Across-the-board tonal polarity in Kipsigis: Implications for the morphology-phonology interface

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Abstract

Using novel data from Kipsigis (Southern Nilotic; Kenya), we present the first attested case of across-the-board paradigmatic tonal polarity. The nominative case forms of nominal modifiers (adjectives, possessives, and demonstratives) are segmentally identical to their oblique case counterparts but have the opposite tonal pattern across-the-board: nominative and oblique modifiers differ in not just one but EVERY tonal specification. Kipsigis polarity thus results in maximal tonal contrast between two morphologically related words. We show how the Kipsigis pattern may be captured in an item-and-process theory of morphology with dedicated exchange mechanisms and an item-and-arrangement theory that allows for morpheme-specific phonology; we suggest that an item-and-process approach may provide a more straightforward account.[*]

Keywords: Morphology, phonology, tone, polarity, Kipsigis, Nilotic

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1. INTRODUCTION. Many recent approaches to the morphology-phonology interface have attempted to reduce all morphological phenomena to the interaction between a phonologically constant affix and its base (e.g. Wolf 2007, Bye & Svenonius 2012, Zimmermann 2013, 2017, Trommer 2014a, b). These item-and-arrangement approaches contrast with item-and-process views of morphology (Hockett 1954), where morphosyntactic distinctions are encoded directly in the form of the base (e.g. Anderson 1992, Aronoff 1994, Alderete 1999, Kurisu 2001, Stump 2001, Inkelas 2014). While some examples of apparent non-concatenative segmental morphology have successfully been recast as affixation (see Kastner & Tucker 2019 for a recent overview, also Rolle 2018), there are many cases of grammatical tonal processes that have resisted such reanalysis (Hyman 2011, 2018, Inkelas 2014, Sande 2017, 2018).

One class of grammatical tonal processes for which an affixation analysis does seem plausible is syntagmatic tonal polarity, where an affix shows 'a tone that is the opposite of the neighbouring tone' (Yip 2002:159). In Kɔnni (Gur; Ghana), for example, the plural suffix *-a* surfaces with a tone opposite to the final tone of the noun stem (Cahill 2004).[1]

(1) Syntagmatic tonal polarity in Kɔnni (Cahill 2004:14)

Plural		Gloss
sí-à	H-L	'fish-PL'
tàn-á	L-H	'stone-PL'
zùnzú-à	L.H-L	'maggot-PL'

Because they depend on a segmental affix and its immediate tonal context, cases of syntagmatic tonal polarity have been analyzed in item-and-arrangement models of morphology as resulting from a combination of concatenation and dissimilation (Kenstowicz et al. 1988, Trommer 2014b). Trommer (2014b) points out that an item-and-process view of morphology would predict languages with paradigmatic tonal polarity, in which two morphologically related words differ systematically only in having one or more opposite tones. That is, there should be a hypothetical language Kɔnni′ in which a morphological distinction such as number is encoded by switching, for instance, just the final tone of the word; this hypothetical Kɔnni′ system is

[1] Abbreviations: 1 = first person, 3 = first person, Adj = adjective, ATR = advanced tongue root, Dem = demonstrative: DIST = distal demonstrative, H = high tone, IPFV = imperfective, L = low tone, MED = medial demonstrative, NOM = nominative, OBL = oblique, PL = plural, PRED = predicative, PROX = proximal demonstrative, SEC = secondary suffix, SG = singular, TH = thematic suffix.

illustrated in 2. Trommer claims that no such language exists and that the item-and-process view therefore overgenerates.

(2) Paradigmatic tonal polarity in Kɔnniˈ (hypothetical)

Singular		Plural	
sí	H	sì	L
tàn	L	tán	H
zùnzú	L.H	zùnzù	L.L

In this paper, we present novel data from Kipsigis (Southern Nilotic; Kenya) showing that case inflection of nominal modifiers, which includes demonstratives, possessives, and adjectives, exhibits true paradigmatic tonal polarity; the nominative and oblique case forms of modifiers differ only in having opposite tones. Tonal polarity in Kipsigis furthermore applies across-the-board, such that each tone in the nominative form of a modifier has the opposite value to its counterpart in the oblique. Some examples from our fieldwork are given in 3.

(3) Paradigmatic tonal polarity in Kipsigis

Oblique		Nominative		Gloss
náːn	H	nàːn	L	‘MED.SG’
tʃòːk	L	tʃóːk	H	‘my.PL’
áɲìŋ	H.L	àɲíŋ	L.H	‘tasty.SG’
tʃéptʃép-èːn	H.H.L	tʃèptʃèp-éːn	L.L.H	‘swift-PL’
míntìlíːl	H.L.H	mìntílìːl	L.H.L	‘sour.SG’
míntìlíːl-èːn	H.L.H.L	mìntílìːl-éːn	L.H.L.H	‘sour-PL’

To the best of our knowledge, Kipsigis tonal polarity represents not only the first documented case of true paradigmatic tonal polarity, but also the first exchange process reported to apply across a whole word. Any analysis of Kipsigis tonal polarity must therefore be able to capture not only its status as a tonal exchange process but also its across-the-board nature.

While our data from Kipsigis support the existence of exchange processes at a descriptive level, the theoretical status of exchange processes nonetheless remains highly contentious (de Lacy 2020). Theories of morphology differ in whether they take exchange processes to be basic, as in item-and-process models (where words are built by the application of morphological processes), or epiphenomenal, as in item-and-arrangement models (where words are built by the concatenation of morphemes). The Kipsigis data, we argue, show that the grammar must

crucially permit (i) morphosyntactically-conditioned phonology as well as (ii) mechanisms to enforce maximal contrast between two morphologically related words. While both sets of approaches are able to implement these properties technically, we suggest that item-and-process models with a dedicated exchange mechanism provide a more straightforward account.

The paper is structured as follows. In §2, we establish descriptive criteria for identifying process morphology and exchange processes and show that previously reported instances of tonal exchange do not meet these criteria. The next two sections present data from Kipsigis. §3 outlines the features of Kipsigis phonology and case marking that are relevant for our discussion of polarity. §4 presents the core data on case inflection on nominal modifiers, showing that the nominative case formation of demonstratives, possessives, and adjectives involves true across-the-board tonal polarity. In §5, we discuss the theoretical status of exchange processes in item-and-arrangement and item-and-process models of morphology and how these models would account for across-the-board contrast in Kipsigis. Across-the-board polarity nonetheless seems to be rare; §6 concludes with a discussion of the conditions that conspire to give rise to such a process in Kipsigis and why it is not more common cross-linguistically.

2. PROCESS MORPHOLOGY. Morphemes have played a central role in morphological theorizing since at least Bloomfield (1933), who defines the morpheme as 'a linguistic form which bears no partial phonetic-semantic resemblance to any other form' (Bloomfield 1933:161). For example, the English plural morpheme /z/ can be suffixed to the another morpheme /dɔg/ to create the complex word /dɔg-z/. It has long been known, however, that the task of identifying morphemes is not always as straightforward as in the /dɔg-z/ example, and cross-linguistically morphology often appears NON-CONCATENATIVE instead. A diverse range of morphological phenomena fall under the label of non-concatenative morphology, including reduplication, infixes, circumfixes, and the root-and-pattern morphology of Semitic languages. A subtype of non-concatenative morphology is PROCESS MORPHOLOGY, where the meaning of a given category is not associated with a particular affix, but is rather expressed via a phonological rule or process. In German, for instance, many nouns form their plural by fronting (umlaut) of the vowel of the singular form, without the addition of a separate plural suffix (e.g. singular [faːtɐ] vs. plural [fɛːtɐ] for 'father'). We focus the discussion in this paper on phenomena which clearly involve a

phonological process without an accompanying (supra)segmental affix, following Inkelas' (2014) diagnostic criterion for process morphology.

(4) Process morphology diagnostic criterion (adapted from Inkelas 2014:76)

A phonological alternation is the sole marker of the morphological construction.

Additional examples of process morphology that satisfy this criterion include ablaut, subtractive morphology and exchange processes.

EXCHANGE PROCESSES (also called 'toggling' or 'polarity') are particularly striking examples of process morphology, in which a morphological contrast is expressed by changing one or more [+F] segments to [-F], and [-F] segments to [+F] in the same environment (Anderson & Browne 1973, McCawley 1974, Anderson 1992, Alderete 1999, Anttila & Bodomo 2000, Moreton 2004, Wolf 2007, de Lacy 2012, 2020, Inkelas 2014, DiCanio et al. 2020). In this section, we present examples of exchange processes previously reported in the literature. Despite there being some skepticism around the robustness of exchange phenomena (e.g. de Lacy 2012, Trommer 2014b), we show that they do exist in the world's languages, at least at a descriptive level, although no true cases of exchange have previously been documented to involve tone.

2.1. EXCHANGE PROCESSES. Although typologically attested, process morphology is nevertheless uncommon compared to affixal morphology (Anderson 1992, Inkelas 2014). Polarity in particular is among the rarest subtypes of process morphology, and its robustness, even at a descriptive level, has been called into question (e.g. de Lacy 2012, Trommer 2014b). Possibly the best-known exchange rule comes from DhoLuo, a Western Nilotic language of Kenya, in which the voicing of the final consonant in the nominative singular base takes on its opposite value in the plural (e.g. Stafford 1967, Okoth-Okombo 1982, Trommer 2008, de Lacy 2012). As shown in 5, voiceless final consonants in the singular become voiced in the plural, while voiced final consonants become voiceless.

