Phonological Data and Analysis Volume 4, Article 4: 1–31 (2022)
https://doi.org/10.3765/pda.v4art4.63

Received 8 June 2021; revised 15 Feb 2022; accepted 22 April 2022. © 2022 Christopher R. Green & Nicola Lampitelli
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Conditions on complex exponence: A case study of the Somali subject marker

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This paper offers a novel analysis of the complex patterns of exponence exhibited by the Somali subject marker (MRK). Somali subject marking presents a typologically rare case of subtractive grammatical tone, and one in which an otherwise predictable process of High tone loss is sometimes impeded by factors related to word structure. In the simplest instances, MRK is realized only tonally by the loss of High tone from the last word in a DP. Under some conditions, however, it is realized only segmentally, with no High tone loss. Still other times, both exponents appear, and even in a few instances, neither is realized. These outcomes are predictable, but analyzing them presents several challenges. One of these is motivating the outcomes from a single underlying form given the apparent independence of the tonal and segmental exponents. Others concern defining the trigger of subtraction and the domain or *valuation window* in which subtraction occurs. We propose a formal account of these outcomes within Cophonologies by Phase (Sande & Jenks 2018; Sande, Jenks & Inkelas 2020), whose division of *vocabulary items* into three types of phonological content is uniquely suited to addressing these analytical hurdles.

Keywords: Somali; subtraction; interfaces; allomorphy; grammatical tone

1 Introduction

Somali has a reduced tonal system (Klingenheben 1949; Hyman 2019a,b), wherein a single, culminative High (H) tone appears on the penultimate or final mora of a given stem (Hyman 1981). Seminal work on the language (e.g., Banti 1988; Hyman 1981; Saeed 1999:63) considers this to be representative of the language's basic tonological state of affairs. The distribution of H tone is similar, but not identical, in morphologically-complex words. There are just two contexts in which H is absent from a Somali word. One is in present and past tense realis mood verbs, and the other occurs in some instances as a result of subject marking. The latter is the focus of this paper. Some function words and clitics also surface without H tone, but this is a separate matter.

Subject marking is realized on main clause subjects that are not indicated as ''in focus'' by one of Somali's three focus particles. Sentence (1) is a declarative clause with no focus marking containing a subject-marked subject; here, subject marking is indicated solely by loss of H tone on the subject noun (nín → nin) and is indicated by the gloss MRK. For comparison, sentence (2) is a declarative clause containing a focus

* The authors are grateful for comments and feedback from colleagues and audience members at the Gothenburg Somali Workshop and the 2021 Princeton Phonology Forum, particularly Sharon Rose, Nina Kaldhol, Laura Downing, Sabrina Bendjaballah, David Le Gac, and Giorgio Banti. They are also indebted to two anonymous reviewers and the editor for critical but highly positive and constructive feedback which helped to substantially improve this paper.

https://doi.org/10.3765/pda.v4art4.63 Published online by Cambridge University Press

particle, *báa*, which has scope over the direct object. Here, subject marking is realized on the vowel of the subject's definite determiner *-ku*, which can be directly compared to that of the direct object *-ka*, which is not subject marked. The absence of subject marking is glossed UMRK. These are but two of several realizations of subject marking, as discussed further below.[1]

(1) (Orwin 1995: 41)
Nin sháah w-úu cabb-ay.
man.MRK tea.UMRK DECL-3SG.M drink-3SG.M.PST
'A man drank tea.'

(2) (Orwin 1995: 93)
Ínan-k-u kóob-k-a b-úu jab-i-y-ay.
boy-DET-MRK cup-DET-UMRK FOC-3SG.M break-CAUS-3SG.M-PST
'The boy broke THE CUP.'

In order to begin establishing the language's basic patterns of subject marking, the examples in (3) compare simple nouns of different shapes that are subject marked to those that are not. As seen here, subject marking may be realized only tonally by the loss of H tone (1a,b), both segmentally and tonally by the addition of *-i* and the loss of H tone (1c,d), or by no tonal or segmental alternation at all (1e,f).

(3) UMRK vs. MRK words

a.	búug	'book.UMRK'	buug	'book.MRK'
b.	nácas	'fool.UMRK'	nacas	'fool.MRK'
c.	naág	'woman.UMRK'	naagi	'woman.MRK'
d.	galáb	'afternoon.UMRK'	galabi	'afternoon.MRK'
e.	dáwo	'medicine.UMRK'	dáwo	'medicine.MRK'
f.	beége	'gauge.UMRK'	beége	'gauge.MRK'

In (4), representative words from above, when modified by a definite determiner, retain their H tone under subject marking, with subject marking realized instead by an alternation of the determiner's vowel. With few exceptions, all subject marking outcomes fall under one of the four types shown in (3) and (4).[2]

(4) UMRK vs. MRK definite determiner phrases

a.	búugga	'the book.UMRK'	búuggu	'the book.MRK'
b.	naágta	'the woman.UMRK'	naágtu	'the woman.MRK'
c.	dawáda	'the medicine.UMRK'	dawádu	'the medicine.MRK'

These patterns of subject marking are well-established in the literature (Andrzejewski 1964; Banti 1984; Hyman 1981; Saeed 1999, among others), but scholars yet disagree on how to explain them. One challenge in doing so arises from the subtractive nature of the phenomenon. Item- or piece-based approaches to morphology (Bye & Svenonius 2012; Halle & Marantz 1993; Hockett 1954; Lieber 1992, among others) tend to consider subtractive alternations or exponence to be subsidiary responses to the addition of some other overt

[1] Data are presented in the official Somali orthography (Andrzejewski 1978) supplemented with tone marking. H tone is indicated by an acute accent. An unmarked vowel is phonologically toneless, though pronounced phonetically low. H tone is assigned to moras (Hyman 1981): a v́v sequence is realized as a fall while a vv́ sequence is a rise. Some speakers realize the latter as flat H across both moras (Banti 1988).

[2] On demonstrative determiners, MRK is optionally *-u* for some speakers. We set aside for now subject marking on inalienable possessives and on DP-final relative clause verbs. Their behavior differs from the patterns discussed here, but we return to them in Section 6.

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exponent, be it segmental or prosodic. As seen above, there is no consistent segmental or prosodic realization of MRK. As such, Somali appears to present a case in which expression of the morpheme's segmental and prosodic exponents are independent of one another, and, moreover, one where H tone loss may be the only expressed exponent of the morpheme. Though another exponent may be expressed under certain structural conditions, one is not necessarily required.[3]

Bearing this in mind, and analogous to other analyses of subtractive tonal phenomena (notably, Hyman 2018; Rolle 2018), Somalists have variously proposed that MRK is exponed by Low tone (Lampitelli & Le Gac 2016; Le Gac 2016, 2018), by a phonologically null element populated by default with Low tone (Lampitelli & Le Gac 2016), or by a tonal feature antagonistic to H tone (Green 2019).[4] These approaches struggle with similar issues, a minor one being that there is no independent evidence that Low tone plays any other role in Somali's tonology. This aside, a bigger analytical challenge rests in defining the *valuation window* (Rolle 2018) or domain within which subtraction occurs. While each of the aforementioned proposals suggests a correlation between MRK's behavior and a word or phrase's structure, none of them entertains the full complement of outcomes that we cover here. Any analysis of MRK must be able to explain why H tone survives in the presence of MRK in words like (3e) but not in (3b), or in words like (3f) but not (3a). Likewise, one must also be able to explain why H tone is retained in the presence of MRK in all instances in (4). From just these few examples, it should be clear that the proposition of a two mora, two syllable, or even a word-sized valuation window cannot provide a coherent explanation for these outcomes.

The account of MRK that we offer here poses that there are several interrelated factors – tonal, segmental, and structural – that jointly govern its exponence. To formalize these outcomes, an account is proposed within Cophonologies by Phase (CBP: Sande & Jenks 2018; Sande et al. 2020), a framework whose division of *vocabulary items* (VI) into three types of phonological content is uniquely suited to capturing the Somali facts. CBP is an extension of Cophonology Theory (Inkelas 1998, et seq.) that incorporates aspects of Distributed Morphology (Halle & Marantz 1993, Embick 2010, 2015, among others) and Phase Theory (Chomsky 2001, 2008) to model phenomena at the interfaces of phonology, morphology, and syntax. Its details and suitability to capture the Somali phenomena are discussed in detail in the next section.

The remainder of the paper is organized as follows. Section 2 provides very brief background on Somali, more substantive discussion of our theoretical assumptions, and an overview of our analysis of MRK. Section 3 then delves into the behavior of the vast majority of nouns in the language, showing that they follow two major tonal patterns. Section 4 then considers two closely related classes of nouns whose tonal behavior is exceptional relative to others. Section 5 briefly discusses nouns modified by definite determiners. Section 6 covers possible extensions to our analysis for more complex structures, as well as several theoretical issues upon which our analysis may bear. Section 7 offers concluding remarks.

2 Background and theoretical assumptions

Somali [iso:som] is an East Cushitic language of the Afroasiatic family. The language is fairly well-described, but a comprehensive formal analysis of the behavior of its subject marker is yet unavailable. The data discussed in this paper pertain to subject marking in Northern Somali (Cerulli 1919), which exhibits a full complement of its realizations (Andrzejewski 1964; Banti 1984; Hyman 1981; Saeed 1999). Not all varieties of Somali realize subject marking in the same way, but the analysis presented here provides a baseline for comparison to what is reported synchronically in other varieties (see, e.g., Banti 1984; Nilsson 2017).

[3] Some have analyzed MRK as a nominative or subject case marker under the assumption that Somali is a syntactic case language. From a morphophonological perspective, this does not bear on our analysis, though it and our approach each entail certain syntactic assumptions discussed further below.

[4] Lampitelli (2013) proposes that MRK is associated with suffix *-i* but no tone; UMRK, in contrast, is associated only with H tone.

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As introduced above, subject marking occurs only on main clause subjects that are not focused by a focus particle. Our primary concern is accounting for the morphophonological behavior of the subject marker morpheme, which we call MRK. That said, any analysis of MRK must take care to, or at least acknowledge that its precise function and the syntactic projection in which it is located remain a matter of debate among Somalists. Possibilities entertained include TopP (Frascarelli & Puglielli 2005, 2009, and related work), the specifier position of an IP (Lecarme 1991, 1995), or within K(ase)P (Lampitelli 2013). It is beyond the scope of this paper to fully entertain the syntactic ramifications of these choices. Rather, the analysis that we present stipulates only that MRK be spelled out in a domain higher than DP, which we label mrkP as a placeholder. We are certain that once we arrive at a principled account of MRK's morphophonology, its syntactic behavior will be further elucidated. More pertinent to our analysis, and as is well known, MRK is realized (whether, tonally, segmentally, or both) on the rightmost element of a DP, regardless of that element's syntactic category, be it a noun, verb, suffix, or clitic. In this paper, we are concerned mainly with the realization of MRK occurring on nouns and determiners. We briefly discuss its realization on relative clause verbs as well as in more complex phrases in Section 6.3, leaving a comprehensive analysis of these constructions for future work.

A principled analysis of MRK must be able to capture all the details of its behavior while being consistent with both the prosodic and the syntactic properties of the language. Any analysis should also be able to account for the fact that the exponents of MRK are realizations of a single morphosyntactic property. To this end, while there have been several compelling attempts at reducing Somali's allomorphic alternations in noun and verb inflection to single underlying forms (see Bendjaballah 1998; Green & Morrison 2016; Godon 1998; Lampitelli 2013; Barillot & Ségéral 2005; Barillot, Bendjaballah & Lampitelli 2018), analyses treating the alternations exhibited by MRK in a similar way have been less successful. As such, this calls for a novel approach, and one that employs a theoretical framework capable not only of handling allomorphy, and allowing for the decomposition of inflected forms, but also one that accounts for the specific phonology associated with the MRK morpheme. As we show below, this is possible within Cophonologies by Phase. We propose a single exponent of MRK which attaches higher than the position spelling out the category-defining head *n*, whose phonological exponent is a High tone. We motivate these choices below.

