Faded Copies:
Reduplication as Sharing of Activity

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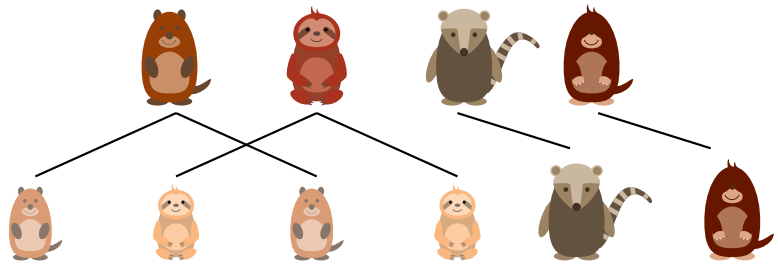
(Slides available at https://evazimmermann.com/talks.html)

Proposal

1. Reduplication is weakening of all elements involved in the copying.

Underlying:

Output:



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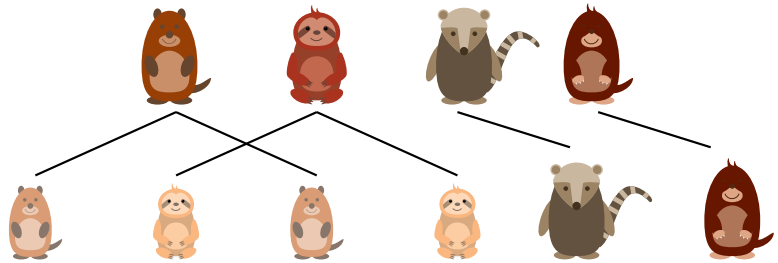

2. Every copy operation gradiently weakens elements.

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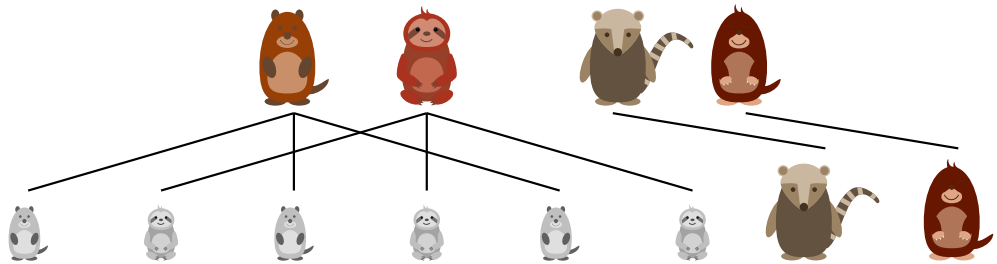

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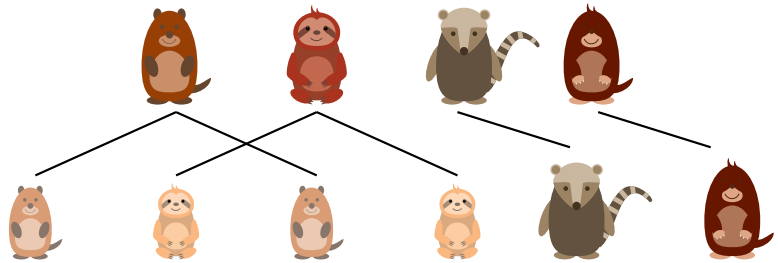

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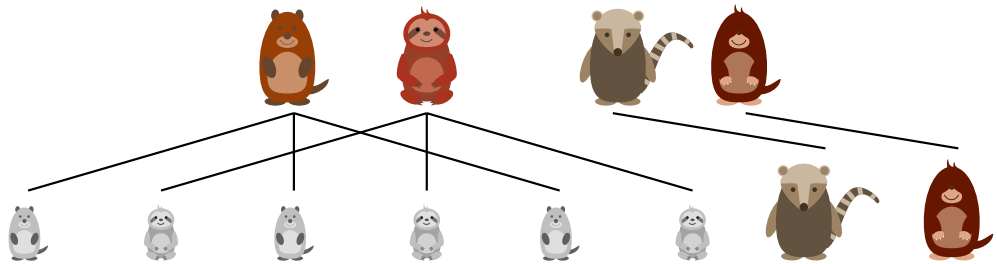

Assumptions

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**.