(5) Voicing polarity in DhoLuo (de Lacy 2012:121)

Singular	Plural	Gloss
gɔt	gɔdɛ	‘hill’
agɔkɔ	agɔgɛ	‘chest’
alap	ælæbe	‘open space’
kɛdɛ	kɛtɛ	‘twig’
kitæbu	kitepe	‘book’
hɪga	hike	‘year’

Despite the prominence of the DhoLuo case in almost all discussions of polarity, de Lacy (2012) argues that plural formation in DhoLuo follows more complex generalizations than is usually assumed and that polarity applies to only a subset of nouns. He therefore concludes that DhoLuo plural formation, along with several other purported cases of polarity (e.g. vowel length polarity in Dinka), do not constitute true exchange processes. However, de Lacy does not rule out the existence of a yet-to-be-discovered polarity pattern, and he discusses the properties that a true polarity pattern should exhibit. Building on de Lacy 2012 and also Wunderlich 2012, DiCanio and colleagues (2020) identify three criteria for defining a true morphophonological exchange process.

(6) Exchange process criteria (adapted from DiCanio et al. 2020:3)

a. Productivity: the alternation must not apply to a limited, closed set of roots in the language.
b. Dominance: the alternation must be the dominant morphological exponent for the morpheme in question.
c. Morphosyntactic uniformity: all roots undergoing the alternation must belong to the same morphosyntactic category.

At least two cases that meet the criteria in 6 have been documented in the literature. One comes from Päri, a Western Nilotic language of South Sudan, in which the frequentative aspect is associated with vowel length polarity (Andersen 1988, 1989, Trommer 2011, Trommer & Zimmermann 2014). As shown in 7, short vowels in the verb stem lengthen in the Päri frequentative, while long vowels in the stem shorten.

(7) Length polarity in Päri (Andersen 1988:8)

Stem	Frequentative	Gloss
a-jap	a-jaːmb-ɪ	‘open’
a-jɪk	a-jɪːŋg-ɪ	‘make’
a-kʌt	a-kʌːnd-ɪ	‘plait’
a-lʊːp	a-lʊp-ɪ	‘speak’
a-rɪːt̪	a-rɪt̪-ɪ	‘sew’
a-waːŋ	a-waŋg-ɪ	‘burn’

Another case is found in San Martín Itunyoso Triqui, an Otomanguean language spoken in Mexico. The formation of 3rd person topic (3TS) forms in Itunyoso Triqui involves a process of ‘glottal toggling’ (DiCanio et al. 2020). If the bare root ends in /ɦ/, /ɦ/ is deleted and the final vowel is lengthened in the 3TS stem; if the bare root ends in a long vowel, the vowel is shortened and /ɦ/ is added. The alternation is illustrated in 8.[2]

(8) Glottal toggling in Itunyoso Triqui (DiCanio et al. 2020:17)

Bare root	3TS stem	Gloss
ttaɦ^{45}	tta:^{3}	‘to be above’
a^{3}toɦ^{3}	a^{3}to:^{3}	‘to sleep’
ri:^{32}	riɦ^{3}	‘to take out’
a^{3}ja:^{32}	a^{3}jaɦ^{3}	‘to read’

Cases like these, while few and far between, indicate that exchange processes do exist in the world’s languages, at least at a descriptive level. However, as de Lacy (2020) notes, the existence of EXCHANGE PATTERNS in description does not automatically necessitate the existence of EXCHANGE MECHANISMS in the theory; these exchange patterns could be epiphenomenal, arising from a confluence of independent factors. For example, length polarity in Päri could result from the interaction of a defective mora and general constraints on syllable weight

[2] In 8 we adopt DiCanio and colleagues’ (2020) numerical transcriptions for tone. While the bare root and 3TS forms also differ in tone, DiCanio and colleagues argue that this alternation is independent of the polarity pattern.

(Trommer & Zimmermann 2014), while glottal toggling in Itunyoso Triqui could arise from opacity involving epenthesis and deletion (de Lacy 2020). Furthermore, it is unclear whether the Päri and Itunyoso Triqui exchange patterns qualify as process morphology given that they involve both addition AND subtraction of some (supra)segmental material. Therefore, while we can conclude that exchange processes are indeed attested descriptively, many more examples of exchange must be collected if we want to determine to any degree of certainty whether they are basic or epiphenomenal. In this paper, we contribute a novel exchange process from Kipsigis to this discussion.

2.2. A TONAL GAP. Tonal morphology provides some of the clearest and most spectacular examples of process morphology cross-linguistically (Inkelas 2014, Sande 2017, 2018). Guébie (Kru; Côte d'Ivoire), for instance, marks the imperfective aspect with a scalar shift in surface tone, which either lowers the tone of the inflected perfective verb or raises the tone of the preceding subject (Sande 2017, 2018). The behavior of verbs is shown in 9, where verbs with a level tonal shape have all their tones lowered by one step in the imperfective, and verbs with a tonal contour have their first tone lowered by one step. Interestingly, perfective verbs with the lowest tone, 1, do not become super-low in the imperfective; rather, the tone of the preceding subject raises by one step instead (see Sande 2017, 2018 for further details).

(9) Scalar tonal shift in Guébie (Sande 2018:262)

Verb	Perfective	Imperfective	Gloss
gba	4	3	'bark'
gbete	3.3	2.2	'boil'
pa	2	1	'tell'
lope	4.1	3.1	'sleep'
gbala	3.4	2.4	'climb'
jiri	2.3	1.3	'steal'
gala	1.1	1.1	'perch'
ci	1	1	'start'

While tonal process morphology is well-attested in tonal languages, no exchange processes previously reported to involve tone meet the criteria in 6. As Trommer (2014b) points out, all of the so-called tonal exchange processes reported in the literature occur with additional segmental material. We have already seen an example of this 'syntagmatic' type of polarity from Kɔnni, where the plural suffix (also subject to [ATR] harmony) surfaces with the opposite tonal specification of the final tone of the noun stem (Cahill 2004); examples are given in 10.

(10) Tonal polarity in Kɔnni (Cahill 2004:14)

Plural		Gloss
sí-à	H-L	'fish-PL'
tíg-è	H-L	'house-PL'
tàn-á	L-H	'stone-PL'
bìːs-á	L-H	'breast-PL'
zùnzú-à	L.H-L	'maggot-PL'

Since this tonal alternation occurs with additional segmental material, some have argued that the apparent polarity effect in Kɔnni is not a true exchange process, but is rather the combined result of affixation and dissimilation, where the tone of the affix alternates in order to avoid an OCP violation (e.g. Kenstowicz et al. 1988, de Lacy 2012, Trommer 2014b). A similar OCP analysis may apply to the formation of present tense of Margi (Chadic; Nigeria), where both the present tense prefix *a* and pronominal clitic *gu* dissimilate tonally from the verb root in 11 (Kenstowicz & Kisseberth 1979, Pulleyblank 1983).

(11) Tonal polarity in Margi (Kenstowicz & Kisseberth 1979:43)

Verb (2SG)		Gloss
á dlà gú	H L H	'you fall'
á wì gú	H L H	'you run'
á g^{h}à gú	H L H	'you reach'
à sá gù	L H L	'you go astray'
à tsú gù	L H L	'you beat'
à hú gù	L H L	'you take'
à və̌l gù	H LH L	'you fly'

Thus no tonal exchange process reported to date has unequivocally been shown to involve true paradigmatic polarity.

Tone therefore appears to constitute a gap in the typology of exchange processes. This might be surprising, given that tonal phonology is known to be generally more permissive than segmental phonology, a point emphasized by Hyman (2011, 2018), who argues that tone can do everything segments can do, but segments cannot do everything tone can do. If Hyman is right, then if exchange processes can target segments and vowel length, it should also be able to target tone. We show in this paper that true tonal polarity is indeed attested and present a case study from Kipsigis.

3. KIPSIGIS BACKGROUND. Kipsigis is the major dialect of Kalenjin, a Southern Nilotic language spoken primarily in Kenya. There are approximately 2 million speakers of Kipsigis, but the language is severely understudied, especially in the theoretical literature.[3] Here we provide a brief overview of Kipsigis phonology (§3.1) and case and DP structure (§3.2), and discuss the general tonal phonology of the language (§3.3). Unless indicated otherwise, all data in this paper come from original fieldwork conducted by the first author with two US-based native speakers (2017-2019) and with ten native speakers in Kenya (during three field trips in 2017, 2018, and 2020). The twelve native speakers (two female, ten male) were between 19-30 years of age and came from three different Kipsigis-speaking areas in Western Kenya. The data were collected in elicitation interviews designed to investigate the morphology and syntax of noun phrases in the language.

3.1. PHONOLOGICAL SYSTEM. Advanced Tongue Root (ATR) and vowel length are distinctive features in the five-vowel system of Kipsigis. Thus there are two sets of vowels:

[3] Descriptive materials on Kipsigis are limited (e.g. Tucker & Bryan 1964, Toweett 1975, 1978, Rottland 1982). To our knowledge, the only available theoretical work specifically on Kipsigis are Jake & Odden 1979, Bossi & Diercks 2019, Kouneli 2019, and Diercks & Rao 2019; some data from Kipsigis also appear in Creider's (1989) theoretical study of syntax in Nilotic languages. Finally, the system of [ATR] vowel harmony of Kalenjin (without indicating which dialect(s) the data come from) has featured in theoretical studies of [ATR] harmony (e.g. Halle & Vergnaud 1981, Baković 2000, Nevins 2010).

