Copying as Weakening:
Accounting for the Typology of Reduplication with Phonological Strength

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Accounting for the Typology of Reduplication
with Phonological Strength

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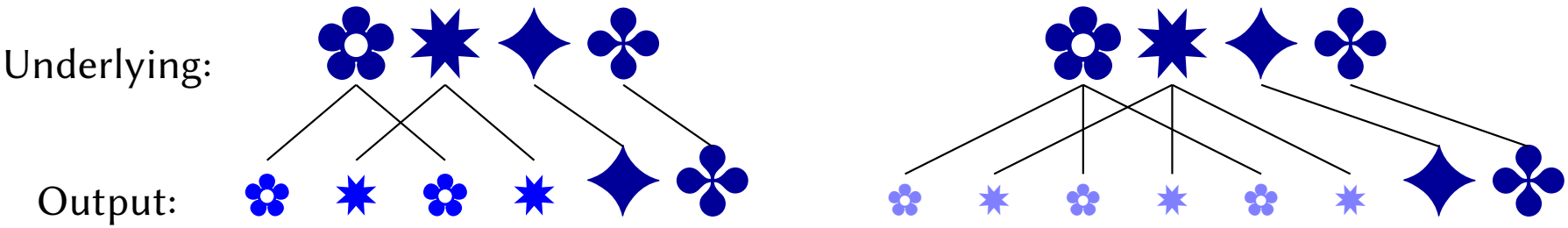
(Slides available at https://evazimmermann.weebly.com/talks.html)

Main Claim

Proposal

1. Reduplication is weakening of all elements involved in the copying.
2. Every copy operation gradiently weakens elements.



Assumptions

1. All linguistic symbols have **activity** that can **gradiently** differ.
2. Reduplication is **fission** to fill empty prosodic nodes.
3. Fission is **distribution of underlying activity**.

Avant: Reduplication and Prosody

- partial reduplication: an affix 'whose canonical shape is constant [...] but whose segmental content varies in an obvious way depending on the base to which it is attached' (McCarthy, 1993, 187)

  → **a prosodically delimited copy is added to express morphological meaning**

(1) Partial reduplication in Ilokano: A heavy syllable (McCarthy, 1993, 187)

kaldíŋ	'goat'	kal∼kaldíŋ	'goats'
púsa	'cat'	pus∼púsa	'cats'
róʔot	'litter'	roː∼róʔot	'litter' PL
tràk	'truck'	traː∼tràk	'trucks'

Avant: Reduplication and Fixed Segmentism (Alderete et al., 1999)

- a reduplicative morpheme also contains an **invariant part**
- such (a) fixed segment(s) can be phonologically predictable (=epenthesis) or lexically stored

(2) Fixed V-Reduplication in Lushootseed (Urbanczyk, 1999, 2001)

gʷədíl	'sit'	gʷ**í**∼gʷədil	'sit down briefly'
bədáʔ	'child'	b**í**∼bədaʔ	'small child'
qʷɬayʔ	'log'	qʷ**í**∼qʷɬayʔ	'stick'
duːkʷ	'knife'	d**í**∼duːkʷ	'small knife'

(3) Fixed C-reduplication in Nuu-chah-nulth (Stonham, 1994, 2004)

haw'a	haː**c**∼haw'acsupt'aːɬ	'they had an eating contest'
hina	hiː**c**∼hinḥsacpeʔi	'the ones on the beach side'
tɬa	tɬaː**c**∼tɬaːḥsa	'it was standing at the edge'

Avant: Reduplication Terminology

(4)

'Traditional': Reduplicant Base

kal ~ kaldíŋ

Here:
(phonological account)

kal ~ kal - díŋ → Copying is symmetrical

Copied Not copied

□ ~ kal díŋ

kal ~ kal díŋ → Empty prosody triggers copying

Copy-Exponent

Copied base

1. Copying as Weakening: Empirical Picture

Reduction Outside of Reduplication

- deletion of certain features (=neutralization) or elements in certain positions; very common: reduction in unstressed positions

(5) V-Deletion in Macushi Carib (Hawkins, 1950; Kager, 1997)

underlying	surface		φ-Structure:
/wanamari/	wnàːmrí	'mirror'	(wana)(mari)
/u-wanamari-rɨ/	wàːnmàːrɾ́ɨː	'my mirror'	(uwa)(nama)(rirɨ)
/u-manari-rɨ/	màːnrìːrɾ́ɨː	'my cassava grater'	(uma)(nari)(rɨ)

(6) V-Reduction in Catalan (Prieto, 1991; Beckman, 1998; Barnes, 2008)

ř́íw	'river'	řiw-ét	'river' Dim	i	→	i
mónə	'monkey'	mun-étə	'monkey'Dim	u, o, ɔ	→	u
néw	'snow'	nəw-étə	'snow'Dim	e, ɛ, a	→	ə
pálə	'shovel'	pəl-étə	'shovel'Dim			

1.1. Copying Enables Reduction

A. C-Reduction in the Copy Exponent: Gitksan (Brown, 2008)

- fixed segmentism reduplication with /i/ (and /a/ next to gutturals)

(7) Plural reduplication (Brown, 2008, 147+148)

dzap	dz i p ∼ dz a p	'make, do'
dulpx^{w}	d i l ∼ d u l px^{w}	'to be short'
ʔisx^{w}	ʔ a s ∼ ʔ i s x^{w}	'stink, smell'

- deaffricativization, deglottalization (+predictable voicing), and depalatalization in the copy-exponent

(8) Plural reduplication and C-reduction (Brown, 2008, 147+148)

m'ats	m i s ∼ m' a ts	'to hit, strike'	ts	→	s
t'u:ts'x^{w}	d i s ∼ t' u: ts' x^{w}	'be black'	X'	→	X
maʃx^{w}	m i s ∼ m a ʃ x^{w}	'white'	ʃ	→	s
iʃxw	a s ∼i ʃ xw	'stink, smell'			

A. C-Reduction in the Copy Exponent: Gitksan

(9) Plural reduplication and C-reduction (Brown, 2008, 147+148)

m'aʦ	m i s ∼ m' a ʦ	'to hit, strike'	ʦ	→	s
t'u:ʦ'x^{w}	d i s ∼ t' u: ʦ' x^{w}	'be black'	X'	→	X
maʃx^{w}	m i s ∼ m a ʃ x^{w}	'white'	ʃ	→	s
iʃxw	a s ∼i ʃ xw	'stink, smell'			

