In order to do that, it is necessary to study the behavior of domains in each module in a single language. Only then can we actually move forward and get a conclusive picture of how direct or indirect the mapping of domains between different modules is.[35] In the paper at hand, we investigated the word-external and the word-internal properties of a wide range of Tense-Aspect-Mood combinations in Sinhala to pinpoint the syntactic, the morphological and phonological effects on the respective domains in each module. We found that both the syntactic constructions (i.e. analytic vs periphrastic constructions) as well as morphological properties (i.e. the different verb classes) had an effect on the formation of phonological domains and we devised a concrete model that derives and explains these findings in a restrictive way.

Our model has the syntax forming locality domains on the basis of elements that are lexically specified to be domain delimiters. In the case of Sinhala, those elements are v and C. Depending on the concrete syntactic derivation, this leads to configurations where the entire clause consisted of one domain only or where the clause was bi-domainal. Crucially, since we assume the concept of phase-extension, we also expect that there is a correlation between word-internal domains and word-external domains. Whenever the entire clause is mono-domainal, then we expect the verbal complex to be mono-domainal for word-internal processes as well and whenever the clause is bi-domainal, we expect the verbal complex to be bi-domainal too.

This dichotomy of mono-domainal vs bi-domainal configurations translated into the morphology as well as the phonology and we saw that the behavior of the umlaut process also makes

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[35]See also Fenger (2020), Bogomolets (2020), Harðarson (2021) for a methodologically similar approach in this sense.

straightforward reference to this dichotomy. We saw, however as well, that the morphology can, to a very limited extent, also manipulate the syntactically generated domains. If a head that was specified as a domain delimiter is pruned away in the morphology, then we expect that word-internal domains can slightly be extended. In our case, we saw that pruning of v can, depending on the clausal configuration, lead to a situation where domain-external morphemes (such as the perfect), are exceptionally integrated into the inner domain. Notably, pruning in the morphological component has no effect on the syntactic derivation. This falls out from the architecture of grammar as morphological effects simply come too late and can only feed processes in the morphology and the phonology but not in the syntax.

5.2   Motivating the model: A quick look at the diachrony

The core observation that this paper builds on was that there is a dichotomy of bound morphemes in the verbal complex in Sinhala which manifests itself in the way they participate in umlaut and the choice of negation.. The intuition that we had to model this dichotomy was some bound morphemes we dubbed as strong umlaut triggers (such as passive or past tense) were proper affixes that really belonged onto the verb while other bound morphemes, namely the weak triggers, were more clitic-like. And the difference between affix-like and more clitic-like morphemes then played out accordingly in the syntax and the phonology. This short section takes a look at the diachrony of the morphemes in question and provides another, we think, strong argument that the model we devise is actually on the right track. In short, we observe that the diachronic development of the verbal morphology strongly supports the idea that strong triggers are real verbal affixes while weak triggers are more clitic-like.

Sinhala (as well as its sister language Dhivehi) draws on a long written tradition and several works have laid out the development from Vedic Sanskrit to Sinhala Prakrit (3rd BCE to 4th CE) to Proto-Sinhala (4-8th CE) to Medieval Sinhala (8th-13th CE) and Modern Sinhala (since 13th CE).[36]

The point that we want to make here in this very short section is that the affixes we took to be picked up by proper head-movement (amongst which were the two strong triggers PST and PASS) can be traced back to genuine verbal affixes in Proto-Sinhala or even to Sinhalese Prakrit:

- The causative morpheme -wə can be traced back to an old Sanskrit affix *-paya (*-pe/ *-ve in Sinhalese Prakrit) (Geiger 1938:154)
- The passive morpheme -e can be traced back to an intransitive verb class marker (*-iya in Sinhalese Prakrit) (Geiger 1938:138)
- The non-past tense affix -nə is inherited from the suffix *-na in Sinhalese Prakrit. (Geiger 1938:134)
- The past tense affix -u/-i is inherited from the Proto-Sinhalese Suffix *-ita/-itu (Geiger 1938:135)

All four of these are genuine verbal affixes in older stages of the language. Crucially, the affixes that we assume to attach to the verb through some cliticization process can be traced back to so-called composite verb constructions of the lexical verb and a semantically bleached auxiliary:[37]

- The perfect morpheme -la goes back to the verbal root *lanu ('to put')
- The informal imperative morpheme -pan is a shortened form of the verbal root *piyan ('to close')

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[36]See e.g. Geiger (1938, 1959), Fritz (2002) and references cited therein.

[37]The diachrony of the reduplication as marker of a progressive aspect is not discussed in any of the sources we consulted.