To address observed distinctions between UMRK vs. MRK contexts formally, we adopt Cophonologies by Phase (Sande & Jenks 2018; Sande et al. 2020), which deals with allomorphic alternations specific to a given morphosyntactic context. Following Sande & Jenks (2018) and Sande et al. (2020), we assume that words are built in the Syntax through cyclic operations in the fashion of Distributed Morphology (DM; Halle & Marantz 1993; Embick 2010) and that exponents are the realization of feature-matrices associated with terminal nodes. An exponent or Vocabulary Item (VI) consists of the association between a morphosyntactic property and a phonological string. This model is couched within Cophonology Theory (Inkelas 1998): a cophonology is the "phonological mapping associated with each construction." As proposed by Orgun (1996), a construction is a non-derived syntactic tree (as in Construction Grammars; see Fillmore, Kay & O'Connor 1988). In CBP, however, a construction is a *derived* syntactic structure. For the matter at stake here, we propose that MRK is associated with its own cophonology, as detailed below.

In CBP, VIs are composed of three phonological elements: i) featural content ($\mathscr{F}$): a string of segments or features; ii) prosodic content ($\mathscr{P}$): a prosodic subcategorization frame, and iii) a cophonology or constraint re-ranking ($\mathscr{R}$). A given item is spelled out within a phase, with its phonological properties superseding those of the string that it dominates. Following Bošković (2016), the framework assumes that cyclic heads send to spell-out the entire content of their phase, with the unique exception of the specifier (contra standard assumptions whereby only the complement of a phase is spelled-out; see Sande et al. 2020: 1219-1220).

CBP adopts two major assumptions from Cophonology Theory. One is that different phonological sub-grammars co-exist within a given language; each is associated with distinct morphosyntactic environments. Another is that this set of distinct phonologies allows for a unified analysis of different morphological processes. In Somali, CBP provides a means to unify the phonological treatment of MRK's various exponents.

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As such, there is no need to postulate multiple distinct allomorphs of MRK. As we shall see, $\mathscr{R}$-content is responsible for MRK's tonal behavior, while $\mathscr{F}$-content governs its segmental realization. MRK's phonological (but not syntactic) scope is entailed at least in part in its $\mathscr{P}$-content.

As just explained, CBP proposes "that morpheme-specific cophonologies are part of the lexical entry" (Sande et al. 2020: 1216). In other words, a VI contains not only the phonological string associated with that particular morphosyntactic property ($\mathscr{F}$-content) but also a specific phonology ($\mathscr{R}$-content). This combination of an item-and-arrangement approach (cf. Distributed Morphology) with an item-and-process framework (cf. Cophonology Theory) provides a means by which to formalize complex allomorphic alternations while postulating a single VI for each morphosyntactic category. Therefore, in CBP, VIs are discrete items bearing specific phonological sub-grammars. This is not possible in DM: as highlighted by Sande et al. (2020), DM may implement morpheme-specific phonology only through specific rules, usually called ''readjustment rules.'' As we shall see, there is no need for such rules to account for MRK's complex pattern: CBP allows for associating a specific cophonology to MRK's VI.

In addition to VIs and the general item-based approach, CBP adopts, following the DM literature, syntactic phases (Chomsky 2001, 2008). Word-formation processes proceed cyclically, through the merger of functional heads to roots. According to Embick (2010), among others, some heads are cyclic (i.e., they are phase-heads), whereas others are not. A cyclic head triggers spell-out, resulting in the realization of the terminal nodes in the phase of that head. The material sent to spell-out is impenetrable to further syntactic computation, as per the Phase Impenetrability Condition (Chomsky 2008). In Vocabulary Insertion, VIs are inserted at terminal nodes (as per standard DM assumptions). Once Vocabulary Insertion is complete, linearization of the phonological string occurs. In CBP, phonological computation depends on the cophonology associated with each VI.

To begin applying these principles to Somali, consider, for example, the VI for the root $\sqrt{\text{danab}}$ 'thunder' in (5), as well as that for UMRK in (6). The root of *dánab* 'thunder.UMRK' is associated with the segmental string /danab/, and with two empty sets corresponding, respectively, to the VI's prosodic subcategorization frame and its cophonology. We assume that roots have empty $\mathscr{P}$-content and are prosodified upon merger with a category-defining head. An empty set associated with $\mathscr{R}$ is computed phonologically by a master constraint ranking, the details of which we motivate in Section 3, rather than a morpheme- or construction-specific cophonology. The phonology of the UMRK VI is also associated with the master ranking, but also with a specific subcategorization frame: it is realized on and requires parsing within a PWd. Its $\mathscr{F}$-content is realized by H.

(5) $[\textit{thunder}]: \longleftrightarrow \left\{ \begin{array}{ll} \mathscr{F}: & /danab/ \\ \mathscr{P}: & \emptyset \\ \mathscr{R}: & \emptyset \end{array} \right\}$

(6) $[\textit{UMRK}]: \longleftrightarrow \left\{ \begin{array}{ll} \mathscr{F}: & /H/ \\ \mathscr{P}: & [X_{\omega}] \\ \mathscr{R}: & \emptyset \end{array} \right\}$

Rather than somehow being involved in case marking, we consider UMRK and its H tone to be introduced by *n* and to be associated with wordhood (Downing & Nilsson 2019; Green & Morrison 2016; Hyman 1981). This stems from the fact that MRK and UMRK are not in complementary distribution: the former does not replace the latter when a subject-marked DP is made of more than one item. Based on this, and the fact that MRK appears only in phrase-final positions, we assume that UMRK and MRK do not occupy the same position in the structure. As mentioned, we remain agnostic as to which projection receives MRK. We use mrkP as placeholder and assume it takes DP as its complement. Whether MRK itself is best considered an affix or clitic is unclear. It is prosodically dependent on the element it modifies, has limited phonological scope, but wide syntactic scope. This has been illustrated in examples like (2): the head *ínan* realizes UMRK's H

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tone, while MRK affects only the definite article *-ku*. Examples in (7) support the same idea: MRK does not replace UMRK in a systematic fashion.

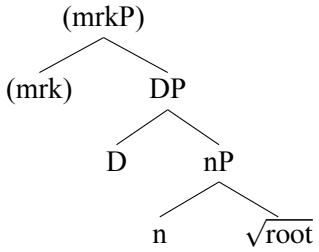
(7) UMRK vs. MRK

a.	mídab	midab
	color.UMRK	color.MRK
	'color'	'color' (subj)
b.	mídab=ka	mídab=ku
	color.UMRK=DEF	color.UMRK=DEF.MRK
	'the color'	'the color' (subj)

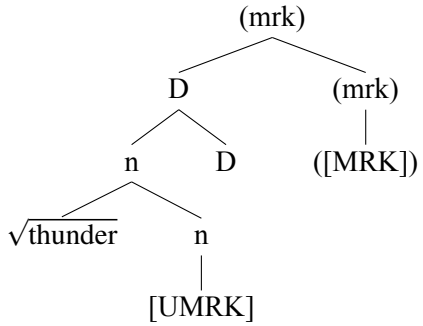
We submit that this configuration must be reflected structurally: MRK takes DP as its complement, and its cophonology rewrites UMRK's master ranking on the linearly closest item. In other words, when MRK is selected for in the syntax, it attaches to the last item of the subject-marked DP; the other elements of that DP surface as default forms, realizing the UMRK configuration.[5]

With these assumptions stated, and following Embick (2010, 2015), we assume that the basic structure in (8) derives a complex head through cyclic movement, with the Somali specific details shown in (9). Complex heads are structures in which there is only one level of projection. The whole structure in (9) behaves as a head and results from successive head-to-head movement in (8): the root moves to *n*, then to D, and finally to *mrk* (see Embick 2010:20-46 for the details of how a complex head is created). The node *mrk* appears between parentheses since it appears only when MRK is selected for.

(8) The basic structure of a Somali noun



(9) Basic complex head of a Somali noun



As captured in these structures, UMRK is introduced by *n*, its presence being obligatory for a noun to be grammatical; prosodification and H tone are properties of all Somali nouns, except in the presence of MRK where the latter may be absent. MRK's realization, we shall see, depends on the syntactic configuration in which the noun occurs. Thus, it is represented in parentheses in (9). We assume that structures in the default

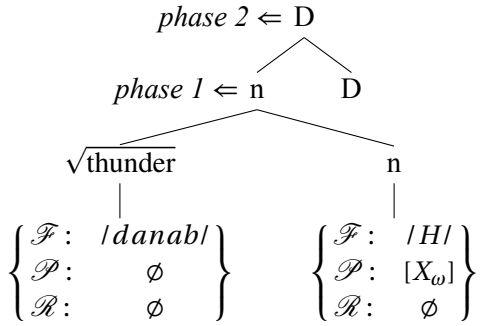
[5] We recognize, of course, that our proposal departs from analyses of Somali as a syntactic case language. We believe this is justified, however, given recent work arguing that if Somali indeed makes use of syntactic case, it does so in a non-canonical way (see, for example, Nilsson 2019).

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UMRK configuration lack mrkP. In the remainder of the paper, we are only concerned with complex heads.

In the CBP framework, VIs are inserted throughout syntactic phases. We illustrate this in (10) with *dánab* 'thunder.UMRK.' Phase 1 is headed by *n*, and thus, both the root and the content of *n* are sent to spell-out when the next head, D, is merged. UMRK is computed phonologically with the root. Since D is empty in indefinite nouns, phase 2 has no phonological influence on *dánab*. Since the VI of UMRK is associated with the same cophonology as the root, the master ranking applies for its phonological computation.

(10) Vocabulary Insertion and linearization: UMRK



MRK's behavior differs in two ways: it belongs to a distinct phase from the root, and it bears a distinct constraint ranking encoded in its VI. This structural distinction is consistent with the default status of UMRK as opposed to MRK. The former is associated with the master ranking, whereas the latter has its own cophonology. In anticipation of the analysis, and with details to follow, we propose the MRK VI in (11).

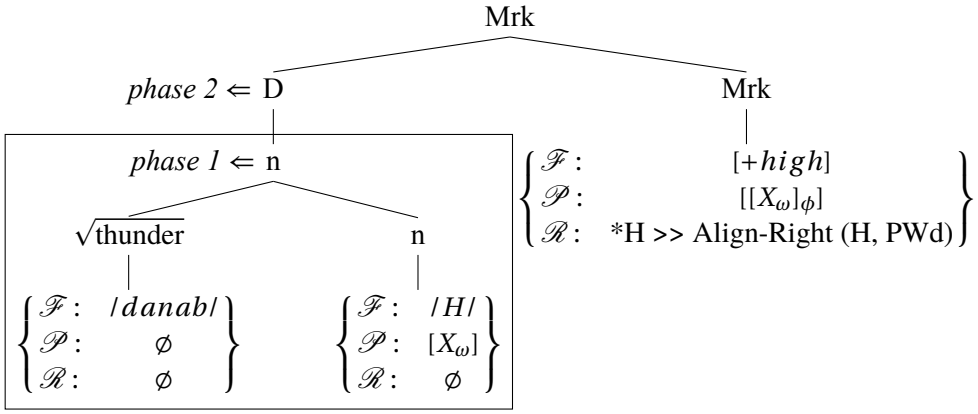
(11) $[MRK]: \longleftrightarrow \left\{ \begin{array}{ll} \mathscr{F}: & [+high] \\ \mathscr{P}: & [[X_\omega]_\phi] \\ \mathscr{R}: & \text{*H >> Align-Right}(H, PWd) \end{array} \right\}$

This VI encapsulates several aspects of MRK's behavior. First, it is realized segmentally in some instances as *-i*; our choice of [+high] to capture this will be made clear below. Second, the prosodic subcategorization $\mathscr{P}$ dictates that MRK must be parsed within a PWd which is at a PPh boundary. Finally, the $\mathscr{R}$-content contains a tentative cophonology for MRK; this will be revised slightly once other details of the morpheme's behavior are established. For now, a key fact is that MRK's cophonology disfavors High tone in most instances: for our current example, in the MRK context, the outcome is toneless *danab* 'thunder.MRK.'

To capture this, in MRK configurations like (12), the terminal node MRK spells-out the VI in (11). This occurs once both phase 1 and phase 2 have been sent to spell-out. This entails that MRK's cophonology, together with its prosodic subcategorization, scopes over previously spelled-out material (corresponding to the enclosed sub-tree). Recall that D is empty in indefinite nouns: as we shall see in section 5, in definite nouns, MRK's valuation window targets the definite determiner instead of the noun. This is consistent with the observation that MRK is realized on the rightmost item within the phrase. As for MRK, we remain agnostic as to whether it is a phasal head, or not: this has no bearing on our analysis.

