Delayed Exponence in Murrinhpatha as an Instance of Myopia in Morphology

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Abstract

In this paper, I discuss and analyze an intricate morphological pattern in Murrinhpatha which involves reordering of the dual marker *ngintha* and an alternation in the form of its adjacent morpheme. I will argue that the phonological correlates of morphemes provide evidence for a cyclic structure of the word in Murrinhpatha. In combination with independently motivated morphological constraints and the featural specifications of the marker, I suggest an analysis couched in Stratal Optimality Theory, where the cyclic architecture of the word provides a straightforward explanation for the placement of the dual marker and the resulting switch in the form of the classifier stem without stipulating position classes as primitive entities of morphological theory. Furthermore, I argue that a cyclic structure neatly explains the simultaneous realization of the daucal (dual/paucal) classifier stem and *ngintha*, which looks like multiple exponence on the surface. My analysis suggests that the overexponence results from the blocking of *ngintha* in the first cycle and the selection of the featurally more specific daucal stem. However, *ngintha* is not strictly bounded to the first cycle, and its realization is delayed until the second cycle. Put shortly, the morphological grammar in the first morphophonological domain cannot anticipate that *ngintha* will be realized in a later stage of the derivation, thus creating an instance of *myopia* in morphology.

1. The Peculiar Placement of Number in Murrinhpatha

Murrinhpatha is a morphologically highly complex language, which is spoken in the Northern Territory of Australia. The relative ordering of bound morphemes within the verbal complex in Murrinhpatha is sketched in table 1. As shown in table 1, the left edge of the verbal complex is occupied by a morpheme traditionally labeled as *classifier stem* or *finite stem*. Classifier stems are typically treated as portmanteau forms that encode classifying

[*]For comments and discussion, I would like to thank Gereon Müller, Barbara Stiebels and Jochen Trommer, as well as the participants of the *Linearization in Morphology* seminar in July 2022.

Cyclicity, 199–238
Mariia Privizentseva, Felicitas Andermann & Gereon Müller (eds.)
LINGUISTISCHE ARBEITS BERICHTE 95, Universität Leipzig 2023

semantics, subject person and number, as well as tense and mood information (Mansfield 2019, Nordlinger and Mansfield 2021). While information about subject person is realized as part of the classifier stem, object person is marked by affixes that attach right to the classifier stem in slot 2. Another crucial part of the verbal complex is the *lexical stem*, which is sometimes referred to as *coverb*. The lexical stem is an uninflected part of the predicate and is realized in slot 5. In addition, a couple of morphemes may be concatenated in positions after the lexical stem; however, only two of these morphemes are relevant for the purpose of this paper.[1] First, TAM markers are linearized after the lexical stem. Second, certain number markers may be realized in positions following the lexical stem. Note also that the relative order of the TAM markers and the number markers is flexible to some extent, while the relative order of morphemes in the domain spanning from the classifier stem until the lexical stem is fixed (Mansfield 2017). Table 1 further shows that subject number is realized in three different positions: first, it is part of the subject information encoded in the classifier stem. Second, additional morphemes realizing subject number are realized either in slot 2 and hence, in direct adjacency to the classifier stem, or in slot 8 at the right edge of the verb. In this paper, I will explain the distribution and positioning of the number markers in Murrinhpatha and how their position patterns with their phonological properties.

Slot 1	**Slot 2**	**Slot 3**	**Slot 4**	**Slot 5**	**Slot 6**	**Slot 8**
Classifier stem (portmanteau w. SUBJ and TAM)	SUBJ number OBJ marker OBL marker	REFL/ REC	incorporated body part/ APPL	lexical stem	TAM	number (SUBJ or OBJ)

Table 1: Relative ordering of morphemes (Nordlinger and Mansfield 2021: 2)

Table 1 illustrates a crucial property of Murrinhpatha morphology: the verbal predicate is typically bipartite, comprising a classifier stem in slot 1 combined with a lexical stem in slot 5. Throughout this paper, classifier stems are boxed while lexical stems are underlined. Classifier stems form

[1] The original overview on the relative ordering of bound morphemes within the morphological word in Murrinhpatha in Nordlinger and Mansfield (2021) includes three more suffixal positions: slots 7 and 9 include incorporated adverbials, while slot 10 marks the position for serialised classifiers. Since none of these morphemes is relevant for the phenomenon under discussion nor for the examples in this paper, I decided to omit these slots in table 1 for reasons of clarity and space.

a closed class, consisting of 38 distinct subparadigms (Nordlinger 2015, Mansfield 2019). The majority of predicates require both a classifier stem and an uninflected lexical stem. While a few classifier stems can function as standalone verbs without a lexical stem, lexical stems can never appear in the verb without a classifier stem (Nordlinger and Mansfield 2021). The example in (1) illustrates the interaction of the bipartite predicate in Murrinhpatha. The predicate which roughly parallels the English predicate 'to tear' is formed by combining an uninflected lexical stem *rartal* with a specific form of the classifier stem subparadigm 14 'slash' which matches the subject and tense information.[2]

(1) Classifier and lexical stems (Nordlinger and Mansfield 2021: 3)
[pam]-ngintha-nu-ma-rartal
3SG.slash.NFUT-DU-REFL-APPL-tear
'The two (non-siblings) will tear it (the cloth) from each other.'

Nordlinger and Mansfield (2021) discuss a thrilling alternation of the classifier stem in relation to the position of the dual marker *ngintha*. A relevant minimal example illustrating this alternation is given in (2). In (2a), the predicate roughly matching the English predicate 'to see' consists of the uninflected lexical stem *ngkardu* and the 1SG form of the classifier stem paradigm 'see', which is illustrated in table 2. Since the subject of (2a) is 1DU, there is an additional dual marker *ngintha* which is realized to the right of the classifier stem. The 3SG object is unmarked. In (2b), in contrast, there is an overt object affix encoding the 2SG object. In this context, the dual marker *ngintha* appears at the right edge of the word. In addition, the classifier stem does not appear in its 1SG form *ba*, but rather in its dual form *nguba*.[3]

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[2]Throughout this paper, I will make use of the following abbreviations: 1 = first person; 2 = second person; 3 = third person; APPL = applicative; CAUS = causative; CL = verb class; DC = daucal; DU = dual; FEM = feminine; FUT = future; IND = indicative; IRR = irrealis; MASC = masculine; NFUT = non-future; NPST = non-past; OBJ = object; OBL = oblique; PC = paucal; PFV = perfective; PL = plural; PST = past; REC = reciprocal; REFL = reflexive; SG = singular; SUBJ = subject; TAM = tense/aspect/mood

[3]A recurrent comment touches the question whether *ngu-* could be considered to be a prefix to the singular stem. However, the morphological similarity between the singular stem and the dual stem is a coincidence of the 'see' paradigm in table 2 and does not occur in other paradigms, which show exactly the same alternation.

(2) Allomorphy of the classifier stem (Nordlinger and Mansfield 2021: 8)

a. [ba]-ngintha-ngkardu-nu
see.1SG.SUBJ.IRR-DU-see-FUT
'We (dual non-sibling) will see him / her.'

b. [nguba]-nhi-ngkardu-nu-ngintha
see.1DC.SUBJ.IRR-2SG.OBJ-see-FUT–DU
'We (dual non-sibling) will see you.'

		NFUT	IRR	PST	PST.IRR
SG	1	bam	ba	be	be
	2	dam	da	de	de
	3	bam	ba	be	be
PL	1	ngubam	nguba	ngube	ngube
	2	nubam	nuba	nube	nube
	3	pubam/kubam	kuba/puba	pube	pube
DC	1		nguba	ngube	ngube
	2		nuba	nube	nube
	3		kuba/puba	pube	pube

Table 2: Paradigm of classifier stem *ba* 'to affect, see' (Mansfield 2019: 249)

In summary, the placement of the dual marker *ngintha* and the form of the classifier stem depend on whether an overt object marker is present. With a covert 3SG object, *ngintha* appears next to the classifier stem, which is in its singular form in this context. However, when an overt object marker is used, *ngintha* attaches to the right end of the word, while the classifier stem appears in its dual form. Thus, the pattern in (2b) looks like an instance of multiple exponence of dual and a discontinuous dependency between the classifier stem and the dual marker *ngintha*, two phenomena typically associated with templatic morphology (Nordlinger 2010). Nordlinger and Mansfield (2021) argue that these changes in form and position suggest the existence of position classes, where the dual marker and object affixes compete for the same position to the right of the classifier stem. However, in this paper, I will explain the relationship between the form of the classifier stem and the position of *ngintha* without relying on the concept of position classes as a fundamental component of morphological theory. Instead, I will examine the phonological features associated with the placement of *ngintha* in section 2 arguing that the phonological properties uncover a cyclic structure of the word in Murrinhpatha. In section 3, I investigate the distribution of number exponents in order to infer assumptions about the internal morphological structure of the number feature and hence, the featural specifications of the number exponents. In section 4, I will elaborate on the assumptions of the Stratal Optimality Theory framework (Kiparsky 2000, Bermúdez-Otero 2016) that I adopt in my analysis. Specifically, I assume that the placement of *ngintha* follows from the interaction of independently motivated morphological constraints rather than from a competition for a specific position class. In section 5, I demonstrate that the constraint interaction causes suppression of *ngintha* in the presence of an overt object marker. Consequently, a more specific form of the classifier stem is selected by the morphological grammar to optimize feature realization. In section 6.1, I will show how my analysis captures the distribution of number exponents. In my analysis, I assume that *ngintha* may attach at a later morphophonological domain to realize features of the input since it is stratally underspecified. However, this is a lexical property of *ngintha* rather than a general property of Murrinhpatha. In section, 6.2, I provide further evidence that the stratal unboundedness of *ngintha* is independent of its suppression at the first cycle. Overall, my paper provides a new view on patterns where morphemes display a different phonological behavior in the context of other exponents. In section 6.3, I discuss how my analysis can potentially be extended to more cases of delayed exponence.

