



Two patterns of tone lowering in Somali

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Abstract

The tonal accent (TA) of Somali undergoes many variations that remain understudied and poorly understood. This paper investigates two of the most important of these variations, which both imply the pitch lowering of the TA. The first lowering involves the last TA of a subject NP. Specifically, the high tone of the TA (H*) becomes mid (M) or low (L) and has been analyzed as resulting from the de-accentuation of the word. The other lowering has been described as the general process whereby a H or M tone is realized at the next tone level below (H→M, M→L), just before a pause.

This paper argues that both pitch lowerings result from the interaction between the H* and a L tone associated with a prosodic constituent. In subject case, the L tone is assumed to be a tonal morpheme that is associated with the phonological phrase and delinks the last H* in a subject NP. In a pre-pausal context, the L tone is a boundary tone associated with higher constituents and only has a local lowering effect on the last mora of those constituents.

Index Terms: Somali, tonal accent, accent, morphemic tone, intonation tone

1. Introduction

1.1. The tonal accent of Somali

Since [1]’s seminal paper, Somali generally has been considered as a tonal or pitch accent language like Japanese. The Somali tonal accent (TA) is analyzed by [1] as an invariant high tone (H) assigned to an underlying accent (*). [1] demonstrates that the tone- or accent-bearing unit (TBU) in Somali is the *vocalic mora* (μ). This accounts for the distributional restrictions on the contour tones observed by [1]’s predecessors [2]–[5]. Indeed, falling and rising tones only appear with long vowels, never with short ones. As for the latter, they can only bear level tones. [1] thus argues that the long vowels with falling and rising tones have to be analyzed as sequences of two vocalic μs bearing a H tone on, respectively, the first and second μ; phonetic minimal pairs such as [bê:r] “liver” vs. [bē:r] “garden” are then represented as /béer/ vs. /beér/ (the TA is indicated by an acute accent). In addition to reducing the inventory of contrastive tones to a single unit of prominence (H tone), [1]’s approach captures morphological regularities such as the alternation between masculine vs. feminine or singular vs. plural nouns (N). This way, masc./fem. alternations such as *inan* “boy.m” vs. *inán* “girl.f” and *béer* “garden.m” vs. *beér* “liver.f” result from similar TA assignment rules (masc. Ns → TA on penultimate μ vs. fem. Ns → TA on final μ). As for the unaccented μs, they are assumed to be pronounced with a default contextually dependent mid (M) or low (L) tone.

[1]’s approach constituted a major breakthrough on understanding Somali word-level prosody. It was adopted by

most scholars working on this issue (e.g., [6]–[12]). It should be noted, however, that a debate has recently emerged about the nature of the Somali word prominence (WP). This debate opposes those researchers who claim that Somali is fundamentally accentual (cf. [13], [14], and [1]) and those who point out the essentially tonal nature of Somali word prominence ([15]–[17]). Although the most part of [1]’s approach will serve as a working basis throughout the paper, the data analysis will lead us to reconsider this issue.

1.2. The tonal-accent variations

It is a noteworthy and well-known fact that the Somali TA has a grammatical function. As seen above, it may characterize gender and number; it also plays a major role in marking grammatical cases. Somali is generally described as having four cases: (i) the absolutive (ABS), (ii) the vocative (VOC), (iii) the genitive (GEN), and (iv) the nominative (NOM). ABS is the default case and concerns the words that are not in the other cases. It has no segmental mark and is indicated by a TA on the final or penultimate μ (e.g., *Maxáméd* “Mohamed”). VOC and GEN contrast with ABS by having suffixes and/or changing the TA location; GEN Ns always have a final TA (*Maxáméd*) and VOC Ns an initial one (*Máxamed!*). As for NOM, in addition to segmental suffixes used in some word classes, the prevailing mark that distinguishes it from all other cases is the loss of the TA (*Maxamed*, *inan-i* “girl.f”). Most authors ([1], [7], [11], [12], [14]) classically account for this loss with an accent deletion rule (*→°).

