A Harmonic Layer Account of Levantine Arabic Syncope

Jochen Trommer Leipzig University
`jtrommer@uni-leipzig.de`

Summary: Syncope in Levantine Arabic verbs (Brame 1974) is one of the classical cases of morphological structure distorting phonological computation in subtle ways. Thus syncope applies in /fihim-na/ → [fhímna] 'we understand', but not in /fihim-na/ → [fihím-na] 'he understands us'. As argued by Newell (2015), cases of this type, where the same formative (here: 1st plural *-na*) has different phonological effects when attached in different derivational stages are inherently problematic for Stratal OT (SOT, Kiparsky 2003, Bermúdez-Otero 2012), which links stratal affiliation to diacritic marking of affixes. However, as Kiparsky (2011) points out, syntax-driven cycles as in Newell's phase-based approach to opacity also make the wrong predictions here because subject-oriented *-na* seems to be morphophonologically earlier than its object-oriented counterpart which is the opposite of what is expected if morphophonology is driven directly by phrasal syntax, where objects merge with verbal projections *before* subjects. In this talk, I show that a new version of the morphophonological cycle, Harmonic Layer Theory, solves both problems.

Harmonic Layer Theory (HLT): HLT combines the Gradient Symbolic Representations approach of Smolensky and Goldrick (2016) with cyclic morphophonology. As in SOT, all morphosyntactic words in HLT pass through two optimization cycles ('layers'), the Stem Layer and the Word Layer, where different affixation processes are linked to one of these layers. However, departing from SOT, these layers share the same grammar, i.e., the same constraint weighting in Harmonic Grammar. Differences between affixes added at different layers result because every layer modifies the representational strength of segments made possible by the assumption of representational gradience, hence 'older' affixes might have different effects than 'younger' ones even if they are otherwise identical.

Analysis: The core idea of the syncope analysis is that stressed vowels gain strength at every cycle (layer) due to the constraint $\mathcal{S}(\acute{V}) = 1$ (where $\mathcal{S}(X)$ denotes the representational strength of a segment X), whereas medial unstressed vowels in open syllables lose stress due to $\mathcal{S}(\check{V}]_\sigma) = 0$. Strength adjustments are minimal because of the high-weighted limiting constraint $|\mathcal{S}| \leq 0.1$ which disallows differences bigger than 0.1 between corresponding input and output segments. (1) shows a single optimization step for *fihim-na* 'we understand' where $\acute{\sigma}\sigma$ is a shorthand for the constraints assigning stress to the penultimate syllable, and the stressed vowel changes its strength from 0.5 to 0.6:

(1) **Input:** = $fi_{0.5}.hi_{0.5}m\text{-}na_{0.5}$	$\acute{\sigma}\sigma$ w=∞	$\lvert\mathcal{S}\rvert \leq 0.1$ w=∞	$\mathcal{S}(\acute{V}) = 1$ w=1.0	$\mathcal{S}(\check{V}]_\sigma) = 0$ w=1	$\mathcal{H}$
☞ a. $fi_{0.4}.hí_{0.6}m\text{-}na_{0.5}$			-0.4	-0.4	-0.8
b. $fi_{0}.hí_{1}m\text{-}na_{0.5}$		-2			∞
c. $fi_{0.5}.hí_{0.5}m\text{-}na_{0.5}$			-0.5	-0.5	-1.0
d. $fi_{0.5}.hi_{0.5}m\text{-}na_{0.5}$	-1			-0.5	∞

(2) shows complete derivations. By assumption, all segments are stored lexically with a strength of 0.5, output segments below 0.5 after the final cycle are pronounced, segments below this value remain silent and are hence effectively deleted. In (2-a) the first stem-vowel is iteratively weakened, hence syncopated (due to its final strength of 0.3). In contrast, the stress shift in (2-b) leads first to strengthening then to weakening of the first vowel which in sum is still above

the pronunciation threshold and does hence not syncopate:

(2)		**Stem Layer**		**Word Layer**		
a. /fi$_{0.5}$.hi$_{0.5}$m/	→	fi$_{0.4}$.hí$_{0.6}$m-na$_{0.5}$	→	fi$_{0.3}$.hí$_{0.7}$m-na$_{0.5}$	[fhímna]	'we understand'
b. /fi$_{0.5}$.hi$_{0.5}$m/	→	fí$_{0.6}$.hi$_{0.5}$m	→	fi$_{0.5}$.hí$_{0.6}$m-na$_{0.5}$	[fihímna]	'he understands us'
c. /fi$_{0.5}$.hi$_{0.5}$m/	→	fí$_{0.6}$.hi$_{0.5}$m	→	fí$_{0.7}$.hi$_{0.5}$m	[fíhim]	'he understands'

Discussion: Finally, I will briefly show that Harmonic Layer Theory in principle extends to a much broader set of data, especially patterns for which it has been argued that variability of process application correlates to the stratal depth of forms as in umlaut and vowel lowering in Chamorro (Chung 1983), English final stop deletion (Guy 1991), and Tommo So vowel harmony (McPherson and Hayes 2016), but also to 'Strict-Domain' effects (see Myers 1991, and references cited there) as in Bantu tone (Myers 1997) where the heterogeneity of repair effects for OCP violations can be straightforwardly derived by tones growing stronger and faithfulness constraints which are parametrized for reacting to representational strength, an approach extending also to hiatus resolution in Ojibwa and alternations targeting nasal+fricative configurations in Malagasy (Newell 2015).

References

Bermúdez-Otero, R. (2012). The architecture of grammar and the division of labour in exponence. In Trommer, J., editor, *The Morphology and Phonology of Exponence*, pages 8–83. Oxford University Press, Oxford.

Brame, M. (1974). The cycle in phonology: Stress in Palestinian, Maltese, and Spanish. *Linguistic Inquiry*, 5:39–60.

Chung, S. (1983). Transderivational constraints in Chamorro phonology. *Language*, 59(1):35–66.

Guy, G. R. (1991). Explanation in variable phonology: An exponential model of morphological constraints. *Language Variation and Change*, 3:1–22.

Kiparsky, P. (2003). Finnish noun inflection. In Nelson, D. and Manninen, S., editors, *Generative Approaches to Finnic Linguistics*, pages 109–161. CSLI, Stanford.

Kiparsky, P. (2011). Chains or strata?: The case of Maltese. Ms., Stanford University. Available online at http://ling.auf.net/lingBuzz/001379.

McPherson, L. and Hayes, B. (2016). Relating application frequency to morphological structure: the case of tommo so vowel harmony. *Phonology*, 33(1):125–167.

Myers, S. (1991). Structure preservation and the strong domain hypothesis. *Linguistic Inquiry*, 22(2):379–385.

Myers, S. (1997). OCP effects in Optimality Theory. *Natural Language and Linguistic Theory*, 15(4):847–892.

Newell, H. (2015). Phonology without strata. *Proceedings of the 2015 annual conference of the Canadian Linguistic Association*.

Smolensky, P. and Goldrick, M. (2016). Gradient symbolic representations in grammar: The case of French liaison. ROA 1286.