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(12) Vocabulary Insertion and linearization: MRK



The remainder of the paper is devoted to detailing how MRK phonology affects nouns and determiners to which it attaches. We start with analyzing basic noun tone patterns in the next section.

3 Basic noun tone patterns

This section discusses characteristics of morphologically-simplex nouns and those formed by certain pluralization strategies or by the addition of some derivational suffixes, in both UMRK and MRK conditions. For each, we limit ourselves to a representative set of structural exemplars. We do so for practical reasons, as MRK can be realized on any morpheme that is final in a DP, regardless of its syntactic status. Thus, it would be impossible to cover all of the morphemes on which MRK might be realized. In every instance, H tone surfaces on either the penultimate or final vocalic mora of the noun. We follow Hyman (1981) in assuming that tone is predictably assigned, rather than being entailed in a word's lexical representation.

3.1 Penultimate H nouns

Nouns in (13) are representative of one major pattern. H tone is located on the penultimate vocalic mora in the UMRK context but is lost in the MRK context without the addition of any segmental content. The pattern holds across different word sizes and shapes.[6]

(13) Penultimate H nouns

a.	gantáal	'arrow.UMRK'	gantaal	'arrow.MRK'
b.	ciídan	'army.UMRK'	ciidan	'army.MRK'
c.	nácas	'fool.UMRK'	nacas	'fool.MRK'
d.	ílig	'tooth.UMRK'	ilig	'tooth.MRK'
e.	sán	'nose.UMRK'	san	'nose.MRK'

Nouns such as these are the clearest and most transparent illustration of the basic subtractive operation entailed by MRK. As seen below, there are other realizations of MRK that involve the addition of a segmental exponent, or some other segmental alternation. Despite this, approaches to subtractive phenomena, and to subtractive grammatical tone in particular, that assume subtraction is an auxiliary response to the addition of some other morphological element must be able to explain such an outcome. We aim to show that while reported subtractive tonal phenomena might typically entail overt morphological addition, Somali illustrates that such addition is not necessarily an inherent characteristic of the process.

[6] Codas do not count in the calculation of tone assignment (Orwin 1996; Saeed 1999); H appears on the vowel in CVC words and never on the final consonant.

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If we proceed unencumbered by standing assumptions about subtractive phenomena, formalizing the transparent outcomes above is straightforward, keeping in mind the properties outlined in Section 2 about the basic structure of Somali nouns and the linear relationship that holds between nP, DP, and mrkP. The constraints in (14) easily model the UMRK distribution of H tone in nouns like those in (13). Starting with these simple outcomes allows us to better address divergences of various types in more complex structures.

(14)

a.	Parse-Tone	Tone in the input is realized in the output
b.	Non-Finality-μ	H tone does not fall on the word-final (vocalic) mora
c.	Align-Right (H, PWd)	H tone lies at the Right edge of a Prosodic Word
d.	*H	No H tones

We assume Parse-Tone to be undominated, as a toneless candidate is never optimal in the UMRK context. This constraint ensures that the H tone associated with a nominal VI is parsed. An opposition between Align-Right (H, PWd) and Non-Finality-μ, with the latter outranking the former, captures the overarching preference in the language for association of H to the penultimate vocalic mora. For Align-Right (H, PWd), a violation is assessed for every vocalic mora (i.e., each tone bearing unit) away from right edge of the PWd that H tone is located in the output. Although non-final H is an arguable preference, we shall see below that it is not necessarily the rule. Lastly, and though its role in our analysis will become clear below, we propose that the markedness constraint *H is low-ranked in the master ranking. The outcomes of this ranking are seen in (15).

(15) /danab, H/ → [(dánab$_{\omega}$)] ‘thunder.UMRK’

/danab, H/	Parse-Tone	Non-Finality-μ	Align-Right (H, PWd)	*H
a. (danab$_{\omega}$)	*!			
b. (danáb$_{\omega}$)		*!		*
☞ c. (dánab$_{\omega}$)			*	*

In the presence of MRK, nouns like those in (13) surface without H tone. We pin this behavior, in part, to the fact that MRK is spelled out in a distinct phase from the root. As introduced above, we argue that the MRK VI entails a cophonology whose $\mathscr{R}$-content includes a re-ranking of constraints, the result of which is that the presence of H tone is no longer optimal, at least in most instances. These properties are entailed in the MRK VI introduced above in (11) and repeated here in (16) for convenience:

(16) $[MRK]: \longleftrightarrow \left\{ \begin{array}{ll} \mathscr{F}: & [+high] \\ \mathscr{P}: & [[X_{\omega}]_{\phi}] \\ \mathscr{R}: & \text{*H} >> \text{Align-Right}(H, PWd) \end{array} \right\}$

Under this analysis, the input to MRK’s cophonology is the output of an earlier phase in which a noun is parsed into a PWd and in which H tone has also been parsed. Because H tone is already spelled out in the input to MRK’s cophonology, Parse-Tone no longer plays a role, though we assume that a faithfulness constraint barring against the loss of an associated tone in the input is present, but necessarily low ranked in order to accommodate H tone loss in MRK contexts. For simplicity, we use Faith as a placeholder. In (17), it is in MRK’s cophonology that the importance of *H becomes apparent. Loss of H tone in MRK contexts here is captured by a re-ranking of *H, promoting it at least over Align-Right (H, PWd).

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(17) /(dánab$_{\omega}$), MRK/ → [((danab$_{\omega}$)$_{\varphi}$)] ‘thunder.MRK’

/(dánab$_{\omega}$), MRK/	Non-Finality-μ	*H	Align-Right (H, PWd)	Faith
a. ((danáb$_{\omega}$)$_{\varphi}$)	*!	*		*
b. ((dánab$_{\omega}$)$_{\varphi}$)		*!	*	
☞ c. ((danab$_{\omega}$)$_{\varphi}$)				*

Though they differ structurally in some respects from the nouns discussed here, the same MRK cophonology re-ranking of *H makes correct predictions for the behavior of the vast majority of other nouns in the language. The behavior of certain exceptional nouns in which H is retained in the MRK context is discussed in Section 4.

3.2 “Final H” nouns

A second major pattern is observed for nouns like those in (18); H surfaces on the final vocalic mora in the UMRK context but is lost in the MRK context. The difference between these nouns and those discussed in Section 3.1 is that the presence of MRK also entails an additional segmental exponent *-i*, or *-yi*, if the stem ends in the same vowel.

(18) ‘‘Final H’’ nouns

a.	qoór	‘neck.UMRK’	qoori	‘neck.MRK’
b.	mindí	‘knife.UMRK’	mindiyi	‘knife.MRK’
c.	galáb	‘afternoon.UMRK’	galabi	‘afternoon.MRK’
d.	Soomaalí	‘Somalis.UMRK’	Soomaaliyi	‘Somalis.MRK’
e.	káb	‘shoe.UMRK’	kabi	‘shoe.MRK’

The correlation between UMRK penultimate H and a toneless, unaffixed MRK in (13) and between UMRK final H and a toneless, affixed MRK in (18) is one argument often offered for the presence of a catalectic vowel slot associated with a mora at the right edge of some Somali stems (e.g., Godon 1998; Lampitelli 2011, 2013; Le Gac 1997). This has been called the ‘‘feminine exponent’’ due to its association with stems requiring t-series ‘‘feminine’’ grammatical gender agreement. ‘‘Masculine’’ grammatical gender instead requires k-series agreement. Compare the initial consonant of the definite determiners modifying ‘‘feminine’’ *galáb* ‘afternoon.UMRK,’ *galáb=ta* ‘the afternoon.UMRK’ (cf. 18c) vs. ‘‘masculine’’ *nácas* ‘fool.UMRK,’ *nácas=ka* ‘the fool.UMRK’ (cf. 13c). As illustrated in the remainder of this section, and elsewhere in this paper, we follow the aforementioned scholars in assuming the presence of this catalectic slot. We do so based on several correlating factors that convincingly substantiate its role in the language’s morphophonology.

From a tonal perspective, the presence of a catalectic slot also has the benefit of unifying patterns of tone assignment in stems. That is, if nouns in (13) have no catalectic slot (/nacas/ → [nácas] ‘fool.UMRK’), and those in (18) do (/galabV/ → [galáb] ‘afternoon.UMRK’), the generalization is that H tone is predictably and consistently assigned to the penultimate mora of all stems. Monosyllabic nouns like (13e) and (18e) are exceptional given that H tone is assigned to their only vocalic mora. For our analysis of MRK, there is yet another correlation to be made: nouns patterning with the former group (lacking a catalectic slot) have no segmental realization of MRK, while those patterning with the latter group (with a catalectic slot) emerge with *-i*.

Still further support for a catalectic slot is found in the ability for certain stem-final consonants (specifically: b, d, m, n, l, and r) to geminate in the formation of *-o* plurals, whose tonal properties are discussed in Section 3.3. Nouns patterning like those in (13) permit stem-final gemination, while nouns patterning like those in (18) fail to do so. For example, *sánnad* ‘year.UMRK’ patterns with nouns in (13); its penultimate H in the UMRK context is lost in the presence of MRK: *sannad* ‘year.MRK.’ When pluralized by *-o*

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(considered by most to be underlyingly /-Co/), it is *sannaddó* 'years.UMRK,' where the stem final consonant geminates. *Irbád* 'needle.UMRK' patterns instead like nouns in (18). It has a final H in the UMRK context. It is realized *irbadi* 'needle.MRK' when MRK is present, where H is lost and *-i* appears. When pluralized by *-o*, it is *irbadó* 'needles.UMRK,' where the same stem final consonant fails to geminate. The generalization, therefore, is that, when a catalectic slot is present in the latter group, /irbadV + Co/, stem final gemination is blocked. However, when such a slot is absent in the former group, /sannad + Co/, gemination by spreading of the stem final consonant is licensed. Display (19) summarizes correlations found between these basic patterns and corresponding proposed underlying representations.[7]

(19) Penultimate H and "Final H" correlation summary

	UMRK	Definite	Plural	MRK	UR	
a.	*sánnad*	*sánnadka*	*sannaddó*	*sannad*	/sannad/	'year'
b.	*irbád*	*irbádda*	*irbadó*	*irbadi*	/irbadV/	'needle'

With these arguments for catalexis in mind, we refer to nouns in (18) as "final H" nouns, as they surface with H tone on their final overt vocalic mora, though phonologically speaking, we follow others in considering this the penultimate vocalic mora of their stem.

The UMRK tonal behavior of "final H" nouns can be captured by precisely the same constraints and ranking proposed for penultimate H nouns above. We assume that a high-ranking constraint militating against the insertion of vocalic features precludes the appearance of a stem-final vowel, though we do not include such a constraint here. Here and elsewhere, we employ V to indicate an empty vocalic mora. Our assumption that such empty prosodic slots surface at the word level echoes Hammond (1995) and Kager (1995), among others.

(20) /galabV, H/ → [(galáb$_{\omega}$)] 'afternoon.UMRK'

/galabV, H/	Parse-Tone	Non-Finality-μ	Align-Right (H, PWd)	*H
a. (galabV$_{\omega}$)	*!			
b. (gálabV$_{\omega}$)			**!	*
☞ c. (galábV$_{\omega}$)			*	*

The behavior of these nouns in the presence of MRK can be captured once again by the promotion of *H above Align-Right (H, PWd), as in (21). The only difference is that, given the presence of the catalectic slot, MRK is exponed segmentally via *-i*. As seen thus far, whether or not MRK is exponed segmentally in this way has no bearing on its ability to affect H tone.

