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WHAT TONE TEACHES US ABOUT LANGUAGE

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In ‘Tone: Is it different?’ (Hyman 2011a), I suggested that ‘tone is like segmental phonology in every way—only more so’, emphasizing that there are some things that only tone can do. In this presidential address my focus extends beyond phonology, specifically addressing what tone tells us about the integration (vs. compartmentalization) of grammar. I discuss some rather striking examples that demonstrate problems for the strict separation of phonology, morphology, and syntax, each time posing the question, ‘What else is like this outside of tone?’. A particularly interesting property that is strictly limited to tone is what I term syntagmatic relativity. I suggest that the uniqueness of tonal phenomena is due to the versatility of pitch, which can be manipulated with a wide range of linguistic functions. Given this versatility, I end by considering the question, ‘Why isn’t tone universal?’.*

Keywords: tone, paradigms, nonlocal phonology, phrase-level morphology, paradigmatic and syntagmatic contrasts

It is a great pleasure—and quite moving—for me to present this brief overview of the importance of linguistic tone today, particularly as 2018 represents the fiftieth anniversary of my joining the Linguistic Society of America in 1968 as an undergraduate at UCLA.¹ My goal in this address is to show that there are some things that only tone can do—and that therefore tone has something to tell us about what Language can do. As I show in this article, tone can be strictly phonological, but it can also be morphological and syntactic. Although I do not discuss this here, tone also can mark important semantic and pragmatic distinctions, for example, concerning information structure. Before going further, however, we first have to ask the important question: What is tone?

In responding to this question I have always reached back to the definition given by Welmers (1959, 1973), which, updated, I adopt here as follows.

- (1) A language with tone is one in which pitch is a contrastive feature of at least some morphemes.

Since the necessary emphasis is on MORPHEMES, that is, the building blocks of words, this excludes systems where pitch exclusively expresses domains larger than the word, for example, where high and low pitch features come in exclusively as phrasal and intonational tones.

Many linguists will be familiar with tone from Standard Mandarin, which distinguishes the following morphemes by pitch.

* This article represents the approximate text of the Presidential Address I presented on January 6, 2018, at the 92nd annual LSA meeting in Salt Lake City, Utah. The corresponding slides (with cartoons) can be seen at <http://linguistics.berkeley.edu/~hyman/papers/2018-hyman-presidential-address-slides2.pdf>. I would like to thank my former student Jeff Good, then a member of the LSA’s executive committee and still the president of the Association for Linguistic Typology, for his generous introduction, during which he pointed out that my initials LMH appropriately stand for Low-Mid-High—hence how could I not become a tonologist? However, it was my colleague Sharon Inkelas, also a member of the executive committee, who convinced me many months before that tone had to be the topic of my presidential address. Finally, I want to thank the editor, Andries Coetzee, for inviting me to submit my address to *Language*, two anonymous referees, and my department chair, Andrew Garrett, who has so fully supported me and my strange ways over the past five years at Berkeley.

¹ See the posted letter from then secretary-treasurer Archibald A. Hill, available online at <http://muse.jhu.edu/resolve/51>.

(2) Mandarin tones (5 = highest pitch, 1 = lowest pitch)

Tone I	(high level)	ma ⁵⁵	'mother'
Tone II	(rising)	ma ³⁵	'hemp'
Tone III	(falling-rising)	ma ²¹⁴	'horse'
Tone IV	(falling)	ma ⁵¹	'scold'

However, at the same time as I was joining the LSA fifty years ago, I learned about tone from Wm. E. Welmers in his language course on Igbo (Benue-Congo; Nigeria), which provides the following minimal quadruplet.²

(3) Igbo tones (' = H(igh) and ` = L(ow) tone)

Low-Low	àkwà	'bed'	[_ _]
Low-High	àkwá	'egg'	[_ ¯]
High-Low	ákwà	'cloth'	[¯ _]
High-High	ákwá	'crying'	[¯ ¯]

Again, the crucial point is that the above and other such tones are exponents of morphemes, which can be either lexical or grammatical.

In a handbook chapter a few years ago I raised the question of whether tone is 'different'. I suggested that 'tone is like segmental phonology in every way—only more so'. I went on to explain what I meant by 'more so' (Hyman 2011a:214):

QUANTITATIVELY more so: tone does certain things more frequently, to a greater extent, or more obviously (i.e. in a more straightforward fashion) than segmental phonology.