- no such reduction outside of reduplication contexts

(10) Preservation of glottalization and affricates (Brown, 2008, 127)

ɬi–ʦ'aqt	'the tip of it' (+DEF-prefix)/
si–ʦ'aq'	'dig, gather clams' (+INTR-prefix)/

B. V-Reduction in the Copied Base: Lushootseed

(Broselow, 1983; Bates et al., 1994; Urbanczyk, 2001)

- alternation between fixed vowel reduplication /Ci–/ and /CV–/

(11) Diminutive Reduplication (Urbanczyk, 2001, 195-207)

a. *Fixed V in copy-exponent*

dúːkʷ	'knife'	díːkʷ	'small knife'
gʷədíl	'sit'	gʷídil	'sit down briefly'

b. *V-Reduction without fixed V*

júbil	'die, starve'	júbil	'small animal dies'
s–túləkʷ	'river'	s–túləkʷ	'creek'

c. *V-Deletion without fixed V*

pástəd	'white person'	pástəd	'white child'
ʔúsil	'dive'	ʔúsil	'shallow dive'

C. Reduction in Copy Exponent and Copied Base: Kwak'wala

(Boas, 1947; Kalmar, 2003; Saba Kirchner, 2010)

- suffixation of /m'uːt/ 'refuse, useless' accompanied by reduplication

(12) Reduction in the copied base (Saba Kirchner, 2010, 177-80)

a.	səl	'drill'	səl ~ sə muːt	'left after drilling'
	kən	'scoop up'	kən ~ kə muːt	'left after scooping up'
b.	k'aːp	'(mouse) gnaw'	k'aː ~ k'əp m'uːt	'gnawings of mouse'
	tiːɬ	'bait'	tiː ~ təɬ m'uːt	'remains of bait'

(13) Reduction in the copy exponent (Saba Kirchner, 2010, 176-79)

a.	məndz	'cut kindling wood	mə ~ mən dzəmuːt	'left after cutting kindling woods'
	c'əm'	'melt'	c'ə ~ c'əm' əm'uːt	'left after melting'
b.	q^{w}'aːl'	'scorch'	q^{w}'ə ~ q^{w}'aːl' əmuːt	'embers'
	saːq^{w}'	'peel bark'	sə ~ saːq^{w}' əmuːt	'left after peeling bark'

C. Reduction in Copy Exponent and Copied Base: Kwak'wala

- reduction avoids stress clashes (*HH) and builds unmarked iambic feet LH, LL, H (H=Vː or sonorant coda) (Struijke, 2000; Saba Kirchner, 2010)

(14)

	e.g.	expected			surface	
		H	H	H	LH	H
a.	səl	(səl)	(səl)	(muːt)	(sə . səl)	(muːt)
		H	H	H	LH	H
b.	k'aːp	(k'aːp)	(k'aːp)	(muːt)	(k'ə . k'aːp	(muːt)
		H	H	LH	LH	LH
c.	məndz	(mən)	(mən)	(dzə.muːt)	(mə . mən)	(dzə.muːt)

- these repairs are bound to copy exponents and copied bases!

(15)

surface			*repair	
H	H	H	LH	LH
(tsʼóː)	(lʼàm)	(yʼàː)	(tsʼə.lʼàm)	(yʼə.yʼàː)

Summary: Copying = Weakening

(16) a. Reduction in the copy-exponent*

sapo ✧ sə ∼ sa po

(McCarthy and Prince, 1995; Becker and Flack Potts, 2011)

e.g. Gitksan, Shuswap, Sanskrit…

b. Reduction in the the copied base

sapo ✧ sa ∼ sə po

(Shaw and Howe, 1999; Struijke, 2000)

e.g. Tohono O'odham, Heiltsuk, Mainland Sliammon,…

c. Reduction in both copy-exponent and the the copied base

sapo ✧ sə ∼ sə po

(Struijke, 2000)

e.g. Kwakwala, Hausa,…

*as 'TETU in the reduplicant' one main argument for correspondence-theory (McCarthy and Prince, 1995)

1.2. Multiple Copying Enables Reduction

Multiple Reduplication

(17) *Multiple Reduplication*
The presence of two or more different reduplicative morphemes in a word.

(18) Reduplication in Tagalog (Mattes, 2007, 126)

a. nag-**du**∼duman siya **bulan**∼bulan
BEG.AV-**Ipfv**∼DEM.DIST 3.SG.AF **Pl**∼month
'S/he goes there every month'

b. ini an **ha**∼**hanap**∼hanap-on
DEM.PROX PB **Ipfv**∼**Pl**∼look.for-UG
'here (they are) continuously searching'

A. Avoidance of Multiple Reduplication: Ahousaht Nuuchahnulth

- some meanings are expressed by reduplication alone (19-a)
- many suffixes trigger prefixing reduplication (=underlined) (19-b)

(19) a.

maɬtiː	‘house’	
ma∼maɬtiː	‘houses’	(PL-maɬtiː)
nuːk	‘song’	
nuː∼nuːk	‘songs’	(PL-nuːk)
naʔa	‘to hear’	
na∼naʔa	‘to understand’	(DER-naʔa)

b. mi∼miɬkʼukʔicuːʃ
RED∼miɬ-kʼuk-ʔitʃuːʃ
to.resemble∼same-to.resemble-2PL.IND
‘both of you look alike’

(Kim, 2003*b*, 136+138)

A. Avoidance of Multiple Reduplication: Ahousaht Nuuchahnulth

- two reduplication-triggering morphemes in a word only result in a single copy-exponent (Kim, 2003*a*,*b*, 2008)

(20) a. na∼naʔak'ukʔiʃ (*na∼na∼naʔak'ukʔiʃ)
DER-naʔa-k'uk-ʔiʃ
DER-to.hear-to.resemble-3SG.IND
's/he seems to be knowledgeable'

b. t'u∼t'uc'iːħ (*t'u∼t'u∼t'uc'iːħ)
PL-t'uc'(up)-ʔiːħ
PL-sea.urchin-to.gather/fish
'gathering more than one sea urchin'