2. Phonological Properties of Murrinhpatha Morphemes

In Murrinhpatha, the phonological behavior of a bound morpheme is determined by its position within the verbal complex. Put simply, we can predict the phonological processes that apply to a particular morpheme based on its position. Mansfield (2017) notes that the position of an affix affects the assignment of word stress and interacts with compensatory lengthening of monomoraic roots. Specifically, prosodic words in Murrinhpatha must consists of at least two morae. In (3a), the word is assumed to have an underlying form of */ke/*. Since short vowels are typically assumed to be monomoraic, */ke/* would violate the minimum quantity of having at least two morae. Therefore, the vowel of the syllable is lengthened to satisfy the bimoraicity condition. In

(3b), the word consists of a monosyllabic classifier stem and an object suffix. Like the noun root in (3a), the classifier stem is a monomoraic CV syllable. However, unlike (3a), the vowel of the classifier stem is not lengthened in (3b). This suggests that the presence of the object marker is taken into account for the bimoraicity requirement on prosodic words. Nevertheless, this generalization does not hold for all affixes. Example (3c) demonstrates that some affixes do not prevent compensatory lengthening. The vowel of the monosyllabic classifier stem /*ti*/ in (3c) is lengthened despite the presence of another moraic future affix. Mansfield (2017) concludes that the absence of compensatory lengthening indicates that a given affix belongs to the same phonological domain as the classifier stem, whereas compensatory lengthening of the root vowel in (3c) suggests that the future affix *nu* does not belong to the same phonological domain as the classifier stem.

(3) Minimum quantity and phonological levels (Mansfield 2017: 362)

a. kéː
   'nerite shell'

b. [ná]-nge
   say.2SG.IRR-3SG.FEM.OBJ
   'tell her'

c. [tíː]-nu
   sit.2SG.IRR-FUT
   'you will sit'

Mansfield (2017) further notes that this domain coincides with the domain of stress assignment. In short, word stress is assigned to the penultimate syllable of the domain relevant for the bimoraicity condition. That being said, it follows that monosyllabic affixes that prevent compensatory lengthening interact with word stress, whereas monosyllabic affixes whose presence does not prevent compensatory lengthening are irrelevant for word stress assignment. This is exemplified in (4), where the phonological domain relevant for bimoraicity and word stress assignment is indicated by square brackets and word stress is indicated by an acute accent.

(4) Word stress and phonological levels (Mansfield 2017: 362, 366, 368)

a. [páta] [wuɾiní-ŋa]-đa
good go.SG.PST-3SG.FEM.OBL-PST
'He was good to her.'

b. [pumam -nga-<u>páta</u>]-ngintha-pibim
use.hands.3PL.NFUT-1SG.OBL-make-DU-IMPFV
'the two of them are making it for me'

In (4a), the first word *pata* fulfills the bimoraicity condition and assigns word stress to its penultimate syllable. The second prosodic word of the sentence consists of a classifier stem, an oblique object marker, and a PST marker. As shown in the examples in (3), object and oblique object markers prevent compensatory lengthening (see (3b)), while TAM markers do not, as in (3c). Example (4a) strikingly shows that word stress falls on the penultimate syllable of the domain including the oblique object marker *ŋa*, but excluding the TAM marker *đa*. In (4b), the lexical stem *pata* receives word stress on its penultimate syllable, thus illustrating that the domain relevant for word stress spans from the classifier stem to the lexical stem and includes all affixes attaching between those two, while affixes attaching further right than the lexical stem are always outside the word stress domain. Table 3 integrates these insights and provides an overview of the morphemes within the verbal complex and their phonological domains.

Slot 1	**Slot 2**	**Slot 3**	**Slot 4**	**Slot 5**	**Slot 6**	**Slot 8**
Classifier stem (portmanteau w. SUBJ and TAM)	SUBJ number OBJ marker OBL marker	REFL/ REC	incorporated body part/ APPL	<u>lexical stem</u>	TAM	number (SUBJ or OBJ)
domain for stress assignment / minimum quantity condition						

Table 3: The verbal complex and phonological domains

This conclusion makes interesting predictions for the dual marker *ngintha*. As shown in the previous section, *ngintha* appears *before* the lexical stem in the absence of an overt object marker, but *after* the lexical stem whenever an overt object marker is present. The examples in (5a) and (5b) illustrate that the placement of *ngintha* correlates with its phonological behavior. In example (5a), there is no overt object marker and *ngintha* receives word stress. In (5b), however, an overt oblique object marker is realized next to the classifier stem with the consequence that *ngintha* is realized after the lexical stem. In this case, word stress falls on the penultimate syllable of the coverb which clearly shows that *ngintha* is outside the word stress domain.

(5) Word stress and phonological levels (Mansfield 2017: 362, 366, 368)

a. [pirim -ngíntha]
stand.3SG.NFUT-DU
'the two of them are standing'

b. [pumam -nga-páta]-ngintha-pibim
use.hands.3PL.NFUT-1SG.OBL-make-DU-IMPFV
'the two of them are making it for me'

In summary, Mansfield (2017) clearly shows that the behavior of affixes offers evidence for distinct phonological domains and that the placement of *ngintha* is closely related to its phonological properties. The presence of overt object markers does not simply cause a reordering of the dual marker *ngintha* but also affects its concatenation within a different phonological domain. This implies that the prosodic word in Murrinhpatha is layered, and that its cyclic structure is significant in explaining the behavior of *ngintha*. However, morphological theories that assume a flat, templatic structure of words, such as Nordlinger (2010), fail to account for this insight. In the following section, I will discuss how number information is scattered among different morphemes to find out more about the featural specifications of these affixes.

3. The Distribution of Number Exponents

Murrinhpatha exhibits another unique, morphological feature in which number information is dispersed among multiple morphemes located in different positions within the verbal complex. Specifically, information on subject number is conveyed through three different positions: first, it is part of the portmanteau classifier stems. Second, additional number affixes can attach to the right of the classifier stem, thus belonging to the domain relevant for word stress assignment (slot 2 in table 3). Third, number affixes can be found in positions after the lexical stem, and hence, outside of the word stress domain (slot 8 in table 3). I will refer to the former group of number markers as *inner number affixes* and to the latter group as *outer number affixes*.

I follow Mansfield (2017, 2019) in assuming that the distinction between the two groups is based entirely on their phonological behavior, with inner number affixes affecting word stress assignment and outer number affixes being invisible to it. Crucially, the number value of a morphological form results from combinations of these three types of exponents. The attested combinations are listed in figure 1 for IRR classifier stems and in figure 2 for NFUT classifier stems. As already mentioned in section 1, the leftmost position is always occupied by the classifier stem. Hence, it is the only exponent of subject number present in all number contexts.

In the case of IRR classifier stems, there are three different forms: singular, daucal and plural.[4] The singular form of the classifier stem is interpreted as singular when it appears without any other number exponent, but it can also be combined with the dual marker *ngintha* in the inner position to refer to exactly two entities that are not siblings. The plural form of IRR classifier stems does not occur with other number markers and is used to refer to plural entities. The daucal form of the classifier stem, which is used in both dual and paucal contexts, is combined with either the dual marker *ngintha* or the paucal marker *ngime* to refer to dual non-sibling entities and paucal entities, respectively.[5] If the daucal classifier stem appears without any additional number affixes, it is used to refer to dual sibling entities. It should also be noted that the number system morphologically represents sibling relationships, which indicates the significant cultural significance of classificatory siblinghood.

The illustration in 1 shows that each number value is realized by exactly one combination of number exponents. However, the alternation of the placement of *ngintha* in the presence of overt object makers yields two possible realizations for dual non-sibling contexts. In the absence of overt object markers, the singular classifier stem is combined with *ngintha* in the inner position. When overt object markers are present, however, this number value is realized by the daucal classifier stem and *ngintha* in the outer position. The

[4]The observant reader will notice that the DC form is morphologically indistinct from the PL form. This syncretism appears in other classifier stem paradigms, as well. However, there exist a number of subparadigms in which the two forms come in different shapes, thus justifying the distinction.

[5]Note that the difference between paucal and plural is partially about the quantity of the entities referred to, but probably also about recognizable reference. Specifically, the paucal is typically used when the reference can be recognized, while the plural is used to refer to non-specific referents (Blythe 2009, Mansfield 2019).

distribution of number exponents in figure 1 raises the question of whether SG, DU.SIBLING and PL contexts are realized only by features encoded in the classifier stem or in combination with phonological empty affixes. Concerning this question, I assume that the number value is realized by features on the classifier stem only and crucially, without features in phonologically empty affixes. The reason for this assumption is basically that these phonologically empty affixes are used in a variety of semantically distinct number contexts (singular, dual sibling, and plural) and can therefore not be assumed to form a natural class. Following this assumption, the featural specification of the classifier stem exponents can directly be inferred from the contexts in which they do not occur with other number exponents.

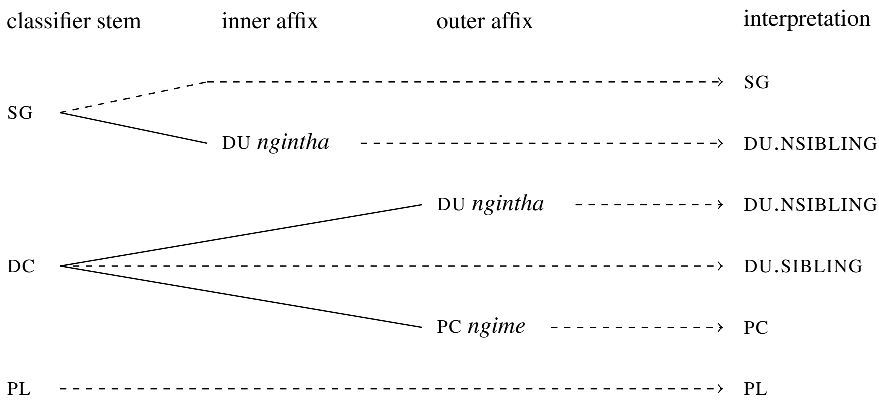


Figure 1: Distribution of SUBJ number in IRR stems (Mansfield 2019: 143)

Figure 2 illustrates the distribution of number exponents in combinations with NFUT classifier stems. Unlike IRR classifier stems, NFUT stems do not have morphologically distinct daucal forms. Instead, paucal and dual sibling contexts are expressed through the use of an inner number affix *ka* which combines with plural classifier stems. This suggests that the daucal is a specific form of a broader number category I will refer to as *non-singular*.

