Length as strength: a new account of Raddoppiamento fonosintattico

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Nutshell Raddoppiamento fonosintattico (RF) (Loporcaro 1997) is a word-boundary gemination process of Standard Italian. Empirical data shows that RF-geminates are shorter than inherent geminates (Campos-Astorkiza 2014). This evidence is not taken into account by any previous analysis. I propose a new representation of length as strength in the framework of *Gradient Symbolic Representations* (Smolensky and Goldrick 2016, Faust and Smolensky 2017, Zimmermann 2017). Crucially, I claim that phonological strength correlates with phonetic length and I hence propose a new dimension of variation for geminates and long vowels. Moreover, I give a unified analysis of RF by assigning strength either to stress or to a weak segment in the lexical representation.

Theoretical Background In *Gradient Symbolic Representations*, continuous, numerical gradience expresses the degree of activity or presence of a symbol in a linguistic representation. Linguistic elements can have underlyingly different degrees of presence; output elements can remain gradiently active as well. The harmony evaluation is formally modeled in Harmonic Grammar where constraints are weighted, not ranked.

Data RF is a sandhi rule that consists of the lengthening of the initial consonant of word_2 in the string word_1-word_2, when word_1 is:

(1) an item of a <u>closed lexical class</u>:
a, da, e, o, ma, né, come, dove, qualche
'to, from, and, or, but, nor, how, where, some'
/ˈkome/ /ˈva/ → [ˈkoːmeˈ**vː**a] 'how are you?'

(2) <u>stressed on the final syllable</u>:
/parˈlo/ /ˈmolto/
→ [parˈloˈ**mː**olto]
's/he talked a lot'

RF (1) is due to the final consonant in ethymon of word_1 (Lat. *ad* > It. *a*, Lat. *quomodoet* > It. *come*). RF (2) is a phonologically predictable stress-triggered gemination.

Proposal I claim that phonological strength (as activity, in the sense of Smolensky and Goldrick 2016) correlates with phonetic length. Hence, singleton, inherent and derived geminates have different underlying strength. Note that Italian gemination involves fortition in addition to lengthening (Payne 2005). I also propose that stress (the strong position in a foot) brings some phonologically derived extra-activity that can be transferred from the suprasegmental tier to a segment, in order to make underlying activity interpretable. In fact, the stressed vowel, in open non final syllables, is always realized as long: /ˈka.za/ [ˈkaː.za]. RF-gemination is caused by adding to a consonant some extra-strength that derives either from other segments or from stress. In case of lexical RF (1), the final root node of word_1 (corresponding to the final etymological consonant) is only partially present in the representation. When the word is uttered in isolation, this root node is too weak to surface, whereas in a string it fuses with the following segment, giving rise to coalescence across a word boundary. In case of stress-driven RF (2), the strength of the stress is reassociated to a segment, in this case the initial consonant of word_2.

Analysis <u>Assumptions</u> (i) Segments and suprasegmental elements in the input can be gradient. (ii) Segments in the output can be gradient. (iii) Strength may surface as a phonetic feature, such as length. If a segment is stronger than 1, then it is longer than segments as strong as 1. (iv) Strength is a property that can be reassociated across tiers. <u>Constraints</u> MAX[STR]: Assign z reward for every activity (x) that is present in the input and is associated to a segment in the output (y) (z=x). (MAX[STR] is a positive constraint and triggers the realization of strength on the segmental tier). UNIF: Assign a violation mark for each departure from 1-to-1 input-output correspondence. FULL!: Assign violation z for every segment that has strength y<1 in the output (z=1-y). ONE!: Assign z violation for every segment that has strength y>1 in the output (z=y-1). ONE!-V: Assign z violation for every vowel that has strength y>1 in the output (z=y-1).

Derivations I give here only a simplified derivation of the data. In the tableaux, gradient violations are represented by the degree of penalty, whereas each discrete violation counts as 1; I give also the indication of the segment where the evaluation is computed.

In case of lexical RF (1), the final root node (•) of word$_1$ (corresponding to the final etymological consonant) is partially present in the representation and has gradient activity (for instance, 0.4). It is too weak to surface, but it can fuse with the following segment in a string, giving rise to coalescence across a word boundary. Candidate (c) fuses the two root nodes into a single one with the feature of the second node /v/ and the strength of both node • + /v/ (1.4), which is interpreted by the phonetics as a geminate. MAX[STR] does not reward candidates (a) because the strength is not visible on the surface, since the root node has no phonological content associated with it.

/kome$\bullet_{0.4}$//*va*/	MAX[STR]	ONE!-V	UNIF	FULL!	ONE!	H
weight	w=+20	w=-7	w=-5	w=-3	w=-2	
a. kome$\bullet_{0.4}$*va*				(1-0.4)$_{(\bullet)}$		-1.8
b. kome$_{1.4}$va	0.4$_{(\bullet \to e)}$	0.4$_{(e)}$	1$_{(e + \bullet)}$		0.4$_{(\bullet \to e)}$	-0.6
☞ c. komev$_{1.4}$a	0.4$_{(\bullet \to v)}$		1$_{(\bullet + v)}$		0.4$_{(\bullet \to v)}$	+2.2

In the stress-triggered RF (2), the extra-strength (for instance, 0.5) brought by the stress is reassociated to a segment (the initial consonant of word$_2$). The final stressed vowel (b) cannot be stronger than 1 because of ONE!-V, therefore the consonant lengthening (c) is the preferred option. Since this extra-strength is suprasegmental, coalescence of segments is not possible here, but rather shift of strength is carried out. MAX[STR] does not reward candidates (a), because the strength remains not visible on the surface.

/par$^{\text{ˈ}0.5}$lo molto/	MAX[STR]	ONE!-V	UNIF	FULL!	ONE!	H
weight	w=+20	w=-7	w=-5	w=-3	w=-2	
a. par$^{\text{ˈ}0.5}$lo molto						0
b. parˈlo$_{1.5}$ molto	0.5$_{(\text{ˈ} \to o)}$	0.5$_{(o)}$	1$_{(\text{ˈ} + o)}$		0.5$_{(o)}$	+0.5
☞ c. parˈlo m$_{1.5}$olto	0.5$_{(\text{ˈ} \to m)}$		1$_{(\text{ˈ} + m)}$		0.5$_{(m)}$	+4

My model can also explain cases of syncronic variation that are not considered by previous accounts. For example, RF is not carried out if there is a glide in coda position of word$_1$: /faˈraj bene/ [faˈraj be:ne]. The stress extra-strength could be associated to the vowels, but ONE!-V penalizes vowel lengthening. The initial consonant of word$_2$ is not the adjacent segment to the stressed one and a locality constraint penalizes RF.

Conclusion I give an unified analysis of both types of RF, using the same representation and the same set of constraints. More generally, gradience allows different representations (slightly different strengths) for apparently identical elements (geminates), taking into account the phonetic evidence.

References • R. Campos-Astorkiza (2014) *Lengthening and prosody in Tuscan Italian.* International Journal of Basque Linguistics and Philology XLVI-1. • M. Loporcaro (1997) *Lengthening and raddoppiamento fonosintattico.* The dialects of Italy, London-New York, Routledge. • D. Passino (2013) *A unified account of consonant gemination in external sandhi in Italian: Raddoppiamento Sintattico and related phenomena.* The Linguistic Review, 30(2). • P. Smolensky and M. Goldrick (2016) *Gradient symbolic representations in grammar: The case of French liaison.* Ms. Johns Hopkins University and Northwestern University.