A second type of variation that affects the TA is the *lowering* of the H and M tones in *pre-pausal* position. As described by [2], [4], [5] (see also [1], [9], [10]), a H or M tone is realized lower in a syllable that is immediately followed by a pause within or at the end of the sentence. Thus, if the two NPs *inán* “(a) girl” and *inán-ta* “girl-the” are uttered in isolation, for example, their H tone is not at the same absolute level. The H tone in *inán* is at a mid level because it is before a pause ([inán#]), while the H tone in *inán-ta* is at a high level because it is followed by another syllable ([inántà]). Similarly, the pitch on the initial syllable of the two NPs is at the same mid level because both are followed by another syllable, while the final syllable of *inánta* is realized at a low level because it is before a pause ([inántà#]).

This paper proposes a reanalysis of both NOM and pre-pausal lowering (PPL). In a first section, by examining [4], [5]’s benchmark data and using more recent acoustic data, I show that a mere binary accentual approach cannot account for the prosodic patterns characterizing a particular class of Ns in ABS and NOM. The following section shows that a tonal approach is required and argues that the NOM is marked by a low tone associated with the phonological phrase. In the third section, I claim that the PPL is triggered by intonation tones and not by a pause. The paper concludes by briefly considering the nature of Somali WP.

2. The data

2.1. Andrzejewski's data

To my knowledge, [4], [5], along with [2], provided the most detailed and comprehensive auditory descriptions of Somali WP. Their work formed the basis for most subsequent research in this field. Table 1 gives the tonal and stress patterns of the five accentual units (AU) defined by [4], [5]. The AUs are borne by the syllables, not the μ s, and combine a tone with a stress, which consists of an increase in intensity only (stress has no effect on duration). The phonetic shape of the AUs is modified by the pausal context, as seen in the preceding section. The explanation for the symbols used in the table is as follows: [+pause] notifies the pre-pausal context; “H/M/L” indicate high, mid, and low pitch targets; “HM/L” refer to the falling tones; and “**,*°,°” stand for degrees of stress (** = even strong stress, *° = diminuendo strong stress, * = secondary stress, and ° = absence of stress). For the sake of comparison, the second part of the table provides the reanalysis of [4], [5]’s AUs into [1]’s notation.

Table 1: *Andrzejewski’s AUs with their tone and stress and converted into Hyman’s representation.*

Andrzejewski	AU1	AU2	AU3	AU4	AU5
[-pause]	H**	HM*°	M°	H**	M°
[+pause]	M*	HL*°	L°	HL*°	M*
Hyman[1]	H*	H*L	L	H*L	H*

Table 2: *AUs (in exponent before the syllables) after Andrzejewski for the four noun Ds in NOM, ABS, and PREM*

	NOM	ABS	PREM	Trans.
D1	³ i ³ nan	¹ i ³ nan	¹ i ³ nan	“boy”
D2	³ i ³ na ³ ni	³ i ¹ nan	³ i ¹ nan	“girl”
D3	¹ hoo ³ yo	¹ hoo ^{3/1} yo	³ hoo ¹ yo	“mother”
D4	³ ba ³ hal ^{3/5} lo	³ ba ³ hal ³ lo	³ ba ³ hal ¹ lo	“beasts”

Table 2 gives, after [4], [5], the AUs appearing on the Ns in the four N declensions (I use [7]’s D system) according to the NOM, the ABS, and the “premodifier form” (PREM), a particular instance of the ABS occurring when a N is followed by a modifier (N, Det, Adj, relative clause) within an NP.

As can be seen, D1/2 Ns are realized with the stress and tone patterns mentioned in the introduction: they exhibit unstressed L/M tones (AU3) in NOM, which contrast with stressed H/M tones (AU1/2) in ABS and PREM. D3 Ns constitute a special but important class of Ns in Somali. Indeed, we observe that they always bear a stressed H tone (AU1), which is constantly on the penultimate syllable in NOM but varies in location in ABS/PREM. As for D4 Ns, Table 2 suggests that they actually are characterized by a three-way contrast between (i) a final H/M tone (AU1) in PREM, (ii) a final constant M tone (AU5) in ABS, and (iii) a M or L tone (AU5~3) in NOM.