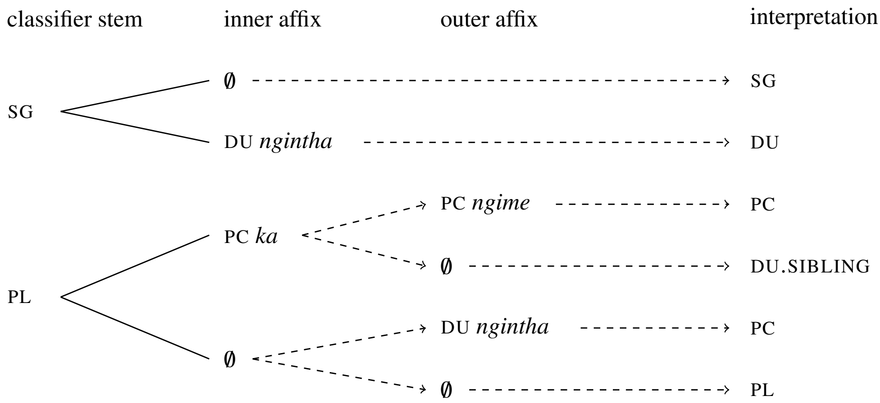


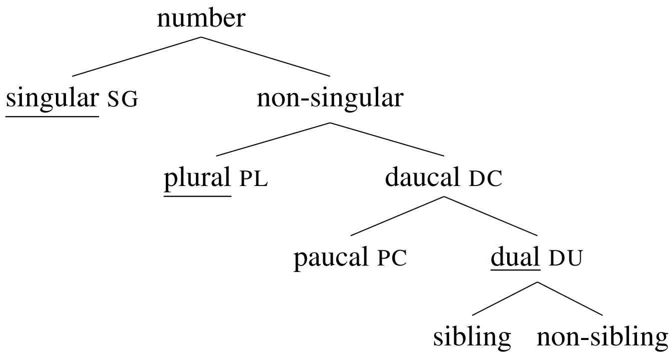
Figure 2: Distribution of SUBJ number in NFUT stems (Mansfield 2019: 143)

Drawing on our generalizations of the distribution of exponents, we can make inferences about the featural composition of morphological number and the specifications of the exponents. My conclusions about the complex number resolution patterns (illustrated in figure 1 and figure 2) suggest a feature geometry for morphological number as shown in (6). Specifically, the existence of only two distinct classifier forms in NFUT paradigms implies a primary division of number into singular and non-singular entities. When a PL classifier stem is used without additional number exponents, it refers to plural entities, indicating that the default interpretation of the non-singular category is plural. However, the non-singular category can also be divided into the daucal subcategory, which further splits into dual and paucal. Siblinghood is only reflected morphologically in dual contexts, indicating that it is a subcategory of dual. The fact that paucal IRR classifier stems refer to dual sibling entities in the absence of additional number exponents suggests that dual is the default interpretation of daucal, and sibling is the default interpretation of dual.

Technically, I propose that morphological number is represented by a set of privative features that are in a dependency relation to each other. Daughter nodes entail the presence of their mother nodes, following the logic of Harley and Ritter (2002). For example, the feature [non-sibling] entails the presence of [dual], [daucal], and [non-singular]. Put simply, [non-sibling] can only be realized in the presence of [dual], [daucal], and [non-singular]. Furthermore, it is technically excluded that a number value comprises two sister nodes.

In the absence of a daughter node, the default interpretation of the mother node is active. Specifically, a feature [non-singular] will be interpreted as [plural] in the absence of a [daucal] feature. In (6), the default interpretation of a mother node is indicated by underlining the respective daughter node. As a consequence, there are two different morphological possibilities for the default values. A default value can either be inferred if only its mother node is realized by a feature or its feature can be spelled out on an exponent. Due to this featural composition, the different number contexts differ in their morphological specificity with dual non-sibling being the most specific number context.

(6) Number specification in Murrinh-Patha



Based on the morphological structure of number in (6) and the distribution of the number exponents in the different contexts, I further infer the following featural specifications of the different exponents. Crucially, I assume that the singular classifier stem does not carry any number features. Rather the singular interpretation is inferred through the default interpretation of number. The plural classifier stem realizes only the feature [non-singular] since it can be combined with paucal markers in NFUT contexts. Crucially, the most specific number context – dual non-sibling – is realized by a SG classifier stem and *ngintha* only. Since I have already established that the SG classifier stem does not realize any number features, it follows automatically that *ngintha* realizes [NON-SINGULAR, DAUCAL, DUAL, NON-SIBLING]. The featural specifications of number exponents in IRR contexts are shown in Figure 3, which also demonstrates that each combination of exponents corresponds to the minimal featural representation of each number context. For instance, the paucal context requires three features: [non-singular] and [plural] are represented in combination in the DC classifier stem, while [paucal] is represented by the distinct outer number affix *ngime*.

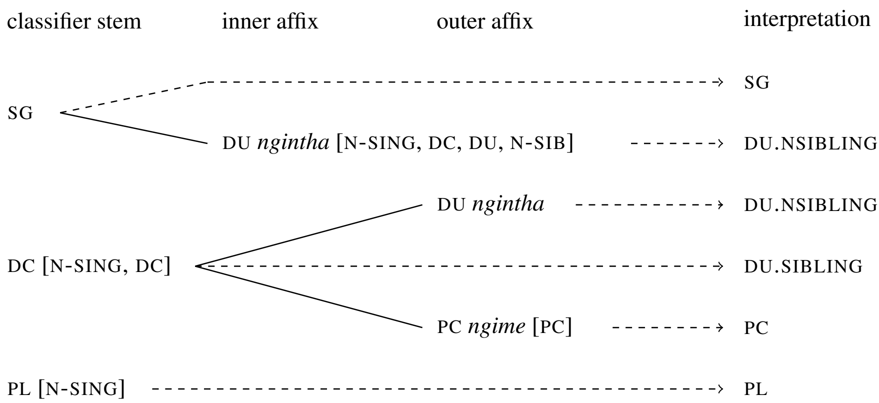


Figure 3: Featural specification of number exponents in IRR classifiers stems

Figure 3 further shows that combination of the DC classifier stem and *ngintha* as an outer number affix is exceptional, since the features [non-singular] and [daucal] are realized twice in this context. Hence, it is the only number context which is not minimally represented by morphological features. In the following two sections, I will connect the featural specifications of the number exponents to the observation that prosodic words in Murrinhpatha are cyclic in order to explain the exceptional phonological and morphological patterning of *ngintha*.

4. Background Assumptions

In section 2, I have demonstrated that the phonological correlates of morphemes serve as a window into the cyclic structure of the prosodic word in Murrinhpatha. Specifically, the prosodic domain relevant for word stress assignment spans from the classifier stem at the left edge of the word to the lexical stems, with all affixes following the lexical stem being invisible for stress assignment. In this paper, I implement the cyclic structure of the word by assuming that affixes are concatenated at different morphophonological strata, following the ideas of *Stratal Optimality Theory* (StratOT) (Kiparsky 2000, Bermúdez-Otero 2011). StratOT is a derivational version of *Standard Parallel Optimality Theory* (SPOT) (Prince and Smolensky 1993), and is based on assumptions similar to those posited by *Lexical Phonology and Morphology* (Kiparsky 1982*a*). Just as SPOT, StratOT pursues the idea that the grammar of Human language consists of a set of *violable, rankable and universal constraints*. The grammars of each individual language results from an individual ranking of these constraints. A core difference of StratOT is the division of labor into several different cyclic domains. A concrete suggestion with respect to the number of domains comes from Bermúdez-Otero (2011), who assumes three different morpho-phonological domains:[6]

1. the *stem-level*
2. the *word-level*
3. the *phrase-level*

An important assumption by StratOT is that morphological derivations are accompanied by cycles of phonological optimization such that the morphological component of the grammar and the phonological component of the grammar are interleaved. After each stratum, bracket erasure takes place, which renders morphological structure inaccessible to further cycles. Bracket erasure is a mechanism introduced by Pesetsky (1979) (referring to Chomsky and Halle 1968) and relates to the process of making morphological boundaries invisible to phonological or morphological rules at the end of a cyclic domain. Consequently, neither phonological nor morphological rules can make reference to these boundaries. In this work, I assume that only the morpheme boundaries are deleted, while the grammar still has access to the morphosyntactic information realized in a previous stratum. In other words, a morphologically complex word, e.g. a root plus its affixes,

[6] A recurrent question in StratalOT is how the grammar determines at which stratum an affix enters the morphological structure. As for Murrinhpatha, the phonological behaviour of the individual morphemes clearly reveals the stratum it belongs to. While it would be highly desirable if affixes belonging to the same stratum would also form a natural class with respect to their morphosyntactic properties, this is not a technical necessity. Rather, it is commonly assumed that it is specified in the lexical entry of each affix at which stratum it enters the optimizing derivation (Bermúdez-Otero 2011, 2016, 2019).

is treated as a morphologically simplex word after bracket erasure. Thus, access to morphological boundaries is only possible within a cycle. Put simply, StratalOT answers the non-trivial question of morphological sensitivity in phonology by restricting this access to morphological structure by phonology to smaller subdomains. The exact architecture of the cyclic model of the morpho-phonology interface I adopt is illustrated in figure 4.

morphological optimization phonological optimization	stem-level
bracket erasure	
morphological optimization phonological optimization	word-level
bracket erasure	
morphological optimization phonological optimization	phrase-level
bracket erasure	

Figure 4: Assumed architecture of the morpho-phonology interface

In this paper, I assume that two strata suffice to explain the phenomenon under discussion. Specifically, I assume that the word stress domain corresponds to the *stem-level*, while affixes attaching outside the stress domain belong to the *word-level*. Example (7) illustrates how these assumptions relate to the exceptional placement of *ngintha*. In the absence of overt object markers, *ngintha* is concatenated at the stem-level, as in (7a). However, when an overt object marker is present, as in (7b), *ngintha* attaches at the word-level.