QUALITATIVELY more so: tone can do everything segments and non-tonal prosodies can do, but segments and non-tonal prosodies cannot do everything tone can do.

To see first how tone can be quantitatively 'more so', consider the eight tonal contrasts on monosyllabic words in Iau (Lakes Plain; Indonesia), given in Table 1.

TONE	NOUNS	VERBS	
H	bé 'father-in-law'	bá 'came'	totality of action punctual
M	bē 'fire'	bā 'has come'	resultative durative
HS	bé' 'snake'	bá' 'might come'	totality of action incompleted
LM	bè 'path'	bà 'came to get'	resultative punctual
HL	bê 'thorn'	bâ 'came to endpoint'	telic punctual
HM	bē 'flower'	bā 'still not at endpoint'	telic incompleted
ML	bè 'small eel'	bà 'come (process)'	totality of action durative
HLM	bē' 'tree fern'	bā' 'sticking, attached to'	telic durative

TABLE 1. Tonal contrasts on monosyllabic words in Iau (Lakes Plain; Indonesia) (Bateman 1990:35–36); (˘) marks M(id) and (ˉ) a S(uperhigh) tone.

As seen on the left side of the table, the eight tones mark lexical contrasts on nouns, while on the right the same eight tones express different inflectional features on the same verb /ba/ 'come'. While we are familiar with the phenomenon of morphological ablaut and of certain other internal changes on roots involving nasal, palatal, or labial prosodies, no other feature has the potential to produce such an eight-way inflectional contrast as seen in Iau. Thus, tone can do more in a QUANTITATIVE sense.

Turning to how tone is different in a QUALITATIVE sense, we turn to the situation in the analysis of Mijikenda Bantu pioneered by Kisseberth (1984) and Cassimjee and Kisseberth (1992). The following examples from Giriama, spoken in Kenya, consist of forms that are underlyingly toneless, receiving phonetic low pitch by default (Volk 2011:17).

² Thus there are, as I like to point out, four different words [akwa], and none of them means 'water'! Note that in many dialects the labialized velar is aspirated (with possible nasalization) in all but the word for 'cloth'. The forms in 3 are as pronounced in Onitsha (Williamson 1972).

- (4) a. ni-na-maal-a 'I want'
 b. ni-na-mal-a ku-guul-a 'I want to buy'
 c. ni-na-mal-a ku-gul-a nguúwo 'I want to buy clothes'

As can be seen in the examples above, the phrase-level penultimate vowel is lengthened. Now consider the corresponding set of forms in 5, where the first-person singular subject prefix /ni-/ has been replaced by the third-person singular (noun class 1) subject prefix /á-/.

- (5) a. a-na-maál-a 'he/she wants'
 b. a-na-mal-a ku-guúl-a 'he/she wants to buy'
 c. a-na-mal-a ku-gul-a nguúwo 'he/she wants to buy clothes'
- ‡
 H
- >

As indicated, in each case the H of /á-/ shifts to the penultimate vowel of the phonological phrase.³ No other phonological property has this ability to shift one or more words to the right. We thus see that tone is qualitatively 'more so': there are some things that only tone can do. Or, as I like to say, tone can do anything you can do better!

In presenting such facts I often invite the audience to ask what else is like this in language? One response I got at a presentation in Paris was that the H tone from /á-/ could instead be considered a third-person singular subject phrasal enclitic. (First- and second-person subjects do not assign such an H tone.) That this cannot solve the problem is seen from the fact that the traveling H can also originate from a lexical morpheme. Thus, while the root /-gul-/ 'buy' in the utterance *ku-gul-a mu-vuure* 'to buy wooden bowls' is underlyingly toneless, the following happens when the H tone root /-bánd-/ 'break' is substituted (Volk 2011:17).

- (6) ku-band-a mu-vuúre 'to break wooden bowls'
- ‡
 H
- >

As a result it is not credible to treat all such penultimate H tones as enclitic.

A second response I have gotten is that this is not really tone, because the H tones are so sparse—and, as I have shown, there are completely toneless utterances. Maybe Giryama is something else that others call a 'pitch-accent' language. I have elsewhere argued that while we can identify clear cases of tone (as defined above) and of word stress (as in English, etc.), there is no coherent class of so-called pitch-accent languages (Hyman 2009). Much of the controversy in word-prosodic typology has been largely terminological. Be this as it may, even if it is not tone, the main point would still stand, namely, that certain morphemes cause pitch effects that can be quite long distance. However, the examples given thus far may have given the false impression that the phenomenon is 'accentual', since only one H is involved in each. In fact, as seen in the examples in 7, words can have more than one H tone (Volk 2011:21).