This three-way H/M/L contrast was not taken into account by [1] and most subsequent authors because only a binary (or privative) contrast H/* vs. L/° was assumed. [18, p. 13] does recognize two kinds of M tones (i.e., those of AU3 and AU5) but decides to simplify the system with two tones only. As for the stress patterns, they broadly correlate with the type of tones except for the M tones, which can bear a stress or not according to the pausal context. In particular, one may wonder

why a pause triggers a stress in AU5 (°→*), while it reduces the stress degree in the AUs 1 (**→*) and 4 (**→*°). Given all these facts, one may therefore wonder what the tone and stress patterns of D4 Ns really are in ABS and NOM and what actually governs stress and tone in Somali. In order to verify [5]’s data and answer these questions, a corpus made up of acoustic and controlled data has been used.

2.2. Acoustic data

The corpus was gathered from a male speaker of Standard Somali (Sp.S) in Paris. Sp.S was born in Central Somalia and was in his early fifties at the time of the recordings. One of the aims of these recordings was to gather speech corpora about the TA patterns and intonation. Target sentences were designed where, among other things, the Ds, the grammatical functions, and the location of the target NPs in the sentences were systematically varied. Sp.S was recorded in several sessions and provided at least five repetitions of each target sentence (see [11, pp. 102–9] for the methodological detail). The general template of the sentences is given in Table 3.

Figure 1 gives the mean F_0 values in semitones (ST) of D2 and D4 Ns in the relevant contexts for the present analysis. The Ns of these Ds are compared because they are both characterized by a final TA. The PREM context consists of N+Det sequences (e.g., *inán-ta* “girl.D2-the,” *nimán-ka* “men.D4-the”). For the ABS, the Ns are inserted within ([+end]) and at the end ([+end]) of the sentence. The Ns in PREM, ABS[+end], and NOM occupy the same position within sentences with a similar syntactic and focal environment (cf. Table 3). The number values refer to the pitch interval between the penultimate and final syllables of the target Ns; the values of the penultimate syllables served as references for calculating the intervals in STs.

Table 3: *General template of the sentences.*

Adv	Target NP[+end]	Foc VP	Target NP[+end]
	ABS~NOM~PREM		ABS

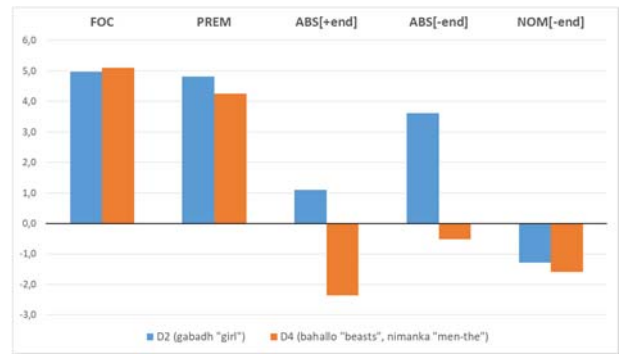


Figure 1: *Mean F_0 values of the interval in STs between the pen. and fin. syllable of D2 and D4 Ns.*

As can be seen in Figure 1, the three-way tone contrast suggested by Table 2 for D4 Ns is confirmed. The pitch intervals in D4 Ns have different values in the PREM, ABS[+end], and NOM contexts. In the PREM context (*nimán-ka*), as expected, there is an increasing pitch from the penultimate syllable up to the final one (+4.3 STs), reflecting a H tone on the last syllable of the N (i.e., *nimán-ka*). In the ABS[+end] and NOM contexts, both intervals are negative, but

the interval realized in the NOM is far more important than that of the ABS[-end].