(7) Anomalous placement of *ngintha* (Nordlinger and Mansfield 2021: 8)

a. [[ba-ngintha-∅-ngkárdu]$_{stem}$-nu]$_{word}$
see.1SG.SUBJ-DU-3SG.OBJ-see-FUT
'We (dual non-sibling) will see him / her.'

b. [[nguba-nhi-ngkárdu]$_{stem}$-nu-ngintha]$_{word}$
see.1DC.SUBJ-2SG.OBJ-see-FUT–DU
'We (dual non-sibling) will see you'

Moreover, the dispersion of number information across different number exponents allows us to draw conclusions about the featural structure of morphological number, as well as the featural specifications of the exponents. Taking their phonological properties and their morphological position into account, we can now determine the featural specification as well as the stratum a morpheme belongs to. This information is summarized in table 4 for each affix relevant for the discussion. Following Harley and Ritter (2002), I assume that 1st and 2nd person are realized using privative person features, while the realization of 3rd person does not involve features and is inferred through default interpretation. The minimal pair in (7) involves two different classifier stem forms, both of which refer to 1st person subjects. As concluded above, singular classifier stems do not comprise any number feature, while the daucal stem carries the features [NON-SINGULAR] and [DAUCAL]. Hence, the featural specifications for the two classifier stems are [1, SUBJECT] for *ba* and [1, SUBJECT, NON-SINGULAR, DAUCAL] for *nguba*. I further assume that the 3rd person object in (7a) is realized by a covert object marker which has the feature [OBJECT], while the 2nd person object marker *nhi* comes with the specification [2, OBJECT]. The final stem-level affix is the number affix *ka*, which combines with NFUT classifier stems and carries the feature [DAUCAL]. Two different types of affixes belong to the word-level in Murrinhpatha. First, all TAM affixes attach at this level, like the [FUTURE] suffix *nu*. Second, some number affixes belong to this stratum, such as the [PAUCAL] suffix *ngime*. Note that the illustration in table 4 reveals that Murrinhpatha has no morphological possibility to realize the feature [PAUCAL] at stem-level. Rather, its realization is delayed until the word-level. In the previous section, I argued that the dual marker *ngintha* has to be specified for the features [NON-SINGULAR, DAUCAL, DUAL, NON-SIBLING], as it combines with the singular stem in the featurally most specific dual non-sibling context. In order to capture the observation that it occurs on both stem-level and word-level, I assume that *ngintha* is *underspecified* with respect to the stratum it belongs to, and may attach at any stratum, an analytical option previously made by Kiparsky (2015).[7]

[7] Note that this assumption is not problematic for the *Cyclic Principle* (see Chomsky 1965, Perlmutter and Soames 1979 and Müller 2023, this volume), given here in (i), which states that an operation has to be carried out as early as possible. In fact, I will show that *ngintha* has to be concatenated as early as possible, as long as the context for its realization is given. Hence, the realization of *ngintha* in a later cyclic domain does not pose a problem for the Cyclic Principle, since the context for the rule to apply is not given in the first domain.

(i) Cyclic Principle (Chomsky 1965, Perlmutter and Soames 1979)
When two operations can be carried out, where one applies to the cyclic domain D_X

Stratum	Category	Specification	Form
Stem	[CL.STEM]	[1, SUBJECT]	*ba*
	[CL.STEM]	[1, SUBJECT, NON-SINGULAR, DAUCAL]	*nguba*
	[LX.STEM]	‘to see’	*ngkardu*
	[OBJ]	[2, OBJECT]	*nhi*
	[OBJ]	[OBJ]	∅
		[DAUCAL]	*ka*
Word	[TAM]	[FUTURE]	*nu*
		[PAUCAL]	*ngime*
unspecified	[SUBJ]	[NON-SINGULAR, DAUCAL, DUAL, NON-SIBLING]	*ngintha*

Table 4: Murrinh-Patha affixes divided into strata

To illustrate how my analysis couched in StratOT derives the peculiar placement of *ngintha*, let me assume that the verb root comes with a list of contextual features that need to be realized by morphological exponents in an optimal way. This list is then checked against the available affixes at each stratum. To ensure that the morphological grammar on a given stratum concatenates only the affixes that are lexically affiliated with it, I assume that the GEN function accesses the lexical entries of the morphemes, in which the stratal specification is stored as a diacritic. Thus, GEN restricts possible output forms to those containing only morphemes with the correct stratal specification. In this paper, I remain agnostic about the origin of these features. Since the core of my analysis rests on the interaction of violable constraints, my analysis is compatible with presyntactic morphological theories based on Optimality Theory (Prince and Smolensky 1993), e.g. Müller (2020) or postsyntactic theories combining OT and Distributed Morphology, like Trommer (2001, 2003), Rolle (2020). To derive the patterns in (7), let us assume that the verbal complex comes with the input features in (8), since it concatenates a classifier stem, a lexical stem, an object marker, and a TAM exponent. I follow the notation introduced by Müller (2020) in using the • symbol to mark features that neeed to be expressed in a morphological word.

(8) Input feature set: V, [•CL.STEM•], [•LX.STEM•], [•TAM•], [•OBJ•]

and the other applies to the cyclic domain $D_{X\text{-}1}$ included in D_X, then the latter is applied first.

These input features are the same for both (7a) and (7b), yet the sentences differ with respect to the features of the arguments that need to be realized. Hence, there are also input feature sets belonging to the arguments of the sentence. The feature sets for (7a) are listed in (9a), while the feature sets of the arguments in (7b) are listed in (9b)

(9) a. SUBJ: [SUBJECT, 1, NON-SINGULAR, DAUCAL, DUAL, NON-SIBLING]
OBJ: [OBJECT] for (7a)
b. SUBJ: [SUBJECT, 1, NON-SINGULAR, DAUCAL, DUAL, NON-SIBLING]
OBJ: [2, OBJECT] for (7b)

Previous work by Trommer (2003, 2008), Crysmann and Bonami (2016) and Müller (2020) has highlighted that the mapping between input features and output morphological forms is regulated by rules on morphological well-formedness. In this paper, I follow Trommer (2003, 2008) and Müller (2020) by implementing these morphological rules as violable constraints in Optimality Theory. An exhaustive list of constraints is given in (10). M(AX)(F) constraints are crucial, since they ensure that each feature of the input F is realized by an exponent in the output. M(AX)(ARG)$_{\text{SUBJ}}$ and M(AX)(ARG)$_{\text{OBJ}}$ are specific versions of M(AX) relating to the argument input feature sets. All M(AX) receive a violation mark for each feature in the input which is not realized by an exponent in the output.

In addition, there are constraints regulating the relative position of certain categories within a morphological word. To this end, Trommer (2003, 2008) observes that person information is typically aligned to the left edge of the word, while number exponents tend to be realized at the right edge of the word. These crosslinguistic tendencies are captured by two constraints which are violated whenever another exponent intervenes between the left edge of a word and an exponent of [Person] (L $\Leftarrow$ PERS(ON)) or the right edge of the word and an exponent realizing [Number] (NUM(BER) $\Rightarrow$ R), respectively. In addition, the markedness constraint *M(ULTIPLE) E(XPONENCE)$_{\text{F}}$ is violated if a feature of the input is realized more than once, thus preventing multiple exponence. Finally, the constraint COH(ERENCE) ensures that features belonging to the same feature set, i.e. the argument feature sets, are realized in adjacency to each other. In this respect, it is irrelevant if the features of the shared feature set are expressed by one and the same exponent or by two different, adjacent exponents. It will only be violated if another exponent which is not part of the shared feature set intervenes.

(10) a. L ⇐ PERS(ON): (Trommer 2003)
Assign * for each exponent between exponents of [Person] and the left edge of the word.

b. M(AX)(F): (Trommer 2008, Müller 2020)
Assign * for each feature [F] of the input if it is not realized on an exponent in the output.

c. M(AX)(ARG)$_{\text{SUBJ}}$:
Assign * for each feature [F] of the subject argument if it is not realized on an exponent in the output.

d. M(AX)(ARG)$_{\text{OBJ}}$:
Assign * for each feature [F] of the object argument if it is not realized on an exponent in the output.

e. *M(ULTIPLE) E(XPONENCE)$_{\text{F}}$:
Assign * for each feature F which is realised by more than one exponent.

f. COH(ERENCE): adapted from Trommer (2008), Müller (2020)
Assign * for each exponent that intervenes between two exponents realizing features from the same feature set in the input.

g. NUM(BER) ⇒ R: (Trommer 2003)
Assign * for each exponent between exponents of [Number] and the right edge of the word.

In contrast to SPOT, the ranking of constraints is only fixed within a stratum. Between the strata, re-ranking may apply. This assumption is based on the observation that certain phonological rules apply only to certain subdomains, suggesting that the ranking of the constraints may differ from one stratum to the other. In the following, I will show how the anomalous positioning of *ngintha* follows from the constraint-driven interaction of the different exponents. Put shortly, my analysis is couched in StratOT and implements the following generalizations:

1. Both objects markers and inner number markers are subject to morphological rules that require them to be a realized in adjacency to the

classifier stem. First, L ⇐ PERS(ON) ensures that object exponents carrying [Person] information are realized at the left edge of the word. Second, COH(ERENCE) requires exponents realizing features from the same feature set in adjacency to each other. Hence, both affixes preferably occupy the position to the direct right of the classifier stem which always occupies the leftmost position in the word.