[+ATR] /i, iː, e, eː, ɑ, ɑː, o, oː, u, uː/ and [-ATR] /ɪ, ɪː, ɛ, ɛː, a, aː, ɔ, ɔː, ʊ, ʊː/.[4] The language has a dominant-recessive [ATR] harmony system: all vowels in a word will agree in the feature [ATR], and a single [+ATR] morpheme in the word makes all other vowels [+ATR]; harmony can be controlled by stems or suffixes and exhibits bidirectional spreading (Halle & Vergnaud 1981, Baković 2000, Lodge 2005, Nevins 2010).[5]

Kipsigis has three surface tones: High (H), Low (L), and a contour high-falling tone (HL). While H and L appears on syllables consisting of either long or short vowels, HL is only attested on long vowels and some syllables with a short vowel and a sonorant coda. Such quantity restrictions on the distribution of contour tones are common cross-linguistically (Zhang 2002). The fact that contour tones are restricted to bimoraic syllables indicates that the TBU in Kipsigis is the mora; Zwarts (2004) and Dimmendaal (2012) reach the same conclusion for the Kalenjin dialect Endo-Marakwet and for Eastern Nilotic languages, respectively. Therefore, contour tones in Kipsigis can be represented as a sequence of a H and a L tone associated to the two moras of a bimoraic syllable. Regular tonal processes are described in §3.3.

3.2. CASE AND DP STRUCTURE. The focus of this paper is the nominative case formation of nominal modifiers (adjectives, possessives, and demonstratives), which exhibit across-the-board tonal polarity for case. It is therefore necessary to introduce some background information on the case system of the language more generally.

Kipsigis has VSO word order (Bossi & Diercks 2019) and a marked nominative case system (Toweett 1979, Rottland 1982, Creider 1989, König 2008, Handschuh 2014): subjects (of

[4] Previous descriptions do not use IPA for the [ATR] distinction in Kipsigis (e.g. Toweett 1979, Rottland 1982, 1983, Kouneli 2019), but we adopt here Local and Lodge's (2004) transcription choices for the Kalenjin dialect Tugen.

[5] While both roots and suffixes can be lexically specified as [+ATR], there are no [+ATR] prefixes in the language. It seems to be a universal property of languages with a dominant-recessive [ATR] harmony system that prefixes never control harmony (Baković 2000, Clements 2000, Hyman 2002, Casali 2003, 2008, though see Moskal 2015 for counterexamples).

transitive or intransitive verbs) are marked with nominative case, while DPs in any other position are left unmarked, surfacing in the oblique case.[6] As shown in 12 and 13, case marking is tonal.

(12) rú-è **là**:**kwɛ̀**:**t**. Nominative: L.L
sleep.3-IPFV child.NOM
'The child is sleeping.'

(13) á-gé:r-é **là**:**kwɛ́**:**t**. Oblique: L.H
1SG-see-IPFV child.OBL
'I see a/the child.'

The nominative form is considered to be the marked form because its tonal pattern is predictable, whereas oblique forms vary in their tonal shape and must be lexically specified. The nominative form of nouns has a predictable L(H_0)L tonal shape; lexical tones are removed, and there is a superimposed melody where L is associated with the first and last syllable with a H plateau in between 14.[7] Fixed tonal melodies of this sort are associated with the nominative case forms of nouns in all Southern Nilotic languages, but there is significant variation in the details of the melody (Rottland 1982, Kiessling 2007).

(14) Nominative L(H_0)L tonal melody on nouns

Oblique		Nominative		Gloss
pé:k	H	pè:k	L	'water'
là:kwé:t	L.H	là:kwɛ̀:t	L.L	'child'
ŋó:ktá	H.H	ŋò:ktà	L.L	'dog'
sòɣàró:k	L.L.H	sòɣárò:k	L.H.L	'sugar'
mágásɛ́:t	H.H.H	màgásɛ̀:t	L.H.L	'skin'
sòlóptʃá:t	L.H.H	sòlóptʃà:t	L.H.L	'cockroach'

[6] We call the unmarked/non-nominative form of the noun 'oblique'; see Handschuh 2014 for a discussion of the various names used in the literature for this case form. Marked nominative is a typologically rare case system globally but is fairly common in East Africa, where Kipsigis is spoken (König 2006, 2008). See Baker 2015 and van Urk 2015 for theoretical analyses of marked nominative case systems.

[7] There are some systematic exceptions to this pattern (e.g. nouns that are formed with the prefix *kip-* 'male' follow different tonal rules), but they are few and not relevant here. See Toweett 1975 and Creider 1982 for a detailed description of nominative tonal marking in Kipsigis and the related dialect Nandi, respectively.

ŋétùndá	H.L.H	ŋètúndà	L.H.L	‘lion’
múgû:lèldá	H.HL.L.H	mùgú:léldà	L.H.H.L	‘heart’
kô:kwà:tìnwê:k	HL.L.L.HL	kò:kwá:tínwè:k	L.H.H.L	‘village.PL’
ɔ́ŋátɔ̀:nɔ́:k	H.H.L.H	ɔ̀ŋátɔ́:nɔ̀:k	L.H.H.L	‘desert.PL’

We assume that the L(H_0)L melody applies to syllables. If it were to target moras, we would expect nouns with a final bimoraic syllable to surface with a HL contour tone, contrary to fact: final syllables always have a L tone in the nominative. Given that the TBU in Kipsigis is the mora (Creider 1982), it is not clear why syllables should be the target for the nominative melody of nouns; exploration of this issue is left as a topic for further research.

In Kipsigis, DPs are strictly noun-initial, with adjectives, demonstratives, numerals, and possessives all following the head noun. All nominal modifiers agree with the head noun in case. Thus adjectives, numerals, and possessives all have an oblique and a nominative form, with the latter being derived from the former, a point which we will return to in §4. An oblique and nominative DP are given in 15 and 16, respectively. The noun [pè:lé:k] ‘elephants’ in 15 becomes [pè:lè:k] with a L.L melody in the nominative in 16, following the L(H_0)L nominative melody shown in 14. The modifiers (proximal demonstrative and adjective in this case), by contrast, bear tones in the nominative in 16 which are the opposite of the oblique tones in 15.[8]

(15) á-gé:r-é **pè:lé:(k)-tʃù** **múr-è:n.**
1SG-see-IPFV elephant.PL.OBL-PROX.PL.OBL dirty-PL.OBL
‘I see these dirty elephants.’

(16) rúàj **pè:lè:(k)-tʃú** **mùr-é:n.**
run.3PL elephant.PL.NOM-PROX.PL.NOM dirty-PL.NOM
‘These dirty elephants are running.’

3.3. TONAL PHONOLOGY. Kipsigis, like other Kalenjin dialects, exhibits several regular tonal processes, all of which are limited to local interactions between tones associated to adjacent moras or syllables. While Yip (2002:133) may be correct on the whole that ‘the most striking

[8] We set aside numerals, which not only follow different morphological rules (e.g. numerals are the only category that take a segmental nominative suffix), but also exhibit different syntactic behavior (e.g. they are the only elements that can modify a noun in the absence of a relativizer) (Kouneli 2019).

property of African tone is its mobility' (see also Hyman 2011), tone in Kipsigis is not very mobile, nor do we find long-distance conditioning of tonal phenomena.[9] We focus here on two phonological processes that are relevant for understanding the tonal grammar of the language: (i) Rising Tone Simplification, where a tautosyllabic LH contour resulting from morphological concatenation surfaces as H, and (ii) High Tone Lowering, where two H tones associated to the same syllable are subject to the OCP and surface as a HL contour tone.

To illustrate these two processes, we use examples from the nominal domain where two adjacent affixes interact tonally. In Kipsigis, all nouns consist of a root, followed by a thematic or number suffix, followed by a marker traditionally called the 'secondary' suffix (Toweett 1975, Kouneli 2019). Thematic suffixes may be either L- or H-toned underlyingly, while the secondary suffix always has a H tone (Toweett 1975, Kouneli 2019). Evidence for the underlying H tone of the secondary suffix comes from a small class of nouns which lack the thematic suffix, as shown in 17 below; the secondary suffix ends in [-k] in the plural and in [-t] in the singular.

(17)	a.	/mét-ít/ → métít	b.	/ʧàːt-ít/ → ʧàːtít	c.	/îːt-ít/ → îːtít
		head-SEC.SG.OBL		hind.leg-SEC.SG.OBL		ear-SEC.SG.OBL
		'head'		'hind leg'		'ear'

When the thematic suffix combines with the secondary suffix, as in 18, we observe a regular phonological process of vowel coalescence that occurs between two short vowels, presumably to avoid vowel hiatus.[10]

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[9] Creider (1982) also reports that all Kalenjin dialects share the typologically rare property of lacking downstep. While no acoustic measurements were taken, there is no impressionistic evidence for downstep in Kipsigis, which is consistent with Creider's claims.

[10] The process of vowel coalescence is independent of the tonal specification of the syllable, and depends entirely on the quality of the vowels participating in coalescence. When the second vowel is [i], the result is always a long vowel, whose quality is predicted by the first vowel, as shown below for [+ATR] vowels (see also Creider & Creider 1989 for Nandi). The [ATR] value of the vowel is not relevant, and [–ATR] counterparts of the vowels below follow the same rules.

a. /ɑ/ + /i/ → [eː] b. /e/ + /i/ → [eː] c. /o/ + /i/ → [eː] d. /i/ + /i/ → [iː]
e. /u/ + /u/ → [uː]

Vowel coalescence only applies between two short vowels; it does not apply, for example, to a sequence of a short vowel (with or without a following glide) and long vowel (Creider & Creider 1989).

(18) a. /sògàr-**ò-ík**/ → sògàr**ó**:k L.L.-**L-H** → L.L.**H**
sugar-TH-SEC.PL.OBL
'sugar'

b. /là:k-w**à-ít**/ → là:kw**ɛ́**:t L.-**L-H** → L.**H**
child-TH-SEC.SG.OBL
'child'

Coalescence of the L-toned thematic suffix with the H-toned secondary suffix results in an underlying tautosyllabic LH sequence. However, surface rising contour tones are prohibited in Kipsigis. Tautosyllabic LH sequences surface instead as a simple H tone, as shown in 18. This process, which we call Rising Tone Simplification, is well-documented across Kalenjin dialects (Creider 1982).

