Faded Copies: Reduplication as Sharing of Activity

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Main Claim A new phonological account of reduplication is proposed which is based on element fission as the sharing of activity. This proposal relying on Gradient Symbolic Representations (Smolensky and Goldrick, 2016) predicts the attested typology of weakening effects for reduplication: Every copy operation gradiently weakens both the copy and the copied elements.

The copying-weakening-correlation It is an often-discussed property of reduplicants to show Emergence of the Unmarked Effects where markedness reduction applies within a reduplicant but is absent in the rest of the language (McCarthy and Prince, 1995; Struijke, 2000; Becker and Flack Potts, 2011). Interestingly, the mirror image for copied elements (=the 'base') can also be found. An example are most Salishan languages where the copied vowel of the stem is reduced to /ə/ or deleted (van Eijk, 1998; Parker, 2011). In the Lushootseed diminutive (1-a), for example, unstressed copied vowels are deleted whereas unstressed non-copied vowels surface faithfully (Bates, 1986; Urbanczyk, 2001). And in ʔayʔaǰuθəm (Sliammon, Mainland Comox) diminutive reduplication, either a /CV-/ reduplicant or a /Ci-/ reduplicant with a fixed segment surfaces, the choice being lexical (1-b). Strikingly enough, deletion of the copied stem vowel (unpredictable given the general phonology of the language) only applies with the former allomorph, not with the latter (Watanabe, 1994; Blake, 2000; Mellesmoen, 2017). Deletion of a vowel is hence crucially bound to a copying operation that applied to this vowel. All this data follows from the generalization that *both the copy and the copied elements are weakened*.

(1) a. Lushootseed DIM (Urbanczyk, 2001, 100)

kupi	'coffee'	kú∼kpi
pišpiš	'cat'	píš∼pšpiš

b. ʔayʔaǰuθəm DIM (Watanabe, 1994, 327)

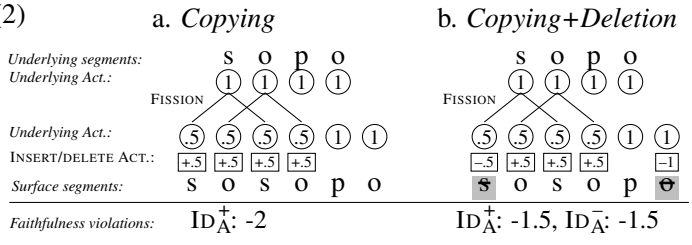
supaju	'ax'	su∼spaju
gəq'-it	'open-STV'	gi∼gəq'it

Further support for the copying-weakening-correlation can be found in the typology of multiple reduplication. Whereas multiple reduplicants faithfully surface in many languages (e.g. Thompson /sil∼sí∼sil'/ 'DIM-DISTR-calico' (Thompson and Thompson, 1992)), others show shortening effects (Zimmermann, 2018). In basically all Southern Wakashan languages, for example, only a single reduplicant surfaces if multiple reduplication-triggers are present in a word (Stonham, 1994, 2004). And in Sikaiana (Donner, 2012), reduplicants are smaller than expected when they cooccur with another reduplicant: The plural reduplication is /CV-/ in isolation (/sopo/ 'jump'; /so∼sopo/ 'PL-jump', p.23) but is truncated to /C-/ if it cooccurs with repetitive bisyllabic reduplication (/sopo∼s∼sopo/; */sopo∼so∼sopo/ 'REP-PL-jump', p.24). The modified generalization is hence that *every copy operation weakens both the copy and the copied element* and multiple copying weakens elements further than just simple copying.

Reduplication as Sharing of Activity The assumption of gradient activity of phonological elements (Smolensky and Goldrick, 2016; Rosen, 2016) allows to straightforwardly capture the copying-weakening-correlation under a phonological account to reduplication based on segmental fission. The crucial assumption of Gradient Symbolic Representations is that all phonological elements have an underlying activation. Though elements can be weakly active underlyingly, all activation is neutralized to the full activity of 1 in the output. The new proposal about fission is that an element can only *distribute its underlying activity equally unto all its output correspondents*. If reduplication is the result of a phonologically triggered copy operation, it follows that both the 'base' and the 'reduplicant' have only partial underlying activity since they are instances of one input element and must share its underlying activity. Given that all output elements are fully active, copying hence results in adding activity to 'strengthen' the copied elements to fully active output elements. In addition, copied elements are 'weaker' and only preserved to a lesser degree by faithfulness constraints than elements that are not copied. The formal implementation of this intuition relies on the assumption that non-realization of