2. In the presence of both overt object markers and inner number affixes, preference is given to the former.

3. Since *ngintha* cannot be concatenated in its designated position, highly ranked placement constraints suppress its realization in the stem-level.

4. In order to realize as many input features as possible, a featurally more specific form of the classifier stem is selected to minimize violations of M(AX)(ARG)$_{\text{SUBJ}}$, thus explaining the different form of the classifier stem.

5. Since *ngintha* is not strictly bounded to the stem-level, its realization is delayed until the word-level.

5. A StratalOT Analysis of Murrinhpatha

Having set the technical preliminaries in the previous section, let me now explain in detail how the peculiar placement of *ngintha* and its phonological correlates can be derived from the interaction of well-established morphological constraints. In this endeavor, let us first consider example (11), repeated from (7a), where *ngintha* attaches to the right of the classifier stem in its singular form.

(11) [[ba-ngintha-∅-ngkárdu]$_{\text{stem}}$-nu]$_{\text{word}}$
see.1SG.SUBJ-DU-3SG.OBJ-see-FUT
'We (du. n-sib.) will see him/her.' (Nordlinger and Mansfield 2021: 8)

The relevant tableau is given in (12). The input to this derivation is the root $\sqrt{see}$, a set of contextual features, as well as the feature sets for the subject and the object argument. As noted earlier in this paper, classifier stems are always portmanteau morphemes carrying subject features. To this end, I assume that the root is an abstract pointer $\sqrt{see}$ to the respective classifier stem paradigm.

That is, it refers to a set of inflected forms of one and the same classifier stem paradigm, but does not choose a specific form of that paradigm. Note that this assumption is unproblematic in StratOT since the root is not a cyclic domain and does not undergo phonological optimization. The contextual features for (7a) are [•CL.STEM•], [•LX.STEM•], [•TAM•] and [•OBJ•], hence giving rise to the constraints MAX(CL.STEM), MAX(LX.STEM), MAX(OBJ) and MAX(TAM). Since all exponents realizing TAM are concatenated at word-level, MAX(TAM) is omitted from the tableau in (12), since it cannot be satisfied at stem-level. However, MAX(CL.STEM), MAX(LX.STEM) and MAX(OBJ) are high-ranked and ensure that a classifier stem, a lexical stem and an object marker are concatenated. As an example, candidate b. is ruled out since it does not comprise a lexical stem, thus fatally violating MAX(LX.STEM). The remaining constraints make sure that the argument feature sets are realized in an optimal way. Recall that the subject is a 1DU NON-SIBLING argument, thus requiring the features [SUBJECT, 1, NON-SINGULAR, DAUCAL, DUAL, NON-SIBLING], while the 3rd person object only requires [OBJECT]. The output form of candidate a. splits the features of the subject onto two different morphemes: the 1st person singular form classifier stem form *ba* realizes [1] and [SUBJECT], whereas *ngintha* spells out the remaining number features [NON-SINGULAR, DAUCAL, DUAL, NON-SIBLING]. The candidates c. and d., both of which lack the dual marker *ngintha*, cannot become optimal, since they fatally violate $\text{MAX(ARG)}_{\text{SUBJ}}$, which ensures that the subject feature set is exhaustively realized. In candidate a., each feature is realized exactly once, thus avoiding violations of *MULTIPLE EXPONENCE. Candidate e. with the 1st daucal classifier stem, however, is ruled out since the two features [NON-SINGULAR] and [DAUCAL] are realized twice. Moreover, candidate a. does not violate COHERENCE, since the two exponents realizing features of the subject feature set are adjacent and not interrupted by different exponents. Most crucially, the object marker does not violate L⇐PERS although it is not at the left edge of the word, since it does not include any person features and is therefore not subject to this constraint. Note that candidate f., in which *ngintha* attaches as an outer affix, is ruled out as it violates COHERENCE due to two intervening morphemes. Put shortly, candidate a. does not violate any constraint on morphological well-formedness and becomes optimal.

(12) Morphological optimization at stem-level, (11)

ba	[CL.STEM], [1, SUBJ], stem-level
nguba	[CL.STEM], [1, SUBJ, N-SING, DC], stem-level
ngkardu	[LX.STEM], 'to see', stem-level
∅	[OBJ], [OBJ], stem-level
nu	[TAM], [FUT], word-level
ngintha	[N-SING, DC, DU, N-SIB], unspecified

√*see*, [•CL.STEM•], [•LX.STEM•], [•TAM•], [•OBJ•] SUBJ: [SUBJ, 1, N-SING, DC, DU, N-SIB] OBJ: [OBJECT]	M(CL.STEM)	M(LX.STEM)	M(OBJ)	*ME	M(ARG)$_{\text{OBJ}}$	L⇐PERS	COH	M(ARG)$_{\text{SUBJ}}$
a. ☞ ba$_{[1,\ \text{SUBJ}]}$-ngintha$_{[\text{N-SING, DC, DU, N-SIB}]}$-∅$_{[\text{OBJ}]}$-ngkardu								
b. ba$_{[1,\ \text{SUBJ}]}$-ngintha$_{[\text{N-SING, DC, DU, N-SIB}]}$-∅$_{[\text{OBJ}]}$		∗!						
c. ba$_{[1,\ \text{SUBJ}]}$-∅$_{[\text{OBJ}]}$-ngkardu								∗!∗∗∗
d. nguba$_{[1,\ \text{SUBJ, N-SING, DC}]}$-∅$_{[\text{OBJ}]}$-ngkardu								∗!∗∗
e. nguba$_{[1,\ \text{SUBJ, N-SING, DC}]}$-∅$_{[\text{OBJ}]}$-ngintha$_{[\text{N-SING, DC, DU, N-SIB}]}$				∗!∗				
f. ba$_{[1,\ \text{SUBJ}]}$-∅$_{[\text{OBJ}]}$-ngkardu-ngintha$_{[\text{N-SING, DC, DU, N-SIB}]}$							∗!∗	

The output of the morphological optimization at stem-level is *ba-ngintha-ngkardu*, which is then taken to the phonological component of the stem-level for further phonological optimization. Note that the output form contains exactly those affixes with are relevant for word stress assignment. Concretely, it contains the classifier stem, inner affixes and the lexical verb, but crucially, no external affixes. Within the phonological component of the stem-level, stress assignment and compensatory lengthening apply. After this computation, bracket erasure takes place and deletes morpheme boundaries. The next step of the derivation takes place in the morphological component at word-level. At this step of the derivation, the grammar has access to the output of the stem-level *banginthangkardu*, the remaining contextual feature [•TAM•], as well as word-level and underspecified affixes. The morphological derivation at word-level is illustrated in (14). Most contextual features have already been satisfied at the previous stratum, except for [•TAM•], which can only be satisfied at word-level, since all TAM affixes are word-level affixes. In order to anchor the input at the left edge of the word, I use the high-ranked ALIGNMENT constraint L⇐V which ensures that all affixes attached at word-level will end up in a suffixal position. The concrete definition of L⇐V is given in (13).

(13) L ⇐V Assign * for each exponent between the base and the left edge of the word.

Since bracket erasure has taken place, the input *banginthangkardu* is treated as a morphologically simplex exponent of the features [SUBJECT, 1, NON-SINGULAR, DAUCAL, DUAL, NON-SIBLING] and [OBJECT] as word-level. Hence, the constraint NUM⇒R is violated once by candidate b. as the TAM exponent *nu* intervenes between *banginthangkardu* and the right edge of the word. Nonetheless, candidate b. becomes optimal since candidate a. does not include any TAM marker and violates the high-ranked MAX(TAM), while candidate c. violates the general suffixing constraint L ⇐V. After this step of morphological optimization, the optimal candidate *banginthangkardu-nu* enters the phonological component of the word-level for further optimization.

(14) Morphological optimization at word-level, (11)

ba	[CL.STEM], [1, SUBJ], stem-level
nguba	[CL.STEM], [1, SUBJ, N-SING, DC], stem-level
ngkardu	[LX.STEM], 'to see', stem-level
∅	[OBJ], [OBJ], stem-level
nu	[TAM], [FUT], word-level
ngintha	[N-SING, DC, DU, N-SIB], unspecified

banginthangkardu, [●TAM●] SUBJ: [~~SUBJ, 1, N-SING, DC, DU, N-SIB~~] OBJ: [~~OBJECT~~]		M(TAM)	L⇐V	NUM⇒R	*ME	*COH
a.	banginthangkardu$_{[\text{SUBJ, 1, N-SING, DC, DU, N-SIB, OBJ}]}$	*!				
b. ☞	banginthangkardu$_{[\text{SUBJ, 1, N-SING, DC, DU, N-SIB, OBJ}]}$-nu			*		
c.	nu-banginthangkardu$_{[\text{SUBJ, 1, N-SING, DC, DU, N-SIB, OBJ}]}$		*!			

Let us now turn to example (7b), repeated here in (15), where *ngintha* is concatenated externally and the classifier stem appears in its daucal form.

(15) [[nguba-nhi-ngkárdu]$_{\text{stem}}$-nu-ngintha]$_{\text{word}}$
see.1DC.SUBJ-2SG.OBJ-see-FUT–DU
'We (du. n-sibl.) will see you' (Nordlinger and Mansfield 2021: 8)

Recall that Nordlinger and Mansfield (2021) argue that the pattern in (15) suggests the existence of *position classes* as primitive entities of morphological theory. Since *ngintha* is blocked in the position after the classifier stem in (15) in the presence of an overt object marker, Nordlinger and Mansfield (2021) assume that both *ngintha* and the object markers compete for the same position class. Moreover, the different shape of the classifier stem in (15) is taken to be evidence for position-conditioned allomorphy where a different allomorph of the classifier stem is chosen in the presence of an object marker. Put shortly, Nordlinger and Mansfield (2021) suggest that position classes exist as abstract elements in the morphological grammar, because there are rules that refer to them. In what follows, I will demonstrate that the model forwarded in this paper derives the pattern in (15) without assuming position classes. Instead, I argue that the placement of *ngintha* follows from the interaction of well-established morphological constraints and the cyclic structure of the word. The tableau illustrating this derivation is provided in (16).