- (7) a. /ku-kálang-a/ 'to fry'
 ku-kalaáng-a
 ‡
 H
- >
- b. /á-na-kálang-a/ 'he/she fries'
 a-na-kalaáng-a
 ‡ ‡
 H H
- >

³ Volk (2011) also proposes that the H initially links to the phrase-final vowel, but then is retracted onto the prominent lengthened penultimate vowel, as occurs in other Bantu languages.

In both 7a and 7b the H of the verb root /-kálang-/ ‘fry’ shifts to the lengthened penult, while in 7b the same H of /á-/ that we saw in 5 above shifts to the root-initial vowel.⁴ Since multiple morphemes can introduce Hs, Giryama clearly meets the definition of tone, and, once again, only tone can do this kind of long-distance shifting.

While Giryama has tone as defined above, it is noncanonical in two senses: one phonological, one morphological. The first concerns the phonological nonlocal shifting of H tones. No other phonological feature or property has this ability to wander long distance across words. In fact, except for tone, most phonological processes are word-bounded (at most encompassing clitics): vowel harmony, consonant harmony, nasal harmony, stress, and so forth. For this reason I have suggested that ‘anyone who is interested in the outer limits of what is possible in phonology would thus be well-served to understand how tone systems work’ (Hyman 2011a: 198). To this I would add that tone also helps us understand what is possible in MORPHOLOGY. This brings me to the second noncanonical property of Giryama, its morphological noncoherence: different features of a morph should COHERE, that is, stick together, not wander off independently. In the present case, the Giryama subject prefix /á-/ should be realized as [á], not as a discontinuous prefix [a] + phrase-penultimate H, possibly on a noncontiguous word.

The disconnect is even more egregious in Chimwiini (Bantu; Somalia), where there is sometimes no segmental prefix at all. Although we shall see an important similarity, Chimwiini is different from Giryama in two ways. First, in Chimwiini all tonal contrasts are grammatical. There is no underlying tonal contrast on lexical morphemes such as nouns and verb roots (as was the case of Giryama /-mal-/ ‘want’ vs. /-bánd-/ ‘break’ and /-kálang-/ ‘fry’). Second, although Giryama allows toneless phrases, in Chimwiini every phonological phrase has to have an H on its final or penultimate syllable. With this in mind, observe the following data (Kisseberth & Abasheikh 2011:1994).

- (8) a. *jile ma-tuundá* ‘you sg. ate fruit’
 b. *jile ma-túúnda* ‘he/she ate fruit’

In these forms the verb *jile* consists of a root *j-* and the inflectional ending *-ile*. There is no overt subject prefix. Instead, the difference between a second-person singular and a (noun class 1) third-person singular subject is seen in the final vs. penultimate placement of the phrasal H tone. In this case the main motivation for attributing the tonal difference to a prefix is from other parts of the paradigm (cf. *chi-jile ma-tuundá* ‘we ate fruit’). However, while such an abstract prefixal tone shift is not impossible, it seems less motivated than directly assigning the H at the phrase level: first- and second-person subjects assign final H, while third-person subjects receive what Kisseberth and Abasheikh (2011) analyze as a default penultimate H, that is, the ‘elsewhere’ case.

There are other cases where a tonal property of one word may be realized on another word in the phrasal domain. A particularly interesting case comes from Kikuria (Bantu; Tanzania), where different tense-aspects assign an H to the first, second, third, or fourth mora (μ) of the verb stem. As seen in the examples in 9, where [marks the beginning of the stem, the (underlined) assigned H then spreads to the penult (Marlo et al. 2014, 2015:252–53).

⁴ As further discussed by Volk, in other Mijikenda languages this H would stop at the vowel that precedes the root.

- (9) a. μ_1 n-to-o- [h_óótóótér-a ‘we have reassured’ past
 b. μ_2 n-to-o- [ho_óótóótér-a ‘we have been reassuring’ past progressive
 c. μ_3 n-to-re- [hootóótér-a ‘we will reassure’ future
 d. μ_4 to-ra- [hootóótér-a ‘we are about to reassure’ inceptive

While such word-level morphological tone is not unusual, what is perhaps unique in Kikuria is what happens when the verb stem does not have enough moras to realize the H tone, for example, in the inceptive forms marked by a *-ra-* prefix and an H on the fourth mora. As seen in the following examples, some speakers continue counting moras onto the following (toneless) object noun.