Note that Rising Tone Simplification only targets a sequence of L and H tones associated to two moras of the same syllable. Sequences of L and H are permitted across a syllable boundary, as shown for a sequence across morpheme boundaries in 19a and within a stem in 19b. The process of Rising Tone Simplification shows that while the TBU is the mora in Kipsigis (Creider 1982), the tonal grammar of Kipsigis can make reference to both moras and syllables.

(19) a. /sìm-tá/ → sìmdá **L.-H** → **L.H**
dirt-SEC.SG.OBL
'dirt'

b. /sòlóp-á-ík/ → sòlóbê:k **L.H**.-H-H → **L.H**.HL
cockroach(PL)-TH-SEC.PL.OBL
'(the) cockroaches'

Kipsigis also exhibits a process of High Tone Lowering, whereby the OCP violation incurred by a tautosyllabic HH sequence such as the one in 20 is resolved by lowering the second H; this process is reminiscent of Meeussen's Rule (Goldsmith 1984) but applies to HH sequences in the same syllable. A surface HL tone can therefore derive from either a HL or HH sequence underlyingly. Like Rising Tone Simplification, High Tone Lowering is also found in other Kalenjin dialects (Creider 1982).

(20) a. /kó:k-w**á-ít**/ → kó:kw**ê**:t H.-**H-H** → H.**HL**
village-TH-SEC.SG.OBL
'a/the village'

b. /lɔ̀ːŋ-**á-ít**/ → lɔ̀ːŋ**ɛ̂**ːt L.-**H-H** → L.**HL**
shield-TH-SEC.SG.OBL
'a/the shield'

d. /sòlóp-**á-í**k/ → sòlób**ê**ːk L.H.-**H-H** → L.**H.HL**
cockroach-TH-SEC.SG.OBL
'a/the cockroach'

Also like Rising Tone Simplification, adjacent (underlying or surface) H tones in Kipsigis are ungrammatical only if they are associated to two moras that belong to the same syllable; H tones are permitted across adjacent syllables, as shown in 21 (also example 17a above).

(21) /ŋóːk-tá/ → ŋóːktá H.H → H.H
dog-SEC.SG.OBL
'dog'

Given the tonal processes discussed in this section, we summarize below our assumptions about tonal representations in Kipsigis.

a. The TBU is the mora (but certain processes make reference to both moras and syllables). A mora is associated to exactly one tone.
b. Surface HL contour tones can correspond to two different underlying tonal structures, either HL or HH, associated to the two moras of a bimoraic syllable.
c. A surface H tone on a bimoraic syllable can correspond to two different underlying tonal structures, either one H tone associated to two moras, or a LH tone sequence.

4. TONAL POLARITY IN NOMINAL MODIFIERS. As shown in §3.2, nominative case on Kipsigis nouns is marked with a tonal melody. Nominal modifiers, which includes possessive pronouns, demonstratives, and adjectives, also inflect tonally for nominative case. Nominative case formation on Kipsigis modifiers involves a process of tonal polarity that applies across-the-board: every tone in the nominative form of a modifier has the opposite value to its counterpart in the oblique. In this section, we describe tonal polarity on modifiers in detail, noting a case in which it systematically underapplies and where there are exceptions.

We start with demonstratives and possessive pronouns, which are all monosyllabic in Kipsigis and agree in case and number with their head noun. Here we only consider demonstratives in simple DPs, such as [làːkwàː-nì] 'this child (child-PROX.SG.OBL)'.

Demonstratives that occur with modifiers appear to undergo an additional process of tonal dissimilation to the following modifier, but only in the oblique; see Appendix A.1 for more details. As exemplified in 22, demonstratives that are L in the oblique surface as H in the nominative, and those that are H in the oblique surface as L in the nominative. Possessives are all L in the oblique and H in the nominative, as shown in 23.

(22) Demonstratives

Oblique		Nominative		Gloss
náːn	H	nàːn	L	'MED.SG'
ʧʊ́ːn	H	ʧʊ̀ːn	L	'DIST.PL'
nì	L	ní	H	'PROX.SG'
ʧù	L	ʧú	H	'PROX.PL'

(23) Possessives

Oblique		Nominative		Gloss
ɲòːn	L	ɲóːn	H	'my.SG'
ʧʊ̀ːk	L	ʧʊ́ːk	H	'my.PL'
ɲìːn	L	ɲíːn	H	'his/her.SG'
ʧɪ̀ːk	L	ʧɪ́ːk	H	'his/her.PL'

Since all demonstratives and possessives in Kipsigis are monosyllabic and have a single tonal specification, we observe only one tonal change in their nominative form. Adjectives, by contrast, have stems ranging between one and three syllables in length, with the majority being disyllabic. Nominative adjectives are polar to their oblique counterparts in their entirety; every tone in the oblique gets flipped in the nominative.[11] Examples are given in 24 of each distinct polarity pattern attested for adjectives, singular or plural. A list of attested oblique ~ nominative adjective pairs are found in Appendix A.2. Recordings of representative patterns are provided in the online supplementary materials. It should be noted that adjectives in Kipsigis constitute a

[11] We limit our discussion to attributive adjectives, which, like possessives and demonstratives, agree in case and number with the noun. Adjectives that are used predicatively have a different tonal shape from attributive adjectives. However, predicative forms of adjectives do not inflect for case and therefore do not participate in the nominative case polarity pattern. Predicative adjectives are thus excluded from discussion in this section but are listed in Appendix A.2 for completeness.

relatively small class, and they can only modify nouns in a relative clause structure (Kouneli 2019).

(24) Adjectives

Oblique		Nominative		Gloss
jà	L	já	H	‘bad.SG’
tò:j	L	tó:j	H	‘black.SG’
ŋà:m	L	ŋá:m	H	‘clever.SG’
áɲìŋ	H.L	àɲíŋ	L.H	‘tasty.SG’
ɲómɲòm	H.L	ɲòmɲóm	L.H	‘easy.SG’
ɲígì:s	H.L	ɲìgí:s	L.H	‘heavy.SG’
kájtìt	H.L	kàjtít	L.H	‘cold.PL’
múr-è:n	H.L	mùr-é:n	L.H	‘dirty-PL’
tʃéptʃép-è:n	H.H.L	tʃèptʃèp-é:n	L.L.H	‘swift-PL’
míntìlí:l	H.L.H	mìntílì:l	L.H.L	‘sour.SG’
kárâ:rán	H.HL.H	kàrá:ràn	L.H.L	‘beautiful.SG’
kárâ:rán	H.HL.H	kàrá:ràn	L.H.L	‘beautiful.PL’
tórô:r-è:n	H.HL.L	tòró:r-é:n	L.H.H	‘tall-PL’
pírî:r-è:n	H.HL.L	pìrí:r-é:n	L.H.H	‘red-PL’
míntìlí:l-è:n	H.L.H.L	mìntílì:l-é:n	L.H.L.H	‘sour-PL’

Tonal polarity applies straightforwardly to simple H and L tones in the oblique, which flip to L and H, respectively, in the nominative. However, polarity underapplies to HL contour tones, which surface as H in the nominative, as in [kárâ:rán] ‘beautiful.SG.OBL’ (H.HL.H) ~ [kàrá:ràn] ‘beautiful.SG.NOM’ (L.H.L). This underapplication can be independently explained by the general prohibition against rising LH tones in the language. The HL contour tone, which cannot flip to LH, surfaces as a simple H via Rising Tone Simplification (§3.3). Thus H in the nominative is

actually the expected result when polarity applies to an oblique HL contour in Kipsigis. The ban on rising tones gives the result that both L and HL tones in the oblique map to H in the nominative. This mapping indicates that the nominative form of adjectives is derived from the oblique, rather than the other way around. The derivation of H from L and HL is predictable, whereas the derivation of L and HL from H is not.

The tonal polarity pattern in Kipsigis satisfies all of DiCanio and colleagues' (2020) criteria for exchange processes laid out in 6, as it is the only (a) productive and (b) dominant strategy to mark nominative case on (c) the uniform morphosyntactic category of nominal modifiers. It therefore qualifies as a true exchange process and, notably, the first one documented to involve true paradigmatic tonal polarity, filling the tonal gap in the typology of exchange processes noted by Trommer (2014b) and discussed in §2.2. The Kipsigis tonal polarity process further differs from previously reported exchange processes in applying across-the-board. While all previously documented cases of exchange involve a single locus of change, in Kipsigis, nominative modifiers differ from their oblique counterparts in EVERY tonal specification (modulo underapplication with HL tones). The result is maximal tonal distinctiveness between the two forms of the case paradigm.

There are a handful of adjectives that represent exceptions to the regular tonal polarity pattern; these are given in 25. Most of these adjectives are plural and frequent and obey a tonal subpattern of being (H)L.L in the oblique and L.H in the nominative. While the polar counterpart of a (H)L tone is a H tone, in these exceptional adjectives (H)L maps to L instead.