(Kim, 2003*b*, 138)

- a pattern that can be found in basically all Southern Wakashan languages (Rose, 1981; Stonham, 1994, 2004)

B. Truncation in Multiple Reduplication Contexts: Sikaiana

(21) Repetitive reduplication (Donner, 2012, 23+24)

a. *Bisyllabic repetitive reduplication*

sopo	sopo∼sopo	‘jump’
sepu	sepu∼sepu	‘dive’
motu	motu∼motu	‘snap’

b. *CV/C-reduplication in the plural*

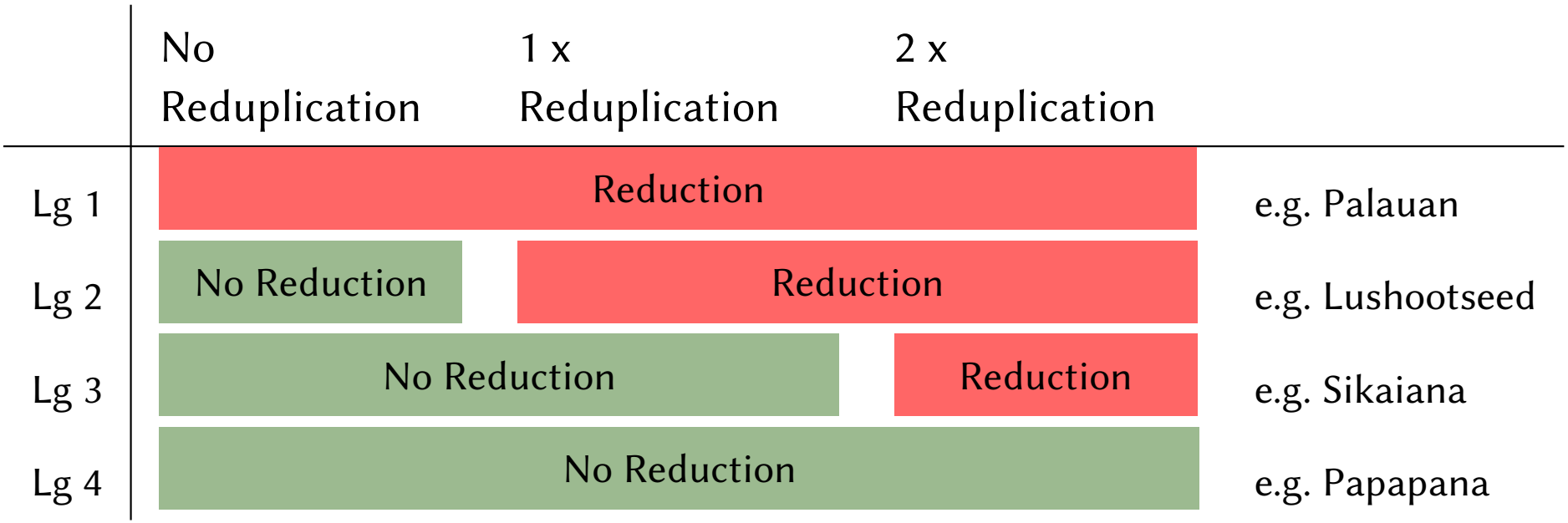
sopo	s ∼ so po	so ∼ so po	‘jump’
sepu	s ∼ se pu	se ∼ se pu	‘dive’
moe	m ∼ mo e	mo ∼ mo e	‘sleep’

c. *Obligatory C-reduplication if both are combined*

sopo	sopo∼ s ∼ so po	*sopo∼ so ∼ so po	‘jump’
sepu	sepu∼ s ∼ se pu	*sepu∼ so ∼ se pu	‘dive’

Summary: Reduction Thresholds

(22)



2. Copying as Weakening: Theoretical Modeling

2.1. Background Assumptions

Copying as Weakening: Assumptions

1. Reduplication Results from Prosodic Affixation
2. Gradient Symbolic Representation
3. Harmonic Grammar
4. Containment
5. **Fission is Distribution of Activity**

1. Reduplication Results from Prosodic Affixation

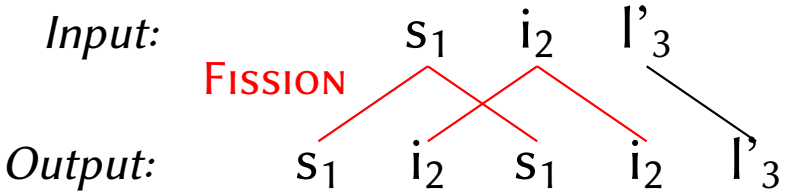
(Marantz, 1982; Pulleyblank, 2009; Saba Kirchner, 2010, 2013*a*,*b*)

- reduplicative morphemes contain **segmentally empty prosodic nodes** that are filled with 'copied' elements
- copying is a general phonological repair that applies to **fill these otherwise empty nodes**
  - no reduplication-specific mechanism, reduplication is just 'normal' affixation
  - explains the fixed prosodic size of copy exponents
  - explains non-concatenative allomorphy between reduplication and lengthening (Saba Kirchner, 2010, 2013*a*,*b*; Zimmermann, 2013)

1. Reduplication Results from Prosodic Affixation

- copying is **fission** of segments violating (23)
  (Spaelti, 1997; Struijke, 2000; Gafos, 2003; Nelson, 2003)

(23) INTS: Assign -1 violation to every pair of output segments that correspond to the same input segment.



(24)

	μ>S	DEPS	*V:	INTS
μ / s1 i2 l'3				
a. μ μ / s1 i2 l'3	*!			
☞ b. μ μ / s1 i2 s1 i2 l'3				**

2. Gradient Symbolic Representation (Smolensky and Goldrick, 2016; Rosen, 2016)

- symbols in a linguistic representation can have **different activities**
- in the following, all output activity is 1
- different activities result in gradient faithfulness violations
  - weakly active elements are easier to delete than 'normal' segments
  - it is costly to realize weakly active elements

(25) Gradient activity = gradient faithfulness violations

b a t – p (1 1 1 .5)	*CC	MAX	DEP
a. b a t p (1 1 1 .5) +.5	-1		-0.5
☞ b. b a t (1 1 1)		-0.5	
c. b a p (1 1 .5) +.5		-1	-0.5

Intermezzo: Max and Dep and GSR

(26) a. Dep : For every pair of corresponding input output elements with underlying activity I and an output activity O where I<O: Assign -(O-I) violations.

b. Max : For every pair of corresponding input output elements with underlying activity I and an output activity O where I>O: Assign -(I-O) violations.