It can thus be concluded that the D4 Ns in NOM and ABS[-end] are characterized by two different tone patterns: the final tone produced in NOM is clearly a L tone (*bahallô*; -1.6 STs), whereas the pitch contour realized in the ABS[-end] is likely to be dependent on intonational factors. This hypothesis is supported by the fact that the D4 Ns in ABS[+end] are produced with a significant pitch fall (-2.4 STs) at the end of the sentence, which is the location for the terminal intonation pattern. Moreover, [11], [19] showed that D4 Ns display a final H tone as in the PREM context when they are focalized (*bahallô*), regardless of their place in the sentence.

As for the D2 Ns, those in NOM (*inani* “girl.D2”) reach a similar negative value (-1.3 STs) to those of the D4 Ns, corroborating the presence of a low tone (*inani*). In the PREM and ABS[-end] contexts, the positive intervals indicate a real H tone on the last syllable (*inán(-ta)*), corresponding to what is reported in the literature; likewise, the positive small interval (+1.1 STs) realized in the ABS[+end] context is likely to be interpreted as a H tone lowered to the mid level before the final pause of the sentence. In any case, it clearly appears that the pitch properties of the D2 and D4 Ns are different in both ABS contexts. These results lead to the conclusion that the D4 Ns are indeed characterized by a three-way tone contrast, and, more generally, that we need to reconsider the phonological representation of the Ns and NOM.

Before addressing this issue, let us briefly consider the intensity. [11] experimentally shows that it is positively correlated to the F_0 : the higher the F_0 , the more important the intensity. The only exception to this correlation reported by [11] are the boundary H tones (H%), which typically realize with an intensity drop in spite of their high pitch. Apart from a few occasions, where intensity peaks were observed on mid and even low pitched syllables, [11] reports that there is no evidence for stress when the syllables do not bear a H tone.

3. The NOM: The proposal

We saw in the introduction that the NOM was defined on accentual bases by most authors from [1]’s article onward. In particular, the NOM was expressed by the deletion of the underlying * of the ABS. The M or L tones observed in surface then are “byproducts” of the resulting accentless μ . As the data have shown, in both the ABS[-end] and ABS[+end] contexts, the D4 Ns always exhibit a pitch fall, whereas the D2 Ns reveal a pitch rise, even if the latter may be small. These pitch pattern contrasts between D2 and D4 Ns suggest that the latter actually have no underlying * in ABS, contrary to the former and what has generally been claimed in the literature. It should also be noted that [11] reports no evidence for stress in ABS as regards D4 N intensity. As the D4 Ns are unaccented in NOM also, they can only be distinguished by their tone properties in ABS and NOM. I will therefore argue that what characterizes the NOM is not the absence of * but a L tone. In ABS, I propose that the D4 Ns have neither * nor tone (\emptyset°); they acquire their pitch properties from the intonational environment. We finally obtain the underlying prosodic patterns given in Table 4 for the D2 and D4 Ns in the PREM, ABS, and NOM contexts. Following [1]’s analysis, these prosodic units are assigned to the final vocalic μ of the Ns; the preceding ones are assigned neither tone nor accent.

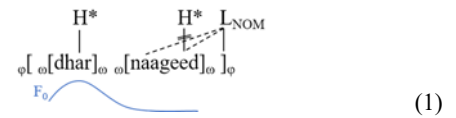
Table 4: Underlying tones and accents in D2/4 Ns

	PREM	ABS	NOM
D2	H*	H*	L $^\circ$
D4	H*	\emptyset°	L $^\circ$

As can be seen in Table 4, the one-to-one correspondence $H \leftrightarrow * / L \leftrightarrow \emptyset$ established by [1] has disappeared. While it is still true that an accented μ implies a H tone, it is no longer true that an accentless one always implies a L tone; an unaccented μ may be toneless or bear a L tone and even a H%; that is, it may have every pitch specification. In fact, the dependence relationship between tone and accent has been reversed. Accordingly, I propose that it is the tones that are underlyingly assigned to words, not the accents. Specifically, a word may be assigned a H tone, which is associated with the penultimate or final μ depending on morphosyntactic features. For instance, D2 Ns are assigned a final H tone because they are feminine and D1 Ns have a penultimate one because they are masculine. When a H tone shows up in a given context, it attracts a *. When a L tone or no tone is assigned to the word, there is no *.

