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ARTICLE

Theoretical approaches to grammatical tone

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Abstract

Tone is distinct from other phonological phenomena both qualitatively and quantitatively (Hyman 2011), and has been instrumental in shaping phonological theory in many ways. However, the contributions to current linguistic theory of "grammatical tone' (GT) – a type of non-concatenative morphology where a morpheme is expressed at least in part by tone and/or tone changes – have been less apparent. In this paper, we take stock of the types of GT patterns attested in the literature and the different theoretical treatments of GT that have been proposed to date. We show that GT is still to a large extent underexplored, and highlight the immense potential of the study of GT for improving our understanding of phonology and its outer limits. This paper serves as an introduction to the high-quality research articles collected in this special issue, which directly address how GT critically informs phonological theory and its current developments.

1. Introduction

Tone is distinct from other phonological phenomena in numerous ways qualitatively and quantitatively, as illustrated by the many examples in Larry M. Hyman's presidential address at the 92nd Annual Meeting of the Linguistic Society of America (Hyman 2018). In the history of the field, tone has been instrumental in shaping phonological theory, for example, establishing phonological representations as multi-tiered under Autosegmental Theory (Goldsmith 1976, 1990) and establishing the existence of tone circles in certain Chinese tone sandhi patterns (Chen 1987), to mention but two examples. However, the contributions to current linguistic theory from 'grammatical tone' have been less apparent. This thematic issue is a collection of papers addressing the topic of grammatical tone, specifically aiming to unite various empirical and theoretical perspectives.

As a starting point, we can broadly define grammatical tone as a tonological pattern (e.g. involving tone addition, deletion, replacement, shifting, assimilation,

dissimilation, etc.), which is restricted to a specific morpheme or construction or a natural class of morphemes or constructions, and not attributable to the general tonal phonology. A straightforward example is given in (1) from the Nigerian language Kalabari (ijn; Harry 2004). Here, the imperative is expressed by adding a high-low (HL) grammatical tone sequence to the end of the verb, with no additional marking. Notice that the grammatical tones co-occur with the lexical tones rather than replacing them, resulting in otherwise marked contour tones and vowel lengthening. Other data in the language reveal that this HL sequence cannot be interpreted simply as intonational boundary tones (see e.g. (3) below).

(1)

	Lexical tone contrasts				*With grammatical tone*	
a.	H	/só/	‘go’	→	sóò	‘go!’
b.	L	/sọ̀/	‘cook’	→	sọ̀ọ́ọ̀	‘cook!’
c.	HH	/ọ́lọ́/	‘cough’	→	ọ́lọ́ọ̀	‘cough!’
d.	H↓H	/ọ́↓lọ́/	‘hold’	→	ọ́↓lọ́ọ̀	‘hold (it)!’
e.	HL	/ḅámà/	‘punish’	→	ḅá↓máà	‘punish!’
f.	LH	/sàkí̩/	‘get up’	→	sàkíi̩	‘get up!’
g.	LL	/lè̩gì̩/	‘sit down’	→	lè̩gíi̩	‘sit down!’

In examples like Kalabari, grammatical tone is straightforwardly analysed as ‘floating tones’ which concatenate to the edge of the word akin to segmental affixes. While such patterns are extremely common and perhaps prototypical of grammatical tone patterns, they represent the starting point of grammatical tone typology rather than its end point. Consider next the Bantu language Makonde (kde; Kraal 2005: 255–257), in (2). The left-hand columns illustrate nouns in isolation, which show six basic lexical tone melodies whose surface forms are dictated by various general tonal operations. In the context of the modifier *ntwaani* ‘what kind of’, however, all nouns are neutralised to a basic LH pattern. This kind of tone alternation is not a general rule of the language but rather one triggered by the modifier itself, thus meeting our definition of grammatical tone. But unlike in the Kalabari example in (1), simple concatenation of floating tone alone appears insufficient to derive the pattern.

