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A new typology of lexical accent competition

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Main claim

We present the results of a typological study that classifies lexical accent patterns with a theory-neutral algorithm. Our findings support a theoretical account that is based on gradient phonological representations which allow competition of accents with different strengths.

Background

Most lexical accent analyses are based on a distinction between unaccented and accentual morphemes and the assumption that either the left- or rightmost accentual morpheme determines the surface accent if more than one accentual morpheme is present. In the Ukrainian examples in Fig. 1 where accented stems and suffixes 'compete', the parameter Leftmost correctly derives the surface accent in Fig. 1-a. In Fig. 1-b, however, a 'dominant' suffix surfaces with accent without being the leftmost accentual morpheme. And Fig. 1-c shows that there are even degrees of dominance in Ukrainian: The suffix in Fig. 1-c only wins against certain stems but not others.

	a. SG.ACC	b. SG.NOM	c. PL.DAT
$\sqrt{foot}$	n ó ɦ-u	noɦ- á	noɦ- á m
$\sqrt{head}$	ɦ ó lov-u	ɦolov- á	ɦ ó lov-am

(V=underlying accent;
V́ =affix accent surfaces,
V́ =stem accent surfaces)

Fig. 1: Accent competition in Ukrainian (Pugh and Press, 1999)

Previous theoretical accounts predict different restrictions for such patterns; examples include: A) roots can only be accentual or non-accentual but not 'dominant' (Halle and Mohanan, 1985; Alderete, 1999), B) affixes can only be accentual, non-accentual, or dominant accentual but can never show more degrees of dominance (Halle and Mohanan, 1985; Revithiadou, 1999), or C) all dominant morphemes are morphological heads (Revithiadou, 1999; Yates, 2017).

Methodology and empirical results

Although there are a multitude of theoretical proposals and empirical case studies on lexical accent (other examples are Kiparsky and Halle, 1977; Halle and Vergnaud, 1987; Czaykowska-Higgins, 1993; Inkelas, 1998; Butska, 2002; Vaxman, 2016; Bogomolets, 2020), there is so far no large-scale typological study that tests the predictions of existing accounts. We aim to fill this gap by conducting a theory-neutral database that collects and classifies lexical accent systems by the number of lexical morpheme classes involved in the lexical accent competition. So far, our database contains 32 languages from 26 different language families/isolates. For each language, a single parameter ‘Leftmost/Rightmost’ (or ‘Outermost/Innermost’ morpheme) is taken to decide the competition in case multiple accentual morphemes are present. For contexts where this is insufficient, a hierarchy of accentual morpheme classes is assumed which thus introduces (degrees of) dominance (‘No’ in (1)). For each language, we ultimately went for the parameter setting that results in fewest morpheme classes. Due to the complexity of the data and the heterogenous sources, this methodology needs to be applied by hand for each language. One important result is that there are 22 languages in our database that cannot be captured with a binary distinction into unaccented and accentual, cf. the list in Fig. 2. Crucially, many of these patterns with ‘degrees of dominance’ are counterexamples to the theoretical predictions A)-C), notated in Fig. 2 as well. We, for example, found 12 counterexamples against restriction C) and hence against a theory where dominance is not a lexical property. Another interesting typological result is the fact that the deciding parameter ‘Outermost’ is unnecessary – all lexical accent systems can be sufficiently described with the directionality parameter Left-/Rightmost (contra, for example, claims in Chung, 1983; Bjorkman, 2010).

				Nr	Decision	Default	Ⓐ	Ⓑ	Ⓒ
1.	Bulgarian	bul	Indo-European	3	LMost	Penult	Yes	Yes	Yes
2.	Hittite	hit	Indo-European	3	LMost	LMost	Yes	Yes	Yes
3.	M. Greek	ell	Indo-European	3	LMost	Antepenult	Yes	Yes	Yes
4.	Colville	oka	Salishan	3	LMost	LMost	Yes	Yes	Yes
5.	Shuswap	shs	Salishan	3	LMost	n.d.	Yes	Yes	Yes
6.	Thompson River Salish	thp	Salishan	3	LMost	RMost	Yes	Yes	Yes
7.	Hidatsa	hid	Siouan	3	LMost	n.d.	Yes	Yes	Yes
8.	Nez Perce	nez	Sahaptian	3	LMost	Penult	Yes	Yes	No
9.	Parabel Selkup	sel	Uralic	3	LMost	n.d.	Yes	Yes	No
10.	A’ingae	con	-	3	LMost	Penult	Yes	Yes	No
11.	Chamorro	chw	Austronesian	3	RMost	RMost	No	No	No
12.	Choguita Rarámuri	tar	Uto-Aztecan	4	LMost	Postin	Yes	No	No
13.	Sahaptin	yak	Sahaptian	4	RMost	n.d.	Yes	No	No
14.	Vedic Sanskrit	san	Indo-European	4	LMost	LMost	Yes	No	No
15.	Coastal Bizkaian Basque	eus	-	4	LMost	RMost	Yes	No	Yes
16.	Arapaho	arp	Algic	4	RMost	Penult	No	Yes	No
17.	Cupeño A	cup	Uto-Aztecan	4	RMost	LMost	No	Yes	Yes
18.	Russian (N, infl)	rus	Indo-European	4	LMost	LMost	No	No	No
19.	Japanese	jpn	Japonic	4	RMost	Antepenult	No	No	No
20.	Lithuanian (N, infl)	lit	Indo-European	6	LMost	LMost	No	Yes	No
21.	Moses Columbian Salish	thp	Salishan	5	RMost	RMost	No	No	Yes
22.	Ukrainian (N, infl)	ukr	Indo-European	7	LMost	LMost	No	No	No