(21) /(galábV$_{\omega}$), MRK/ → [((galabi$_{\omega}$)$_{\varphi}$)] 'afternoon.MRK'

/(galábV$_{\omega}$), MRK/	Non-Finality-μ	*H	Align-Right (H, PWd)	Faith
a. ((gálabi$_{\omega}$)$_{\varphi}$)		*!	**	
b. ((galábi$_{\omega}$)$_{\varphi}$)		*!	*	
☞ c. ((galabi$_{\omega}$)$_{\varphi}$)				*

[7] Metrical motivation for catalexis is implicit in the literature (e.g., Hammond 1995; Kager 1995; Kiparsky 1991) such that these segmentally empty prosodic constituents function to avoid degenerate feet, particularly in languages exhibiting trochaicity. Whether this applies in the case of Somali is not yet clear. Metrification in Somali is seldom discussed outside the literature on poetic metrics (for an overview, see Orwin 2001), though Green (2021, 80-84) suggests that it may help to explain certain patterns of vowel alternation triggered by suffixation. One diagnostic suggested for the presence of catalexis is the presence of sub-minimal words; this would apply to Somali (Orwin 1996). It is notable that Ulfsbjorninn (2017) also appeals to catalexis to account for analogous phenomena in Afar, a Cushitic language closely related to Somali.

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We capture this behavior and the independence of these exponents via the MRK VI's $\mathscr{F}$-content, which we propose is a floating feature – [+high] – that associates to a vocalic mora, if one is available. Otherwise, if one is not unavailable, MRK cannot be expressed segmentally. If MRK were instead a full-fledged vowel bearing its own mora, one would expect for it to be expressed segmentally in all instances. We discuss further our motivations for a featural approach to MRK's segmental content in Section 5.

The ability to separate $\mathscr{R}$-content (constraint ranking) and $\mathscr{F}$-content (featural content) in the CBP framework allows us to capture the independence of MRK's tonal and segmental exponents and to explain why H tone loss need not entail segmental exponence, though the two may co-occur under certain conditions. The difference relative to other instances of subtractive tone reported in the literature may simply be that a VI associated with subtraction elsewhere has more robust $\mathscr{F}$-content whose expression does not rely on the presence of a open slot for association. As such, segmental addition in these more robust cases would be observed in all instances, rather than being dependent on other structural factors, as it is in Somali. The result, therefore, is an apparent but not necessary dependency between morphological addition and tonal subtraction.

3.3 Nominal derivatives and plurals

The same correlations between tone location in UMRK contexts and MRK's patterns of exponence extend to many nouns formed by suffixation. This is illustrated in (22), where stems are given first, followed by a noun formed by suffixation in the UMRK context and in the presence of MRK.

(22) Nominal derivative exemplars

a.	*dír*	'send'	*diráal*	'emissary.UMRK'
			diraal	'emissary.MRK'
b.	*hél*	'find'	*helitáan*	'discovery.UMRK'
			helitaan	'discovery.MRK'
c.	*jámac*	'group.UMRK'	*jamciyád*	'union.UMRK'
			jamciyadi	'union.MRK'
d.	*mashrúuc*	'project.UMRK'	*mashaariíc*	'projects.UMRK'
			maschaariici	'projects.MRK'

As in simple stems, UMRK penultimate H nouns have MRK counterparts that lack H tone. Likewise, UMRK ''final H'' nouns both lose their H tone and gain *-i* in MRK contexts. These patterns correlate with grammatical gender in a way that is identical to that seen in simple stems. The substantive difference between complex nouns like these and the stems discussed thus far is that H tone in UMRK contexts is located on the suffix, rather than on the stem itself. Also, and though they are not shown here in the interest of space, compounds exhibit the same behavior.[8] Green & Morrison (2016) argue that these outcomes arise due to a combination of H tone culminativity and morphological dominance such that a single H tone appears on the rightmost element of a larger word formed by affixation or compounding.

The basic tonal behavior of nouns discussed here, in both UMRK and MRK contexts, emerges from the same master ranking of constraints motivated above. This is not surprising given their tonal similarity to nouns discussed above. The main difference between them is structural; these suffixes subcategorize for parsing within a prosodic word with the stem that they modify. Other affixal elements in the Somali, and notably inflectional suffixes and clitics, exhibit markedly distinct tonal and segmental characteristics, suggesting that they have different subcategorization requirements; see Green & Morrison (2018) for more discussion of their properties. The denominalizer VI for suffix *-iyad* is shown in (23).

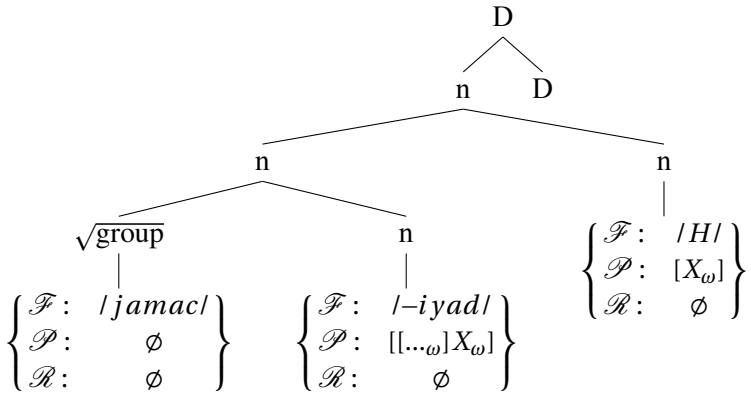
[8] Given the parallels between their segmental and tonal behavior and that of ''final H'' nouns, we assume that some derivational suffixes also contain a catalectic slot. Their presence, once again, may ultimately be metrically motivated.

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(23) [n:denom]: $\longleftrightarrow \left\{ \begin{array}{ll} \mathscr{F}: & /-iyad/ \\ \mathscr{P}: & [[\ldots_{\omega}]\ X_{\omega}] \\ \mathscr{R}: & \emptyset \end{array} \right\}$

In (24), we illustrate the structure of *jamaciyád* 'union.UMRK.' This noun is built upon the root *jámac* 'group.UMRK' to which suffix *-iyad* attaches; in turn, UMRK is adjoined to *n*.

(24) Structure of *jamaciyád* 'union.UMRK'



When it comes to MRK contexts, the MRK cophonology acts on the output of an earlier phase in which these words, though more complex, have been spelled out with their H tone. In the interest of space, we do not illustrate the evaluation of these nouns in tableaux, as it closely parallels that seen for stems in Sections 3.1 and 3.2.

The behavior of other suffixed nouns – for example, *-o* plurals, *-e* agentive/instrumental nouns, and several others, like those formed by *-nimo*, which derives abstract nouns – is slightly, but substantively different. As shown in (25), these nouns have in common that their suffix ends in a vowel. In UMRK contexts, H tone appears on this vowel, despite it being word final. In MRK contexts, H tone is lost, though once again without the addition of any other exponent.

(25) Suffixed nouns with final H

a.	sannaddó	'years.UMRK'	sannaddo	'years.MRK'
b.	irbadó	'needles.UMRK'	irbado	'needles.MRK'
c.	baaré	'teacher.UMRK'	baare	'teacher.MRK'
d.	hoggaamiyé	'leader.UMRK'	hoggaamiye	'leader.MRK'
e.	jaalnimó	'friendship.UMRK'	jaalnimo	'friendship.MRK'

Accounting for the basic UMRK tonal behavior of these nouns cannot be captured by a constraint ranking of Non-Finality >> Align-Right (H, PWd) given that H tone is found word-finally. As such, we propose that the difference in their behavior rests in the $\mathscr{R}$-content of these suffixal VIs. They entail a re-ranking of these two constraints such that Align-Right (H, PWd) is ranked above Non-Finality, as seen for the *-o* plural VI (26).

(26) [n:pl]: $\longleftrightarrow \left\{ \begin{array}{ll} \mathscr{F}: & /-o/ \\ \mathscr{P}: & [[\ldots_{\omega}]\ X_{\omega}] \\ \mathscr{R}: & \text{Align-Right}(H, PWd) >> \text{Non-Finality-}\mu \end{array} \right\}$

Consider, for example, the noun *náas* 'breast.UMRK' which, when singular, surfaces with penultimate H, like other k-series nouns. When pluralized, H appears on the plural suffix: *naasó* 'breasts.UMRK.' Though

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structurally similar to the suffixed nouns in (22), which surface with penultimate H in accordance with the master ranking, a final H is instead attested here. This outcome is formalized in (27) with the $\mathscr{R}$-content re-ranking proposed above.

(27) /naas, o, H/ → [((naas$_\omega$)ó$_\omega$)] 'breasts.UMRK'

/naas, o, H/	Parse-Tone	Align-Right (H, PWd)	Non-Finality-μ	*H
a. ((naas$_\omega$)o$_\omega$)	*!			
b. ((náas$_\omega$)o$_\omega$)		*!*		*
c. ((naás$_\omega$)o$_\omega$)		*!		*
☞ d. ((naas$_\omega$)ó$_\omega$)			*	*

As already proposed for the MRK VI, a re-ranking of *H >> Align-Right (H, PWd) once again correctly captures the loss of H tone in nouns like those in (25); this is shown in (28). This re-ranking yields attested outcomes despite the re-ranking of Non-Finality-μ and Align-Right (H, PWd) required for vowel-final suffix VIs in (26). This is, in fact, predicted by the architecture of the CBP. MRK is merged in an outer phase with respect to these nominal suffixes, and, thus, its cophonology takes previously spelled-out material as its input and is therefore not concerned with the ''previous'' re-ranking.

(28) /((naas$_\omega$)ó$_\omega$), MRK/ → [(((naas$_\omega$)o$_\omega$)$_\varphi$)] 'breasts.MRK'

/((naas)ó$_\omega$), MRK/	*H	Align-Right (H, PWd)	Non-Finality-μ	Faith
a. (((naas$_\omega$)ó$_\omega$)$_\varphi$)	*!		*	
b. (((naás$_\omega$)o$_\omega$)$_\varphi$)	*!	*		*
c. (((náas$_\omega$)o$_\omega$)$_\varphi$)	*!	**		*
☞ d. (((naas$_\omega$)o$_\omega$)$_\varphi$)				*

Thus far, with the noted exception of vowel-final suffixes, the tonal behavior of Somali nouns is highly consistent in both UMRK and MRK contexts. In the former, H surfaces on the penultimate or final vocalic mora, while in the latter, H tone is lost. Some nouns entail the addition of a segmental exponent of MRK, but the conditions governing its appearance are orthogonal to the VI's tonal exponence. With these basic patterns defined and formalized, the next section turns to two classes of nouns whose tonal behavior is exceptional relative to other nouns in the language. Of primary concern is that the nouns retain their H tone in the presence of MRK.

4 Exceptional nouns: H is retained when MRK is present

The nouns discussed in Section 3 exhibit similar tonology, whether they are morphologically simplex or formed by suffixation. Only those nouns formed by vowel-final suffixes differ, albeit slightly, in that they surface with a final H tone. This section covers two additional groups of nouns whose behavior differs more substantively from others. While in some ways, these nouns appear structurally similar to *-o* plurals and *-e* agentives/instrumentals, it will be shown that they behave unlike them both morphologically and tonologically.

We begin with a direct comparison between these two groups of nouns in (29) where *-o* plural and *-e* agentives/instrumental exemplars are shown in (29a, b). Their exceptional counterparts are shown in (29c, d); for lack of a better designation, we refer to these as *dáwo*-type and *beége*-type nouns. In the former, as discussed in Section 3.3, nouns surface with H tone on their suffix in UMRK contexts. In the latter, which are formed by what appear to be the same suffixes, nouns instead surface with H tone on the stem in UMRK contexts.

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(29) Final H vs. Stem H comparison

a.	*naagó*	'women.UMRK'	*naagáha*	'the women.UMRK'
b.	*baaré*	'investigator.UMRK'	*baaráha*	'the investigator.UMRK'
c.	*dáwo*	'medicine.UMRK'	*dawáda*	'the medicine.UMRK'
d.	*beége*	'gauge.UMRK'	*beegáha*	'the gauge.UMRK'

Dáwo-type and *beége*-type nouns have other distinguishing properties. For example, (29) shows that when modified, such as by a definite determiner, H tone surfaces on what would appear to be the suffix preceding the definite determiner. Thus, in these and similar instances (i.e., before a modifier), *dáwo*-type and *beége*-type nouns are tonally identical to their *-o* plural and *-e* agentive counterparts.[9] More important here, however, is that *dáwo*-type and *beége*-type nouns retain their H tone when MRK is present, as in (30). Thus, both the UMRK and MRK forms of these nouns are tonally identical. Again, recall for the sake of comparison that *-o* plurals and *-e* agentives behave differently in that lose their tone in MRK contexts.