(2)

	Lexical tone contrasts			*Grammatical tone neutralisation*
a.	/n-tandasa/ ‘porridge’	[ntàndààsà]	→	[**ntàndàsá** ńtwáànì] ‘what kind of porridge?’
b.	/lu-kalongó/ ‘throat’	[lùkàlòóngò]	→	[**lùkàlòngó** ńtwáànì] ‘what kind of throat?’
c.	/li-putíla/ ‘type of trap’	[lìpùtíìlà]	→	[**lìpùtìlá** ńtwáànì] ‘what kind of trap?’
d.	/li-híndili/ ‘cooking stone’	[lìhíndíìlì]	→	[**lìhìndìlí** ńtwáànì] ‘what kind of cooking stone?’
e.	/u-túlulí/ ‘brain’	[ùtútúúlì]	→	[**ùtùtùlí** ńtwáànì] ‘what kind of brain?’
f.	/ú-njenjemá/ ‘mosquito’	[ùnjénjèémà]	→	[**ùnjènjèmá** ńtwáànì] ‘what kind of mosquito?’

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In the last two and a half decades, there has been a surge of in-depth descriptive and analytic work on such patterns of grammatical tone (hereafter GT). In Africa, a sample of families in which GT is pervasive include Dogon (Heath 2008; McPherson 2014; McPherson & Heath 2016), Mabia/Gur (Hyman & Olawsky 2003; Roberts 2016), Mande (McPherson 2017, 2019; Green 2018; Konoshenko 2018), Ijoid (Efere 2001; Harry 2004; Harry & Hyman 2014; Rolle 2021), Bantu (Odden & Bickmore 2014) and Nilotic (Andersen 1995; Trommer 2011), among others. Extensive work on GT has been conducted outside of Africa, as well. In the Americas, perhaps the most famous cases of robust GT are found in the Otomanguean family in Mexico, which includes Zapotec, Mixtec and Chatino sub-groups (Campbell 2014; McIntosh 2015; Sullivant 2015; Villard 2015; Palancar & Léonard 2016). Further, in Asia GT is found widely in the Japonic family (Kawahara & Wolf 2010; Kubozono & Giriko 2018; Matsumori 2019), and to a lesser degree in other Asian languages which are otherwise 'GT-poor', such as Cantonese (yue; e.g. 'changed tone', Alderete *et al.* 2022), Burmese (mya; incipient GT for possessor marking, Allott 1967; Tian 2018) and Dzongkha (dzo; incipient GT for ergative marking, Watters 2018: 127).

From these collective efforts, we now know that GT demonstrates a unique configuration of properties, above and beyond the already well-known remarkability of tone generally. Templatic effects are found in great regularity across African GT systems, surpassing in regularity and scope their more famous segmental template counterparts à la Semitic and Yokuts. One example comes from Kalabari, a language introduced already. Here, the lexical tone of a noun is replaced with one of four tonal templates (L, HL, LH or H$^{\downarrow}$H) depending on the modifier it co-occurs with. The core patterns are shown in (3) (Harry & Hyman 2014: 651).

(3)

	EXAMPLE:		*Quantifier* jà 'some'	*Associative* tụ̀bọ̀ 'child's'	*Determiner* tọ 'which'	*Poss. pron.* ịnà 'their'
a.	námá	'meat' →	jà **nàmà**	tụ̀bọ̀ **námà**	tọ **nàmá**	ịnà **ná$^{\downarrow}$má**
b.	pùlò	'oil' →	jà **pùlò**	tụ̀bọ̀ **púlò**	tọ **pùló**	ịnà **pú$^{\downarrow}$ló**
c.	bélè	'light' →	jà **bèlè**	tụ̀bọ̀ **bélè**	tọ **bèlé**	ịnà **bé$^{\downarrow}$lé**
d.	gàrí	'garri' →	jà **gàrì**	tụ̀bọ̀ **gárì**	tọ **gàrí**	ịnà **gá$^{\downarrow}$rí**
e.	bá$^{\downarrow}$rá	'hand' →	jà **bàrà**	tụ̀bọ̀ **bárà**	tọ **bàrá**	ịnà **bá$^{\downarrow}$rá**