- (10) a. to-ra- [karaang-á éyétóóké ‘we are about to fry a banana’
 b. to-ra- [sukur-a éyétóóké ‘we are about to rub a banana’
 c. to-ra- [βun-a eyétóóké ‘we are about to break a banana’
 d. to-ra- [ry-a eyetóóké ‘we are about to eat a banana’

In the first example the verb has four moras, so the H is assigned to the final inflectional ending *-a*. In the other cases the H is assigned to the appropriate mora of the following noun. As in the previous examples, once the H is assigned to the noun it spreads to the penult. What is striking is that the mora count begins with the stem, ignoring the inceptive prefix *-ra-*, but is allowed to consider the next word, thus producing the phrase-level bracketing paradox in 11.

- (11) a.  Grammatical
 prefixes + stem object
 b.  Prosodic
 prefixes + stem object

Again we must ask: What else is like this in language?

Another equally intriguing case comes from Kalabari (Ijo; Nigeria), which assigns tonal melodies by grammatical construction. First, note that it is not uncommon for a morphological process to assign a tonal melody that neutralizes lexical tonal contrasts at the word level. As seen in Table 2, the underlying contrastive tones of a verb are replaced by an LH melody in Kalabari when the verb is detransitivized (Harry & Hyman 2014:650).

	TRANSITIVE			INTRANSITIVE	
kán	H	‘tear, demolish’	káán	LH	‘tear, be demolished’
kón	L	‘judge’	kón	LH	‘be judged’
ányá	H-H	‘spread’	ányá	L-H	‘be spread’
díma	L-L	‘change’	díma	L-H	‘change’
sá ^l kí	H- ^l H	‘begin’	sákí	L-H	‘begin’
kikimà	H-H-L	‘hide, cover’	kikimá	L-L-H	‘be hidden, covered’
pàkírí	H-L-H	‘answer’	pàkírí	L-L-H	‘be answered’
gbóló ^l má	H-H- ^l H	‘join, mix up’	gbólómá	L-L-H	‘be joined, mixed up’

TABLE 2. Transitive vs. intransitive verb tones in Kalabari (Ijo; Nigeria).

It is, however, rare for a ‘replacive’ tonal melody to be assigned at the phrase level. Such is the case in Kalabari. The examples in 12 show the H-H noun /námá/ ‘animal, meat’ taking four different tone melodies depending on the construction (Harry & Hyman 2014:651).

- (12) CONSTRUCTION PHRASAL TONES
- a. Possessive noun + N HL tòbò námà ‘the child’s animal’
- b. Possessive pronoun + N HLH (→ H-^lH) ìnà ná^lmá ‘their animal’
- c. Determiner + N LH tò námá ‘which animal?’
- d. Quantifier + N L jà námá ‘some meat’

tion based on syllable weight). C nouns assign an H to the last vowel of the verb, while D nouns retain the H on themselves.

A similar case has been recently reported from the Uechi dialect of Miyako (Ryukyuan; Japan), as seen in the following examples (Matsumori 2017:2).

- (15) 'inside a field of ...'
- a. A: kúúsú 'chili pepper' → kúúsú bári-nú náká-ń-dù
- b. B: súmná 'long onion' → súmná bá-ri-nù nàkà-ń-dù
- c. C: básòò 'banana' → básòò bàri-nù nàkà-ń-dù
(*nu* 'genitive', *naka* 'inside', *n* 'locative', *du* 'focus')

Class A nouns condition an H-to-L drop on the second word to their right, while class B nouns condition the drop on the first. Since class C nouns already have an H-to-L drop, it is realized there, all subsequent syllables being realized L. Again, the distinction between A, B, and C is strictly lexical, and therefore unpredictable. There thus does not seem to be much to distinguish the lexical vs. grammatical conditioning of phrasal tonology. Again, what else is like this in language?

While the above examples have all involved the ability of an earlier word to assign a tone to a later word, there also are cases of purely phonological long-distance interaction between tones. In Peñoles Mixtec (Otomanguean; Mexico), a language where syllables can be H, L, or toneless, there is a rule that deletes an L tone after another L, an OCP (OBLIGATORY CONTOUR PRINCIPLE) effect: $L \rightarrow \emptyset / L _$ (Daly & Hyman 2007). As seen in the example in 16, the two Ls can be separated by any number of toneless syllables (= moras), in this case twelve.