(30) UMRK vs. MRK comparison

a.	*dáwo*	'medicine.UMRK'	*dáwo*	'medicine.MRK'
b.	*beége*	'gauge.UMRK'	*beége*	'gauge.MRK'

In attempting to explain such outcomes, both Saeed (1999, 57) and Green (2021, 125) suggest that the exceptional behavior of these nouns may be due to relexicalization, with their erstwhile suffixes having become reinterpreted synchronically as part of the stem. Such a proposition finds support in the following facts. First, typical nouns with a H tone *-o* suffix are created productively; they are interpreted as plural and have an unsuffixed singular counterpart. *Dáwo*-type nouns differ in that many refer to masses or other uncountable or conceptually collective items, and they have no unsuffixed counterpart. Analogously, typical nouns with a H tone *-e* suffix are agentive or instrumental nouns formed productively from a verbal base. *Beége*-type nouns are more diverse in their origins, and though some have unsuffixed counterparts, the connection between them is non-transparent or non-compositional. For example, compare *beége* 'gauge' and *béeg* 'unit of measurement for grain,' and *guddoómi* 'to chair a committee' and *guddoomíye* 'executive.'[10]

If these suffixes have indeed been reanalyzed as part of the stem, it would help to explain their tonal behavior. That is, one could view their basic (unmodified) tonal pattern as reflecting an overarching preference in Somali for penultimate H tone, which we have seen above. The fact that H tone shifts rightward when the nouns are modified, however, might suggest that, despite relexification, the nouns are still treated by speakers as structurally bimorphemic, just as *-o* plurals and *-e* agentives are. If this were not the case, and these nouns behaved like other monomorphemic nouns, we would expect them to retain their H on the noun stem when modified, such as by a definite determiner. Definite determiners do not otherwise affect stem tone, as seen by comparing a typical noun like *sánnad* 'year.UMRK' to its form when modified by a definite determiner, *sánnadka* 'the year.UMRK'; H tone remains on the same tone bearing unit in both instances. As seen in (29), *dáwo-* and *beége*-type nouns are affected tonally by the presence of a definite determiner.

Of course, one must also address how and why *dáwo-* and *beége*-type nouns retain their H tone in the presence of MRK. This, we argue, also stems from their ''hybrid'' structure. That is, though they structurally resemble other suffixed nouns, they behave tonally in some ways like other unsuffixed singular nouns.

Assuming that the facts just discussed justify the proposition of relexification, the tonal behavior of *dáwo-* and *beége*-type nouns in UMRK contexts can be modeled in an uncomplicated way. As discussed

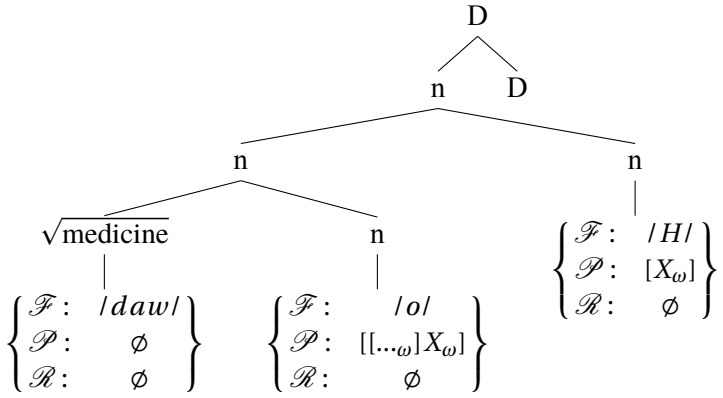
[9] In both types, suffixal vowels typically alternate to *-a* when not in word final position, though other alternations are possible; see Gabbard (2010). These alternations do not directly bear on their tonological behavior.

[10] There are borrowed nouns like *baáko* 'package' (from Italian *pacco* [pak:o]) that pattern similarly, perhaps on analogy.

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above, structurally, they closely resemble *-o* plurals and *-e* agentives, though tonally, they behave like unsuffixed stems. This suggests that *dáwo*- and *beége*-type nouns are likely products of the master ranking; they exhibit penultimate H tone, rather than a re-ranking that favors final H tone, like their productively-formed counterparts. This is shown for *dáwo* in (31), but the same configuration holds for *beége*-type nouns.

(31) Structure of *dáwo* 'medicine.UMRK'



As products of the master ranking, the evaluation of these nouns in the UMRK context, as in (32), closely resembles that in (15) for basic stems. Though these nouns bear structural similarity to (27), their $\mathscr{R}$-content yields markedly different outcomes.

(32) /daw, o, H/ → [((dáwω)oω)] 'medicine.UMRK'

/daw, o, H/	Parse-Tone	Non-Finality-μ	Align-Right (H, PWd)	*H
a. ((dawω)oω)	*!			*
b. ((dawω)óω)		*!		*
☞ c. ((dáwω)oω)			*	*

When considering the behavior of *dáwo*- and *beége*-type nouns in the presence of MRK, one encounters a challenge. In all other nouns discussed thus far, MRK entails a wholesale loss of H tone, but here, H is retained. As Tableau (33) illustrates, a re-ranking of *H above Align-Right (H, PWd), as proposed for the MRK VI's $\mathscr{R}$-content, and which has successfully produced all other attested forms, incorrectly predicts H loss for these nouns. Candidate (33b) exhibits the attested tonal configuration for this noun, while the ranking, as is, predicts an unattested form (33c).

(33) /((dáwω)oω), MRK/ → [(((dáwω)oω)φ)] 'medicine.MRK'

/((dáwω)oω), MRK/	Non-Finality-μ	*H	Align-Right (H, PWd)	Faith
a. ((dawω)óω)φ)	*!	*		*
☹ b. ((dáwω)oω)φ)		*!	*	
☞ c. ((dawω)oω)φ)				*

This result brings to the fore that MRK does not simply act to remove all H tones from a given word, but rather, its effects are more subtle. MRK appears to be able to remove only certain H tones, while others are somehow immune to its effects. This is reminiscent of what Rolle (2018, 113) calls *indomitability* effects whereby an otherwise regular grammatical tone operation fails to occur where expected. The questions, therefore, are: what factor renders H tone in *dáwo*- and *beége*-type nouns immune to MRK's effect, and how can this be modeled in a principled way?

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To address these questions, one might be tempted to suggest that MRK's inability to remove H in *dáwo*- and *beége*-type nouns relates to the fact that H is not precisely at their right edge. However, this has not otherwise impeded MRK's ability to do so in words like *dánab* 'thunder.UMRK' which surface toneless *danab* 'thunder.MRK' in the presence of MRK. The same comparison precludes a valuation window calculated simply by counting moras or syllables. Given that H remains in *dáwo*- and *beége*-type nouns, a word-sized valuation window is similarly problematic. Furthermore, given the apparent bimorphemic nature of these exceptional nouns, e.g., $((\text{daw}_{\omega})\text{o}_{\omega})$, if MRK's role were to simply prevent H tone from being expressed in the domain within which it is parsed (here, the larger PWd containing both stem and suffix), one would expect an entirely toneless outcome. However, this does not occur, as H survives on the stem itself. Such an outcome is problematic for stratal approaches to phonology, including Cophonology Theory, which are predicated on dominance effects. This is because, at the word level, there is no way to target the suffix's domain to the exception of the stem's. The generalization is clear, nonetheless: MRK's ability to remove H tone is limited to some span immediately preceding it, within which it is parsed.

One way to address their behavior is to posit that *dáwo*- and *beége*-type nouns, having been relexicalized nouns, are simply exceptional. However, this seems unsatisfactory given how neatly these nouns align with other aspects of Somali's morphophonology. One could perhaps refer to morphology, as MRK's ability to remove H tone, in all instances, encompasses only the morpheme at the right edge, within which it is parsed; as we have seen, this may exclude the stem domain. Reference to morphological, as opposed to prosodic domains, though, is problematic given the Indirect Reference Hypothesis (see, e.g., Inkelas & Zec 1990; Bonet, Cheng, Downing & Mascarò 2019) whereby phonology is said to have access only to prosodic domains.

We can see two further analytical possibilities predicated instead on prosodic structure. The first of these is to assume that Somali's tone-attracting suffixes project their own PWd, analogous to what occurs in compounding. Such an analysis is implicit in other work on Somali, including both Green & Morrison (2016) and Le Gac (2018). This might seem a promising possibility given that most suffixes are disyllabic, or bimoraic, and this is said to be the language's minimal word size (Green 2021, 86). This approach fails, however, to account for why these suffixes are never prosodically independent. Even more challenging to justify would be the structure of smaller suffixes, though there could perhaps be an analogical effect. Under such an analysis, should it be viable, MRK's valuation window could easily be stated as the rightmost minimal PWd in a phrase. This would render the H tone of *dáwo*- and *beége*-type nouns outside of the valuation window.

A less speculative possibility, which we adopt here, is to invoke the foot as a domain of application. Invocation of the foot permits reference to a domain of application that is smaller than a PWd, though it may be co-extensive with it. A foot can be the size of a syllable, but also larger than one. Notably, the foot as a domain does not bear the burden of prosodic independence and, as a constituent of the prosodic hierarchy, it is hypothesized to be a possible valuation window for grammatical tone (Rolle 2018, 90). Of course, full exploration into the foot as a metrical domain is beyond the scope of this paper, though one could point to a rich literature on Somali poetic metrics where reference to the foot is clear (Banti & Giannattasio 1996; Johnson 1979; Orwin 2001; Orwin & Riiraash 1997, among others).

Via this approach, whereas in Somali's core word-level phonology, H tone is dispreferred on a final mora (via Non-Finality-μ), MRK's behavior could be defined by a constraint demanding that H tone be absent from the right edge of a phrase, in a window co-extensive with a foot. Thus, while a markedness constraint like *H is too powerful to capture MRK's effects, replacing *H in our ranking, with another like Non-Finality-φ can capture MRK's subtlety. This constraint would prevent H tone from appearing rightmost in a phrase, in the valuation window stated just above. Replacing *H with this constraint, with it accordingly being ranked below Align-Right (H, PWd) and Non-Finality-μ in UMRK contexts, makes no incorrect predictions. Importantly, replacing *H with this constraint in MRK's cophonology, as shown in the revised VI for MRK in (34), overcomes the unattested deletion of H in (33).

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(34) $[MRK]: \longleftrightarrow \left\{ \begin{array}{ll} \mathscr{F}: & [+high] \\ \mathscr{P}: & [[X_\omega]_\phi] \\ \mathscr{R}: & \text{Non-Finality} - \phi >> \text{Align-Right}(H, PWd) \end{array} \right\}$

In (35), the ranking Non-Finality-μ >> Non-Finality-φ >> Align-Right (H, PWd) correctly predicts the tonal behavior of *dáwo*- and *beége*-type nouns in MRK contexts. Because H is not located at the right edge in the input to MRK's phonology, it survives, being affected neither by Non-Finality-μ nor by Non-Finality-φ. Such outcomes also finally provide evidence for a critical ranking of Faith >> Align-Right (H, PWd); their bearing on one another has not been clear until this point, and they have been accordingly unranked thus far.

(35) /((dáw$_\omega$)o$_\omega$), MRK/ → [(((dáw$_\omega$)o$_\omega$)$_\varphi$)] 'medicine.MRK'

/((dáw$_\omega$)o$_\omega$), MRK/	Non-Finality-μ	Non-Finality-φ	Faith	Align-Right (H, PWd)
a. ((daw$_\omega$)ó$_\omega$)$_\varphi$)	*!	*		
☞ b. ((dáw$_\omega$)o$_\omega$)$_\varphi$)				*
c. ((daw$_\omega$)o$_\omega$)$_\varphi$)			*!	

For comparison, (36) illustrates the evaluation of typical *-o* plurals in the presence of MRK, employing this new constraint. As argued for above, their H-attracting suffix entails its own cophonology which MRK's cophonology later acts upon. Tableau (37) similarly shows a monomorphemic noun in the presence of MRK where the foot-size valuation window is co-extensive with the entire word.