Such patterns of 'tonal overwriting' in (3) – as well as in (2) from Makonde – are widespread in GT systems, and are often not bound to the word from which they originate. A particularly extreme case comes from the Orungu dialect of Myene (mye; Bantu, Maniacky & Ambouroue 2014: 252, 257), shown in (4). Most inflectional contexts have a quite limited GT effect (if any), for example, the negative past in (4a), whose prefixes sponsor no GT, and the floating tone of the root (conventionally represented as Ⓗ) does not venture beyond its own word boundaries. In contrast, in the superficially similar negative present in (4b), the floating Ⓛ GT replaces the tones of all words to its right, up to the clause boundary. Similarly, contexts such as the negative subjunctive in (4c) sponsor a floating Ⓗ GT, which equally spreads in an unbounded manner to the right. Here, tonal overwriting is clause-bound, rather than word- or even phrase-bound.

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(4) a. *Negative past*
/à-é-ɾè-ɾìɣⒽ-è àwáná áŋkà ɣó ìŋkòlò/
3SG-PFX-NEG-leave-FV children alone PREP tonight
[èɾé↓**tíɣ** àwán ↓áŋkà ɣó ↓ŋkólò]
's/he did not leave the children alone tonight'

b. *Negative present*
/à-é-ɾè-Ⓛ-ɾìɣⒽ-a àwáná áŋkà ɣó ìŋkòlò/
3SG-PFX-NEG-**GT**-leave-FV children alone PREP tonight
[èɾé**tìɣ** **àwàn àŋkà ɣò ŋkòlò**]
's/he does not leave the children alone tonight'

c. *Negative subjunctive*
/à-Ⓗ-ɾìɣ-à àwáná áŋkà ɣó ìŋkòlò/
NEG-**GT**-leave-FV children alone PREP tonight
[à-**ɾíɣ** **áwán áŋká ɣó ŋkóló**]
'do not leave the children alone tonight'

Furthermore, one recent case of grammatical tone circulated widely in the literature comes from another Bantu language Kuria (kuj; Odden 1987; Cammenga 1994, 2004; Mwita 2008; Marlo *et al.* 2014, 2015; Rolle & Lionnet 2020; Sande *et al.* 2020; Trommer in press), and has caused phonologists to reassess the received wisdom that 'grammars don't count' (on counting effects: McCarthy & Prince 1986; Kenstowicz 1994: 372; Hayes 1995: 307; Smith & Tsimpli 1995: 312; Isac & Reiss 2008: 65; Graf 2017; Paster 2019; Kawahara & Kumagai 2023; see these last two works for extensive references). In Kuria, a high GT is assigned to the first, second, third or fourth mora of the prosodic stem depending on the grammatical context. (5) summarises the basic patterns, with page references to Mwita (2008). (Note that various language-general spreading rules are not reflected in these forms, as they are orthogonal to the grammatical tone patterns.)

(5)

a.	∅ Hortatory imperative	to-tá-(turuuŋana)$_{\Sigma}$ 'let us welcome' (336)
b.	ɱ1 Habitual past (FOC)	n-to-ogá-(**tú**ruuŋaini)$_{\Sigma}$ 'we used to welcome (then)' (305)
c.	ɱ2 Hodiernal past progressive (FOC)	n-to-oga-(tu**rú**uŋaini)$_{\Sigma}$ '(indeed) we have been welcoming (today)' (316)
d.	ɱ3 Remote future (FOC)	n-to-re-(turu**ú**ŋana)$_{\Sigma}$ 'we will welcome (then)' (321)
e.	ɱ4 Hortatory imperative (inceptive)	to-ra-(turuu**ŋá**na)$_{\Sigma}$ 'we are about to welcome' (328)
f.	ɱ1+4 Narrative past	to-gá-(**tú**ruu**ŋá**na)$_{\Sigma}$ '(and) we welcomed' (329)

The clause-level tonal overwriting from Orungu and the counting effects in Kuria are excellent examples of tone going above and beyond what is expected of segmental counterparts. In comparison, we know of no clear and convincing case of a language

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where vowel harmony is triggered by a prefix but spreads unbounded to the opposite clause edge (for related commentary, see Kaisse 2019, and for a reported case of sentence-level harmony in Isaaq Somali [som], see Andrzejewski 1955). We sketch such a pattern in (6), where we call it 'Faux Orungu'. Likewise, we know of no language in which inflectionally restricted umlaut idiosyncratically targets a numerically defined position in the word, as imagined in (7) in 'Faux Kuria' using a hypothetical stem /turuŋana/.