(25)

Oblique		Nominative		Gloss
tûː-èːn	HL.L	tùː-éːn	L.H	'black-PL'
êːtʃ-èːn	HL.L	èːtʃ-éːn	L.H	'big-PL'
lɛ̂ːlàtʃ	HL.L	lɛ̀ːlátʃ	L.H	'white.PL'
mjâːtʃ-èːn	HL.L	mjàːtʃ-éːn	L.H	'good-PL'
jâːtʃ-èːn	HL.L	jàːtʃ-éːn	L.H	'bad-PL'
tàlà	L.L	tàlá/tàlà	L.H/L.L	'gentle.SG'

Most of the adjectives above are exceptional not only in the formation of nominative case, but also in the formation of plural. Regular adjectives in Kipsigis form their plural by either the addition of the [+ATR] suffix [-eːn], which causes any [-ATR] stem vowels to become [+ATR] due to the dominant [+ATR] harmony system in the language (§3.1), or by a change from [-

ATR] to [+ATR] without the addition of overt morphology. These regular processes are illustrated in 26 below.

(26)

Oblique singular		Oblique plural		Gloss
ápìɲ	[-ATR]	ápìɲ	[+ATR]	‘tasty’
tórò:r	[+ATR]	tórô:r-**è:n**	[+ATR]	‘tall’
tò:j	[-ATR]	tû:-**è:n**	[+ATR]	‘black’
jɔ̀:s	[-ATR]	jô:s-**è:n**	[+ATR]	‘old’

While [tû:-è:n] ‘black-PL’ is regular for plural formation, the singular ~ plural pairs of the other adjectives in 27 below reveal irregularities. More specifically, [ê:tʃ-è:n] ‘big-PL’ is suppletive, while [mjâ:tʃ-è:n] ‘good-PL’, [jâ:tʃ-è:n] ‘bad-PL’, and [lê:làtʃ] ‘white-PL’ all undergo an irregular phonological change to the stem. Moreover, in the first two examples [-e:n] does not behave as a dominant [+ATR] suffix as it does with all other adjectives, and the singular ~ plural pair for ‘white’ is the only attested case in the grammar of Kipsigis of a [+ATR] stem becoming [-ATR] in a derived form.

(27)

Oblique singular	Oblique plural	Gloss
ò:	ê:tʃ-è:n	‘big’
mjɛ̀	mjâ:tʃ-è:n	‘good’
jà	jâ:tʃ-è:n	‘bad’
lè:l	lê:làtʃ	‘white’

Finally, [tàlà] ‘gentle.SG’ is the only adjective in Kipsigis with a CV.CV syllable shape, and for many speakers it is invariant in the plural. As 25 shows, there is variation in the formation of nominative for this adjective: two of our consultants only accept L.L in the nominative (which shows that this adjective does not inflect for case for these speakers), while three consultants accept both L.L and L.H.

Apart from [tû:-è:n] ‘black-PL’, then, the adjectives that are exceptional with respect to case are irregular in a variety of ways. Furthermore, they are all high-frequency words, which tend to be exceptional cross-linguistically (Francis et al. 1982, Bybee 1985). We therefore treat them as lexical exceptions and do not include them in our analysis. We speculate that most of them have a L.H tone in the nominative by analogy to the large number of disyllabic adjectives with this tonal shape in the nominative.

In sum, productive nominative case formation on Kipsigis nominal modifiers involves a process of across-the-board tonal polarity, the first of its kind documented in the literature. Any analysis of Kipsigis tonal polarity must therefore be able to capture its status as a morphologically-conditioned exchange process enforcing maximal distinctiveness between two members of a paradigm.

5. APPROACHES TO KIPSIGIS. Across-the-board tonal polarity in Kipsigis is an exchange process par excellence: it satisfies all of the criteria in 6 established in DiCanio et al. 2020 for exchange processes, and does not involve any accompanying segmental material. The Kipsigis pattern can therefore be added to our growing typology of confirmed exchange processes. While exchange processes are attested descriptively, their theoretical status has remained a source of great debate in the literature (e.g. de Lacy 2012, 2020, Trommer 2014b). The major point of contention is whether exchange processes are basic, the result of some dedicated exchange mechanism, or epiphenomenal, the result of a conspiracy of independent factors. As de Lacy (2020) notes, the theoretical status of exchange is highly theory-dependent.

In this section, we discuss two models of morphology and their implications for the status of exchange processes, with a focus on how they would account for the across-the-board tonal polarity in Kipsigis. We start with item-and-process approaches to morphology, which can exploit explicit exchange mechanisms to capture the Kipsigis pattern (§5.1). We then turn to item-and-arrangement approaches, which analyze polarity as the combined result of affixation of an abstract (or null) morpheme and morphologically-conditioned phonology (§5.2). In order to successfully capture across-the-board tonal polarity, each analysis must crucially allow (i) a morphologically-conditioned phonological contrast to be (ii) maximally expressed on every syllable. While both item-and-arrangement and item-and-process approaches are able to implement this technically, we suggest that the notion of maximal contrast is encoded in a more straightforward way in the item-and-process view.

5.1. ITEM-AND-PROCESS. In item-and-process (IP) approaches to morphology, derived forms are viewed as the result of a morphologically-conditioned rule or process applying directly to a root or stem base (Hockett 1954). For example, the whole word /dɔgz/ is produced when a morphophonological process /X/ → /Xz/ applies to the base /dɔg/ bundled with a plural feature.

These morphophonological processes can have the effect of adding or removing material from a base and/or changing the base itself. Affixal morphology thus holds no special status in IP. Rather, it is precisely the existence of process morphology, many cases of which, as some claim, 'cannot properly be represented as the addition of an affix' (Anderson 1992:68), that motivates the IP view. Examples of IP frameworks include Anderson 1992 and Aronoff 1994; morphophonological rules are also permitted in SPE (Chomsky & Halle 1968).

IP approaches are considered to be less restrictive than item-and-arrangement models (Anderson 1992), both in terms of their empirical predictions and the kinds of rules or constraints allowed. Exchange processes, for example, are naturally accommodated in the IP view, as they involve changes to a base rather than the addition of segmental material. IP models are also able to encode exchange patterns using rules or constraints designed specifically to induce polarity. These dedicated exchange mechanisms directly encode the notion of contrast into the grammar. In this section, we discuss examples of such mechanisms and how they might account for across-the-board tonal polarity in Kipsigis.

In a rule-based approach, exchange processes can be captured using an explicit exchange rule involving alpha notation: /αF/ → [−αF] (Chomsky & Halle 1968, Moreton 2004). Recall voicing polarity in DhoLuo from §2.1, whereby final consonants in the nominative flip their voicing value in the plural.[12] DhoLuo voicing polarity can be generated by applying a plural-specific exchange rule /α voice/ → [−α voice] word-finally. While voicing polarity in DhoLuo involves a featural change on a single consonant, tonal polarity in Kipsigis applies to every syllable in a word. However, this is naturally accommodated in a rule-based approach, since the tonal exchange rule /α high/ → [−α high] marking nominative case can be context-free, operating in every phonological environment to which it can apply. Explicit alpha exchange rules therefore easily capture the notion of morphologically-driven, across-the-board polarity.

De Lacy (2020) has suggested that some exchange patterns, such as glottal toggling in Itunyoso Triqui (§2.1), can also be generated in a rule-based framework using extrinsic rule ordering, where two or more rules apply sequentially, possibly resulting in opacity. It is not

[12] As was already discussed in §2.1, de Lacy (2012) presents arguments against interpreting the DhoLuo pattern as an instance of true polarity. We treat it as a polar pattern here simply to illustrate how various models of morphology can generate this pattern, should it be attested.

immediately evident how an analysis using ordered rules would work for Kipsigis, given that the most obvious rules we could entertain (one triggering tone lowering and another triggering tone raising) would mutually feed each other. We do not rule out this possibility entirely, as further investigation may show that an analysis involving the opaque interaction of a complicated set of rules is indeed tenable. Nevertheless, explicit exchange mechanisms seem to us to provide a more likely account of polarity patterns like that in Kipsigis.

Exchange processes are more problematic for constraint-based approaches, since segments can map to either [+F] or [-F], such that neither value of [F] can be considered more or less marked than the other (Moreton 2004). Parallelist approaches to exchange processes require either mechanisms to deal with opacity (de Lacy 2020), or an explicit exchange mechanism, such as anti-identity constraints enforcing phonological distinctiveness between two members of a morphological paradigm (Mortensen 2006, Sande 2017, 2018).[13] As discussed above, some yet-to-be-determined opacity effect may be able to generate the Kipsigis pattern. A dedicated exchange mechanism such as anti-identity constraints may find more immediate success; such constraints include anti-faithfulness (Alderete 1999, 2001) and RealizeMorpheme (Kurisu 2001). However, both anti-faithfulness and RealizeMorpheme constraints are defined to incur a single locus of contrast between two members of a morphological paradigm. In fact, Alderete (1999, 2001) argues that it is crucial that anti-faithfulness constraints are defined existentially, so that just one faithfulness violation is enough to satisfy an anti-faithfulness constraint. For the anti-faithfulness approach to capture the across-the-board nature of tonal polarity in Kipsigis, then, an important modification must be made. Since the Kipsigis exchange process involves a change in every tone, the anti-faithfulness constraint enforcing polarity in nominative modifiers must be defined not existentially but universally, such that EACH tone in the derivative must differ in value from its counterpart in the base. However, allowing anti-faithfulness constraints to be defined universally would be an extremely powerful modification of the theory, as it not only entails multiplication of constraints in the grammar but also predicts that across-the-board polarity should be far more common than it is. Thus even with a dedicated exchange mechanism,

[13] Paradigmatic distinctiveness is thus in a sense the morphological counterpart to contrast preservation (Kiparsky 1973, Łubowicz 2003) and dispersion (e.g. Flemming 1995, 2006, Padgett & Tabain 2005) in phonetics and phonology.

parallelist constraint-based approaches require modification in order to capture the Kipsigis pattern.