(16) Morphological optimization at stem-level, (15)

ba	[CL.STEM], [1, SUBJ], stem-level
nguba	[CL.STEM], [1, SUBJ, N-SING, DC], stem-level
ngkardu	[LX.STEM], 'to see', stem-level
nhi	[OBJ], [2, OBJ], stem-level
nu	[TAM], [FUT], word-level
ngintha	[N-SING, DC, DU, N-SIB], unspecified

	√*see*, [•CL.STEM•], [•CL.STEM•], [•TAM•], [•OBJ•] SUBJ: [SUBJ, 1, N-SING, DC, DU, N-SIB] OBJ: [OBJ, 2]	M(CL.STEM)	M(LX.STEM)	M(OBJ)	*ME	M(ARG)$_{OBJ}$	L⇐PERS	COH	M(ARG)$_{SUBJ}$
a.	ba$_{[1, SUBJ]}$-nhi$_{[2, OBJ]}$-ngintha$_{[N-SING, DC, DU, N-SIB]}$-ngkardu							*!	
b.	ba$_{[1, SUBJ]}$-ngintha$_{[N-SING, DC, DU, N-SIB]}$-nhi$_{[2, OBJ]}$-ngkardu						*!		
c.	ba$_{[1, SUBJ]}$-nhi$_{[2, OBJ]}$-ngkardu								****!
d.	ba$_{[1, SUBJ]}$-nhi$_{[2, OBJ]}$-ngkardu-ngintha$_{[N-SING, DC, DU, N-SIB]}$							*!*	
e. ☞	nguba$_{[1, SUBJ, N-SING, DC]}$-nhi$_{[2, OBJ]}$-ngkardu								**
f.	nguba$_{[1, SUBJ, N-SING, DC]}$-ngintha$_{[N-SING, DC, DU, N-SIB]}$-nhi$_{[2, obj]}$-ngkardu				*!*		**		
g.	ba$_{[1, SUBJ]}$-ngintha$_{[N-SING, DC, DU, N-SIB]}$-ngkardu			*!					
h.	ba$_{[1, SUBJ]}$-ngintha$_{[N-SING, DC, DU, N-SIB]}$-∅$_{[OBJ]}$-ngkardu					*!			

In contrast to example (11), there is an overt object marker *nhi* in (15), which comes with the featural specification [2, OBJECT]. Thus, the constraint L⇐PERS becomes active, thus shifting the marker to the right of the finite stem.[8] In the previous derivation in (12), the constraint remained inactive since the covert object marker does not spell out person features. In the context of *nhi*, however, L⇐PERS now causes a competition between the object marker and *ngintha* for the position to the right of the classifier, thus following the empirical intuition by Nordlinger and Mansfield (2021). In my analysis, however, the competition arises from morphotactic constraints on positioning preferences rather than from position classes. Specifically, candidate b. replicates the order of affixes that became optimal in (12), yet fatally violates L⇐PERS since the overt object marker *nhi* carries person features. However, shifting the dual marker *ngintha* to the right of the object marker, as in candidates a. or d.,

[8] Since both the classifier stem and the object marker carry person features, an additional constraint would be needed to determine which affix will end up in the left-most position. This could be achieved with a high-ranked L⇐V, as in (14), which generates structures in which the classifier stem is always to the left.

causes fatal violations of COHERENCE. Not realizing an object marker at all in candidate g. or choosing a different object marker in candidate h. in order to avoid violations of L⇐PERS or COHERENCE is not possible, either, due to the high-ranked constraint MAX(OBJ) and MAX(ARG)$_{OBJ}$. Since *ngintha* cannot be realized in its preferred position, the grammar chooses to not concatenate the marker at stem-level. Since *ngintha* realized the input features [NON-SINGULAR, DAUCAL, DUAL, NON-SIBLING], non-realization of the markers yields four violations of the constraint MAX(ARG)$_{SUBJ}$, thus ruling out candidate c. However, the grammar still has the option to choose the more specific classifier stem *nguba*, which is specified for [1, SUBJECT, NON-SINGULAR, DAUCAL], in contrast to *ba*. In (12), the choice of *nguba* was blocked since simultaneous realization of *nguba* and *ngintha* creates a violation of *ME. In the derivation in (16), choosing *nguba* becomes now the preferred option since non-realization of *ngintha* prevents a violation of *ME and creates only two violations of MAX(ARG)$_{SUBJ}$. Thus, candidate (e), which includes *nguba*, but excludes *ngintha*, becomes optimal.

The optimal output form *nguba-nhi-ngkardu* is taken to the phonological component of stem-level, where the evaluation of the minimum quantity condition and stress assignment apply. After this step, computation at stem-level is complete, bracket erasure takes place and the output is shifted to word-level, illustrated in (17). In contrast to the derivation in (14), no exponent is realizing the input features [DUAL, NON-SIBLING] yet, which caused two violations of M(ARG)$_{SUBJ}$ at stem-level. As a consequence, the grammar will try to find a matching exponent and a TAM exponent. Since *ngintha* is unbounded with respect to the stratum it attaches to, it is concatenated now at word-level and will therefore be realized outside the word stress domain. Since Murrinhpatha does not only have the underspecified *ngintha* number exponent, but also a word-level only number marker *ngime*, I believe that the grammar at this level still requires access to the input feature structure to find the matching exponent. Thus, the constraints M(ARG)$_{SUBJ}$ and *ME are still active, however, the relative ranking of these constraints has changed. At word-level, *ME is ranked below M(ARG)$_{SUBJ}$. As a consequence, the grammar will favor candidates in which all input features are realized. The high-ranked MAX constraints require that both a number and a TAM exponent are concatenated at this step, thus ruling out candidate a. in (17). Again, there is a constraint L⇐V ensuring that all affixes added at this level are suffixes, therefore excluding candidate d. At this point of the derivation, NUM⇒R (Trommer 2001, 2003, 2008) becomes active and regulates the relative ranking of TAM and *ngintha*. Candidate b., which surfaces in (2b) is therefore successfully predicted to become the optimal candidate.[9]

(17) Morphological optimization at word-level, (15)

ba	[CL.STEM], [1, SUBJ], stem-level
nguba	[CL.STEM], [1, SUBJ, N-SINGR, DC], stem-level
ngkardu	[LX.STEM], 'to see', stem-level
nhi	[OBJ], [2, OBJ], stem-level
nu	[TAM], [FUT], word-level
ngintha	[N-SING, DC, DU, N-SIB], unspecified

ngubanhingkardu, [●TAM●] SUBJ: [~~SUBJ, 1, N-SING, DC~~, DU, N-SIB] OBJ: [~~OBJECT, 2~~]			M(TAM)	L⇐V	NUM⇒R	*ME	*COH
a.		ngubanhingkardu$_{\text{[SUBJ, 1, N-SING, DC, OBJ, 2]}}$	*!	*			
b.	☞	ngubanhingkardu$_{\text{[SUBJ, 1, N-SING, DC, OBJ, 2]}}$-nu-ngintha$_{\text{[N-SING, DC, DU, N-SIB]}}$			**	**	***
c.		ngubanhingkardu$_{\text{[SUBJ, 1, N-SING, DC, OBJ, 2]}}$-ngintha$_{\text{[N-SING, DC, DU, N-SIB]}}$-nu			***!	**	
d.		nu-ngubanhingkardu$_{\text{[SUBJ, 1, N-SING, DC, OBJ, 2]}}$-ngintha$_{\text{[N-SING, DC, DU, N-SIB]}}$		*!	*	**	

In the analysis suggested in this paper, the anomalous placement of *ngintha* is an instance of *myopia* in grammar. On the surface, the pattern in (15) seems like overexponence of the features [NON-SINGULAR] and [DAUCAL]. However, the phonological properties of the word reveal that the apparent overexponence results from cyclicity in the style of Kiparsky (1982*a*,*b*) (see also the discussion about different versions of cyclicity in Müller 2023, this volume). First, *ngintha* is suppressed in the presence of an overt object marker. Due to the non-realization of *ngintha* at stem-level, the grammar selects a featurally more specific classifier stem. Second, *ngintha* is underspecified with respect to the stratum at which it attaches, and is therefore realized at word-level. Crucially, the grammar at stem-level cannot anticipate that *ngintha* will be realized in a later step. Hence, the stem-level grammar chooses the optimal option for its domain although this results in overexponence at a later domain.

[9] It is worth mentioning that the relative order of the TAM exponents and the number exponents are word-level are rather flexible. Thus, it remains unclear whether the relative order should be regulated by morphotactic constraints or whether the order is subject to free variation.

In this paper, I follow Nordlinger and Mansfield (2021) in assuming that there is in fact a competition between overt object markers and *ngintha* for the position to the right of the classifier stem. However, the theoretical device triggering the competition are constraints that are based on crosslinguistic preferences of the realization of person and number markers rather than position classes. My analysis is superior in two more aspects. First, it heavily relies on cyclicity, thus naturally explaining the phonological behavior of *ngintha* in both positions. Second, while Nordlinger and Mansfield (2021) exploit position classes to explain *that* the classifier stem alternates, the analysis forwarded in this paper can also explain *why* it shifts to the paucal form. It is worth mentioning that affixation itself is only limited by *MULTIPLE EXPONENCE and other constraints on morphological well-formedness. As long as these constraints are obeyed, affixation may in principle apply without any restriction on the maximum number of affixes. In this respect, this work differs from a position-class analysis in the style of Nordlinger and Mansfield (2021), but also from other morphological analyses of affixation, such as Wunderlich and Fabri (1995), Wunderlich (1997), Ortmann (1999), Aissen (2003), Don and Blom (2006), Müller (2020).