- (16) $\text{íí}^N \text{dii-ni-kwe-ši kada-kwe-ši } \text{íí}^N \text{ } \text{íí}^N \text{ } \text{čiu}^N$
 L L → ∅
 'only one of them will do each of the jobs'
 (one alone-only-PL-she POT-do-PL-she one one work)

At the risk of sounding like a broken record, nothing but tone can do this.

In summary, the long-distance effect of tone, its oft-noted mobility (Clements & Goldsmith 1984b:6, Yip 2002:133), is strictly limited to tone, which, as pointed out, goes far beyond what is possible with other phonological features. I take this to be demonstrated and noncontroversial. This then raises the important question of WHY tone is different, which I divide into two subparts. The first is why tone has such versatility, such a wide range of possibilities going from one typological extreme to the other—from the dense and extensive lexical and PARADIGMATIC contrasts cited above from Iau, to the sparse, strictly grammatical SYNTAGMATIC placement of final vs. penultimate H tones in Chimwiini. The second subpart is why tone can do things that other phonological features and stress cannot do. The answer must ultimately have to do with the nature of the brain: humans—and apparently other species (cf. Hoeschele 2017)—are endowed with the ability to exploit the properties of relative pitch more fully than most other, for example, segmental, properties.

One of these properties is that pitch is scalar, thus producing step-wise tonal chains as in Guébie (Kru; Ivory Coast), a language that distinguishes four levels of pitch, 4 being highest, 1 lowest. In this language the underlying tone of a verb goes down by one step in the imperfective aspect (Sande 2017a,b, 2018).

As seen in Table 3, pitch level 4 becomes 3, 3 becomes 2, and 2 becomes 1. If we compare this to what happens with vowel height, the step-wise chain in Danish seems similar. However, there is a difference. As indicated, when Danish /æ/ occurs before /r/, since it cannot go any lower, it backs to [a]. The story is quite different, and signifi-

nize and store intervals and melodies also accounts for the long-distance tonal effects that we have seen—and of which we keep track! Other phrasal phonology is largely limited to local effects of assimilation or deletion that occur between segments that meet at a word boundary, such as two consonants (C#C) or two vowels (V#V).

While an H can shift two or more words to the right without seeming to cause problems in comprehensibility, I can only speculate that if segmental features were to do this, they would more seriously obscure word identities and hence the overall meaning of the utterance. Again, tone can do anything you can do better!

The final question I would like to raise is: If tone is so great, why isn't it universal? Why are only around half of the world's languages tonal (Maddieson 2013), with large pockets in Africa, East and Southeast Asia, Mexico, the Northwest Amazon, and parts of New Guinea? Tone would seem to be a good candidate for universality for several reasons. First, tone presents few, if any, articulatory difficulties vs. consonants, which all spoken languages exploit for distinguishing morphemes. Second, tone is acoustically simple, based just on F₀, in contrast to consonants and vowels, which are universally exploited despite the intersecting factors that enter into their (often complex) acoustics. Third, tone is acquired early (Li & Thompson 1977:185, Demuth 2003:220). And finally, tone can mark all kinds of neat things—as we have seen!

The hypothesis that I would like to advance is that tone owes its nonuniversality to the versatility and relative independence of pitch in language.⁶ Pitch is so versatile that it can equally well be exploited for intonation in order to distinguish, for example, statements from questions, declaratives from imperatives, and vocatives and exclamatives, not to mention the 'paralinguistic' functions of pitch marking tempo and the emotional state of the speaker—even in tone languages! There is in effect a competition between exploiting pitch for these functions vs. distinguishing morphemes. At the same time we recognize the relative independence of pitch from the rest of phonology and language. It is no accident that Goldsmith (1976a,b) focused primarily on tone, which is the most autosegmental of features. When compared to the features that distinguish consonants and vowels, it is the least integrated with other features: while laryngeal gestures can influence pitch, pitch does not normally influence consonants and vowels (Hyman & Schuh 1974:108). This is so true that both Clements et al. 2011 and Hyman 2011b suggest that tones need not be broken down into distinctive features—an issue that is still under discussion (cf. McPherson 2017).