(6) *Faux Orungu (unattested): Unbounded clause-level front–back harmony*

/a-e-**ɾe**-ɾiɣ-a	awana	aŋka	ɣo	iŋkolo/
3SG-PFX-**NEG**-leave-FV	children	alone	PREP	tonight
[e**retiɣæ**	**æwænæ**	**æŋkæ**	**ɣø**	**iŋkølø**]

(7) *Faux Kuria (unattested): Counting effects with inflectional umlaut with stem /turuŋana/*

a.	μ1	Habitual past	n-to-oga-(**ty**ruŋana)$_{\Sigma}$
b.	μ2	Past progressive	n-to-oga-(tu**ry**ŋana)$_{\Sigma}$
c.	μ3	Remote future	n-to-re-(turu**ŋæ**na)$_{\Sigma}$
d.	μ4	Inceptive	to-ra-(turuŋa**næ**)$_{\Sigma}$

Other notable properties making grammatical tone distinct are non-local assignment of GT on the tonal tier (Tommo So [dto]; McPherson & Heath 2016: 623), GT demonstrating affix faithfulness as commonly as root faithfulness (Rolle 2018; cf. McCarthy & Prince 1995; Beckman 1998; Urbanczyk 2011), across-the-board paradigmatic tone polarity (Kipsigis [sgc]; Kouneli & Nie 2021) and scalar GT changes in a five-height tone system (Guébie [gie]; Sande 2019).

The empirical richness of GT has engendered a rich literature of explicit theoretical proposals. Grammatical tones have been analysed as qualitatively distinct contrastive units (Kimenyi 1978 on Kinyarwanda [kin]), and more recently as quantitatively distinct using gradient strength (a scale from 0.0 to 1.0; Smolensky & Goldrick 2016; Zimmermann 2018; Kushnir 2022). Various approaches have also used special configurations of floating tones to produce unique grammatical tone effects, for example, 'circumfixal' floating tones in Trommer (2011). Other approaches postulate no special 'tones' in GT patterns, but rather involve some modification of the grammar and rule/constraint set. Examples include the use of Cophonology Theory plus markedness constraints (Inkelas 1998; Sande *et al.* 2020), construction constraints with direct reference to syntactic c-command (McPherson 2014) and various forms of transderivational correspondence (e.g. antifaithfulness in Alderete 2001a, 2001b). Still others appeal only to prosodic domains and markedness to account for GT patterns (Rolle & Kari 2022), adopt a version of MaxEnt involving special operations 'regularisation' and 'scaling' (Gouskova & Linzen 2015), or simply assume omnipresent suppletive allomorphy (Archangeli & Pulleyblank 2022). Hovering over all GT accounts is the perennial question of why tone (and tone alone) shows its unique set of properties. Certainly, the autosegmental nature of tone is partially responsible (where tones often interact 'at a distance'), but what precisely can preclude patterns akin to the hypothetical (6) and (7) (*inter alia*) is not settled.

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Despite both our empirical progress and subsequent theoretical sophistication, the above theories are rarely directly compared nor are the underlyingly GT patterns. Part of the motivation for this special issue is that there still remains a wide disconnect between linguistic theory and this grammatical tone literature, especially with respect to interface theories which probe the relationship of phonology to separate syntactic/morphological module(s). This is true across the phonologically oriented literature, for example, Stratal Optimality Theory (Bermúdez-Otero 2012, 2018; Kiparsky 2015), Constraint Indexation (Pater 2000; Jurgec & Bjorkman 2018), Match Theory (Selkirk 2009, 2011; Selkirk & Lee 2015) and other architectural treatises (e.g. Scheer 2011, 2012). Equally, GT remains under-incorporated in morphosyntactically oriented interface work, for example, Paradigm Function Morphology (Stump 2001), Distributed Morphology (Halle & Marantz 1993), Construction Morphology (Booij 2010) and Parallel Architecture (Jackendoff 1997).

