Underdetermined Headedness and Brazilian Portuguese Vowel Reduction

Andrew Nevins
a.nevins@ucl.ac.uk

In order for the claim that positional strength and segmental complexity are correlated to go through, we must develop a model vowel systems in which complexity can be clearly 'read off' the structure. Naturally, binary features such as [±round],[±high] cannot be very easily translated into measures of comparative complexity of vowel representations (the valiant efforts of SPE Chapter 9 notwithstanding), in part because vowel systems depend so much on the inventory of contrasts to which each vowel must be compared and contrastively represented. As a direct result of Element Theory's way of building complexity into the number of primes that compose a segment, reduction processes in positions that support less complexity (i.e. unfooted or in the weak half of a binary foot) target these composite structures, and lenition in fact involves the removal of element structure. Of even greater utility, however, is its notion of *headedness*, which expresses the fact that given a two-element combination, one of the elements exhibits a greater say on the realization of the resulting composite. Distinctions in headedness are empirically necessary for languages (such as, say, English) that distinguish [ɛ] and [æ]: while both are composed of |A,I|, one needs to express their difference formally, and this is accomplished by designating |A| as the head (indicated by underlining) in |A,I| [æ], whereas |I| is the head in |A,I| (where linear order means nothing), which represents [ɛ] .

So what of a language with a contrast between tense and lax mid vowels, such as the [e, ɛ] and [o,ɔ] of 7-vowel languages, such as Brazilian Portuguese? I claim that Element Theory underdetermines the answer to this question, and that this ambiguity is a feature, not a bug, as it enables one to express idiolectal and dialectal variation. In particular, let us assume that a headed combination of two elements is more complex than an unheaded combination:

> (1) A headed element-theoretic combination |α,β| is more complex (and thus less easily licensed in a prosodically weak position) than an unheaded version of the combination |α,β|

Returning to the expression of the stressed inventories of 7-vowel systems, we may in principle represent them as either (2a) or (2b) (where stressed [i,u,a] are also headed):

(2a)

|I|	[i]		|U|	[u]
|I,A|	[e]		|U,A|	[o]
|I,A|	[ɛ]		|U,A|	[ɔ]
		|A|	[a]		

(2b)

|I|	[i]		|U|	[u]
|I,A|	[e]		|U,A|	[o]
|I,A|	[ɛ]		|U,A|	[ɔ]
		|A|	[a]		

The only point of variation between (2a) and (2b) is whether the tense-mid series is represented as headed and the lax-mid as unheaded, as in the former, or whether the lax-mid is represented as headed and the tense-mid as unheaded, as in the latter, but I claim that this constitutes precisely the

difference between ‘Northeastern’ (2a) and ‘Southeastern’ (2b) BP (labels I put in scare quotes to indicate their status as idealizations over large dialectal areas).

In particular, it is often noted that Northeastern speakers reduce the contrast between tense and lax pretonic mid vowels to the lax version of the pair, thereby pronouncing [tɛlɛvisão] ‘television’ with lax vowels, while Southeastern speakers pronounce this same word as [televisão], with tense pretonic mid vowels. Most accounts of these phenomena have simply recast the facts by saying that lax vowels are the ‘default’ in the Northeast, while tense vowels are the default in the Southeast. With headedness (and its analytic underdetermination in 7-vowel systems) as a formal aspect of the representation, however, we can encode default status in slightly more nuanced terms, according to (1): in a weak position (e.g. pretonically), the less complex, and thereby non-headed version of the pair will be favored, and this in turn is why [ɛ,ɔ] are preferred in (2a), corresponding to Northeastern dialects, while these same vowels are headed, and hence dispreferred, in Southeastern dialects.

The status of the systems in (2a) vs. (2b) in enacting reduction of specific kinds of headed expressions in fact lead to particular correlational predictions within these dialects. In particular, up until now we have not discussed the representation of nasal vowels, which involve the element |L| in Backley (2011). Nasal [ã], therefore, would be composed of |L,A|.

Recall that Southeastern dialects accomplish neutralization of the [e/ɛ] contrast by removing the headed version, namely |I,A|, and thereby show a dispreference for complex expressions with headed |A|. This makes the prediction that these same dialects will show comparatively more reduction of nasal [ã], producing it instead as a much more centralized [ə̃] than their Northeastern brethren (which is reported to be an independently attested observation about the South/North dialectal split), as the |A|-removed version of the vowel would be represented as |L| alone (i.e. a nasal schwa).

By contrast, Northeastern dialects accomplish neutralization of the [e/ɛ] contrast by removing the headed version, namely |I,A|, and thereby show a dispreference for complex expressions with headed |I|. In terms of complex expressions involving nasality and |I|, the nasal diphthong [ə̃j] (found in words such as *ontem* ‘yesterday’) should undergo comparatively more vowel reduction, and indeed it seems to be the case that these dialects reduce nasal mid-vowel diphthongs to [i] (producing forms such as [onti]) more than their Southern kin.

In sum, by encoding the notion of ‘default’ in a more principled manner as ‘the non-headed version of a complex vocalic expression’, we can begin to pursue falsifiable correlations as to whether the same dispreferred headed vowels in |I,A| (Northeast [e]) vs. |I,A| (Southeast [ɛ]) correlate with reduction of the headed element in other combinations, such as |L,A| and |L,A,I| respectively. Moreover, the encoding of headedness as a formal property also makes predictions about the phonetic distribution within the vowel space of these mid vowels: as Kenstowicz (2010) shows for Italian dialects, when [ɛ] is preferred (by hypothesis, system (2a)), “the closed mid vowels are very near to the high vowels, while the open mid vowels are relatively well separated from the single low vowel”; in other words, when [ɛ] is preferred, it is because [e] is

more |I|-like – and thus closer to |I| in acoustic space -- exactly as represented in (2a).

References

Backley, Phillip. 2011. *An Introduction to Element Theory*. Edinburgh University Press.

Bisol, Leda. 1989. Vowel harmony: a variable rule in Brazilian Portuguese. *Language Variation and Change* 1, 185-198.

Donegan, Patricia. 1978. *On the Natural Phonology of vowels.* Doctoral dissertation, The Ohio State University.

Fails, Willis and J. Halvor Clegg. 1992. A spectrographic analysis of Portuguese stressed and unstressed vowels. Donald Macedo and Dale Koike, eds. *Romance Linguistics: the Portuguese Context*. Westport, CT: Bergin and Garvey, pp. 31-42.

Harris, John. 1994. *English Sound Structure.* Oxford: Blackwell.

Kenstowicz, Michael. 2010. Vocale incerta, vocale aperta. *Studi e Saggi Linguistici* 48, 25-50.