In the foregoing, in the interest of simplicity, I have purposely avoided examples with extraordinarily complex morphophonemic alternations, obscure grammatical conditioning, or conflicting constraints—opacities beyond anything found in segmental phonology. In many African and Mexican languages the verb tone paradigms can rival any Indo-European language, past or present. For example, Malinaltepec Tlapanec (Otomanguean; Mexico) distinguishes at least twenty inflectional tone classes (Palancar 2016:131n.). In addition, it is well known that Bantu inflectional tonology is quite complex (see the papers in Clements & Goldsmith 1984a, Hyman & Kisseberth 1998, and *Africana Linguistica* 20 (Odden & Bickmore 2014), among many others). I also acknowledge the extraordinary research being done on the very complex Chatino languages, which differ significantly from each other (Cruz 2011, Campbell 2014, 2016, McIntosh 2015, Sullivan 2015, Villard 2015, Woodbury 2019). What I am saying is that one does not even have to enter into these complex details to appreciate the genius and uniqueness of tone.

⁶ I would like to thank Bruce Hayes and Keith Johnson for suggestions along these lines.

So, to summarize, what has tone taught us about language? First, concerning grammar, several of the examples I have shared show that tone, defined as a contrastive feature of morphemes, obscures the distinction between phonology, morphology, and syntax. In some languages the interaction is so extensive that it is only partly joking to say that tone is the glue that holds the grammar together! Concerning phonology, there is hardly a need to reiterate the central importance of tone in the development of autosegmental phonology (Goldsmith 1976a,b), which I have exploited in many of the examples above. Autosegmental phonology was originally designed for tone, and, as I have said, tone remains the most autosegmentally independent of features. It also has served as the model for conceptualizing intonation, feature geometry, harmonies, prosodic morphology, and more. As we have seen in the examples I have cited, tonal alternations can be quite robust and regular. I would like therefore to end by reassuring anyone who doubts the existence of productive, categorical phonology manipulating discrete elements that all of this is alive and well in tone. We still have a lot of work to do, a lot to learn. I hope that this brief overview of my own fascination with and awe of tone will encourage present and future researchers to join in the enterprise and contribute to our understanding of the unique linguistic properties it has to offer. As I like to say, I never met a tone I didn't like. Thank you.

REFERENCES

- AHLAND, MICHAEL BRYAN. 2012. *A grammar of Northern Mao (Mâwés Aas'è)*. Eugene: University of Oregon dissertation.
- BATEMAN, JANET. 1990. Iau segmental and tonal phonology. *Miscellaneous Studies of Indonesian and Other Languages in Indonesia* 10.29–42.
- CAMPBELL, ERIC. 2014. *Aspects of the phonology and morphology of Zenzontepec Chatino, a Zapotecan language of Oaxaca, Mexico*. Austin: University of Texas, Austin dissertation.
- CAMPBELL, ERIC. 2016. Tone and inflection in Zenzontepec Chatino. *Tone and inflection*, ed. by Enrique L. Palancar and Jean Léo Léonard, 141–62. Berlin: De Gruyter Mouton.
- CASSIMJEE, FARIDA, and CHARLES W. KISSEBERTH. 1992. The tonology of depressor consonants: Evidence from Mijikenda and Nguni. *Berkeley Linguistics Society (Special session on typology of tone languages)* 18.26–40. DOI: 10.3765/bls.v18i2.1543.
- CLEMENTS, G. N., and JOHN GOLDSMITH (eds.) 1984a. *Autosegmental studies in Bantu tone*. Dordrecht: Foris.
- CLEMENTS, G. N., and JOHN GOLDSMITH. 1984b. Autosegmental studies in Bantu tone: Introduction. In Clements & Goldsmith 1984a, 1–18.
- CLEMENTS, G. N.; ALEXIS MICHAUD; and CÉDRIC PATIN. 2011. Do we need tone features? *Tones and features: Phonetic and phonological perspectives*, ed. by John A. Goldsmith, Elizabeth Hume, and Leo Wetzels, 3–24. Berlin: De Gruyter Mouton.
- CREISSELS, DENIS. 2017. Construct forms of nouns in typological perspective. Paper presented at the 50th annual meeting of the Societas Linguistica Europaea, Zurich, September 13, 2017.
- CRUZ, EMILIANA. 2011. *Phonology, tone and the functions of tone in San Juan Quiahije Chatino*. Austin: University of Texas, Austin dissertation.
- DALY, JOHN P., and LARRY M. HYMAN. 2007. On the representation of tone in Peñoles Mixtec. *International Journal of American Linguistics* 73.165–208. DOI: 10.1086/519057.
- DEMUTH, KATHERINE. 2003. The acquisition of Bantu languages. *The Bantu languages*, ed. by Derek Nurse and Gérard Philippson, 209–22. London: Routledge.
- GOLDSMITH, JOHN. 1976a. *Autosegmental phonology*. Cambridge, MA: MIT dissertation.
- GOLDSMITH, JOHN. 1976b. An overview of autosegmental phonology. *Linguistic Analysis* 2.23–68.
- HARRY, OTELEMATE, and LARRY M. HYMAN. 2014. Phrasal construction tonology: The case of Kalabari. *Studies in Language* 38.649–89. DOI: 10.1075/sl.38.4.01hym.
- HEATH, JEFFREY, and LAURA MCPHERSON. 2013. Tonosyntax and reference restrictions in Dogon NPs. *Language* 89.265–96. DOI: 10.1353/lan.2013.0020.