Turning back to the L tone appearing in the NOM, I claim that it is an actual morphemic tone; let us call it “ L_{NOM} .” Before explaining how L_{NOM} is assigned to words, two important properties characterizing the NOM case in Somali have to be specified: (i) only the *last* element of the subject NP receives NOM morphology (be it a N, a Det, an Adj, or a V), and the elements preceding the NOM item are in the PREM; (ii) NOM has *cumulative* properties, which can be seen in the so-called *nominative-of-genitive* form ([4]–[6], [7, p. 15]). For instance, the D2 Ns receive an *-eéd* suffix in GEN with a final TA when the NP is in ABS (e.g., [*dhár naag-eéd*]NP “a cloth of a woman”); in NOM, the final TA of GEN is replaced by L_{NOM} but the suffix *-eéd* remains ([*dhár naag-eéd*]NP).

The fact that L_{NOM} affects only the *right edge* of a group of words and cumulates with segmental case suffixes points out its intonation-like behavior. Adopting [20]’s framework, I will thus assume that L_{NOM} is actually associated with the right edge of the *phonological phrase* (ϕ) that encompasses the subject NP. In addition, the morphemic L_{NOM} requires (i) to be linked to the final or only μ of the ϕ it is associated with and (ii) to spread leftwards up to the beginning of the last or only *prosodic word* (ω) dominated by ϕ . Given the linear nature of tonal representations, specifically the necessary absence of crossing tonal association lines, the multiple linking/spreading of the L_{NOM} entails the deletion of any intervening H* tones. The representation of a NOM NP is given in (1) below.



(1)

As can be seen, the last or only ω in the NOM ϕ is thus characterized by a L plateau triggered by the L_{NOM} spreading. The pitch drop observed in our data (Figure 1) will be explained in the section about the pre-pausal lowering.

A remaining issue about NOM is the tone patterns of D3 Ns. As we saw (Table 2), these Ns exhibit a *penultimate* H tone while all other words in NOM lose their own. To solve this problem, I will adopt [17]’s assumption according to which D3 Ns are actually characterized by *two* underlying H tones instead of having only one like the other words (e.g.,

/hoo^Hyo^H/ “mother.D3” vs. /i^Hnan/ “boy.D1,” /ina^Hn/ “girl.D2”). This accounts for the fact seen earlier that D3 Ns present an alternating penultimate or final H tone in ABS, whereas the location of H in the other words is invariant in this case. In surface, the two Hs are reduced to one by an OCP constraint prohibiting two identical H tones from being present in a ω . This two-H tone pattern is supposed to be induced by the particular morphological features of D3 Ns. [17] argues that the *-e/o* that typically ends these Ns is neither a derivational nor an inflectional suffix, but some kind of “thematic vowel” with a mere classificatory function.

Based on this assumption, I propose that this thematic vowel defines its own ω , which is further adjoined to the ω of the D3 N stem, producing a recursive structure of ω s as follows: [[hoo^Hy] _{ω} [-o^H] _{ω}]. In contrast, the Ns of the other Ds are nonrecursive ω s (e.g., [ina^Hn] _{ω}) and are thereby assigned one H tone at most. In NOM, L_{NOM} thus delinks the H of the last ω leftwards, i.e., the H of [-e/o] _{ω} , as it does in the other Ds, but the H of the stem remains, generating [[hoo^Hy] _{ω} [o^{L_{NOM}}] _{ω}]. This way, the NOM penultimate H of D3 Ns is not only generated, but the NOM case is also reduced to a unique and hence more understandable process applying to all NOM NPs.

4. The pre-pausal lowering (PPL)

We saw that, according to [4], [5], PPL is the process whereby a H or M tone is realized at the next tone level below (H→M, M→L), just before a pause. By and large, this process was experimentally confirmed by [11] with some precision. According to his results, a word final H tone (WFH*, e.g., *gabádh*) is always slightly lower than a word penultimate one (WPH*, *inan*) when the word is located at the right edge of a prosodic constituent that basically corresponds to the *intermediate phrase* (ip) in [20]’s terms, followed or not by a pause within the sentence. At the end of the letter, the difference in pitch height is much more important, which is consistent with [4], [5]’s data. An exception to this lowering is when the word is uttered under contrastive focalization. In this case, a WFH* remains almost as high as a penultimate one, even at the sentence end. These different degrees of pitch height are illustrated in Figure 2 below.