1. Copying as Weakening: Empirical Picture
1.1 Copying Enables Reduction
1.2 More Copying Enables More Reduction

2. Copying as Weakening: Theoretical Modeling
2.1 Background Assumptions
2.2 Proposal: Fission is Distribution of Activity
2.3 Example 1: Lushootseed
2.4 Example 2: Sikaiana

3. Discussion and Conclusion

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** (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

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kal ∼ kaldíŋ

Here:
(phonological account)

kal ∼ kal - díŋ → Copying is symmetrical

Copied Not copied

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Copy-Exponent Copied base

1. Copying as Weakening: Empirical Picture

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)

(5) 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'

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

(6) 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'			

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t'u:tɬ'x^{w}	d i s ∼ t' u: tɬ' 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

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

ɬi–tɬ'aqt	'the tip of it' (+Def-prefix)/
si–tɬ'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–/

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

a. *Fixed V in copy-exponent*

dúːk^{w}	'knife'	d íː d uːk^{w}	'small knife'
g^{w}ədíl	'sit'	g^{w} íː g^{w} ədil	'sit down briefly'

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b. *V-Reduction without fixed V*

júbil	'die, starve'	jú ~ jə bil	'small animal dies'
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c. *V-Deletion without fixed V*

pástəd	'white person'	pá ~ p stəd	'white child'
ʔúsil	'dive'	ʔú ~ ʔ sil	'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

(10) 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'

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b.	k'aːp	'(mouse) gnaw'	k'aː ~ k'əp m'uːt	'gnawings of mouse'
	tiːɬ	'bait'	tiː ~ təɬ m'uːt	'remains of bait'

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(11) 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'

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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)

(12)

	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)

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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

(13)

surface			*repair	
H	H	H	LH	LH
(tsˈóː)	(lˈèm)	(yˈàː)	(tsˈə.lˈèm)	(yˈə.yˈàː)

Summary: Copying = Weakening

(14) 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 copied base

□ + sapo ✧ sə ∼ sə po

(Struijke, 2000)

e.g. Kwakwala, Hausa, Tagalog,…

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

1.2. More Copying Enables More Reduction

Multiple Reduplication

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

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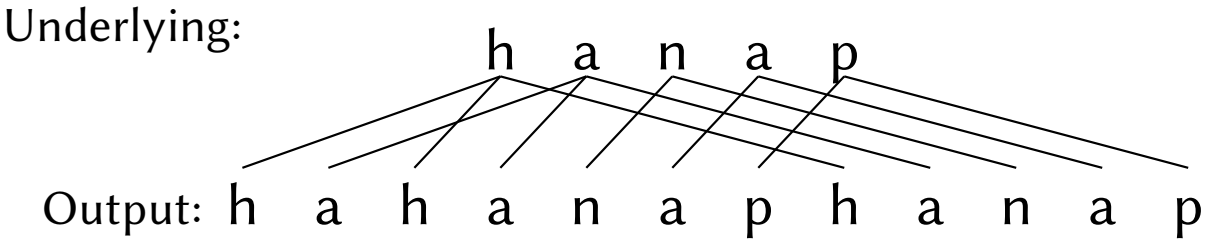
(16) Reduplication in Tagalog (Mattes, 2007, 126)

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'

(17) Multiple Copying



A. Avoidance of Multiple Reduplication: Ahousaht Nuuchahnulth

- some meanings are expressed by reduplication alone (18-a)
- many suffixes trigger prefixing reduplication (=underlined) (18-b)

(18) a.

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

b. mi ∼ mi ɬk’ukʔicuːʃ

RED∼miɬ-k’uk-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

(Kim, 2003*a*,*b*, 2008)

- two reduplication-triggering morphemes in a word only result in a single copy-exponent

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

b. t'u ∼ t'u c'iːħ (* t'u ∼ t'u ∼ t'u c'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 (Donner, 2012)

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

a. *Bisyllabic repetitive reduplication*

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

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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'