Serialist constraint-based approaches have enjoyed some success in capturing a wide range of across-the-board phenomena, such as harmony. In Harmonic Serialism, for instance, a feature may spread locally to one additional segment at each step of the derivation (McCarthy 2000, 2009, Kimper 2011). However, harmony generally involves spreading of the same feature value across (part of) a word. By contrast, syllables in Kipsigis modifiers do not all acquire the same tonal value in the nominative; rather, they take on the value opposite to that of their oblique counterpart. Polarity is thus distinct from other across-the-board phenomena. It is unclear, at least without additional assumptions, how polarity would spread in a serialist constraint-based framework.[14]

In sum, the IP view takes all morphology to be morphologically-conditioned phonology. IP approaches can capture across-the-board tonal polarity in Kipsigis by making use of dedicated exchange mechanisms, which naturally encode the notion of maximal contrast between two members of a morphological paradigm.

5.2. ITEM-AND-ARRANGEMENT. Many have questioned whether it is necessary to posit explicit exchange mechanisms in the grammar, citing such mechanisms and IP models in general as being unconstrained (Wolf 2007, de Lacy 2012, 2020, Trommer 2014b, Trommer & Zimmermann 2014). The item-and-arrangement (IA) view of morphology, by contrast, is generally considered to be a more restrictive theory, one which assumes that the morpheme is the minimal unit of form and meaning, and words are built by arranging morphemes in a sequential fashion. Examples of IA frameworks include Lieber 1980, Kiparsky 1982, and the theory of Distributed Morphology (Halle & Marantz 1993). In IA approaches, exchange processes are treated as epiphenomenal; what looks like polarity on the surface is the result of interactions between concatenation of (possibly abstract or zero) morphemes and general phonological processes. In this section, we discuss representative IA approaches to polarity and tonal

[14] It does not seem possible to incorporate anti-faithfulness constraints, for instance, into a Harmonic Serialism model, given that serial derivations generally operate on input-output correspondences, while anti-faithfulness constraints are transderivational and operate on output-output correspondences.

morphology, and argue that the combination of concatenation and general phonology alone cannot account for the Kipsigis pattern; positing morphologically-conditioned phonology is unavoidable. However, morphologically-conditioned phonology in IA appears to be equally as unrestrictive as morphophonological rules in IP.

Non-concatenative morphology has traditionally been seen as problematic for IA approaches (Anderson 1992). However, there has been a trend in the literature of reanalyzing examples of non-concatenative morphology within an IA view, going back at least as far as McCarthy's (1981) analysis of Arabic root-and-pattern morphology and Marantz's (1982) analysis of reduplication as cases of affixation. Process morphology poses a particular challenge for IA theories, however, as the lack of additional segmental material makes it difficult to identify the component morphemes of a word. There are two main strategies for analyzing process morphology in IA theories. The first option maintains that the phonological grammar contains no morpheme-specific phonological rules or constraints, and thus process morphology arises from affixation of a morpheme with an abstract phonological representation and its interaction with general phonology (e.g. Akinlabi 1996, Zoll 1996, Wolf 2007, Trommer 2014b). This morpheme could consist of an empty mora or floating feature; umlaut in German plurals, for instance, could be analyzed as the affixation of a floating vowel feature, which docks due to a general ban on floating material in the output. A second option, which Inkelas (2014) calls the Phonological Reductionism approach, relies on morpheme-specific phonological rules, such that instances of process morphology are analyzed as affixation of a zero morpheme which triggers morphologically-conditioned phonological changes to the stem; German umlaut could then be analyzed as affixation of a null plural suffix which conditions a vowel alternation in the nominal stem.

Wolf (2007) proposes an IA approach to exchange processes that is representative of the first type of strategy, which appeals to abstract morpheme representations and general phonology only. We briefly summarize his account of DhoLuo voicing polarity, in which the final consonant in the nominative singular base is reversed in the plural; examples are repeated in 28.

(28) Voicing polarity in DhoLuo (de Lacy 2012:121)

Singular	Plural	Gloss
gɔt	gɔdɛ	‘hill’
agɔkɔ	agɔgɛ	‘chest’
alap	ælæbe	‘open space’
kɛdɛ	kɛtɛ	‘twig’
kitæbu	kitepe	‘book’
hɪga	hike	‘year’

Wolf proposes that the plural morpheme in DhoLuo has two allomorphs with opposite values for the floating feature [voice], as shown in 29. Like the overt suffix -/E/, the floating feature also associates from the right. Polarity arises due to the interaction of a set of language-general constraints governing the docking of floating features, which conspire to select the plural allomorph whose featural specification differs from that of the final consonant of the stem.

(29) DhoLuo plural: {[+voice] -E, [−voice] -E}

There are two major differences, however, between the DhoLuo and Kipsigis cases. First, the DhoLuo plural suffix includes both segmental material (/-E/) and an abstract featural specification ([voice]), while no segmental material is present in the nominative inflection of Kipsigis nominal modifiers. Second, voicing polarity in DhoLuo involves a featural change on a single consonant that is most local to the plural suffix, while polarity in Kipsigis applies across-the-board, to every syllable of the nominal modifier.

In order for a Wolf-style analysis to capture the Kipsigis data, we would need to make a number of stipulations that are not supported by the general tonal phonology of the language. For example, the morpheme governing nominative case would require at least two floating tonal allomorphs with opposing values and no accompanying segmental material, as in 30.

(30) Kipsigis nominative case on modifiers: {H, L}

However, there is no evidence for the existence of floating tones without accompanying segmental material in Kipsigis and other Kalenjin dialects. For example, Creider (1982), in his

detailed study of nominal tonology in Kalenjin, does not report any true floating tones.[15] If the nominative formation of modifiers is analyzed in terms of a floating tone, it would be the only example of such a tone in Kipsigis.[16] Furthermore, given that the language does not generally employ simple floating tones (e.g. just H or L), it would be surprising if the only example of a floating tone in Kipsigis were also polar. While not impossible, this seems unlikely.

In order to capture the across-the-board nature of the Kipsigis pattern, some additional mechanism would be needed to ensure that polar tones dock on every syllable, expressing maximal contrast. At least two possible mechanisms come to mind; however, both of them crucially appeal to morphologically-conditioned phonological rules, constraints or constraint rankings. For example, a morpheme-specific constraint could dictate that the nominative morpheme must be maximally realized on the word, causing a polar allomorph to dock on every syllable. Alternatively, the docking of just one polar allomorph could trigger dissimilation across the rest of the word, resulting in a kind of cascade of OCP effects. The predicted resulting tonal pattern would be one of alternating H and L specifications. While both of these mechanisms are plausible, they would again constitute stipulations with little support from the general phonology of the language. Regarding the second strategy, for example, we have already seen that Kipsigis tolerates adjacent syllables with the same tonal specification, including in nominative modifiers; examples include [tʃèptʃèp-éːn] 'swift-PL.NOM' with an L.L.H pattern and [tòróːr-éːn] 'tall-PL.NOM' with an L.H.H pattern. Regardless of the approach, it is clear that the across-the-board

[15] While Creider (1982) does call some tones 'floating', this term crucially refers to the tone of a morpheme whose segmental material has undergone deletion for independent phonological reasons (Toweett 1979).

[16] It is an open question whether the nominative melody for nouns (§3.2) should be analyzed in terms of a sequence of floating tones. The nominal melody differs from most cases of floating tones in completely overwriting the noun's lexical tonal specifications. In this respect, the nominal melody also differs from the type of floating tone that would be needed for adjectives, which crucially refers to the lexical tones of the stem. Furthermore, Creider (1982) argues that the nominative melody for nouns is associated late, that is, after a number of segmental phonological operations have taken place; there is no clear evidence for similar timing in the nominative formation of adjectives. Thus not only does the nominal melody not fit the usual profile of a floating tonal affix, but it would also require a very different affixal analysis from that of adjective polarity.

nature of Kipsigis polarity is morpheme-specific, and whatever mechanisms are used to capture it requires morpheme-specific phonology.[17]

The above discussion of Wolf's (2007) analysis shows that IA approaches that disallow morpheme-specific phonology cannot capture polarity patterns of the Kipsigis type, as also acknowledged by Trommer (2014b). IA approaches which explicitly appeal to morphologically-conditioned phonology, on the other hand, may be more successful. For example, Pak (2019) proposes to analyze the grammatical tone system of the Bantu language Logoori within the framework of Distributed Morphology as the combination of affixation of tonal morphemes, general phonology, and 'readjustment rules'; readjustment rules are morpheme-specific phonological rules that apply to stems. One could similarly analyze Kipsigis polarity following the Phonological Reductionism strategy for process morphology: as affixation of a zero morpheme, which causes morpheme-specific phonological changes to the stem. How polarity is implemented would vary by the particular approach, but by allowing phonological rules or constraints (or their rankings) to be morphologically-conditioned, such analyses would essentially be a notational variant of the IP approaches discussed in §5.1, except that the morphophonological rules in this case would be triggered by concatenation of a zero morph. With the addition of morphologically-conditioned phonology needed to account for patterns like Kipsigis, IA analyses consequently become equally as unrestrictive as their IP counterparts.