2. Summary of papers

The seeds of this issue were planted at the 2021 Princeton Phonology Forum (PϕF), whose focus was 'tone and phonological theory'. Many of the talks at this workshop involved GT, and given the importance of this topic as a whole (as discussed in §1), this naturally led to the present issue. While some of the participants of that workshop have papers here, the two were formally separate and submissions were open to any and all interested parties.

Our issue is inevitably skewed towards Africa, in line with the characterisation that certain tonal regions of the world – in particular Asia – use tone primarily lexically rather than grammatically. Still, this issue involves a wealth of exemplification of GT from several languages families such as Mabia/Gur, Benue-Congo (especially its sub-branch Bantu), Kru and Nilotic in Africa, as well as Otomanguean in Mexico.

The first paper, by **Hannah Sande**, asks the general question 'Is grammatical tone item-based or process-based?' Morphology as item-based *vs.* process-based has been a long-standing debate in the morphological literature (Hockett 1954; Bermúdez-Otero 2012), with certain frameworks, like the aforementioned Distributed Morphology, treating morphological operations as primarily item-based while others, such as Anderson's (1992) A-morphous Morphology, argue that morphology is better analysed as process-based.

In her article, Sande draws on case studies from a number of languages and develops a set of diagnostics to determine whether the GT alternations are best analysed as item-based, process-based or suppletive. These diagnostics include whether the GT has a consistent realisation across a paradigm, whether it is phonologically derivable, and whether it follows the general rules of the language's phonology. If a case of GT meets all three criteria, it is best analysed as item-based; if it fails to meet any of the criteria, it is best analysed as suppletive; and finally, if it is phonologically derivable but is inconsistent in its realisation and outside of the regular bounds of the phonological grammar, then it is best analysed as process-based.

Sande goes on to show that item- and process-based morphology can in fact be unified in a single framework, Cophonologies by Phase (Sande 2019; Sande *et al.*

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2020). However, the distinction between items and processes remains relevant for how this framework captures GT. Item-based GT involves the addition of an underlying phonological form in the vocabulary item, process-based GT involves morpheme-specific constraint ranking and suppletive GT – such as the Chinese tone replacement case discussed in the article – requires lexical listing of allomorphs. While many excellent papers have analysed individual cases of GT, this paper highlights what GT can reveal about the architecture of the morphophonological grammar when diverse case studies are considered together.

Next are four papers focusing on GT patterns in particular languages. Most of the cases of GT involve tonological operations that express a morphosyntactic feature, but tone can interact with morphology in broader ways as well. **Arto Anttila** and **Adams Bodomo**'s paper, titled 'Tone and morphological level ordering in Dagaare' explores these latter interactions. In Dagaare (dga; Mabia/Gur, Ghana and Burkina Faso), tonal processes such as dissimilation, spreading and tonal absorption are sensitive to morphological level (stem level, word level, postlexical level) as well as syntactic category, and as such fit our working definition of GT as a grammatically restricted tonological pattern.

To expand, cross-linguistically nouns and verbs are subject to different constraint rankings and hence different tonal behaviour (Smith 2011). This situation is found in Dagaare. For instance, at the stem level, toneless syllables are filled in by H tone spreading in nouns, but by default L insertion in verbs, e.g. /tuu-ró/ → [túú-ró] 'follow-AG' (noun), but /tuu-ró/ → [tùù-ró] 'follow-IPFV' (verb). The key piece of evidence for level ordering in Dagaare comes from whether and how a sequence of two H tones is repaired. At the stem level, Meeussen's Rule applies, dissimilating the second H tone to L. In contrast, at the word level, such as in compound formation, a downstep is inserted between the two H tones, and at the postlexical level, HH sequences are left unrepaired.

Anttila and Bodomo's paper provides an example in which GT requires cyclicity in word formation: at most one downstep is permitted per word, and downstep derived at the stem level by contour tone simplification blocks the derivation of downstep at the word level, a familiar 'inside-out' effect. They couch their analysis in Stratal OT (Kiparsky 2000), where constraint rankings may differ depending upon stratum but also depending upon syntactic category, as in Cophonology Theory (Anttila 2002; Inkelas & Zoll 2007). In short, the authors demonstrate that 'once morphology is properly understood phonology turns out to be simple'. GT thus proves to be an important tool in understanding morphology, phonology and the interface between the two components of grammar.