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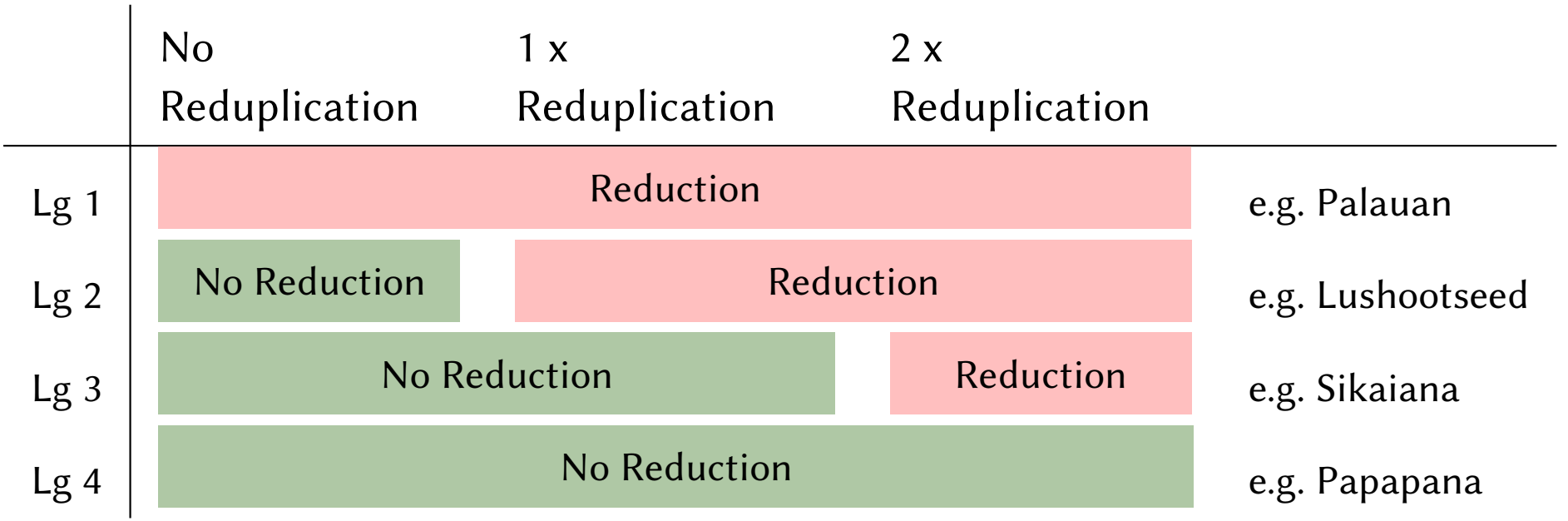
c. *Obligatory C-reduplication if both are combined*

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

Summary: More Copying = More Weakening

(21)



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**

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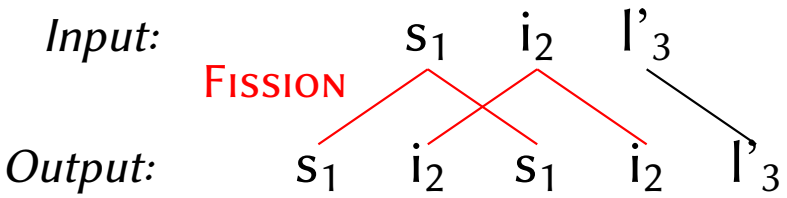
(Marantz, 1982; Pulleyblank, 2009; Saba Kirchner, 2010, 2013*a*,*b*)

- 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 (22)
  (Spaelti, 1997; Struijke, 2000; Gafos, 2003; Nelson, 2003)

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



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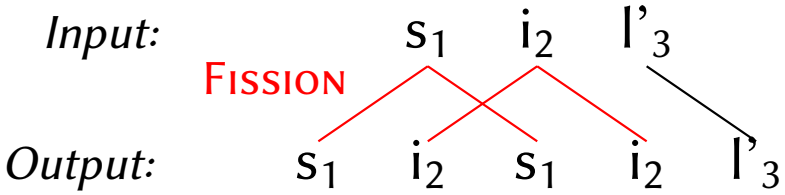


(23)

	μ>V	DEPS	*V:	INTS
μ / s1 i2 l'3 (μ)				
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

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

(24) 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

(25) 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 voicing in Japanese Rendaku (Rosen, 2016)
   - allomorphy in Modern Hebrew (Faust and Smolensky, 2017)
   - lexical accent in Lithuanian (Kushnir, 2017)
   - tone sandhi in Oku (Nformi and Worbs, 2017)
   - tone allomorphy in San Miguel el Grande Mixtec (Zimmermann, 2017*a*,*b*)
   - lexical stress in Moses Columbian Salishan (Zimmermann, to appear)
   - exceptional tone (non)spreading in San Molinos Mixtec (Zimmermann, 2018*a*)
   - interaction of phonological/lexical gemination/lenition in Italian (Amato, 2018)
   - compound stress in Sino-Japanese (Rosen, 2018)
   - compound tensing in Korean (Lee, 2019)
   - stress-syncope interaction in Levantine Arabic (Trommer, 2018)
   - (interacting) ghost segments in Welsh (Zimmermann, 2018*c*)
   - …

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

- constraints are **weighted**, not ranked

(26) 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 (26-b+c) only violate C2 and C3 with a lower weight than C1, they have a worse harmony score than (26-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*)

(27) μ>V: Assign -1 violation for every μ that does not dominate a vowel.