Summing up, across-the-board tonal polarity in Kipsigis can be accommodated in either an IP theory of morphology with exchange mechanisms, or an IA theory with morpheme-specific phonological rules or constraints, but not in an IA theory that does not recognize the central role that morphology plays in the determination of phonological form. That is, while morphophonological rules of the IP type can be dispensed with in an IA model, it is still necessary to maintain phonological rules that are morpheme-specific. The version of IA that the Kipsigis data point towards can therefore be seen as equally unconstrained as IP approaches. However, the pattern of maximal morphological contrast observed in Kipsigis is more explicitly encoded in IP models via morphophonological rules. Furthermore, IP approaches appear more

[17] As briefly discussed in §5.1, de Lacy (2020) proposes an account of Itunyoso Triqui polarity that relies on the use of opacity mechanisms. One might similarly appeal to opaque rule or constraint interactions between concatenation and phonological rules for the treatment of Kipsigis. Again, however, it is not immediately clear what these rules or constraints for Kipsigis would be.

economical: while both IA and IP require morphologically-conditioned phonology, IA additionally needs concatenation of an abstract morpheme. Thus we believe that IP models capture maximal contrast in a more straightforward and intuitive way. It has nonetheless been suggested that the choice between an IP model and an IA model with morpheme-specific phonology is primarily one of theoretical preference (e.g. Inkelas 2014); we leave it for further research to uncover additional empirical grounds to prefer one approach over the other.[18]

6. CONCLUSION. In this paper, we showed that Kipsigis exhibits across-the-board paradigmatic tonal polarity, a phenomenon that was previously thought to be impossible across languages (Trommer 2014b). The Kipsigis pattern is not only the first documented case of true tonal exchange, but also the first exchange process reported to apply across a whole word, with the effect of creating maximal contrast between two members of a morphological paradigm. While both item-and-process and item-and-arrangement analyses of the Kipsigis pattern may be tenable, the latter must crucially make reference to morphologically-conditioned phonology. We therefore suggested that item-and-process models provide a more straightforward account of across-the-board tonal polarity in Kipsigis.

Affixal morphology, however, is thought to be more common than process morphology in the world's languages. Thus the question arises as to whether the advantages of IP models extend beyond the Kipsigis polarity pattern to traditional segmental affixes. There are different ways to interpret the empirical landscape. In one interpretation, the rarity of true process morphology of the Kipsigis type indicates that the theory should be able to accommodate both affixes and processes, pointing towards a hybrid IA-IP theory (e.g. Orgun 1996, Inkelas 1998, 2014, Riehemann 2001, Inkelas & Zoll 2005, Booij 2010). In such a theory, both affixes and rules (or constraints) would be valid strategies for expressing a morphosyntactic category, and languages can vary in the extent to which they employ either of the two strategies. For example, it may be the case that only a small subset of languages make use of exchange rules, whereas many more employ affixes. There is another interpretation of the empirical facts, however, in which all morphology should be subsumed within the IP theory, and process morphology is

[18] Hill (2020), for example, provides evidence from historical change to support non-IA models of morphology.

either not as rare as we might think or is ruled out for independent reasons. For example, Inkelas (2014) suggests that process morphology with no overt affix and morphologically-conditioned phonology with an overt affix share many properties in common and should therefore be treated formally alike (see also Orgun 1996, Inkelas 1998, Inkelas & Zoll 2005, Sande 2019). The Kipsigis pattern seems to support this view, since the only models that are able to account for the data are precisely those that allow for morphologically-conditioned phonology. Since morphologically-conditioned phonological effects are very prevalent cross-linguistically, process morphology under this view would be less rare than previously thought. Certain types of process morphology may be rare or unattested not because they are predicted to be impossible but because of independent factors, such as learnability or historical considerations (Anderson 1992, Alderete 2008).

The appeal to independent factors is relevant for the question of why phenomena of the Kipsigis type are so rare cross-linguistically. Why have we not found more examples of true tonal and/or across-the-board exchange? In what remains we discuss two properties of Kipsigis morphophonology that might conspire to create the right conditions for across-the-board tonal polarity: (i) a simple tonal system with two underlying tones (H and L), and (ii) the status of both H and L as phonologically active in the language.

As discussed in §2.2, it is perhaps surprising that tonal exchange processes are not more common cross-linguistically, given that tonal phonology is more permissive than segmental phonology (Hyman 2011, 2018), and tonal morphology provides some of the most striking examples of process morphology (Inkelas 2014, Sande 2017, 2018). However, for tonal polarity to be possible, at least two factors are relevant: the size of the tonal inventory and the phonological activity of the tonal features involved. The relevance of inventory size can be easily understood: in a language with multiple level and contour tones, it might be more complicated to refer to opposite tone values.[19] We therefore expect to find polarity phenomena in languages with a simple tonal system of only two tones. Furthermore, both tones must be phonologically active. This is important because in many languages (particularly in the Bantu family) with grammatical tone and a H vs. L distinction, only H is active and lexically specified, and L is a

[19] Although scalar phenomena of the Guébie type (Sande 2017, 2018; §2.2) might be expected to be possible in a multi-tone system.

phonological default (e.g. Hyman 2001, Downing 2011). In Kalenjin dialects, on the other hand, L tones are not defaults. For example, Creider (1982) postulates H, L and HL underlying tones for the Kalenjin dialect Nandi, and he describes a particular phenomenon of L tone downstep which is analyzed with reference to phonologically active L tones. Dimmendaal (2012) also notes a process of vowel shortening in Kalenjin that is sensitive to specific tonal melodies of the stem; although this phenomenon is not yet well-understood in Kipsigis, Kouneli (2019) reports that long vowels may be shortened word-finally in trisyllabic nouns with a L.L.H tonal melody, which indicates that L tones must play a role in the grammar. In sum, the availability of tonal polarity in a language is subject to the following conditions on the language's tonal system: the tonal inventory should contain only two tones, and both tones must be phonologically active.

How might ACROSS-THE-BOARD tonal polarity come about? One possible explanation is that tones are suprasegmental and, in languages with a robust grammatical tone system, present on every mora or syllable in every word in the language.[20] This means that any phonological process that references tone is in principle applicable in all words in the lexicon of a language. A process that refers to segmental features, by contrast, can only apply to the subset of words that contain segments that bear those features. Imagine, for example, a language Kipsigis′, where nominative case is realized by flipping the value of voicing in an adjective. Assuming Kipsigis′ does not have voiceless sonorants, the nominative of the adjective *bá* would be *pá*, but the nominative of *má* would either be identical to the oblique or ineffable; the latter would lead to pervasive paradigm gaps (all those words without obstruents), and the former might be more difficult to learn since the child can only deduce the polarity rule from that subset of the lexicon with obstruents. Compare that to (actual) Kipsigis, where flipping a tone is possible for not only every word in the lexicon but every syllable of every word. We therefore speculate that across-the-board polarity will only be available with suprasegmental features that are present in every word of the language. Tone is an especially good candidate for across-the-board polarity because it also applies on every syllable.

[20] There are languages where some words are not tonally specified (e.g. mixed languages or languages that have recently undergone tonogenesis; see Coetzee et al. 2018 on Afrikaans), as well as languages where not every syllable is tonally specified (e.g. pitch accent systems). To our knowledge, however, these languages do not have robust grammatical tone systems.

Non-polar across-the-board phonological phenomena such as vowel harmony are very common in the world's languages, and Kipsigis is an example of a language with a robust [ATR] harmony system (see Casali 2003, Rose 2018, and Rolle et al. 2020 for typological studies of [ATR] harmony systems). It is thus not surprising that across-the-board polarity would be an option in a language whose grammar independently allows both polarity and across-the-board phenomena like harmony. We saw in §4 that a class of [-ATR] adjectives in Kipsigis form their plural by changing all their vowels to [+ATR]. Just as every vowel in the adjective must become [+ATR] in the plural, then, every tone in the adjective must flip in the nominative.[21] Across-the-board polarity may therefore have the same motivations as those hypothesized for harmony. Vowel harmony has been claimed to enhance contrasts that are difficult to perceive (e.g. Kaun 2004). Similarly, one could imagine that multiple tonal changes are more easily perceived or learned than a single tonal change, especially in a language like Kipsigis where H and L tones are phonetically similar: impressionistically, the pitch range of our consultants is very narrow, and the phonetic realization of a given tone relies heavily on context.[22]

While patterns of the Kipsigis type may be rare, we also note that most languages with grammatical tone are severely understudied. Nilo-Saharan languages, for example, make heavy use of grammatical tone (Dimmendaal 2019). However, the tonal properties of Nilo-Saharan differ significantly from that of better-studied African languages. For example, while many Bantu languages avoid adjacent H tones in an OCP effect known as Meeussen's Rule (Goldsmith 1984), Nuer (Western Nilotic; South Sudan, Ethiopia) freely allows H-H configurations and bans adjacent L tones instead (Gjersøe 2020). Unfortunately, many Nilo-Saharan languages lack even a basic descriptive grammar. The tonal morphology of Nilo-Saharan languages is therefore a clear avenue for further research, one which may reveal that polarity phenomena of the Kipsigis type are in fact more widely attested than previously thought. Tonal morphology has also historically been underdiscussed in morphological theory. There are few theoretically-guided typological studies of grammatical tone (e.g. Rolle 2018) and discussions of non-concatenative morphology often ignore tonal morphology entirely (e.g. Kastner & Tucker 2019), despite tonal

[21] Unlike the nominative formation, the plural formation is amenable to a concatenative analysis: plural may be spelled out by a segmentally null [+ATR] feature, which causes harmony.

[22] See also Creider 1982 for a description of the phonetic cues for tone perception in Kalenjin.

phenomena providing some of the clearest examples of process morphology. The present paper on Kipsigis demonstrates just how much we need more descriptive and theoretical research on grammatical tone from a diverse sample of languages, in order to better understand not only tone but also the morphology-phonology interface.

Appendix

A.1. DEMONSTRATIVES AND POSSESSIVES. As was described in §4, demonstrative and possessive morphemes in Kipsigis inflect for Case and exhibit the polarity pattern in the formation of nominative. The lists in (31) and (32) include the full paradigms for demonstratives and possessives, respectively. The tonal shape of the morphemes in predicative position has been included for completeness.