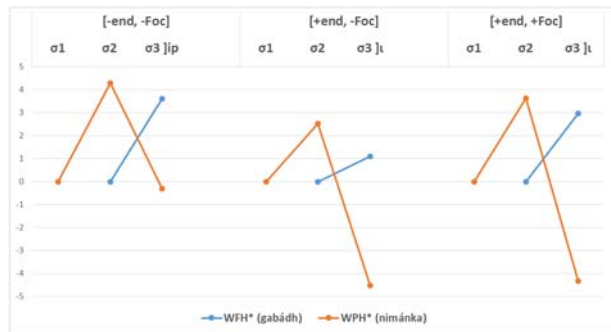
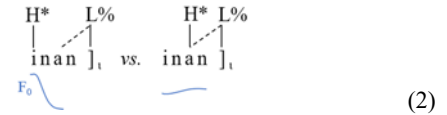


Figure 2: F_0 (ST) mean values (5 rep.) of the syllables (σ) in words with WFH* and WPH* within and at the end of the sentence as well as under focalization.

The fact that the lowering occurs within the sentence, whether or not there is a pause, suggests that the latter is not the real cause of the lowering. In addition, one could wonder how a silence—i.e., nothing—could influence the F_0 height. In fact, the tone lowering is triggered before the right edge of ip and achieves its most important degree at the end of the

sentence, that is, before the right edge of the hierarchically highest prosodic constituent of the sentence, the *intonational phrase* (i). Now, [11], [21] established that i in declarative sentences is right bounded by a L tone (L%), as in the vast majority of languages. Figure 2 displays such a L%, which is directly realized on the last μ of the words with a penultimate H tone ([+end] conditions). As a result, the “pre-pausal” final L tones reported by Andrzejewski (cf. AUs 2–4) are to be interpreted as the mere realizations of L% or L_{ip}.

For the WFH*s lowered at sentence end, I argue that they are also due to the association of L% with the sentence final μ . That is, since Somali cannot phonetically realize contour tones on a single μ (cf. introduction), the double association of H and L% tones with the same μ is realized as a much lowered H or M tone; put another way, being linked to the same TBU, the L% “merges” with H. Otherwise, the H tone stays at the same pitch height as is the case with the WPH*s, whether or not located in the same syllable as L%. As a matter of fact, the initial high pitch target of the falling tones (cf. AU2) does not undergo lowering, but only its final mid part does, becoming L, i.e., L%. This confirms that the vocalic μ is the TBU, not the syllable. The L% association and its effects on the H*s are represented in (2) below in D1 (*inan*) and D2 (*inán*) Ns.



As mentioned above, the WFH*s are not lowered under focalization. This suggests that L% is not linked to the final μ and hence cannot lower the H tone. However, the reason why L%/L_{ip} remains unassociated in this case needs to be determined. Within sentence, the WFH*s are lowered before the right edge of the ip, albeit to a lesser extent than at sentence end. This constituent is right bounded by a low or high tone (L/H_{ip}) [11], [19]. As with L%, the lowering of the WFH*s at the end of ip is thus likely to be produced by L_{ip}; conversely, H_{ip} may also merge with the final H*, generating a substantial F_0 rise (see [11], [19]). Moreover, L_{ip} accounts for the F_0 patterns of the D4 Ns we saw earlier. In the ABS and NOM contexts, these Ns always exhibit final pitch falls, which are more important in NOM. These falls can therefore be viewed as resulting from the association of L_{ip} with the D4 Ns’ final μ ; in NOM, the combined effects of L_{ip} and L_{NOM} bring about a deeper pitch drop.