2. Gradient Symbolic Representation (=GSR)

1. Embedded in a general **computational architecture for cognition** (=Gradient Symbolic Computation Smolensky and Goldrick, 2016)
2. A **unified account** for different exceptional phonological behaviours:
   - liaison consonants in French (Smolensky and Goldrick, 2016)
   - semi-regularity of Japanese Rendaku (Rosen, 2016)
   - allomorphy in Modern Hebrew (Faust and Smolensky, 2017)
   - lexical accent in Lithuanian (Kushnir, 2017)
   - lexical stress in Moses Columbian Salishan (Zimmermann, to appear*b*)
   - tone sandhi in Oku (Nformi and Worbs, 2017)
   - tone allomorphy in Mixtec (Zimmermann, 2017*a*,*b*)
   - gemination and lenition of consonants in Italian (Amato, 2019)
   - compound tensing in Korean (Lee, 2019)
   - typology of ghost consonants (Zimmermann, 2019, to appear*a*)
   - …
3. Allows **true gradience**, i.e. multiple classes of differently-behaving phonological elements (Zimmermann, 2018*b*, to appear*b*)
4. Allows **gradient phonetic** effects (McCollum, 2018)

3. Harmonic Grammar (Legendre et al., 1990; Potts et al., 2010)

- constraints are **weighted**, not ranked

(27) Toy Example: Weighted Constraints

Input	C1 100	C2 60	C3 50	*Harmony Score*
☞ a. Output candidate 1	-1			-100
b. Output candidate 2		-1	-1	-110
c. Output candidate 3		-2		-120

- constraint ganging and threshold effects are predicted
  - though (27-b+c) only violate C2 and C3 with a lower weight than C1, they have a worse harmony score than (27-a) since the lower-weighted violations **gang up**

4. Containment (Prince and Smolensky, 1993/2004)

- non-realization of an element is setting its **activity to zero** (=gray)
- non-realized elements can be enough to fill prosodic nodes
  (Trommer, 2011; Trommer and Zimmermann, 2014; Zimmermann, 2017*c*)

(28)
a. μ>S: Assign -1 violation for every μ that does not dominate a segment.
b. μ>S P: Assign -1 violation for every μ that does not dominate a **phonetically interpreted** segment.

(29)

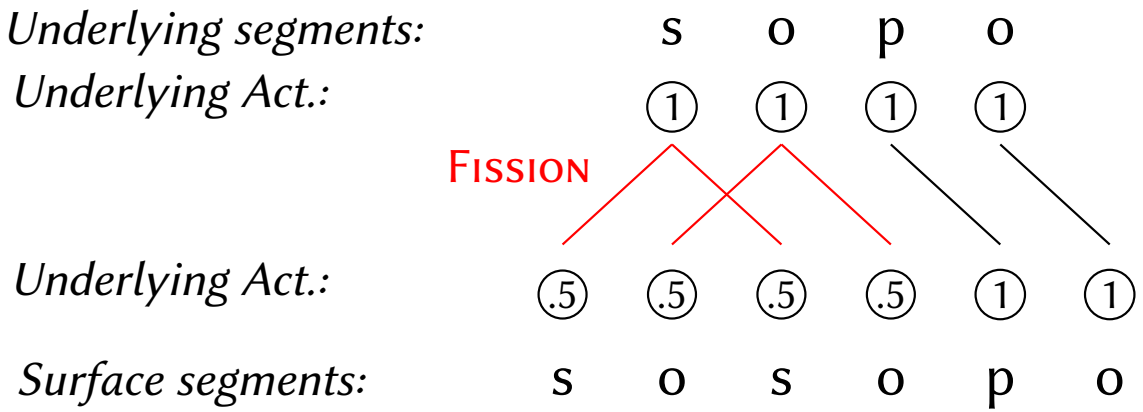
	μ>S	Ints	μ>S P	Max	
μ μ μ s o p o 1 1 1 1	100	10	5	5	
(☞) a. μ μ μ s o∼s o p o 1 1 1 1 1 1		-2			-20
b. μ μ μ s o∼s o p o 1 1 1 1 1 1 -1		-2	-1	-1	-30

2.2. Proposal: Fission is Distribution of Activity

5. Fission is Distribution of Activity

(30) GEN operation: Fission
Input element S_1 with activity A corresponds to x output elements S_1 with underlying activity A/x.

(31)

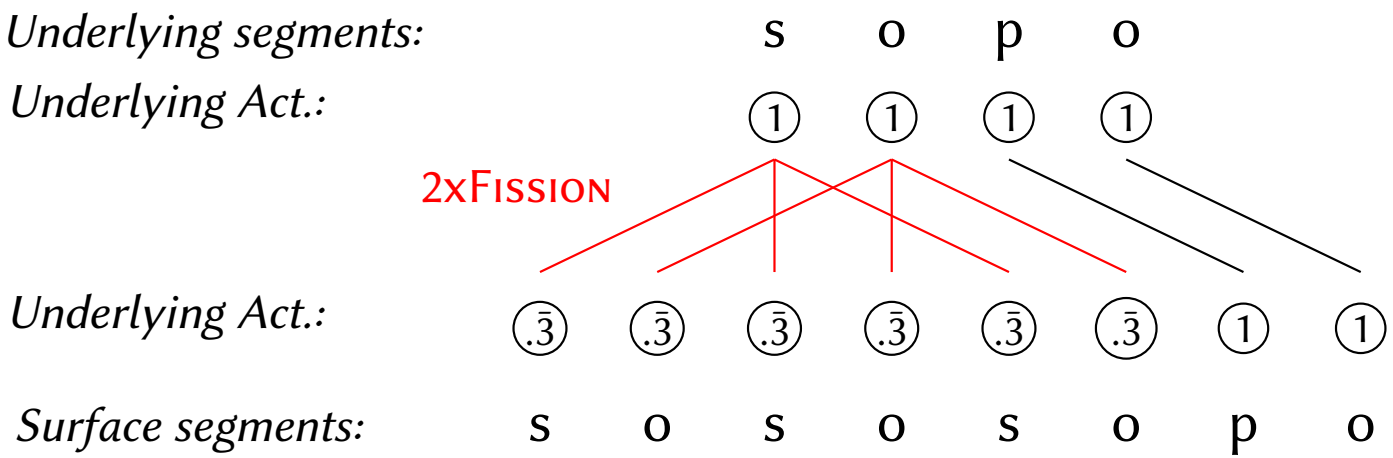


= elements that **result from fission necessarily have an activity smaller than 1** that corresponds to input activity