(36) /((naas$_\omega$)ó$_\omega$), MRK/ → [(((naas$_\omega$)o$_\omega$)$_\varphi$)] 'breasts.MRK'

/((naas)ó$_\omega$), MRK/	Non-Finality-φ	Align-Right (H, PWd)	Non-Finality-μ	Faith
a. (((naas$_\omega$)ó$_\omega$)$_\varphi$)	*!		*	
b. (((naás$_\omega$)o$_\omega$)$_\varphi$)		*!		*
c. (((náas$_\omega$)o$_\omega$)$_\varphi$)		*!*		*
☞ d. (((naas$_\omega$)o$_\omega$)$_\varphi$)				*

(37) /(dánab$_\omega$), MRK/ → [((danab$_\omega$)$_\varphi$)] 'thunder.MRK'

/(dánab$_\omega$), MRK/	Non-Finality-μ	Non-Finality-φ	Faith	Align-Right (H, PWd)
a. ((danáb$_\omega$)$_\varphi$)	*!	*	*	
b. ((dánab$_\omega$)$_\varphi$)		*!		*
☞ c. ((danab$_\omega$)$_\varphi$)			*	

As we hope these outcomes reveal, prosodification and the location of input H tone both play an important role in MRK's behavior. MRK must be parsed within a PWd, which is particularly clear in forms involving catalexis. However, its phonological (i.e., subtractive) scope, is over a smaller domain. This domain must at once be smaller than a word but also larger a single syllable, though it may be co-extensive with either in some instances. We submit that the foot is a reasonable and principled choice to formalize MRK's valuation window. As a subject marker, MRK's syntactic scope is much different; it can mark as a subject a much larger domain, which may be a noun of any size, but also a DP, or as we shall see below, a string of DPs.

While several unpublished works cited above suggest that prosodic structure somehow has a bearing on MRK's behavior, the analysis offered here addresses a key challenge that each has faced; we capture in a principled way the subtlety of MRK's behavior, and particularly, why MRK does not remove H tone indiscriminately from the word that it modifies. In the next section, we briefly compare UMRK vs. MRK behavior in contexts with a definite determiner. The outcomes are in support of the analysis we have proposed thus far, though they act upon elements resident in D, as opposed to *n*.

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5 Definite determiners

A final, well-established set of contexts to discuss relative to MRK involve nouns modified by a definite determiner (DEF). In these instances, MRK is realized only segmentally via alternation of the DEF's vowel: cf. *sánnad=ka* 'the year.UMRK' and *sánnad=ku* 'the year.MRK.' Here, H tone is present in both the UMRK and MRK conditions. Given what we have seen thus far in Somali, because H tone survives on the noun stem when modified by DEF, this suggests that it is somehow outside MRK's valuation window. Our goal in this section is to motivate how and why this might be. In doing so, we show that DEF and other determiners exhibit unique segmental and tonal phonology that can be distinguished from that observed stem-internally or between a stem and its derivational suffixes. We argue that these unique outcomes point to DEF being parsed in a phase whose input is the output of the nP phonology; DEFs select nouns that are prosodified and toned. In turn, we show that it is the output of this phase that is thereafter acted upon by MRK. This supports our earlier proposition that mrkP must be structurally higher than both nP and DP. For ease of comparison to what has been discussed above, we begin by discussing phrases in which basic pattern nouns like those in Section 3 are modified by DEF. We then turn to differences that pertain to the exceptional *dáwo*- and *beége*-type nouns discussed in Section 4.

5.1 DEF with basic tonal pattern nouns

The examples above, and also those in (4), show that DEF's tonology is markedly different from other nominal modifiers. DEF does not attract tone, and it represents one of the only a few instances in Somali in which H is present but does not necessarily surface on the penultimate or final vocalic mora of a word. DEFs also exhibit unique segmental phonology relative to other affixes. Somali's DEFs are *-ka* and *-ta* in their basic form, with their initial consonant agreeing in k-series or t-series grammatical gender with the noun that they modify. Each is susceptible to predictable "sandhi effects" (Green & Morrison 2018) that depend on the consonant immediately preceding them: /-ka/ may be realized *-ka, -ga, -ha*, or *-a*, while /-ta/ may be realized *-ta, -da, -dha*, *-sha*. These alternations do not occur in other instances of affixation.

The full array of conditions yielding each of these specific outcomes is not important here, but we hope that one particularly striking illustration will suffice. Consider, for example, the noun *baalál* 'feathers.UMRK.' This noun requires t-series grammatical gender agreement, and when modified by the t-series DEF *-ta*, the outcome is *baalásha* 'the feathers.UMRK.' Here, we find a well-known, albeit unusual alternation: /l+t/ → *sh*, [ʃ]. Compare this to another noun *gácal* 'dear person.UMRK,' which when modified by the abstract suffix *-tooyo*, yields *gacaltooyó* 'kindness.UMRK.' Here, the sequence /l+t/ fails to alternate to *sh*. Such distinctions are robust, are found in both the nominal and verbal system, and have been argued to implicate unique stem-level vs. phrase-level morphophonology (Green & Morrison 2016, 2018).

By extension, this segmental behavior correlates with tonal behavior, as well as with behavior in the presence of MRK. Indeed, it helps to elucidate why the addition of DEF has no effect on H tone. That is, if the input to the phase in which DEF is parsed is both prosodified and toned, and DEF's phonology is governed by the master ranking, at least as far as tone is concerned, one expects tone to emerge unaffected. As seen in Tableau (38), *hílib=ka* 'the meat.UMRK' emerges as optimal provided that a input-output Faithfulness constraint penalizes H loss or movement; we have referenced such a constraint above. Of course, DEF's cophonology also requires a re-ranking of constraints bearing on the language's segmental phonology in order to yield the observed sandhi alternations, but these have no immediately bearing on tone and are not included here for the sake of simplicity.

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(38) /(hílib$_{\omega}$), ka/ → [((hílib$_{\omega}$)ka)] 'the meat.UMRK'

/(hílib$_{\omega}$), ka/	Non-Finality-μ	Faith	Align-Right (H, PWd)
a. ((hilíb$_{\omega}$)ka)	*!	*	
b. ((hilib$_{\omega}$)ká)		*!	
c. ((hilib$_{\omega}$)ka)		*!	
☞ d. ((hílib$_{\omega}$)ka)			*

To account for the behavior of DEF in the presence of MRK, a few additional words of explanation are necessary, mainly because MRK is realized only by a vocalic alternation without the loss of H tone: e.g., *hílib=ku* 'the meat.MRK.' Analogous to our proposition above regarding the necessity of an open slot to realize MRK's segmental exponent *-i*, the same arguably applies here. To motivate this, we posit a featural distribution for Somali vowels in (39), where the language encodes a contrast between [high] and [back], but where the low vowel /a/ is underspecified for height.[11]

(39) Vowel features

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

In the alternation of DEF's /a/ → [u], we propose that MRK's [+high] fills the empty featural slot in the low vowel's matrix, but has no effect on its specification for [back] given that the vowel is already specified for this feature. The result is [+high,+back], and therefore *u*, an outcome in line with the generalization posed above that MRK is realized segmentally only when it finds an open slot that can accommodate it.[12] This is, of course, just one way to capture these outcomes featurally. An editor suggests that perhaps [a], rather that being underspecified for height, is instead specified as [+low] but that this feature may be overcome by [+high] in some instances when the two are in conflict. For our purpose here, the results are equivalent, though the choice may prove to have other implications for the language's vocalic phonology that are beyond the scope of this paper.

From a tonological standpoint, the fact remains that MRK has no tonal affect in these instances. This, too, arises transparently from our earlier claim that MRK subcategorizes for parsing within a PWd, but also its proposed valuation. In this way, MRK could be seen as ''smothering'' (Bennett, Harizanov & Henderson 2018) DEF into a PWd (((hílib$_{\omega}$)ku$_{\omega}$)$_{\varphi}$) in order to achieve its subcategorization. In instances of such prosodic smothering, the behavior of one affix and its relationship to the stem is superceded by the prosodic subcategorization requirements of another outer morpheme; the inner affix is forced or ''smothered'' into a lower domain as a result. In Somali, one could view this as MRK's subcategorization requirements forcing DEF into a PWd, requiring parsing of the morpheme as a foot. MRK's cophonology, as elsewhere, demands only that the rightmost foot in the phrase surface toneless. Because DEF is already toneless, there is no tonal alternation. This outcome follows without complication from the same promotion of Non-Finality-φ seen

[11] Somali also has a contrast often described relative to [ATR] (see Armstrong 1934; Nilsson & Downing 2019; Saeed 1999). To not get too far afield into segmental matters, we concern ourselves here only with matters related to [high] and [back].

[12] One might question why words ending in other vowels do not alternate in the presence of MRK, but this is predicted by the proposed featural distribution. All other vowels are already specified for [high] and are therefore unaffected by MRK's feature filling nature. A reviewer asks about the behavior of stem-final [a], which is difficult for us to comment on given that the language provides no such stems, with two exceptions, both of which are function words. As noted in Banti (1984), the final long vowel in *kastaa* 'each, every' does not alternate in the presence of MRK, but it does lose its H tone. The other exception, is *laba* 'two', which is realized as *labi* when MRK is present. One could argue here that [+high] is still contributed in a feature-filling manner, though why the vowel appears as [i] instead of [u] is unclear.

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elsewhere in MRK contexts. The outcome, overall, bears a strong resemblance to the retention of H tone in lexicalized *dáwo*- and *beége*-type nouns in MRK contexts, as discussed in Section 4.

5.2 DEF with exceptional tonal pattern nouns

As introduced above, a tonal alternation occurs when *dáwo*- and *beége*-type nouns are modified, such as by DEF. In such instances, H tone appears at the right edge of the stem – *dawá=da* 'the medicine.UMRK' – thus, this causes the resulting DPs to appear tonally like other suffixed vowel-final nouns (see Section 3.3). Other instances of modification by DEF do not result in H tone alternation.

We propose that an explanation for both H tone alternation in the former, and lack thereof in the latter, can again be motivated with reference to the foot and can be formalized via a high-ranked alignment constraint – Align-H (Ft, R) – which, encoded in DEF's cophonology, ensures that H tone appears on the final parsed foot in a phrase. There is a notable comparison to be made relative to MRK: MRK requires H to be absent from the rightmost foot, while for DEF, one appears required on it.

In UMRK contexts for simple stems, like in (40), no alternation is entailed. This may be because morphemes like DEF are affixal clitics (Green & Morrison 2016). As such, they are not parsed into a foot unless compelled into a PWd, such as by MRK. With this possibility ruled out, Non-Finality-μ ensures that H remains where it is located in the input. For the sake of simplicity, only foot boundaries are indicated in the following tableaux.

(40)

/(hílib), ka/	Align-H (Ft, R)	Non-Finality-μ	Faith	Align-R (H, PWd)
a. (hilíb)ka		*!	*	
☞ b. (hílib)ka				*

When DEF modifies *dáwo*- and *beége*-type nouns, the situation is different. This lends itself to a structural explanation, however, as words like these comprise two feet in the input, as suggested above. As such, given the requirements of DEF's co-cophonology, Align-H (Ft, R) ensures that H tone shifts rightward onto the final foot. This is shown in (41). Thus, it is only when H is located on a non-final foot in the input that an alternation is observed.

(41)

/(dáw)(o), da/	Align-H (Ft, R)	Non-Finality-μ	Faith	Align-R (H, PWd)
a. (dáw)(a)da	*!			*
☞ b. (daw)(á)da		*	*	

Despite the specificity of this alternation, both outcomes follow naturally from Somali's basic tonology. The H tone alternation seen in *dawáda* 'the medicine.UMRK' mirrors what occurs in other morphologically-complex words. In comparison to other nouns modified by DEF, the only difference here lies in the unique structure of *dáwo*- and *beége*-type nouns. Moreover, the principle that helps to explain rightward H tone shift in *dawáda* 'the medicine.UMRK' is analogous to that leading to the inability of MRK to affect H tone in *dáwo* 'medicine.MRK.' Thus, the key to understanding the tonology of these words rests in their unique prosodification and arguably requires reference to the foot as a domain.