To conclude this section, it is worth pointing out the difference in behavior between the morphemic L_{NOM} and the boundary tones L% and L_{ip}. Although all of them are supposed to be associated with a prosodic constituent and secondarily linked to the final μ of that constituent, the morphemic L_{NOM} has the property of spreading leftwards and hence delinking the H*s, whereas the boundary L tones only have a local effect of lowering the already associated tones.

5. Conclusion

It has been argued that NOM and PPL, which were traditionally analyzed as completely distinct phenomena, are actually both triggered by a similar feature, namely a L tone associated with a prosodic constituent but having a different behavior in each case. The proposed analysis has also implied that word accents are actually derived from tones and not the reverse. This means that, at word level, Somali is not accentual but essentially tonal.

6. References

- [1] L. M. Hyman, "Tonal accent in Somali," *Studies in African Linguistics*, vol. 12, no. 2, pp. 169–201, 1981.
- [2] L. Armstrong, "The phonetic structure of Somali," *Mitteilungen des Seminars für orientalische Sprachen zu Berlin*, vol. 37, no. 3, pp. 116–161, 1934.
- [3] A. Klingenheben, "Ist das Somali eine Tonsprache?," *Zeitschrift für Phonetik und allgemeine Sprachwissenschaft*, vol. 3, no. 5–6, pp. 289–303, 1949.
- [4] B. Andrzejewski, *The Declensions of Somali Nouns*. London: University of London, School of Oriental and African Studies, 1964.
- [5] B. Andrzejewski, *The Case System of Somali*. London: University of London, School of Oriental and African Studies, 1979.
- [6] G. Banti, "The morphology of the nominative in Somali," in *Discussion Papers for the Fifth International Phonology Meeting*, Wien, 1984, pp. 27–31.
- [7] G. Banti, "Two Cushitic systems: Somali and Oromo nouns," in *Autosegmental studies on pitch accent*, 1988, pp. 11–50.
- [8] M. Orwin, *Colloquial Somali*. London: Routledge, 1995.
- [9] J. I. Saeed, *Somali reference grammar*. Hyattsville, MD, USA: Dunwoody Press, 1987.
- [10] J. I. Saeed, *Somali*. Amsterdam: John Benjamins, 1999.
- [11] D. Le Gac, "Structure prosodique de la focalisation: le cas du somali et du français," Doctoral thesis, Paris 7 Paris Diderot, Paris, France, 2001.
- [12] D. Le Gac, "Tonal alternations in Somali," in *Research in Afroasiatic Grammar II*, J. Lecarme, Éd. Amsterdam: John Benjamins, 2003, pp. 287–304.
- [13] H. Van der Hulst, "Deconstructing stress," *Lingua*, vol. 122, no. 13, pp. 1494–1521, 2012.
- [14] C. R. Green and M. E. Morrison, "Somali wordhood and its relationship to prosodic structure," *Morphology*, vol. 26, pp. 3–32, 2016.
- [15] L. M. Hyman, "Word-prosodic typology," *Phonology*, vol. 23, no. 2, p. 225, 2006.
- [16] L. M. Hyman, "Do all languages have word accent?," in *Word Stress: Theoretical and typological issues*, H. Van der Hulst, ed. Cambridge: Cambridge University Press, 2014, pp. 56–82.
- [17] D. Le Gac, "Somali as a tone language," in *Proceedings of Speech Prosody 2016*, Boston, 2016, pp. 292–296.
- [18] J. I. Saeed, *The Syntax of Focus and Topic in Somali*. Hamburg: Helmut Buske, 1984.
- [19] D. Le Gac, "Marques prosodiques de la focalisation contrastive en Somali," in *Fonction et moyens d'expression de la focalisation à travers les langues*, A. Lacheret-Dujour, ed. Leuven, Belgium: Peeters, 2003, pp. 49–80.
- [20] J. B. Pierrehumbert and M. E. Beckman, *Japanese Tone Structure*. Cambridge, MA, USA: MIT Press, 1988.
- [21] J. Frid, "Aspects of Somali Tonology," MA thesis, Lund University, Lund, Sweden, 1995.