= all output correspondents of S_1 have the same amount of activity that corresponds to input activity

5. Fission is Distribution of Activity

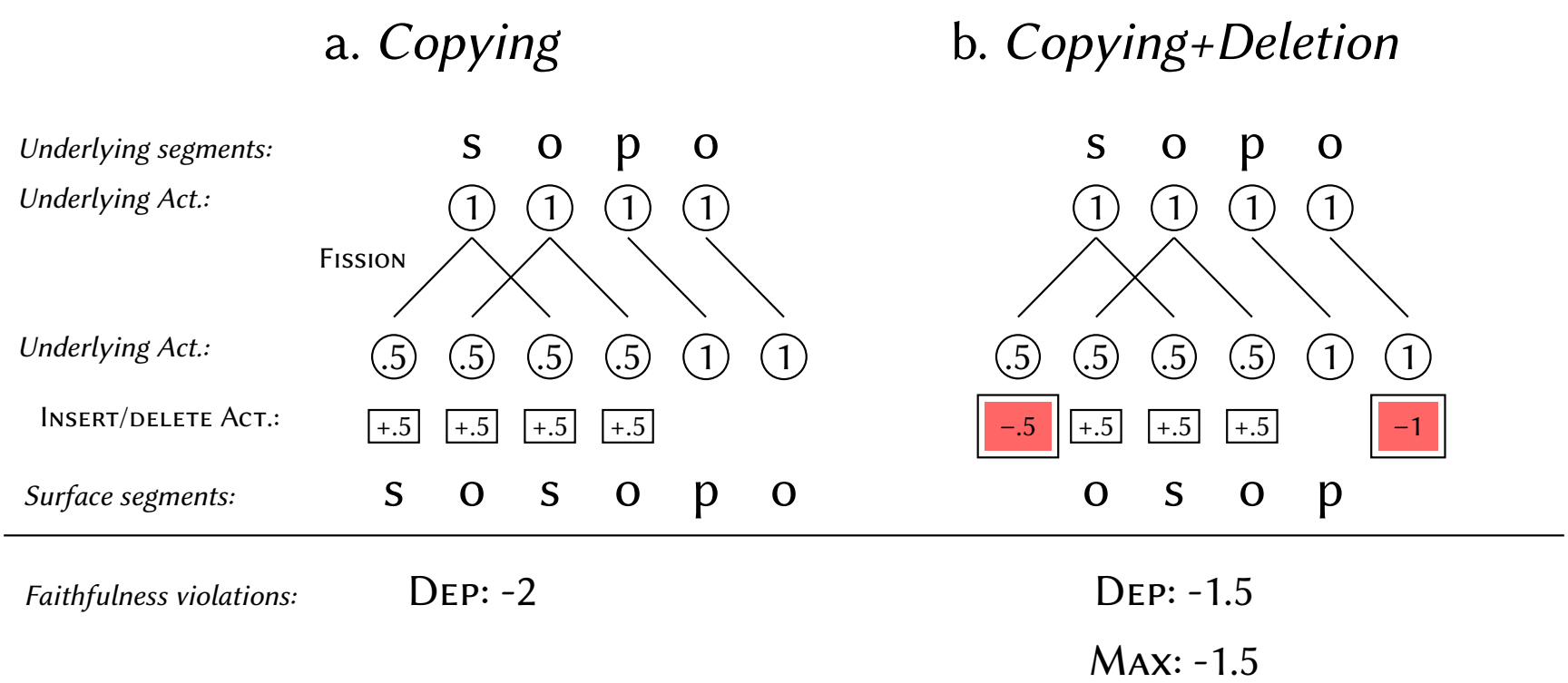
(32) More copying = Further Weakening



5. Fission is Distribution of Activity

- crucial consequence for elements with the same underlying activity: Non-realization of a copied segment is better for MAX; they are **weaker**

(33)



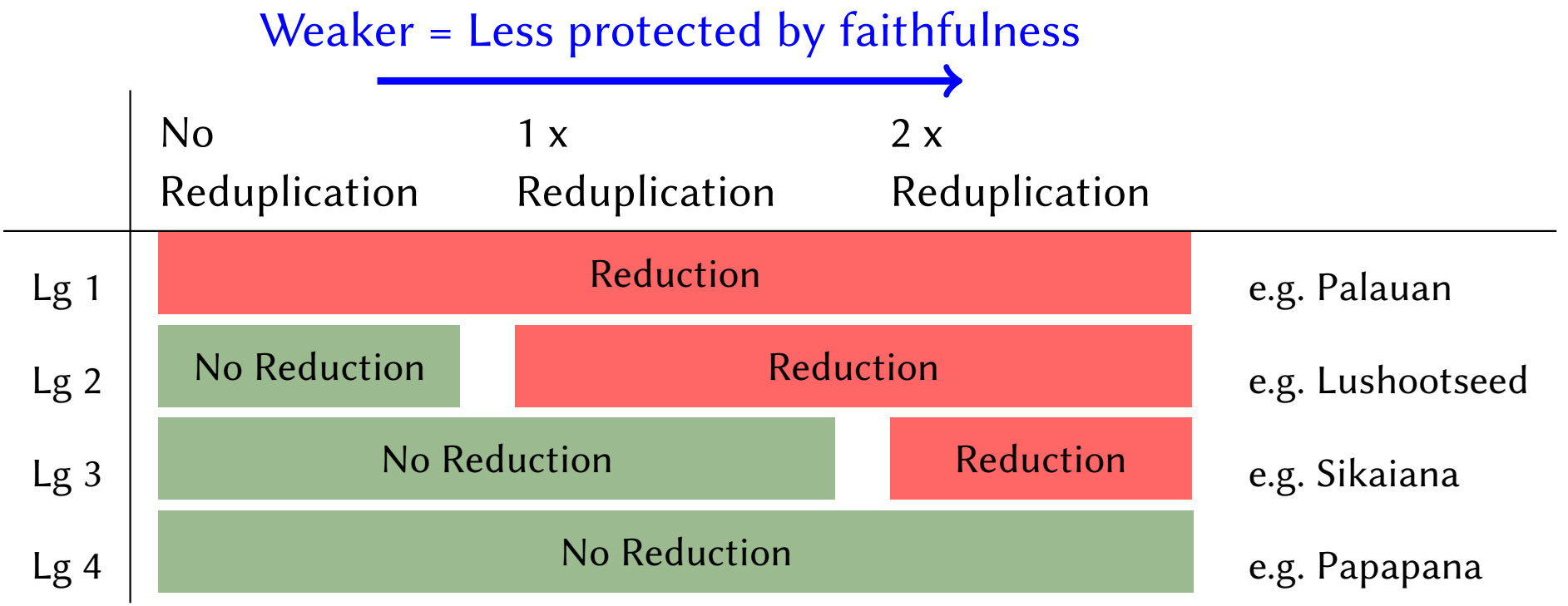
Faithfulness violations:

a. DEP: -2

b. DEP: -1.5
MAX: -1.5

Predicted Typology: Reduction Thresholds

(34)



Toy Example

(35)

		DeletePenult!	Max	
NoRed-a.	s a p o ① ① ① ①	-1		
NoRed-b.	s a p o ① ① ① ① −1		-1	
1xRed-a.	s a∼s a p o .5 .5 .5 .5 ① ① +.5 +.5 +.5 +.5	-1		
1xRed-b.	s a∼s a p o .5 .5 .5 .5 ① ① +.5 +.5 +.5 −.5		-0.5	
2xRed-a.	s a∼s a∼s a p o $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ ① ① $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$	-1		
2xRed-b.	s a∼s a∼s a p o $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ ① ① $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$ $-.\bar{3}$		$-0.\bar{3}$	

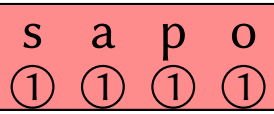
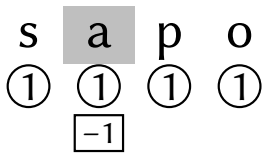
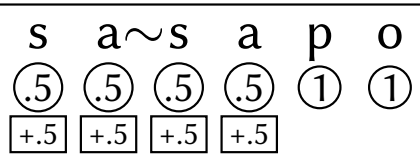
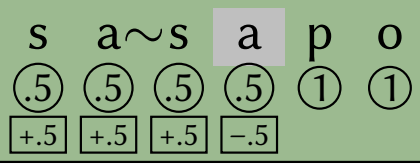
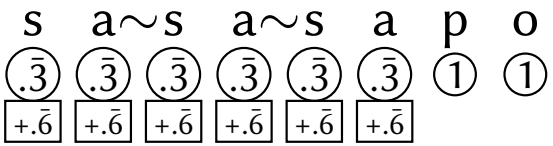
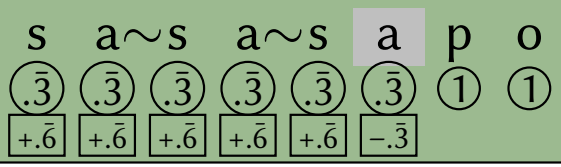
Lg 1: Always Reduction (e.g. Palauan)

(36) DeletePenult! ≫ Max

		DeletePenult! 1000	Max 100	
NoRed-a.	s a p o ① ① ① ①	-1		-1000
☞ NoRed-b.	s a p o ① ① ① ① −1		-1	-100
1xRed-a.	s a∼s a p o .5 .5 .5 .5 ① ① +.5 +.5 +.5 +.5	-1		-1000
☞ 1xRed-b.	s a∼s a p o .5 .5 .5 .5 ① ① +.5 +.5 +.5 −.5		-0.5	-50
2xRed-a.	s a∼s a∼s a p o .3̄ .3̄ .3̄ .3̄ .3̄ .3̄ ① ① +.6̄ +.6̄ +.6̄ +.6̄ +.6̄ +.6̄	-1		-1000
☞ 2xRed-b.	s a∼s a∼s a p o .3̄ .3̄ .3̄ .3̄ .3̄ .3̄ ① ① +.6̄ +.6̄ +.6̄ +.6̄ +.6̄ −.3̄		-0.3̄	-33.3̄

Lg 2: Only Reduction if Reduplication (e.g. Lushootseed)

(37) MAX ≫ DELETEPENULT! and DELETEPENULT! ≫ 0.5xMAX

		DELETEPENULT! 99	MAX 100	
☞ NoRed-a.		-1		-99
NoRed-b.			-1	-100
1xRed-a.		-1		-99
☞ 1xRed-b.			-0.5	-50
2xRed-a.		-1		-99
☞ 2xRed-b.			-0.$\bar{3}$	-33.$\bar{3}$

Lg 3: Only Reduction if Multiple Reduplication (e.g. Sikaiana)

(38) 0.5xMax ≫ DeletePenult! and DeletePenult! ≫ 0.$\bar{3}$xMax

		DeletePenult! 99	Max 200	
☞ NoRed-a.	s a p o ① ① ① ①	-1		-99
NoRed-b.	s a p o ① ① ① ① −1		-1	-200
☞ 1xRed-a.	s a∼s a p o .5 .5 .5 .5 ① ① +.5 +.5 +.5 +.5	-1		-99
1xRed-b.	s a∼s a p o .5 .5 .5 .5 ① ① +.5 +.5 +.5 −.5		-0.5	-100
2xRed-a.	s a∼s a∼s a p o .$\bar{3}$.$\bar{3}$.$\bar{3}$.$\bar{3}$.$\bar{3}$.$\bar{3}$ ① ① +.$\bar{6}$ +.$\bar{6}$ +.$\bar{6}$ +.$\bar{6}$ +.$\bar{6}$ +.$\bar{6}$	-1		-99
☞ 2xRed-b.	s a∼s a∼s a p o .$\bar{3}$.$\bar{3}$.$\bar{3}$.$\bar{3}$.$\bar{3}$.$\bar{3}$ ① ① +.$\bar{6}$ +.$\bar{6}$ +.$\bar{6}$ +.$\bar{6}$ +.$\bar{6}$ −.$\bar{3}$		-0.$\bar{3}$	-66.$\bar{6}$

Lg 4: No Reduction (e.g. Papapana)

(39) $0.\bar{3}$xMax ≫ DeletePenult!