In the remainder of this paper, I will first elaborate on how the interaction of morphological constraints can neatly explain the distribution of object number exponents in section 6.1. Section 6.2 emphasizes that the anomalous placement of *ngintha* is an interplay of suppression, reranking, and stratal underspecification, and hence, a lexical property of *ngintha*. Moreover, the placement of *ngintha* and its phonological correlates are connected to cyclicity, universal morphological constraints, and stratal underspecification. Since these properties can be assumed to exist in other languages, as well, the analysis suggests that we should find more patterns of delayed realization in other languages than Murrinhpatha. To this end, I discuss Umlaut in Sinhala in section 6.3.

6. Discussion

6.1. An Extension to Object Number

In the previous section, we have seen that the realization of *ngintha* is delayed since it cannot be realized in its preferred position to the right of the classifier stem. Specifically, the intervention of an object marker causes a fatal violation of COHERENCE, which ensures that exponents belonging to the same argument appear in adjacency. These assumptions predict that *ngintha* should be allowed to appear after the object marker when it spells out features of the object argument, since this would not cause a violation of COHERENCE. The examples in (18), however, illustrate that this prediction is not borne out. In both subexamples, the features of the object are realized by means of three separate markers. In (18a), there is an inner, pronominal affix *ngan*, a daucal marker *ngku* and an outer paucal, feminine affix *ngime*. We already encountered the paucal exponent *ngime* when discussing the distribution of subject number exponents in figures 1 and 2 and concluded that it always appears as an outer affix. Hence, nothing contradicts the assumption that *ngime* is a word-level affix, thus explaining that it appears as an outer affix after the lexical stem in (18a). However, this assumption cannot be extended to *ngintha* in (18b). For this example, we would expect *ngintha* to appear after the object pronominal *ngan*, since *ngintha* is stratally unbounded and does not violate COHERENCE when it marks object features. Put shortly, the placement of *ngintha* as an outer affix in (18b) seems unexpected and contradicts the analysis suggested in the previous section.

(18) Distribution of object number participants (Mansfield 2019: 150f)

a. [[pan -ngan-ngku-bat]$_{\text{stem}}$-ngime]$_{\text{word}}$
slash.3SG.NFUT-1PL.OBJ-DC.OBJ-hit-PC.FEM
'she hit us (paucal, female)'

b. [[pan -ngan-ngku-bat]$_{\text{stem}}$-ngintha]$_{\text{word}}$
slash.3SG.NFUT-1PL.OBJ-DC.OBJ-hit-DU
'she hit us (dual, female)'

Let us delve deeper into this pattern and determine the featural specifications of the number exponents by examining the distribution of object number exponents, which is given in figure 5. The leftmost column refers to the possible forms of the pronominal affix, which is the 1PL form *ngan* in (18a) and (18b). In contrast to the classifier stem forms in figures 1 and 2, the singular never combines with other number exponents. As a consequence, I assume that the singular object pronominal is specified for [SINGULAR] whereas singular classifier stems are unspecified. Thus, Murrinhpatha exploits two different realization strategies for the singular category: it is inferred by default in the singular classifier stems but realized by the features [SINGULAR] in the object pronominals. Without any additional number exponents, the PL forms refer to plural entities and can therefore be assumed to be specified for [NON-SINGULAR]. Example (18a) demonstrates that the plural pronominal may combine with an additional daucal marker *ngku*. In the absence of additional outer number exponents, the combination of a plural pronominal and daucal *ngku* refers to dual, sibling referents. Thus, I infer that plural pronominals are only specified for [NON-SINGULAR] whereas *ngku* is specified for [DAUCAL]. For *ngime* and *ngintha*, we have already established the featural specifications [PAUCAL] and [NON-SINGULAR, DAUCAL, DUAL, NON-SIBLING], respectively. Recall that *ngime* and *ngintha* differ in their stratal affiliation. While *ngintha* attaches at both phonological domains depending on the morphological context, *ngime* ever only attaches at word-level. Hence, we have to assume that it is a word-level affix.

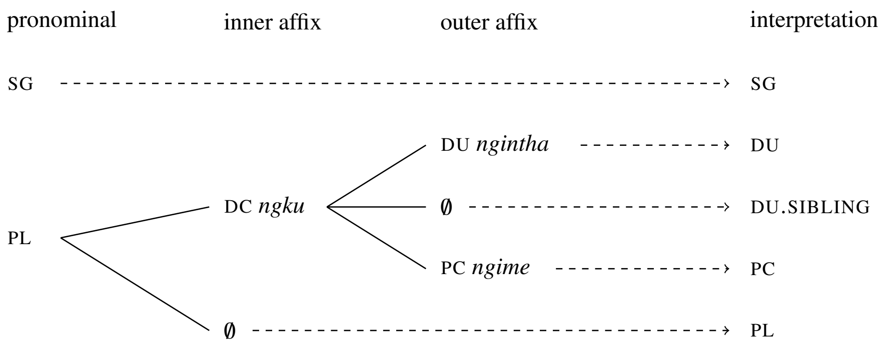


Figure 5: Distribution of OBJ number exponents (Mansfield 2019: 143)

That being said, we can now list the featural specifications and stratal affiliations of the exponents in (18) in 5. Crucially, the plural pronominal is specified for [NON-SINGULAR], while the singular pronominal is [SINGULAR].

Stratum	**Category**	**Specification**	**Form**
Stem	[CL.STEM]	[SUBJECT]	*pan*
	[LX.STEM]	'to hit'	*bat*
	[OBJ]	[2, OBJECT]	*nhi*
	[OBJ]	[1, OBJECT]	*ngi*
	[OBJ]	[OBJ]	∅
	[OBJ]	[1, OBJECT, NON-SINGULAR]	*ngan*
		[DAUCAL]	*ngku*
Word		[PAUCAL]	*ngime*
unspecified	[SUBJ]	[NON-SINGULAR, DAUCAL, DUAL, NON-SIBLING]	*ngintha*

Table 5: Murrinh-Patha affixes divided into strata

In the following, I will show that the featural specifications of the number exponents explain why *ngintha* is realized as an outer affix despite referring to the object argument in (18b). The input to the derivation in (19) is the contextual features [•CL.STEM•], [•LX.STEM•] and [•OBJ•], as well as the feature sets of the arguments. Since the subject is 3SG, the subject argument set only requires the feature [SUBJECT], which will automatically be realized by concatenating a classifier stem. The object argument is 1DU, hence requiring the features [1, OBJECT, NON-SINGULAR, DAUCAL, DUAL, NON-SIBLING]. Note that there is no contextual feature [•TAM•] and therefore no constraint MAX(TAM), since the syntactic context does not require it. The tableau in (19) allows the following observation: since the object pronominal is already specified for [NON-SINGULAR], simultaneous realization of *ngintha* will always result in a violation of *MULTIPLE EXPONENCE.

(19) Morphological optimization at stem-level, (18b)

pan [CL.STEM], [SUBJ], stem-level
bat [LX.STEM], 'hit', stem-level
ngan [OBJ], [1, OBJ, N-SING], stem-level
∅ [OBJ], [OBJ], stem-level
ngku [DC], stem-level
ngime [PC], word-level
ngintha [N-SING, DC, DU, N-SIB], unspecified

$\sqrt{slash}$, [•CL.STEM•], [•LX.STEM•], [•OBJ•] SUBJ: [SUBJECT] OBJ: [1, OBJ, N-SING, DC, DU, N-SIBL]		M(CL.STEM)	M(LX.STEM)	M(OBJ)	*ME	M(ARG)$_{OBJ}$	L⇐PERS	COH	M(ARG)$_{SUBJ}$
a. ☞	pan-ngan$_{[1,\ OBJ,\ N\text{-}SING]}$-ngku$_{[DC]}$-bat					**			
b.	pan-ngintha$_{[N\text{-}SING,\ DC,\ DU,\ N\text{-}SIB]}$-bat			*!		**			
c.	pan-ngan$_{[1,\ OBJ,\ N\text{-}SING]}$-ngintha$_{[N\text{-}SING,\ DC,\ DU,\ N\text{-}SIB]}$-bat				*!				
d.	pan-ngku$_{[DC]}$-ngintha$_{[N\text{-}SING,\ DC,\ DU,\ N\text{-}SIB]}$-bat			*!	*	**	*		
e.	pan-ngan$_{[1,\ OBJ,\ N\text{-}SING]}$-bat					***!			
f.	pan-ngan$_{[1,\ OBJ,\ N\text{-}SING]}$-ngku$_{[DC]}$-ngintha$_{[N\text{-}SING,\ DC,\ DU,\ N\text{-}SIB]}$-bat				*!*				

Since *MULTIPLE EXPONENCE is higher ranked than M(ARG)$_{OBJ}$, these violations are fatal for candidates c., d. and f., all of which contain an object pronominal and *ngintha*. Note also that switching to the singular pronominal is not possible, since the [SINGULAR] feature on *ngi* in 5 contradicts the required [NON-SINGULAR] feature of the object.[10] Deleting the object pronominal altogether, however, creates a fatal violation of M(OBJ) in candidate b. The only remaining option for the stem-level grammar is to not realize *ngintha* at stem-level. This causes three violations of M(ARG)$_{OBJ}$ in candidate e. The grammar has the option to minimize the violations of M(ARG)$_{OBJ}$ by concatenating the daucal marker *ngku* in candidate a, which becomes optimal.