an element is setting its activity to 0, and that a change of activation for a segment is penalized by ID_{A}^{+} (=no adding of activity) and ID_{A}^{-} (=no deletion of activity). This is illustrated in (2) where /sopo/ undergoes copying of the initial CV. The underlying activity of /s/ and /o/ respectively is thus distributed equally among two output segments. Given that full activity is required in the output, 0.5 activity must be added for all four segments. (2-b) shows the effect of copying for deletion: Whereas non-realization of a non-copied element (final /o/) implies removal of 1.0 activity, non-realization of a copied element (initial /s/) is 'cheaper' given that it implies reduction of only 0.5 underlying activity. The apparent Duke-of-York situation that a newly created copied segment remains unrealized in the output becomes transparent if one considers the reason for copying in a phonological account to reduplication: It applies to fill otherwise empty prosodic nodes (Marantz, 1982; Pulleyblank, 2009; Saba Kirchner, 2010, 2013*a*,*b*; Bermúdez-Otero, 2012). In a containment-based system (Prince and Smolensky, 1993/2004; Trommer and Zimmermann, 2014), a copied and unrealized element can be sufficient to fill a prosodic node given that an element with activity of 0 is still better than no element at all. Phonetically unrealized elements are struck through and have a grey background.

(2)



How this framework predicts the gradient effect of the copying-weakening correlation is shown below for the Sikaiana example. Vowel deletion is taken to be triggered by an OCP-constraint against identical vowels in adjacent syllables (necessarily violated by CV-copying). There are three important weighting arguments in the HG formalization of the analysis: ID_{A}^{-} penalizing deletion has a higher weight than the OCP predicting that non-copied sequences of identical vowels are tolerated. Even 0.5x violations of ID_{A}^{-} are still more important than the OCP and the plural reduplicant hence shows no deletion in isolation (2). But $0.\bar{3}$x violations of ID_{A}^{-} are finally out-weighed by the OCP and avoidance of too many identical vowels emerges for multiple reduplication (3). Only a vowel that is copied twice and thus had to share its activity among three output instances is hence weak enough for deletion. The prosodic affixes triggering copying are abbreviated with 'RED' and the constraints ensuring their 'filling' are not given in the following. (That deletion only applies in the plural 'reduplicant' follows mainly from the different sizes of the prosodic affix nodes and their tolerance for unrealized segments.)

(2) *No shortening in single reduplication*

RED_{μ} s o p o (1) (1) (1) (1)	ID_{A}^{-} 20	OCP 9	
☞ a. s o∼s o p o (.5) (.5) (.5) (.5) (1) (1) [+.5] [+.5] [+.5] [+.5]		-3	-27
b. s ~~o~~∼s o p o (.5) (.5) (.5) (.5) (1) (1) [+.5] [–.5] [+.5] [+.5]	-0.5	-2	-28

(3) *Shortening in multiple reduplication*

$\text{RED}_{\sigma\sigma}$ RED_{μ} s o p o (1) (1) (1) (1)	ID_{A}^{-} 20	OCP 9	
a. s o p o∼s o∼s o p o ($\bar{3}$) ($\bar{3}$) (.5) (.5) ($\bar{3}$) ($\bar{3}$) ($\bar{3}$) ($\bar{3}$) (.5) (.5) [+.6] [+.6] [+.5] [+.5] [+.6] [+.6] [+.6] [+.6] [+.5] [+.5]		-4	-36
☞ b. s o p o∼s ~~o~~∼s o p o ($\bar{3}$) ($\bar{3}$) (.5) (.5) ($\bar{3}$) ($\bar{3}$) ($\bar{3}$) ($\bar{3}$) (.5) (.5) [+.6] [+.6] [+.5] [+.5] [+.6] [–.$\bar{3}$] [+.6] [+.6] [+.5] [+.5]	-0.$\bar{3}$	-3	-33.$\bar{6}$

Discussion This account makes some similar predictions as the existential faithfulness account in Struijke (2000) but differs in that it 1) is more modular and does not rely on morpheme-specific constraints as the standard BR-correspondence-theoretic account, and 2) predicts the gradient nature of the copying-weakening-correlation. Fission as split of activity implies that elements get weaker the more they are copied and languages can show different threshold effects for reduction: It can be generally excluded (e.g. Thompson), can only affect copied elements (e.g. Lushootseed), or can only affect elements that are multiply copied (e.g. Sikaiana).