6 Discussion and predictions

The account of MRK's behavior we propose above differs from previous analyses in three ways. First, it poses a formal division between MRK's segmental and tonal exponents, despite treating them as elements of the same VI. This allows for the unification of the exponents of MRK under a unique, but complex under-

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lying form: the VI (34). This is possible via our adoption of CBP. MRK's subtractive effect is driven by the VI's $\mathscr{R}$-content, while its segmental effects are attributable to its $\mathscr{F}$-content. Its phonological scope relates, at least partially, to the VI's $\mathscr{P}$-content. Relatedly, our CBP-based account provides a means by which to motivate MRK's often deleterious tonal effects without the introduction of a Low tone or "negative" feature compelling the loss of High tone. Second, our approach analyzes MRK's behavior as a morphologically-triggered tonal operation, or more specifically, as an instance of subtractive grammatical tone. In the literature on grammatical tone, such subtractive phenomena are typologically rare and oftentimes difficult to substantiate. Lastly, as discussed further in Section 6.3, our approach appears extensible to and makes accurate predictions about MRK's behavior in more complex structures, including for inalienable possessive determiners and for associative (aka genitive) constructions, whose behavior in MRK contexts is often relegated to exception. We expand further on these points in subsections below.

6.1 Morpheme-specific phonology and cyclicity

In Section 2, we underlined the fact that the CBP framework allows for a unified analysis of MRK by positing a single underlying form. The reason for this lies in the framework's theoretical underpinnings: it adheres to both arrangement- and process-based approaches to word formation, as is true in standard Cophonology Theory, cf. Orgun 1996, ch 3. We showed in Section 3 that MRK's VI is a complex item consisting of (not always present) segmental $\mathscr{F}$-content, but also two other pieces of information that encode its subcategorization ($\mathscr{P}$-content) and the specific phonology it imposes on the item it attaches to ($\mathscr{R}$-content). In other words, morpheme-specific phonology is necessary to account for the array of MRK's behavior. As such, the VI in (34) allowed us to account for several distinct tonal outcomes observed in the presence of MRK. For the sake of clarity, Table 1 shows an exemplar of each specific alternation of MRK we presented, as well as the (sub)section in which this alternation is analyzed. We show our analysis in the corresponding columns, one for UMRK, the other for MRK.

Table 1: Recap of the analysis

section	UMRK	analysis	MRK	analysis	
3.1	*dánab*	(dánab$_{\omega}$)	*danab*	((danab$_{\omega}$)$_{\varphi}$)	'thunder'
3.2	*galáb*	(galábV$_{\omega}$)	*galabi*	((galabi$_{\omega}$)$_{\varphi}$)	'afternoon'
3.3	*naasó*	((naas$_{\omega}$)ó$_{\omega}$)	*naaso*	(((naas$_{\omega}$)o$_{\omega}$)$_{\varphi}$)	'breasts'
4	*dáwo*	((dáw$_{\omega}$)o$_{\omega}$)	*dáwo*	(((dáw$_{\omega}$)o$_{\omega}$)$_{\varphi}$)	'medicine'
5	*hílib-ka*	((hílib$_{\omega}$)ka$_{\varphi}$)	*hílib-ku*	(((hílib$_{\omega}$)ku$_{\omega}$)$_{\varphi}$)	'the meat'

The analysis of both *dánab* 'thunder' and *galáb* 'afternoon' follows from the master ranking: in UMRK contexts, the master ranking disfavors final H. Following others, we assume a catalectic V in *galáb*-type of nouns so that H is consistently on the penultimate mora. MRK's cophonology, in turn, erases H in both types of nouns. As discussed, any analysis is challenged by cases like *naasó* 'breasts' and *dáwo* 'medicine' which behave differently in MRK contexts, but also in contexts in which DEF is suffixed.

In order to solve this puzzle, we not only employed morpheme-specific phonology, but we made use of a second, crucial mechanism: cyclicity. Again, this is central in CBP, which inherited it from DM and related work (Embick 2010, among others). As mentioned in Section 2, in DM, cyclicity is enforced through the application of phases, which allow for separate processes to apply within distinct phases. MRK's realizations follow from the fact that mrkP merges with DP and thus does not belong in the same phase as the root and nP (see Section 2 above).

Cyclicity plays a further role in instances in which either DEF, or MRK, or both are selected for in the structure. This can be seen, for instance, in *hílib-ka* 'the meat': here, DEF has no effect on H in the noun

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because it comes in a later phase, headed by D, and its cophonology entails no re-ranking of constraints that would trigger a tonal alternation. Similarly, mrkP takes DP as its complement in MRK configurations. In *dáwo* 'medicine.MRK,' for instance, MRK creates a PPh; in doing so, it prosodifies over an earlier phase (an nP, in the case at hand) in which the output is parsed into a PWd. As discussed earlier (cf. (35) and (36)), H is not deleted in *dáwo* whereas it is so in *naaso* 'breasts.MRK.' These different outcomes arise because the input to MRK's cophonology finds H located in different prosodic constituents. MRK's deleterious effect is neutralized in *dáwo*, but realized in *naaso*. In the latter, MRK's cophonology applies to the output of the plural suffix *-o* co-phonology, as illustrated by VI (26): H is under the scope of MRK and can be erased by it. Overall, our account shows the need for morpheme-specific phonology in combination with cyclicity.

6.2 Subtractive grammatical tone

As discussed above, MRK's morphophonology is subtractive and tonal, though it does additionally entail segmental exponence under some conditions. The absence of segmental exponence does not preclude tonal exponence. Importantly, MRK's tonal effects are witnessed only under particular grammatical conditions, which is indicative of its classification as a *grammatical tone* (GT) operation. According to Rolle (2018, 2), operations falling under this heading are "not part of the general phonological system and are only licensed by specific grammatical conditions." Within Rolle's four-way GT typology, *subtractive* GT is one of two types of *dominant* GT operations, the other being *replacive-dominant*. Subtractive-dominant GT entails a loss of tone on some "target" initiated by a morphologically dominant "trigger," without the target being revalued by some other tone. Replacive-dominant GT operations are similar, but they involve revaluation of the target by another tone or melody. In both types, the process occurs within or is limited in its scope to a given domain, or *valuation window*. As we have illustrated, these defining characteristics are seen in Somali. The MRK morpheme is the trigger and acts upon a target that immediately precedes it, removing its H tone. Its valuation window, as we have argued based on the Somali facts, is the rightmost foot in a phrase-final word. This may be co-extensive with the whole word, but it need not be so.

While subtractive morphological phenomena are rare cross-linguistically, both tonal and otherwise, the Somali outcomes are unique relative to other reported cases of subtractive tone and accordingly merit recognition. This is because H tone loss is arguably the MRK VI's primary exponent, or, at the very least, it cannot be viewed as a secondary exponent relative to MRK's segmental exponent(s). As we have argued, MRK is realized segmentally only when a slot is available to which its [+high] feature can be associated. Such an outcome differs from the best-known cases of subtractive tone, several of which are discussed in Rolle (2018). As Rolle discusses, and as we introduced above, subtractive GT operations present an analytical challenge. In cases of subtractive tone, subtraction occurs alongside the addition of a segmental morpheme. As such, it has been, heretofore, difficult to disentangle the two exponents. Standing viewpoints consider tonal subtraction to be "auxiliary prosodic exponence" (Rolle 2018). However, as raised earlier, the Somali facts suggest that while overt morphological addition may accompany tonal subtraction, it is not a necessary condition on the subtractive operation. An editor rightly points out that the MRK VI still contains featural content, despite it not being expressed in all instances, and questions therefore whether the Somali subtractive tone phenomenon is truly noteworthy. We would answer this affirmatively, as the Somali outcomes provide new insight into the characteristics of these phenomena. At the very least, they provide a clear case of subtraction, devoid of any other *overt* segmental morphological addition. As such, Somali arguably provides a better exemplar of subtractive tone than the best cited cases of Japanese and various Bantu languages, whose outcomes are ambiguous in that they entail morphological addition alongside accentual/tonal subtraction.

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The fact that MRK instantiates a case of GT relates to the discussion we have presented in Section 6.1, namely the application of morpheme-specific phonology. This may *prima facie* be challenging for item-based approaches to morphology, since this GT operation appears to be a process (and not an *exponent*) applying to strings that have already been spelled out. We claim, however, that this is not the case since CBP is indeed a theory arguing for the existence of discrete exponents, the VIs. Therefore, as we have shown, this particular case of GT can be handled simply through adapting the $\mathscr{R}$-content of MRK's VI to the conditions triggering the GT itself.

6.3 MRK in complex structures

Though we have focused on MRK's behavior in nouns of various shapes, sizes, and composition, as well as in simple DPs, the morpheme can be realized on any main clause subject, provided that it is not in focus. We have set aside discussion of more complex structures, thus far, in the interest of establishing the morpheme's baseline properties and behavior. In this section, we discuss how our analysis might be extended to more complex structures, which appears possible to do, with relatively little adjustment in most instances. There are, however, certain complications that must be explained, which we believe are perhaps attributable to morphotactics. In the remainder of this section, we explore three constructs cited in the literature as being divergent when it comes to MRK's behavior: i) possessive determiners, ii) associative constructions, and iii) relative clauses headed by a non-focused subject noun. In the interest of space, it is not our intent to analyze them fully, but rather, we briefly illustrate below how our analysis might be applied to them.

In UMRK contexts, the encoding of inalienable (inherent) possession involves a sequence of noun + possessive determiner. The noun exhibits H tone, and the possessive determiner is realized with H on its final TBU, as in *aabá-hayý* 'my father.UMRK.' An analogous tonal configuration is found in associative (aka genitive) constructions like *nín=ka hilib=ká* 'the man's meat.UMRK.' In this sequence of two DPs, there are two H tones: one appears on the possessor and another on the final TBU of the possessum. This H tone appearing at the right edge in both these constructs is considered by Somalists to be the hallmark characteristic of associative/genitive relationships of different types in the language (Saeed 1999, 64) .

Alienable (non-inherent) possession, on the other hand, is also encoded by noun + possessive determiner, but the possessive determiner is thereafter followed by a definite determiner. This is seen in *qálin-káy=ga* 'my pen.UMRK' where the same possessive determiner from above is followed by DEF. In these constructions, the noun is once again toned, but the second H tone now falls on the penultimate mora of the possessive determiner, rather than at the right edge of the construction as it did above for inalienable possessives (and associative constructions). Thus, ''associative marking'' (i.e., the appearance of a right edge H) does not occur on alienable possessives, such as might be seen in an unattested form like **qálin-kay=gá*. Despite being orthographically represented as one word, we follow Green & Morrison (2016) in our assumption that both phrases containing possessive determiners contain two prosodic words, each bearing its own H tone.

In MRK contexts, nothing unusual obtains for alienable possessives. H tone remains in place on both the noun and possessive determiner, and MRK is realized only segmentally via alternation of the definite determiner's vowel: *qálinkáygu* 'my pen.MRK.' This is identical to what occurs for all phrases containing a definite determiner and MRK; see Section 5. The outcome is similar but not identical for associative constructions. For example, *nínka hilibká* 'the man's meat.UMRK,' is realized *nínka hílibku* 'the man's meat.MRK' when MRK is present. Here, H tone on the possessor is unaffected by MRK, but the H of the possessum is located on the stem alongside an alternation in the definite determiner vowel.

MRK's affect on inalienable possessives is remarkably different. The same phrase from above, *aabá-hayý* 'my father.UMRK' is realized *aaba-háy* 'my father.MRK' in MRK contexts. Compared to the UMRK context, the noun has lost its tone, and a single H appears on the penultimate mora of the possessive. To facilitate comparison between the three constructions, outcomes are summarized in Table 2.

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Table 2: Alienable possessive vs. Associative vs. Inalienable possessive

	UMRK	MRK	gloss
Alienable	*qálin-káy=ga*	*qálin-káy=gu*	'my pen'
Associative	*nín=ka hilib=ká*	*nín=ka hílib=ku*	'the man's meat'
Inalienable	*aabá-haý*	*aaba-háy*	'my father'

Because the behavior of alienable possessives is fairly unremarkable, we will set them aside below. An outstanding question, however, is why alienable possessives do not exhibit associative marking via right edge H tone. Though the matter deserves further attention, a careful look at the language reveals that while various combinations of possessive, definite, and associative morphology are possible in the language's nominal system, forms exhibiting all three elements are unattested.