Next is **Nadine Grimm**'s paper 'Exponence and the functional load of grammatical tone in Gyeli'. This examines the division of labour between tonal and segmental co-exponents of morphological categories, focusing on the intricate tone system of Gyeli (gyi; Bantu, Cameroon). GT is used almost exclusively in the marking of tense/aspect/mood and polarity on the verb and preverbal markers in Gyeli.

Grimm's paper makes two main points. First, the more segmental material there is in a morpheme, the weaker the functional load of the tonal co-exponent of that morpheme. In other words, morphemes with both segmental and tonal co-exponents

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are characterised by one-sided redundancy: the segmental co-exponent would in most cases suffice to distinguish the morpheme (and the tonal information can be seen as redundant), whereas the tonal co-exponent on its own would not be sufficient (i.e. the segmental information cannot be considered redundant). Tone is thus morphologically informative and non-ambiguous only when it is the sole exponent of a morphological category.

The second point of the paper has to do with the relation between grammatical and lexical tones. Gyeli is a language where GT is 'dominant', following Rolle's (2018) usage of the term – that is, when confronted with a choice between the realisation of grammatical and lexical tones, the language always realises the former at the expense of the latter, which is overwritten. Interestingly, however, when there is room for both in a verb form (i.e. when there are enough tone-bearing units), both are realised. In other words, Gyeli strives to maintain both lexical and grammatical tones, and sacrifices lexical tone only when one of the two must go. GT in Gyeli is thus dominant only 'under duress', that is, as a last resort. This case exemplifies GT winning out over a root's underlying lexical tone when they compete, a common situation in tone systems and one which contradicts the general finding with segmental patterns, in which a root's phonological features are preserved over those of an affix (Urbanczyk 2011).

Bantu is one of the few families where there are both a critical mass of tone researchers and a substantial existing tone literature. It is therefore not surprising to find another Bantu-focused paper: **Larry Hyman** and **Hildah Kemunto Nyamwaro**'s paper on 'Grammatical tone mapping in Ekegusii'. Indeed, their study here picks up where Bickmore's (1997, 1999) and Cammenga's (2002) earlier studies on Ekegusii (guz) left off. Hyman & Kemunto Nyamwaro's paper provides an extremely detailed empirical study of verbal GT, including a state-of-the-art description that works out the many conditioning factors governing the shape of individual GT patterns.

Their paper brings up several important theoretical issues. One is that in order to derive the Ekegusii tone mappings, global access to word-level morphological and phonological information is required. Thus, while the GT patterns themselves target the smaller prosodic stem domain, the conditioning factors need not be contained solely within this constituent. This finding is striking when put alongside other papers in this issue (in particular Yuni Kim's; see below), which involve a more constrained cyclic model which lacks the power of such global calculations. Rather than viewing this simply as a contradiction, we see it as calling for a more nuanced theory which finely demarcates where we expect globality effects and where cyclicity effects.

Perhaps the most remarkable aspect of Ekegusii is yet another instance of what Rolle & Bickmore (2022) descriptively refer to as 'first–last tone harmony', found infrequently but persistently across Bantu (Meeussen 1967, 1971; Nsuka Nkutsi 1982; Schadeberg 1989; Roberts-Kohno 2000, 2014; Bickmore 2007, 2014; Hyman 2012; Jones & Freyer 2019). Hyman & Kemunto Nyamwaro show that certain grammatical contexts in Ekegusii show 'tonal agreement' between the subject prefix, which appears at the left edge of the word, and the final inflectional vowel at the right edge. For example, in the 'subject relative clause today past negative (Past1)', if the subject prefix is lexically high-toned, then a grammatical high tone falls on the last

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suffix (e.g. *ábanto* ***bá****-tá-á-súgum-****á*** ‘people who didn’t push’). In contrast, if this subject prefix happens to be toneless, then the final suffix too must remain toneless and cannot host the grammatical tone (e.g. *…****o****-tá-á-súgúm-****a*** ‘…who didn’t push’). Rolle & Bickmore (2022) interpret such globally sensitive patterns as suppletive allomorphy, and articulate the ramifications of this for linguistic theory with respect to morphological locality and directionality. Regardless of interpretation, non-local dependencies like this should be of major interest to linguists of several stripes (including the computationally minded, for whom first–last phonological harmony is said to be outside of what is possible in phonology; see Heinz & Idsardi 2013; Lai 2015; Jardine 2020).