	DeletePenult! 100	Max 1000	
☞ NoRed-a.	s a p o ① ① ① ①	-1		-100
NoRed-b.	s a p o ① ① ① ① −1		-1	-1000
☞ 1xRed-a.	s a∼s a p o .5 .5 .5 .5 ① ① +.5 +.5 +.5 +.5	-1		-100
1xRed-b.	s a∼s a p o .5 .5 .5 .5 ① ① +.5 +.5 +.5 −.5		-0.5	-500
☞ 2xRed-a.	s a∼s a∼s a p o $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ ① ① $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$	-1		-100
2xRed-b.	s a∼s a∼s a p o $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ $.\bar{3}$ ① ① $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$ $+.\bar{6}$ $-.\bar{3}$		$-0.\bar{3}$	$-333.\bar{3}$

2.3. Example 1: Lushootseed

Lushootseed Reduction (simplified)

Pattern

- vowels are reduced to /ə/ (=loss of all place features) if they are copied

- Reduction is triggered by (40-a) penalizing place features in unstressed positions
- outside of copying, (40-b) preserves vowels from reduction

(40)
a. *UnstrV: Assign -1 violation for every unstressed full V (=place features).

b. Id-V : For ever input vowel with activity I, assign -I violations if the corresponding output vowel has a different place feature specification.

Lushootseed: Reduction only for copied vowels

(41) a. Id-V ≫ *UnstrV

b. *UnstrV ≫ -0.5xId-V

(42) Reduction in the copied base

	Id-V	*UnstrV	Dep	
	40	30	10	
a.		-2	-2	-80
b.	-1	-1	-2	-90
☞ c.	-0.5	-1	-2	-70

2.4. Example 2: Sikaiana

Sikaiana Syncope

Pattern

- syncope for the monosyllabic copy-exponent is optional for single reduplication and obligatory for multiple reduplication

- V-Deletion in the CV-copy-exponent is triggered by (43-a)
- the penult stressed V is never deleted (43-b)

(43)
a. $\textsc{Int}_{\textsc{OCP}}$: Assign -1 violation to every pair of output segments that correspond to the same input segment and are adjacent on their tier*.

b. $\textsc{Max}_{\textsc{STR}}$: For ever input element with activity I and its stressed output correspondent with activity O where I>O:
Assign -(I-O) violations.

*Vowels and Consonants are on separate tiers.

Sikaiana: No Syncope for Single Reduplication (bisyllabic)

(44) 0.5xMax ≫ 0.5xDep

	MaxStr	Max	Dep	IntOCP	
σ σ σ σ s o p o ① ① ① ①	1000	100	46	27	
☞ a. σ σ σ σ s o p o∼s o p o .5 .5 .5 .5 .5 .5 .5 .5 +.5 +.5 +.5 +.5 +.5 +.5 +.5 +.5			-4		-184
b. σ σ σ σ s o p o∼s o p o .5 .5 .5 .5 .5 .5 .5 .5 +.5 +.5 +.5 -.5 +.5 +.5 +.5 +.5		-0.5	-3.5		-211

Sikaiana: Optional Syncope for Single Reduplication (monosyllabic)

(45) $0.5\times\textsc{Dep} + \textsc{Int}_{\textsc{OCP}} = 0.5\times\textsc{Max}$

	$\textsc{Max}_{\textsc{Str}}$	Max	Dep	$\textsc{Int}_{\textsc{OCP}}$	
	1000	100	46	27	
☞ a.			-2	-1	-119
☞ b.		-0.5	-1.5		-119
c.	-0.5	-0.5	-1.5		-619

*Simplification of the optionality that can be modeled in, e.g. MaxEnt (Johnson, 2002; Goldwater and Johnson, 2003; Wilson, 2006).

Sikaiana: Syncope in Multiple Reduplication Contexts

(46) $0.\bar{6}\times\textsc{Dep} + \textsc{Int}_{\textsc{OCP}} \gg 0.\bar{3}\times\textsc{Max}$

		$\textsc{Max}_{\textsc{Str}}$	Max	Dep	$\textsc{Int}_{\textsc{OCP}}$	
	σ σ σ σ μ μ μ s o p o ① ① ① ①	1000	100	46	27	
a.	σ σ σ σ σ μ μ μ μ μ s o p o∼s o∼s o p o .3̄ .3̄ .5 .5 .3̄ .3̄ .3̄ .3̄ .5 .5 +.6̄ +.6̄ +.5 +.5 +.6̄ +.6̄ +.6̄ +.6̄ +.5 +.5			-5.9̄	-1	-302,9̄
☞ b.	σ σ σ σ σ μ μ μ μ μ s o p o∼s o∼s o p o .3̄ .3̄ .5 .5 .3̄ .3̄ .3̄ .3̄ .5 .5 +.6̄ +.6̄ +.5 +.5 +.6̄ −.3̄ +.6̄ +.6̄ +.5 +.5		-0.3̄	-5.3̄		-278,6̄
c.	σ σ σ σ σ μ μ μ μ μ s o p o∼s o∼s o p o .3̄ .3̄ .5 .5 .3̄ .3̄ .3̄ .3̄ .5 .5 +.6̄ +.6̄ +.5 +.5 +.6̄ +.6̄ +.6̄ −.3̄ +.5 +.5	-0.3̄	-0.3̄	-5.3̄		-611,9̄

2.5. Example 3: Ahousaht Nuuchahnulth

Ahousaht Syncope

Pattern

- many reduplication-triggering morphemes but only a single copy-exponent if two are combined within one word

- V-Deletion is again triggered by (47-a)
- that only copy-exponents triggered by some prosodic affixes can be deleted follows from the different weights of (47-b) and (47-c)

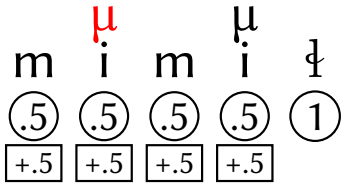
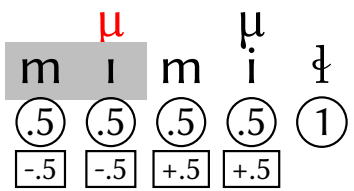
(47)
a. $\textsc{Int}_{\textsc{OCP}}$: Assign -1 violation to every pair of output segments that correspond to the same input segment and are adjacent on their tier.

b. $\boxed{\mu > S}_{P}$: Assign -1 violation for every mora that does not dominate a phonetically interpreted segment.

c. $\boxed{\sigma > S}_{P}$: Assign -1 violation for every syllable that does not dominate a phonetically interpreted segment.