(31)

Demonstrative	Predicative	Oblique	Nominative	Gloss
ni/nɪ	L	L	H	'PROX.SG'
ʧu/ʧʊ	L	L	H	'PROX.PL'
nɑ:n	H	H	L	'MED.SG'
ʧɑ:n	H	H	L	'MED.PL'
ni:n/nɪ:n	H	H	L	'DIST.SG'
ʧu:n/ʧʊ:n	H	H	L	'DIST.PL'

(32)

Possessive	Predicative	Oblique	Nominative	Gloss
ɲʊ:n	HL	L	H	'my.SG'
ʧʊ:k	HL	L	H	'my.PL'
ŋu:ŋ	HL	L	H	'your.SG'
ku:k	HL	L	H	'your.PL'
ɲɪ:n	HL	L	H	'his/her.SG'
ʧɪ:k	HL	L	H	'his/her.PL'
ɲɑ:n	HL	L	H	'our.SG'
ʧɑ:k	HL	L	H	'our.PL'
ŋwɑ:ŋ	HL	L	H	'your(PL).SG'
kwɑ:k	HL	L	H	'your(PL).PL'
ɲwa:n	HL	L	H	'their.SG'
ʧwa:k	HL	L	H	'their.PL'

§4 showed that nominative tonal polarity straightforwardly applies to demonstratives in simple DPs with no other modifiers; we refer to these as isolation forms of the demonstrative. However, some demonstratives in their non-isolation forms, that is, when they co-occur with modifiers in complex DPs, appear to undergo an additional process of tonal dissimilation to the following modifier, but only in the oblique. This is shown in the examples (34) and (35) for the demonstrative whose isolation form is [nì] 'PROX.SG.OBL' (33).

(33)	là:kwà:-**nì**		Dem: L	
	child.SG.OBL-PROX.SG.OBL			
	'this child'			
(34)	là:kwà:-**nì**	**tórò**:**r**	Dem: L	Adj: H.L
	child.SG.OBL-PROX.SG.OBL	tall.SG.OBL		
	'this tall child'			
(35)	là:kwà:-**ní**	**mjɛ̀**	Dem: H	Adj: L
	child.SG.OBL-PROX.SG.OBL	good.SG.OBL		
	'this good child'			

This process is restricted to oblique demonstratives, as shown by comparison to the nominative counterparts of [nì], whose form [ní] 'PROX.SG.NOM' is constant in isolation (36) and non-isolation (37)-(38). Note that the form of the nominative is polar to the isolation form of the oblique.[23]

(36)	là:kwá:-**ní**		Dem: H	
	child.SG.NOM-PROX.SG.NOM			
	'this child'			
(37)	là:kwá:-**ní**	**tòró**:**r**	Dem: H	Adj: L.H
	child.SG.NOM-PROX.SG.NOM	tall.SG.NOM		
	'this tall child'			

[23] An observant reader might notice that the nouns in (36)-(38) do not follow the rules outlined in §3.2 for the nominative formation of nouns. This is because the rules in 3.2 are for nouns that bear the secondary suffix, which is usually an obligatory part of the noun but cannot occur with singular demonstratives. The form of the noun without the suffix follows different rules for nominative case formation, which are not very well understood. However, it is clear that these rules are not related in any way to the rules used for secondary forms of the noun (Toweett 1975, Creider 1982).

(38) là:kwá:-**ní** **mjɛ́** Dem: H Adj: H
child.SG.NOM-PROX.SG.NOM good.SG.NOM
'this good child'

Because the oblique dissimilation process holds between phonological words instead of within a word, we suggest that it takes place in the derivation after morphological tonal processes have applied. Each demonstrative is therefore first spelled out as an isolation form. Nominative case formation then applies to the isolation form of the oblique demonstrative, giving rise to polarity. Only afterwards does oblique dissimilation apply, at the phrasal level. We leave a full analysis of this interaction between syntax and phonology in Kipsigis for future work.

A.2. ADJECTIVES. A full list of adjectives investigated for tonal polarity is provided in (39) arranged by increasing length. As noted in §4, adjectives in Kipsigis constitute a relatively small class; the adjectives investigated below represent a near-exhaustive list of the examples found in Toweett (1979). While there are certainly more adjectives in the language, there are, to our knowledge, no adjectives with tonal patterns that differ from those in (39). The list includes both singular and plural adjectives. Exceptions to oblique ~ nominative polarity are marked with a *; these exceptions were discussed in §4. For completeness, we have included the tonal patterns of the oblique and nominative case form of each adjective when used attributively, as well as the adjective's tonal shape when used predicatively.

(39)

Adjective	Predicative	Oblique	Nominative	Gloss
ja	H	L	H	'bad.SG'
mur	H	L	H	'dirty.SG'
mjɛ	H	L	H	'good.SG'
oː	HL	L	H	'big.SG'
jɔːs	HL	L	H	'old.SG'
ʊːj	HL	L	H	'difficult.SG'
tʊːj	HL	L	H	'black.SG'
ŋɑːm	HL	L	H	'clever.SG'
mur-eːn	H.L	H.L	L.H	'dirty-PL'

tala	L.L	L.L	L.H/L.L	‘gentle.SG’	*
purgej	H.H	H.L	L.H	‘hot.SG’	
kajtɪt	H.H	H.L	L.H	‘cold.SG’	
kɑjtit	H.H	H.L	L.H	‘cold.PL’	
kɛrgɛj	H.H	H.L	L.H	‘same.SG’	
kergej	H.H	H.L	L.H	‘same.PL’	
lɪtɪt	H.H	H.L	L.H	‘straight.SG’	
taŋkʊs	H.H	H.L	L.H	‘soft.SG’	
tʃɛptʃɛp	H.H	H.L	L.H	‘swift.SG’	
aɲɪŋ	H.HL	H.L	L.H	‘tasty.SG’	
ɑɲiŋ	H.HL	H.L	L.H	‘tasty.PL’	
ataːl	H.HL	H.L	L.H	‘awkward.SG’	
ɲʊmɲʊm	H.HL	H.L	L.H	‘easy.SG’	
ɲumɲum	H.HL	H.L	L.H	‘easy.PL’	
tiliːl	H.HL	H.L	L.H	‘clean.SG’	
toroːr	H.HL	H.L	L.H	‘tall.SG’	
piriːr	H.HL	H.L	L.H	‘red.SG’	
lalaŋ	H.HL	H.L	L.H	‘warm.SG’	
lɑlɑŋ	H.HL	H.L	L.H	‘warm.PL’	
mʊgʊl	H.HL	H.L	L.H	‘round.SG’	
ɲigiːs	H.HL	H.L	L.H	‘heavy.SG’	
ɲɪgan	H.HL	H.L	L.H	‘brave.SG’	
pɛrpɛr	H.HL	H.L	L.H	‘stupid.SG’	
perper	H.HL	H.L	L.H	‘stupid.PL’	
tɛbɛːs	H.HL	H.L	L.H	‘wide.SG’	
tɛntɛn	H.HL	H.L	L.H	‘slender.SG’	
tɛrtɛr	H.HL	H.L	L.H	‘light.SG’	
kɔlkɔl	H.HL	H.L	L.H	‘fierce.SG’	

kunuːr	H.HL	H.L	L.H	‘crooked.SG’	
tuː-eːn	HL.L	HL.L	L.H	‘black-PL’	*
eːtʃ-eːn	HL.L	HL.L	L.H	‘big-PL’	*
lɛːlatʃ	HL.L	HL.L	L.H	‘white.PL’	*
mjaːtʃ-ɛːn	HL.L	HL.L	L.H	‘good-PL’	*
jaːtʃ-ɛːn	HL.L	HL.L	L.H	‘bad-PL’	*
tʃeptʃep-eːn	H.H.L	H.H.L	L.L.H	‘swift-PL’	
purge-eːn	H.H.L	H.H.L	L.L.H	‘hot-PL’	
mintiliːl	H.L.H	H.L.H	L.H.L	‘sour.SG’	
karaːran	H.HL.H	H.HL.H	L.H.L	‘beautiful.SG’	
kɑrɑːrɑn	H.HL.H	H.HL.H	L.H.L	‘beautiful.PL’	
ɑtɑːl-eːn	H.HL.L	H.HL.L	L.H.H	‘awkward-PL’	
toroːr-eːn	H.HL.L	H.HL.L	L.H.H	‘tall-PL’	
piriːr-eːn	H.HL.L	H.HL.L	L.H.H	‘red-PL’	
tiliːl-eːn	H.HL.L	H.HL.L	L.H.H	‘clean-PL’	
ɲigɑn-eːn	H.HL.L	H.HL.L	L.H.H	‘brave-PL’	
ɲigiːs-eːn	H.HL.L	H.HL.L	L.H.H	‘heavy-PL’	
mugul-eːn	H.HL.L	H.HL.L	L.H.H	‘round-PL’	
tebeːs-eːn	H.HL.L	H.HL.L	L.H.H	‘wide-PL’	
kolkol-eːn	H.HL.L	H.HL.L	L.H.H	‘fierce-PL’	
kunuːr-eːn	H.HL.L	H.HL.L	L.H.H	‘crooked-PL’	
mintiliːl-eːn	H.L.H.L	H.L.H.L	L.H.L.H	‘sour-PL’	

As a minor note, there are some adjectives whose stems differ in tonal shape between the oblique singular and the oblique plural, where the singular ends in L but the plural stem ends in a falling HL contour, such as [tóròːr] ‘tall.SG.OBL’ vs. [tórôːr-èːn] ‘tall-PL.OBL’. These adjective stems also

have a final HL in the predicative, suggesting that the underlying representation of the adjective may have a final HL specification that simplifies to L in the oblique singular. Regardless of the form of the oblique, however, the tonal polarity pattern between the oblique and nominative still holds.

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