- HEINZ, JEFFREY. 2018. The computational nature of phonological generalizations. *Phonological typology*, ed. by Larry M. Hyman and Frans Plank, 126–95. Berlin: De Gruyter Mouton.
- HOESCHELE, MARISA (ed.) 2017. *Comparative Cognition & Behavior Reviews* 12. (Special issue on animal music perception.) Online: http://comparative-cognition-and-behavior-reviews.org/vol_12/.
- HYMAN, LARRY M. 2009. How (not) to do phonological typology: The case of pitch-accent. *Language Sciences* 31.213–38. DOI: 10.1016/j.langsci.2008.12.007.
- HYMAN, LARRY M. 2011a. Tone: Is it different? *The handbook of phonological theory*, 2nd edn., ed. by John Goldsmith, Jason Riggle, and Alan Yu, 197–239. Oxford: Blackwell.
- HYMAN, LARRY M. 2011b. Do tones have features? *Tones and features: Phonetic and phonological perspectives*, ed. by John A. Goldsmith, Elizabeth Hume, and Leo Wetzel, 50–80. Berlin: De Gruyter Mouton.
- HYMAN, LARRY M., and CHARLES W. KISSEBERTH. 1998. *Theoretical aspects of Bantu tone*. Stanford, CA: CSLI Publications.
- HYMAN, LARRY M., and RUSSELL G. SCHUH. 1974. Universals of tone rules: Evidence from West Africa. *Linguistic Inquiry* 5.81–115. Online: <https://www.jstor.org/stable/4177809>.
- HYMAN, LARRY M., and IMELDA UDOH. 2006. Relic noun-class structure in Legbo. *West African linguistics: Papers in honor of Russell G. Schuh* (Studies in African Linguistics, supplement 11), ed. by Paul Newman and Larry M. Hyman, 75–99. Columbus: The Ohio State University Department of Linguistics and Center for African Studies.
- JARDINE, ADAM. 2016. Computationally, tone is different. *Phonology* 33.247–83. DOI: 10.1017/S0952675716000129.
- KISSEBERTH, CHARLES W. 1984. Digo tonology. In Clements & Goldsmith 1984a, 105–82.
- KISSEBERTH, CHARLES W., and MOHAMMED I. ABASHEIKH. 2011. Chimwiini phonological phrasing revisited. *Lingua* 121.1987–2013. DOI: 10.1016/j.lingua.2011.06.003.
- LI, CHARLES N., and SANDRA A. THOMPSON. 1977. The acquisition of tone in Mandarin-speaking children. *Journal of Child Language* 4.185–99. DOI: 10.1017/S0305000900001598.
- MADDIESON, IAN. 2013. Tone. *The world atlas of language structures online*, ed. by Matthew S. Dryer and Martin Haspelmath, Ch. 13. Munich: Max Planck Digital Library. Online: <http://wals.info/chapter/13>, accessed December 22, 2017.
- MARLO, MICHAEL R.; LEONARD CHACHA MWITA; and MARY PASTER. 2014. Kuria tone melodies. *Africana Linguistica* 20.277–94. DOI: 10.2143/AL.20.0.3062073.
- MARLO, MICHAEL R.; LEONARD CHACHA MWITA; and MARY PASTER. 2015. Problems in Kuria H tone assignment. *Natural Language and Linguistic Theory* 33.251–65. DOI: 10.1007/s11049-014-9251-y.
- MARTINET, ANDRÉ. 1947. Où en est la phonologie? *Lingua* 1.34–58. DOI: 10.1016/0024-3841(49)90044-3.
- MATSUMORI, AKIKO. 2017. Prosodic units and phonological processes of the Miyako-jima and Tara-jima systems in Miyako Ryukyuan. Paper presented at the Workshop on Prosody and Prosodic Interfaces in Japanese and Korean, University of Hawai'i at Manoa, October 11, 2017.
- MCINTOSH, JUSTIN DANIEL. 2015. *Aspects of phonology and morphology of Teotepec Eastern Chatino*. Austin: University of Texas, Austin dissertation.
- MCPHERSON, LAURA. 2014. *Replacive grammatical tone in the Dogon languages: A factorial typology*. Los Angeles: University of California, Los Angeles dissertation.
- MCPHERSON, LAURA. 2017. Tone features revisited: Evidence from Seenku (Mande, Burkina Faso). *Diversity in African languages: Selected papers from the 46th Annual Conference on African Linguistics*, ed. by Doris Payne, Sara Pacchiarotti, and Mokaya Bosire, 5–21. Berlin: Language Science Press. DOI: 10.17169/langsci.b121.280.
- MCPHERSON, LAURA, and JEFFREY HEATH. 2016. Phrasal grammatical tone in the Dogon languages: The role of constraint interaction. *Natural Language and Linguistic Theory* 34.593–639. DOI: 10.1007/s11049-015-9309-5.
- ODDEN, DAVID, and LEE BICKMORE (eds.) 2014. *Africana Linguistica* 20. (Special issue on melodic H tone.)
- OLAWSKY, KNUT J. 2006. *A grammar of Urarina*. Berlin: Mouton de Gruyter.
- PALANCAR, ENRIQUE L. 2016. A typology of tone and inflection: A view from the Otomanguan languages of Mexico. *Tone and inflection: New facts and new perspectives*, ed. by Enrique L. Palancar and Jean Léo Léonard, 109–39. Berlin: De Gruyter Mouton.