From this point of the derivation, the computation proceeds as already described in section 5. The optimal candidate of the derivation in (19),

[10]In Murrinhpatha, it seems that exponents with non-matching features never surface. Recent work by Privizentseva (2021), however, has shown that conflicting features do not necessarily cause the derivation to crash. To this end, it can either be assumed that surface forms with conflicting exponents are ruled out due to high-ranked constraints on morphological matching, or excluded from the generated set of output forms by a restriction on GEN.

pan-ngan-ngku-bat passes the phonological computation at stem-level, after which bracket erasure takes place. Afterwards, *pannganngkubat* enters the morphological derivation at word-level, which is illustrated in (20). Recall that the word-level includes re-ranking of *MULTIPLE EXPONENCE and M(ARG$_{\text{Obj}}$). Consequently, the optimal output candidate of the derivation in (20) is candidate b., in which *ngintha* serves to realize the remaining features [DUAL, NON-SIBLING] of the object feature set despite violating *MULTIPLE EXPONENCE, while candidate a. which avoids a violation of *MULTIPLE EXPONENCE by not concatenating another number exponent is ruled out since it fatally violates M(ARG$_{\text{Obj}}$).

(20) Morphological optimization at word-level, (18b)

pan	[CL.STEM], [SUBJ], stem-level
bat	[LX.STEM], 'hit', stem-level
ngan	[OBJ], [1, OBJ, N-SING], stem-level
∅	[OBJ], [OBJ], stem-level
ngku	[DC], stem-level
ngime	[PC], word-level
ngintha	[N-SING, DC, DU, N-SIB], unspecified

pannganngkubat SUBJ: [~~SUBJECT~~] OBJ: [~~1, OBJ, N-SING, DC~~, DU, N-SIB]		L⇐V	M(ARG$_{\text{Obj}}$)	NUM⇒R	*ME	*COH
a.	pannganngkubat$_{[\text{SUBJ, OBJ, 1, N-SING, DC}]}$		*!*			
b. ☞	pannganngkubat$_{[\text{SUBJ, OBJ, 1, N-SING, DC}]}$-ngintha$_{[\text{N-SING, DC, DU, N-SIB}]}$			*	**	
c.	ngintha$_{[\text{N-SING, DC, DU, N-SIB}]}$-pannganngkubat$_{[\text{SUBJ, OBJ, 1, N-SING, DC}]}$	*!		*	**	

Put shortly, the analysis forwarded in this paper can also capture the observation that *ngintha* appears as an outer affix when it refers to the object argument. However, the delayed realization of *ngintha* results from a violation of *MULTIPLE EXPONENCE rather than from a violation of COHERENCE.

6.2. Morphological Blocking of Stem-Level Affixes

In the analysis I forward in 5, I assume that the grammar at stem-level determines the non-realization of *ngintha* in the context of overt objects. Since *ngintha* is stratally unbounded, it has the chance to be realized at a later level. A core assumption of StratOT is that the stratal affiliation is a lexical property of each affix. In simpler terms, it is a lexical coincidence that *ngintha* can be realized later, which is entirely independent of its suppression at stem-level. This assumption further predicts that stem-level affixes with similar featural specifications would be blocked in the context of overt object markers. Example (21) illustrates that this prediction is in fact borne out. In both subexamples, the subject is 3PC. Recall from the distribution of number exponents in 2 that this context is realized by a combination of the PL classifier stem and an additional daucal affix *ka* in inner position in NFUT contexts. This is exactly the combination that surfaces in example (21a), which does not contain overt object markers. In (21b), however, the presence of an overt object marker *nga* blocks the realization of *ka*, yet the subject is 3PC. In contrast to *ngintha*, however, *ka* is a stem-level affix only and can therefore not be realized at word-level. As a result, the feature [DAUCAL] remains unrealized.

(21) *-ka* as a stem-level affix only (Mansfield 2017)

a. [[Pumám -ka]$_{\text{stem}}$-ngime]$_{\text{word}}$.
say.3PL.NFUT-DC.SUBJ-PC.FEM
'They (paucal) said'

b. dɻáf [[pumám -nga]$_{\text{stem}}$-neme]$_{\text{word}}$
draft do.3PL.NFUT-1SG.OBJ-PC.MASC
'They (paucal) drafted me.'

6.3. Another Instance of Delayed Realization: Umlaut in Sinhala

Due to the differential phonological behaviour of *ngintha* in the two possible positions, I treat the placement of *ngintha* as delayed realization due to morphological blocking. Given that the morphological constraints, cyclicity, and stratal underspecification are expected to exist in other languages, as well, my analysis predicts more patterns of delayed concatenation. Specifically, we should find languages in which one and the same affix displays different phonological properties depending on the morphological context of the affix. Such a pattern is found in Sinhala, as exemplified in (22). In this language, certain affixes like the perfective suffix *la* trigger umlaut of the root. In (22a), the root with the underlying form *ad* 'to pull' surfaces as *æ* in the context of the perfective suffix *la*. Similarly, the underlying 'root *bal* 'to look' becomes *bæl* in the context of the past suffix *u* in (22b). When a causative suffix intervenes, as in (22c) and (22d), the umlaut-triggering past suffix behaves differently than the perfective suffix. While the past suffix triggers umlaut across the causative in (22d), umlaut is blocked in the context of the causative in (22c). In short, it cannot be assumed that umlaut only applies in strictly local configurations, since it does apply across intervening affixes in (22d). A possible explanation for the blocking of umlaut in (22c) is delayed realization. In similarity to delayed concatenation of *ngintha*, we could assume that the causative blocks concatenation of the perfective marker in the cyclic domain responsible for umlaut. Parallel to *ngintha*, the perfective marker *la* is stratally unbounded and attaches at a later, cyclic domain.

(22) Umlaut in Sinhala (Fenger and Weisser 2022: 5,7)

a. æ-ə-la tie-nə-wa
   pull-CL2-PFV be-NPST-IND
   'have pulled'

b. bæl-∅-u-wa
   look-CL1-PST-IND
   'looked'

c. ad-ə-wə-la tie-nə-wa
   pull-CL2-CAUS-PFV be-NPST-IND
   'have made someone pull'

d. bæl-ə-wə-u-wa
   look-CL1-CAUS-PST-IND
   'made someone look'

7. Conclusion

In this paper, I have discussed and explained the peculiar placement of the dual marker *ngintha* in the morphologically highly complex language Murrinhpatha, in which the presence of overt object markers affects the position of the dual marker *ngintha* and the form of the classifier stem. Specifically, *ngintha* appears to the right of the classifier stem in the absence of overt object markers in (23a) but at the right edge of the word when object markers are overtly realized in (23b). Furthermore, Murrinhpatha uses the singular form of the classifier stem when adjacent to the dual marker in (23a), but the daucal form when followed by the object marker in (23b).

(23) Placement of *ngintha* (Nordlinger and Mansfield 2021: 8)

a. ba-ngintha-ngkardu-nu
see.1SG.SUBJ.IRR-DU-see-FUT
'We (dual non-sibling) will see him / her.'

b. nguba-nhi-ngkardu-nu-ngintha
see.1DC.SUBJ.IRR-2SG.OBJ-see-FUT–DU
'We (dual non-sibling) will see you.'

Nordlinger and Mansfield (2021) have argued that these two phenomena provide evidence for the existence of position classes in morphological theories. Specifically, the authors analyze the alternation of the classifier stem as an instance of *position-dependent allomorphy*, where the form of the classifier stem depends on the morphological content of the following position class. Moreover, Nordlinger and Mansfield (2021) assume that the replacement of *ngintha* follows from its competition with the object marker for the position class to the right of the classifier stem.

In this paper, I tackle this view and illustrate that both phenomena follow from the interaction of universal and violable morphological constraints, the featural specifications of the exponents, and the cyclic structure of the word in Murrinhpatha. To this end, the phonological behaviour of affixes in different positions was discussed in section 2 with the conclusion that the word in Murrinhpatha is separated into two different morphophonological layers.

Section 3 examines the distributions and combinations of the different number exponents in Murrinhpatha, which allowed us to infer the morphological structure of number and the featural specifications of the number exponents.

Section 4 capitalizes on the StratalOT framework adopted in the analysis. StratalOT neatly captures the cyclic structure of the word and the interaction of violable constraints. Crucially, these universal, morphological constraints are based on typological tendencies of the realization of phi features (Trommer 2001). In sum, my assumptions build upon independent evidence, whereas position classes have to be stipulated as primitive entities of morphological theory.

In section 5, I explain how the interaction of constraints and the featural specifications of the exponents explain both the placement of *ngintha* and the alternation of the classifier stem form. Specifically, the position of *ngintha* results from a competition between different morphological constraints, where both object markers and inner number markers are required to attach to the right of the classifier stem. First, L ⇐ PERS(ON) ensures that object exponents carrying [Person] information are realized at the left edge of the word. Second, COH(ERENCE) requires exponents realizing features from the same feature set in adjacency to each other. Since L ⇐ PERS(ON) outranks COH(ERENCE), object markers win the competition and appear to the right of the classifier stem in (23b). Since *ngintha* can no longer be realized in its designated position, it is suppressed at the first morphophonological cycle altogether. As a consequence, a featurally more specific form of the classifier stem is selected to realize as many input features as possible. Thus, the analysis forwarded in this paper does not only explain that the form of the classifier stem changes but also why it changes to the daucal marker. Since *ngintha* is not strictly bounded to the stem-level, its realization is delayed until the word-level.

In the remainder of this paper, I illustrate how my analysis can be extended to object number in section 6.1. Put shortly, the extraordinary placement of *ngintha* follows from suppression at stem-level, the stratal unboundedness of *ngintha*, and constraint reranking, which allows the grammar to delay its realization. Section 6.2 highlights that these factors are independent of each other. Evidence for this claim comes from the paucal marker *ka*, which is suppressed in the very same morphosyntactic context but cannot be concatenated later, thus resulting in deletion of the exponent. This paper opens an entirely new view on patterns where morphemes display a different phonological behavior in the context of other exponents. Section 6.3 illustrates how this generalization can potentially be extended to more cases of delayed exponence.

In sum, I have analyzed a complex morphological pattern by means of a StratOT analysis which rests on independently motivated assumptions and is therefore beneficial to analyses using position classes. Moreover, this paper has shown that studying the phonological properties of affixes provides a window into the morphological structure of the word, which allows us to answer recalcitrant morphological problems.

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