The two remaining contexts – inalienable possessives and associative constructions – have in common that they exhibit a right edge "Associative H" (ASSOC) in UMRK contexts. While the involved elements must be juxtaposed, the associative relationship between them is encoded on the surface solely by the appearance of a H tone at the right edge of the last element. We can think of no obvious reason to posit the addition of another H tone contributed by ASSOC; rather, we envision this operation acting on H tone present in the input. In some ways, the tonal outcomes involving ASSOC are similar to others in Somali involving suffixal morphemes: H tone "shifts" rightward. With reference to our example of *nín=ka hilib=ká* 'the man's meat.UMRK' above, this outcome can be captured by a high ranking constraint like Align-Right (H, PPh) in the ASSOC cophonology, requiring alignment of H tone to the edge of a phrase. Another possibility, however, might be that the ASSOC VI subcategorizes for a PWd, and its cophonology entails a ranking of Align-Right (H, PWd) >> Non-Finality-μ, similar to what we have seen elsewhere for nouns modified by vowel-final suffixes in Section 3.3. Either option would yield the same result, and we can see no clear means by which to tease them apart.

More intriguing is that ASSOC and MRK appear to be incompatible with one another. Conceivable yet unattested forms like **nín=ka hilib=kú* and **nín=ka hilib=ku* would be at odds with one another, at least tonologically. This may be because, on the one hand, ASSOC requires a right edge H tone, while on the other, MRK militates against the presence of one. The choice made is that ASSOC is realized tonally only in UMRK contexts. In MRK contexts, MRK's effects take precedence, while ASSOC goes tonally unrealized. Thus, in a phrase like *nín=ka hílib=ku* 'the man's meat.MRK,' whose last element is N+DEF, MRK is exponed just as it is on any other DEF; see Section 5.

The most puzzling tonal comparison to be made in Somali concerns nouns followed by an inalienable possessive determiner in UMRK vs. MRK contexts: cf. *aabá-haý* 'my father.UMRK' and *aaba-háy* 'my father.MRK.' While the former outcome is straightforward to explain, the tonal configuration in the MRK context deserves further consideration. As elsewhere for MRK, there may be a structural explanation for this unique tonal outcome.

For comparison, it is important to keep in mind that the rightmost element of alienable possessives is definable; i.e., it can be modified by DEF. This suggests that it is a DP, akin to what is seen in associative constructions. Based on this fact and its tonal behavior, this suggests that an alienable possessive construction comprises two DPs parsed as a nested phonological phrase: e.g., (((qálin$_{\omega}$)$_{\varphi}$)((káy$_{\omega}$)ga$_{\varphi}$)$_{\varphi}$) 'my pen.UMRK.' In MRK contexts, there is no H tone loss, but rather MRK is exponed only by alternation of DEF's vowel. This parallels the behavior of other noun + DEF sequences in Section 5. There is no segmental or tonal effect on the first word.

The elements of an inalienable possessive phrase, by comparison, are both undefinable; neither can be modified by a definite determiner. This fact, and their tonal behavior given just above strongly suggests that these constructions contain two words within a single phonological phrase: e.g., ((aabá$_{\omega}$)(haý$_{\omega}$)$_{\varphi}$) 'my

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father.UMRK.' In MRK contexts, the fact that a single H tone surfaces suggests that only a single word is parsed *aabaháy* 'my father.MRK.' This outcome follows neatly from MRK's subcategorization requirements, namely that it requires parsing within a PWd. Here, MRK would ''smother'' the phrase into a PWd. The master ranking, interwoven with constraints motivated thus far for morphemes parsed within DP and mrkP combine to yield the attested result. This is shown in (42), where the same properties of the MRK VI motivated throughout this paper yield *aabaháy* 'my father.MRK.'

(42)

/[(aábe$_{\omega}$)(háy$_{\omega}$)$_{\varphi}$], MRK/	Culm	Al-H (Ft,R)	Non-Fin-μ	Non-Fin-φ	Faith(T)	Al-R (H, PWd)
a. [((aába)(háy)$_{\omega}$)$_{\varphi}$]	*!			*		***
b. [((aába)(hay)$_{\omega}$)$_{\varphi}$]		*!			*	***
c. [((aaba)(haý)$_{\omega}$)$_{\varphi}$]			*!	*	**	
☞ d. [((aaba)(háy)$_{\omega}$)$_{\varphi}$]				*	*	*
? e. [((aaba)(hay)$_{\omega}$)$_{\varphi}$]					**	

Under the analysis motivated thus far, MRK requires parsing within a PWd. To achieve this, there are several options to be entertained. Maintaining both input H tones would violate an undominated contraint on Culminativity (42a). As discussed in the literature, Somali permits at most one H per PWd (Hyman 1981; Green & Morrison 2016). In Section 5, we proposed that a DP-level constraint Align-H (Ft, R) is ranked above Non-Finality-μ which ensures that H tone appears rightmost in such a phrase; its presence eliminates a candidate where H is retained on the first input word, as opposed to the second (42b). Non-Finality-μ itself, from the master ranking, selects against H tone at the right edge (42c). There are two remaining viable candidates that we can envision, one of which is the attested winner and the other being entirely toneless such that both input H tones are lost. Given what we have seen of Somali thus far, one would expect the attested form (42d) to lose given that it violates Non-Finality-φ, as contributed by MRK's cophonology; see Section 4. Despite this, however, it would appear that the doubly unfaithful candidate (42e) is truly non-optimal. This is perhaps due to an effect of cumulativity; deletion of two input H tones cannot be accommodated. What we believe is apparent here, once again, is the additive nature of the CBP architecture whereby the master ranking is augmented due to constraint re-ranking in different phases, ultimately conspiring to yield sometimes complex outcomes like that seen for inalienable possessives.

This outcome also illustrates that although MRK has an imperative to remove H tone located at the right edge of a phrase, under some conditions, such as when MRK's cophonology is presented with an input with more than one H tone, it cannot achieve this goal. When such conditions obtain, H appears on the penultimate mora of the possessive determiner, ultimately reflecting the position for H tone favored by the language in general.

Lastly, recall from our initial discussion that MRK can be realized on any element that is phrase- or clause-final, under appropriate conditions. Our analysis nicely predicts these outcomes. As illustrated by examples (43), (44), and (45), in such instances, MRK's phonological effects are witnessed only on a phrase-or clause-final PWd and no further. This reinforces the fact that its phonological scope is identical to that predicted by its proposed $\mathscr{P}$-content, despite its syntactic or semantic scope being much broader (i.e., the entire phrase or clause is effectively ''subject-marked''). For example, in a phrase like *nín iyo naagi* 'man and woman.MRK' (cf. (43)), the noun *nín* exhibits H tone, illustrating that it is not phonologically affected by MRK. It is only the final PWd of the phrase *naagi* that surfaces without H and with *-i*; this is a "final H" t-series noun, so this is what one expects. In such a phrase, we have two conjoined DPs, each projecting a PPh. MRK affects only the rightmost PPh. Though only the last DP is affected phonologically by MRK, the entire phrase would be interpreted as the ''subject'' of some verb.

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This is in support of MRK being resident in a high projection, not only above DP, but perhaps even above IP, as proposed by Lecarme (1999), among others.

(43) (Banti 1984: 27)
Béri báa [nín iyo naag]-i abeesó ark-een
day.UMRK FOC man.UMRK and woman-MRK snake.UMRK see-3PL.PST
'ONE DAY, a man and a woman saw a snake.'

(44) (Cilmiga Bulshada 2, Muqdisho 2018: 15)
[Qóf kastá oo nagá míd ah]-i wáxa uu leeyahay
person.UMRK each.ASSOC REL of.us one.UMRK be-MRK FOC 3SG.M have.3SG.M.PRS
kaalín
task.UMRK
'Each one of us has A TASK TO DO.'

(45) (Andrzejewski 1964: 139)
[Nín-k-a hálkaa fadhdhi-y-aa] waa wadáad-k-ii hálayto nóo
man-DEF-ABS here sit-3SG.M-PRS.MRK DECL mullah-DEF-ABS last.night to.us
y-ími
3SG.M-come.PST
'THE MAN WHO IS SITTING THERE is the mullah who came to us last night'

Mismatches like these abound but are accommodated by the analysis that we have proposed. For example, in structures like (44), a complex noun phrase (offset by square brackets) is subject-marked, but only at its right edge, where MRK tonally and segmentally affects the final PWd, this time being a relative clause verb.

The fact that MRK can realize its effects, both segmentally and tonally, even on verbs in circumstances like these, leads to another possible extension of our analysis, namely the predictions that it makes concerning the composition of VIs and the status of H tone in Somali's verbal system. As pointed out by Green & Morrison (2018), several structural parallels exist between Somali nouns and verbs, such as the ability of the vast majority of derivational suffixes to attract H tone while subsequently witnessing loss of H on a stem, but also the presence of just a few suffixes that fail to do so.

One essentially unexplored matter is that there may be a direct counterpart to MRK in the verbal system. That is, while several verb contexts entail the presence of H tone, there are a subset of contexts that surface toneless. These toneless contexts are the present habitual and simple past, and other contexts derived from them. The exceptionality of these toneless contexts is obscured, however, by the fact that they are so commonly encountered relative to toned contexts like the optative, potential, and imperative, as well as all negative verbs, all of which are toned. What may be fruitful to explore in future work is the correlation between H tone loss via MRK ''subject-marking'' in the nominal domain, the absence of H tone in arguably ''known'' or ''given'' indicative contexts in the verbal domain. This behavior is reminiscent in some ways of cross-linguistic research on the prosodic realization of new vs. given information. Overviews on the topic found in works like Baumann (2006), Büring (2011), and Ladd (1996) illustrate a tendency for discourse-new or focused information to be prosodically-marked or accented, often by higher pitch, while given, known, or otherwise topical information is deaccented. Whether and how this applies to Somali must be left to future work, but if it holds, it would be another argument in favor of decoupling outcomes related to UMRK, ASSOC, and perhaps even MRK, from syntactic case.

7 Conclusion

In this paper, we have provided an analysis of Somali MRK that offers a clear and coherent explanation for its behavior, focusing on four well-discussed contexts in which it appears. This account is grounded in prin-

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cipled assumptions concerning Somali's prosodic structure and tonology that are supported by the language's segmental phonology and syntax. The paper proposes a solution to a longstanding debate concerning Somali morphophonology and tone by appealing to a prosodically-conditioned markedness constraint whose ranking in the MRK cophonology effectively militates against the appearance of H tone only within a defined window at the right edge of a phrase, rather than acting on all H tones indiscriminately. In most but not all instances, this leads to H tone loss, but there are some predictable structural conditions under which H is retained. Our analysis, grounded in CBP also provides a means by which to capture the independence of MRK's tonal and segmental exponents, illustrating that the conditions governing their appearance have little to do with one another.

We have argued that the behavior of Somali MRK contributes to our understanding of grammatical tone, and that it provides a more convincing example of a subtractive grammatical tone operation than seen elsewhere in the literature. Somali shows that tonal subtraction can no longer be considered "auxiliary" exponence in all instances. Also, and despite focusing on word- and simple phrase-level constituents, we have shown that our analysis makes accurate predictions about the behavior of MRK in larger phrases and clauses. Furthermore, we hope that our analysis will contribute to a growing body of research aimed at disentangling the morphosyntax of case in Somali. Our analysis illustrates that the morphophonology of operations or alternations traditionally attributed to case marking suggest that the involved morphemes appear not to be manifested in a syntactically-consistent way.

Abbreviations

In addition to abbreviations from the Leipzig Glossing Rules, the following are used in this article for language examples: ASSOC associative; MRK subject-marked; UMRK non-subject-marked. Abbreviations in the body text include ASSOC associative; CBP Cophonologies by Phase; DEF definite determiner; DM Distributed Morphology; DP determiner phrase; GT grammatical tone; H high tone; IP inflection phrase; KP case phrase; mrkP MRK-phrase; MRK subject-marked; PPh phonological phrase; PWd prosodic word; TBU tone bearing unit; UMRK non-subject-marked; VI vocabulary item.

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https://doi.org/10.3765/pda.v4art4.63 Published online by Cambridge University Press