Lastly, **Yuni Kim**’s paper ‘Grammatical and lexical sources of allomorphy in Amuzgo inflectional tone’ takes us outside of Africa to examine the complex GT patterns in the Mexican language Amuzgo (azg). Amuzgo is part of the Otomanguean family, known for having some of the most complicated systems of inflectional tone (Palancar & Léonard 2016), made especially challenging by the often large number of inflection classes whose membership appears to be mostly unpredictable. Amuzgo is no exception. Kim shows that transitive verbs in Amuzgo belong to up to 21 arbitrary inflection classes, defined by the distribution of replacive GT patterns in 1SG and 2SG forms. However, this irregularity levels out in derived causatives, where inflectional tone patterns become predictable based on the lexical tone of the verb root.

Kim accounts for this discrepancy in behaviour by appealing to cyclic spell-out: morphosyntax spells out in chunks when a phase head is reached, and morpho-lexical features are checked off in the process, so that they are no longer active or visible at later cycles (Bobaljik 2000). Causatives contain a Voice head, which triggers spell-out, and so by the time person inflection is reached, the verb’s inflection class features are no longer active; thus, allomorphy can be sensitive to phonological form alone. Non-causatives, on the other hand, contain no such phase head, and so tone marking person can be sensitive to inflection class. Kim’s work thus adds to the growing number of case studies in which GT provides crucial evidence for a cyclic model of morphosyntax (see also McPherson & Heath 2016; McPherson 2019; Sande 2019; Sande *et al.* 2020).

Kim analyses the replacive nature of Amuzgo GT with a combination of allomorph listing and cophonologies. Essentially, every input contains both the root’s and any affix’s lexical tones, along with a list of candidate allomorphs with each of Amuzgo’s five possible inflectional tones. These allomorphs are listed in a preferred order, with a constraint PRIORITY assigning an increasing number of violations the farther down the priority list a particular allomorph is. Slightly different constraint sets for 1SG and 2SG inflection account for tonal differences between these two forms. Viewed in terms of Sande’s diagnostics, Amuzgo GT appears to be suppletive. It is not phonologically consistent across the paradigm; it is not easily phonologically derivable (as Kim shows in her §4.2); and it does not follow the general phonology of the language. Nevertheless, the choice between listed suppletive allomorphs can be phonologically conditioned. Thus, Kim’s analysis of Amuzgo GT elucidates not only the larger architecture of morphosyntax but also the details of how phonology and morphology interact to decide upon surface allomorphs.

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3. Conclusion

We sought to produce an issue dedicated to the importance of grammatical tone for wider linguistic theory, and phonological inquiry in particular. In this sense, the papers collected here succeed by bearing on a number of ongoing theory-driven debates in the literature, such as the role of storage *vs.* computation in deriving surface patterns, local *vs.* global access to neighbouring phonological content and the fine timing of morpho-phonological processes in a stratal organisation.

At the same time, we must acknowledge that at least half the world's languages are tonal (Yip 2002), with a huge number of them in the least-documented areas of the world (Hammarström 2010, 2014). Although Africa (particularly Bantu languages) and Meso-America are relatively well-represented in the literature on grammatical tone (and, unsurprisingly, in the present collection), tonal languages from other areas or language families where GT has been identified (e.g. in New Guinea, North and South America, Pakistan or New Caledonia) ought to be included in discussions of grammatical tone as well. The task of bringing together grammatical tone and linguistic theory is enormous, and requires broader coverage, both empirical and theoretical, of the many tonal systems that are still awaiting analysis and often even basic description. In the end, we firmly believe that linguistic theory – and especially the interrelations of phonology, morphology and syntax – still has a huge amount to gain by specifically engaging with grammatical tone. This special issue, however limited in scope, is one step in this direction.

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