Ahousaht: No Syncope for Single Reduplication (empty mora)

(48) MAX + [μ>S]$_P$ ≫ DEP + 2xINT$_{OCP}$

	[σ>S]$_P$	MAX	[μ>S]$_P$	INT$_{OCP}$	DEP	
	100	30	12	10	10	
☞ a. 				-2	-2	-40
b. 		-1	-1		-1	-52

Ahousaht: No Syncope for Single Reduplication (empty syllable)

(49) MAX + $\boxed{\sigma\text{>}S}_P \gg$ DEP + 2xINT$_{OCP}$

	$\boxed{\sigma\text{>}S}_P$	MAX	$\boxed{\mu\text{>}S}_P$	INT$_{OCP}$	DEP	
σ σ n u: k (1) (1) (1)	100	30	12	10	10	
☞ a. σ σ n u: n u: k (.5) (.5) (.5) (.5) (1) [+.5] [+.5] [+.5] [+.5]				-2	-2	-40
b. σ σ n u: n u: k (.5) (.5) (.5) (.5) (1) [-.5] [-.5] [+.5] [+.5]	-1	-1			-1	-140

Ahousaht: Syncope in Multiple Reduplication Contexts

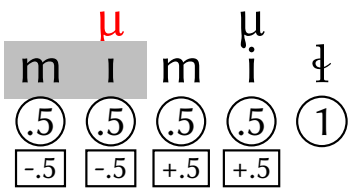
(50) $2\text{x}\textsc{Int}_{\textsc{OCP}} + 1.\bar{3}\textsc{Dep} \gg 0.\bar{6}\text{x}\textsc{Max} + \mu\text{>S}$

		$\boxed{\sigma\text{>S}}_{\text{P}}$	Max	$\boxed{\mu\text{>S}}_{\text{P}}$	$\textsc{Int}_{\textsc{OCP}}$	Dep	
	σ σ σ μ μ μ n a ʔ a (1) (1) (1) (1)	100	30	12	10	10	
a.	σ σ σ σ μ μ μ μ n a n a n a ʔ a (.3̄) (.3̄) (.3̄) (.3̄) (.3̄) (.3̄) (1) (1) [+.6̄] [+.6̄] [+.6̄] [+.6̄] [+.6̄] [+.6̄]				-4	-3.9̄	-79,9̄
☞ b.	σ σ σ σ μ μ μ μ n a n a n a ʔ a (.3̄) (.3̄) (.3̄) (.3̄) (.3̄) (.3̄) (1) (1) [+.6̄] [+.6̄] [-.3̄] [-.3̄] [+.6̄] [+.6̄]		-0.6̄	-1	-2	-2.6̄	-78,6̄

Ahousaht: The Crucial Gradient Violations

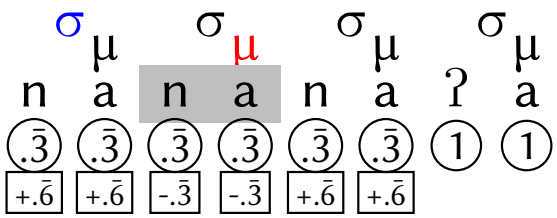
(51) MAX + [μ>S]$_P$ ≫ DEP + 2xINT$_{OCP}$

	[σ>S]$_P$ 100	MAX 30	[μ>S]$_P$ 12	INT$_{OCP}$ 10	DEP 10	
b.		-1	-1		-1	-52



(52) 1.$\bar{3}$DEP + 2xINT$_{OCP}$ ≫ 0.$\bar{6}$xMAX + μ>S

	[σ>S]$_P$ 100	MAX 30	[μ>S]$_P$ 12	INT$_{OCP}$ 10	DEP 10	
☞ b.		-0.$\bar{6}$	-1	-2	-2.$\bar{6}$	-78,$\bar{6}$



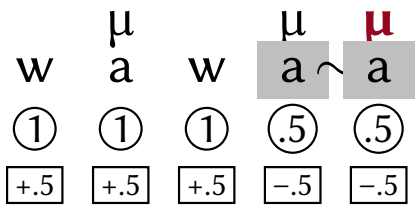
3. Discussion

Further Predictions 1

- Weakening not only implies reduction but also being an easier target for **other phonological processes** (e.g. assimilation)
- The same typology is expected for **phonotactic copying** (Kawahara, 2007; Kitto and de Lacy, 1999)
- If output elements can have weak activity and thus violate markedness gradiently (cf. Zimmermann (2018*a*,*c*,*b*); vs. Smolensky and Goldrick (2016); Rosen (2016)), copy-exponents and copied bases are predicted to **tolerate more marked structure**
  - e.g. marked structures in copy-exponent in Oowekyala (Howe, 2000)
  - e.g. copy-exponents as exceptional non-undergoers in Mojeño Trinitario (Rose, 2014; Marquardt, 2018)

Further Predictions 2

- **Complete reduction** in copy-exponent and copied base?
  - systematically attested as **subtraction**
  - e.g. Aymara accusative /wawa + Acc/ –> [waw]



Conclusion

- extending a phonological account of reduplication based on segmental fission with the assumption that **fission is distribution of underlying activity** correctly predicts
  - the typology of reduction in copy-exponents and/or copied bases
  - the **gradient effect** of more copying=more weakening in the typology of multiple reduplication (main advantage over an alternative based on Existential Faithfulness (Struijke, 2000))

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