Compound verb constructions are widespread in the area and present in many Indo-Aryan and Dravidian languages and even in Sinhala, they are still very much in use, for example for benefactive applicative uses (with *denəwa* 'to give') or for reflexive uses (*gannəwa* 'to take'). It is a well-known grammaticalization process that such semantically bleached auxiliary verbs can be welded into verbal affixes over time. And, in a sense, this is exactly what we model with our word-internal locality domains. The perfect morpheme *-la*, which used to be a compound verb, is on the verge of being integrated as a proper verbal affix but it has not yet completed that process. We thus treat it as some sort of clitic, i.e. an element, which is categorically ambiguous. It is not acquired by purely syntactic head-movement but it is also not morphophonologically free.

What all of this shows is that again, the correlation between the syntactic behavior regarding embedded negation and phonological behavior regarding umlaut is not a coincidence. Rather it can be traced back to the different origins of the two classes of morphemes. In one case, the morphemes were genuine verbal affixes and the syntactic structures were genuinely mono-clausal throughout the last two centuries. On the other hand, the weak triggers PERF and INF.IMP can be traced back to composite verb constructions, which, at some point, were most certainly bi-clausal and thus it is no surprise that they allowed for embedded negation back then. The point is that the locality domains in the modern language still reflect this dichotomy and in a sense still mimic the diachronic development of the weak triggers as biclausal constructions.

Ultimately, what we want to double down on in this section, is that the model we designed can straightforwardly implement these kinds of diachronic developments, which, we think, are very common and tie the knot between diachronic studies of morphosyntax and synchronic theorizing. We take this to be another strong argument in favor of our model.

6   Conclusion

In this paper, we offered an in-depth study of two, seemingly unrelated, phenomena in the insular Indo-Aryan language Sinhala. Both, verbal stem umlaut in the language (and in particular, the underapplication of umlaut in certain contexts) as well as the use of embedded negation (and in particular, the overapplication of using embedded negation in certain matrix contexts) have puzzled researchers of Sinhala for quite a while. We offered two solutions to these long-standing problems, both of which made use of the concept of locality domains.

The crucial contribution of this paper does not lie however in the concrete implementation of these two phenomena but rather in the observation that the locality domains in both domains are essentially isomorphic. Certain morphemes lose their ability to trigger umlaut only when they were not root-adjacent and it is exactly the same set of morphemes that allows for the use of embedded negation in matrix contexts. Thus, the respective locality domains extend across two logically independent dimensions: (i) On the one hand, we observe a correlation between locality domains in syntax and phonology but (ii) on the other hand, there is also a correlation between word-internal processes and word-external processes. We argued that this was not a coincidence and that we need a model of grammar that allows us to derive if and when locality domains across different areas of grammar are systematically related in the way we observed this for Sinhala.

The model we proposed rests on two basic assumptions that we deduced out of the observations above. First, in order to derive the isomorphism between the locality domains between syntax and the phonology, we assume – in line with a fair amount of recent research couched in both the syntax-phonology interface and with work in Distributed Morphology – that the syntax inherits locality domains to the morphology and to the phonology. Secondly, in order to derive the correlation between word-internal and word-external domains, we followed the literature on phase-extension (see e.g. den Dikken (2007), Gallego and Uriagereka (2007) and others) in assum-

ing that syntactic locality domains (i.e. phases) cannot be reduced to simple uniform category labels (such as vP and CP) but rather that the formation of phases is subject to syntactic operations. In particular, we made use of the concept that head-movement (a word formation process), also extends clausal phases. This allowed us to derive that locality domains relevant the word-external phenomenon of negation mirrored those relevant for the word-internal phenomenon of umlaut.

As we hope to have shown in detail throughout this paper, we do not simply make the claim that locality domains across modules must be the same for conceptual reasons. We still do allow for a limited amount of mismatches between locality domains across modules. The one type of mismatch we discussed in detail was the fact that the absence of a class marker in one of the verb classes in Sinhala lead to slightly bigger locality domains as opposed to the other. In this spirit, we hope to help pave the way towards a model of the syntax-morphophonology mapping that is not simply black and white. Rather than saying that there are no mismatches or that mismatches are everywhere, we need a typology of possible and impossible mismatches in order to propose a coherent model.

And in order to get there, we strongly advocate what one might call the holistic study of grammar. As we have seen, the syntactic choice of negation correlated with the word-internal applicability of a purely phonological process, namely umlaut. One of the main take-aways from this finding can be put as simple as this: Understanding the locality domains governing phonological processes can actually help us determine the workings of syntactic operations and vice versa. However, they can of course only do so, when we look at all modules of grammar at the same time. If our model of phonological process X makes predictions for the syntax or the morphology (or the other way round), then we should actually go and test these predictions and not leave them unexplored.

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