- PASTER, MARY. 2003. Tone specification in Leggbo. *Linguistic description: Typology and representation of African languages*, ed. by John M. Mugane, 139–50. Trenton: Africa World Press.
- PATEL, ANIRUDDH D. 2003. Language, music, syntax and the brain. *Nature Neuroscience* 6(7).674–81. DOI: 10.1038/nn1082.
- ROLLE, NICHOLAS. 2017. A hybrid OT-DM model: Support from a morphological conspiracy in Degema. Handout from a paper presented at the Syntax-Prosody in OT (SPOT) Workshop, University of California, Santa Cruz, November 18, 2017.
- ROLLE, NICHOLAS. 2018. *Grammatical tone: Typology, theory, and functional load*. Berkeley: University of California, Berkeley dissertation, to appear.
- SANDE, HANNAH. 2017a. Process morphology in a realizational theory. *North East Linguistic Society (NELS)* 47.91–104.
- SANDE, HANNAH. 2017b. *Distributing morphologically conditioned phonology: Three case studies from Guébie*. Berkeley: University of California, Berkeley dissertation.
- SANDE, HANNAH. 2018. Cross-word morphologically conditioned scalar tone shift in Guébie. *Morphology*. DOI: 10.1007/s11525-018-9327-1.
- SANDE, HANNAH, and PETER JENKS. 2017. Cophonologies by phase. Handout from paper presented at the North East Linguistic Society (NELS) 48, Reykjavik, Iceland.
- SULLIVANT, JOHN RYAN. 2015. *The phonology and inflectional morphology of Chá?knyá, Tataltepec de Valdés Chatino, a Zapotecan language*. Austin: University of Texas, Austin dissertation.
- VILLARD, STÉPHANIE. 2015. *The phonology and morphology of Zacatepec Eastern Chatino*. Austin: University of Texas, Austin dissertation.
- VOLK, EREZ. 2011. *Mijikenda tonology*. Tel Aviv: Tel Aviv University dissertation.
- WELMERS, WILLIAM E. 1959. Tonemics, morphotonemics, and tonal morphemes. *General Linguistics* 4.1–9.
- WELMERS, WILLIAM E. 1973. *African language structures*. Berkeley: University of California Press.
- WILLIAMSON, KAY. 1972. *Igbo English dictionary*. Benin City: Ethiope Publishing.
- WOODBURY, ANTHONY C. 2019. Verb inflection in the Chatino languages: The separate life cycles of prefixal vs. tonal conjugational classes. *Inflectional complexity and verb classes: A view from the Otomanguean languages of Mexico*, ed. by Matthew Baerman, Timothy Feist, and Enrique Palancar. Berlin: Language Science Press, to appear.
- YIP, MOIRA. 2002. *Tone*. Cambridge: Cambridge University Press.

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