Fig. 2: Languages with more than two accentual morpheme classes

Theoretical proposal

The assumption of Gradient Symbolic Representations (Rosen, 2016; Smolensky and Goldrick, 2016) can predict all these properties of lexical accent systems. The degrees of dominance follow as a lexical property since all linguistic objects (e.g. H-tones or feet) have a certain underlying activity that can gradiently differ (Zimmermann, 2018), expressed here as numerical values from 0-1. Such an analysis based on gradiently active H-tones is given in Fig. 3 for lexical accent in Ukrainian, correctly predicting the full paradigm in Fig. 4. One basic mechanism of accent competition is the minimization of gradient MAX violations predicting that the accent with the highest input activity surfaces ((2) in Fig. 3). Another basic mechanism is coalescence of two weakly active identical elements into a single element (cf. Smolensky and Goldrick, 2016) that is assumed to be only possible if the resulting output activity equals the full activity of 1. Under coalescence ((4) in Fig. 3), the accent surfaces in the default Leftmost position.

root →	ø	$\mathbf{H_{0.2}}$	$\mathbf{H_{0.6}}$	$\mathbf{H_{0.8}}$	$\mathbf{H_{1.0}}$	affix↓
SG.NOM	ø+ $H_{1.0}$ ❶	$H_{0.2}$+ $H_{1.0}$ ❷	$H_{0.6}$+ $H_{1.0}$ ❷	$H_{0.8}$+ $H_{1.0}$ ❷	$H_{1.0}$ +$H_{1.0}$ ❸	$\mathbf{H_{1.0}}$
PL.DAT	ø+ $H_{0.8}$ ❶	$H_{0.2}$+$H_{0.8}$ ❹	$H_{0.6}$+ $H_{0.8}$ ❷	$H_{0.8}$ +$H_{0.8}$ ❸	$H_{1.0}$ +$H_{0.8}$ ❷	$\mathbf{H_{0.8}}$
SG.ACC	ø+ $H_{0.5}$ ❶	$H_{0.2}$+ $H_{0.5}$ ❷	$H_{0.6}$ +$H_{0.5}$ ❷	$H_{0.8}$ +$H_{0.5}$ ❷	$H_{1.0}$ +$H_{0.5}$ ❷	$\mathbf{H_{0.5}}$
PL.ACC	ø+ $H_{0.1}$ ❶	$H_{0.2}$ +$H_{0.1}$ ❷	$H_{0.6}$ +$H_{0.1}$ ❷	$H_{0.8}$ +$H_{0.1}$ ❷	$H_{1.0}$ +$H_{0.1}$ ❷	$\mathbf{H_{0.1}}$
	$\sqrt{article}$	$\sqrt{height}$	$\sqrt{foot}$	$\sqrt{head}$	$\sqrt{base}$	

❶ only accent surfaces; ❷ stronger accent surfaces; ❸ Leftmost accent wins (=if same activity); ❹ Coalescence (if sum of activity is 1) and Leftmost default

Fig. 3: Ukrainian: GSR representation

SG.NOM	statt^{j}- á	vysot- á	noɦ- á	ɦolov- á	osnóv -a
PL.DAT	statt^{j}- ám	vysót -am	noɦ- ám	ɦólov -am	osnóv -am
SG.ACC	statt^{j}- ú	vysot- ú	nóɦ -u	ɦólov -u	osnóv -u
PL.ACC	statt^{j}- í	vysót -y	nóɦ -y	ɦólov -y	osnóv -y
	$\sqrt{article}$	$\sqrt{height}$	$\sqrt{foot}$	$\sqrt{head}$	$\sqrt{base}$

Fig. 4: Ukrainian: Paradigm with one representative context for each pattern

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