(28) [μ>V]$_P$: Assign -1 violation for every μ that does not dominate a **phonetically interpreted** vowel.

(29)

μ + sopo	μ>V 100	Ints 10	[μ>V]$_P$ 5	Max 5	
a. μ μ μ / s o p o / 1 1 1 1	-1		-1		-105
☞ b. 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

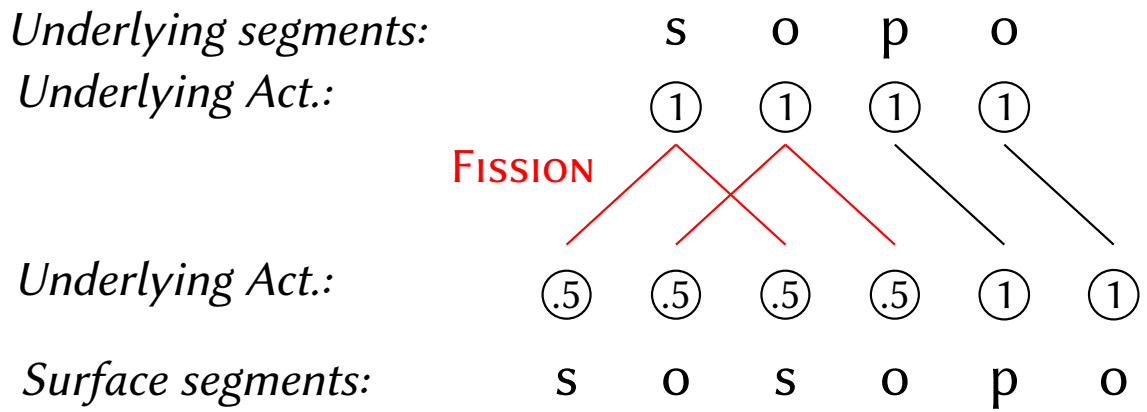
(to be modified soon)

2.2. Proposal: Fission is Distribution of Activity

5. Fission is Distribution of Activity

(30) GEN restriction on fission
Input element S_1 with activity A corresponds to x output elements S_1 with underlying activity A/x.

(31)

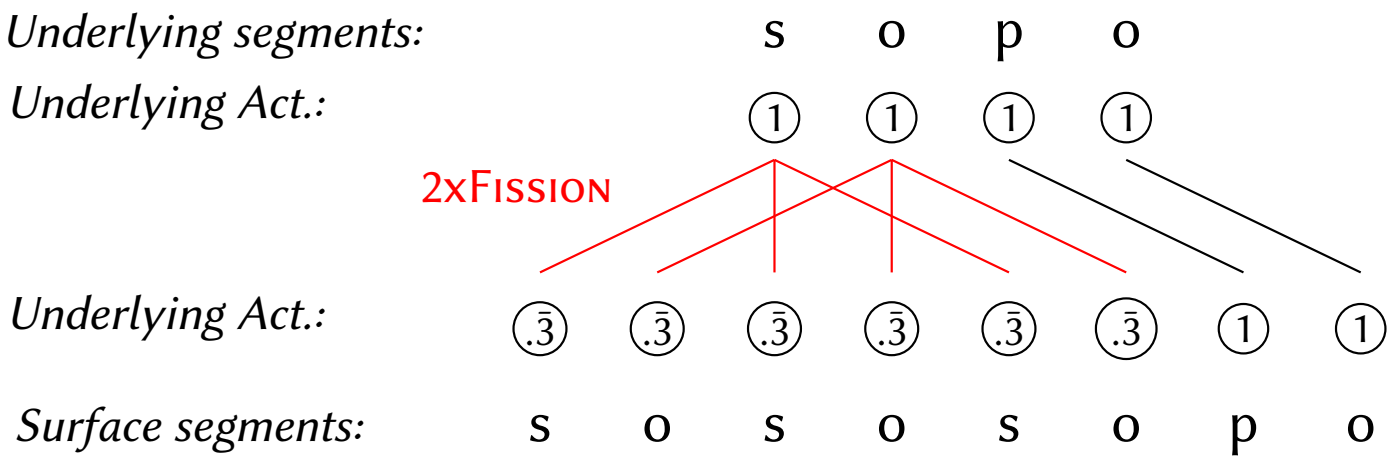


= elements that result from fission necessarily have an activity smaller than 1 that corresponds to input activity

= all output correspondents of S_1 have the same amount of activity that corresponds to input activity ➙ **copying weakens symmetrically**

5. Fission is Distribution of Activity

(32) More copying = More Weakening

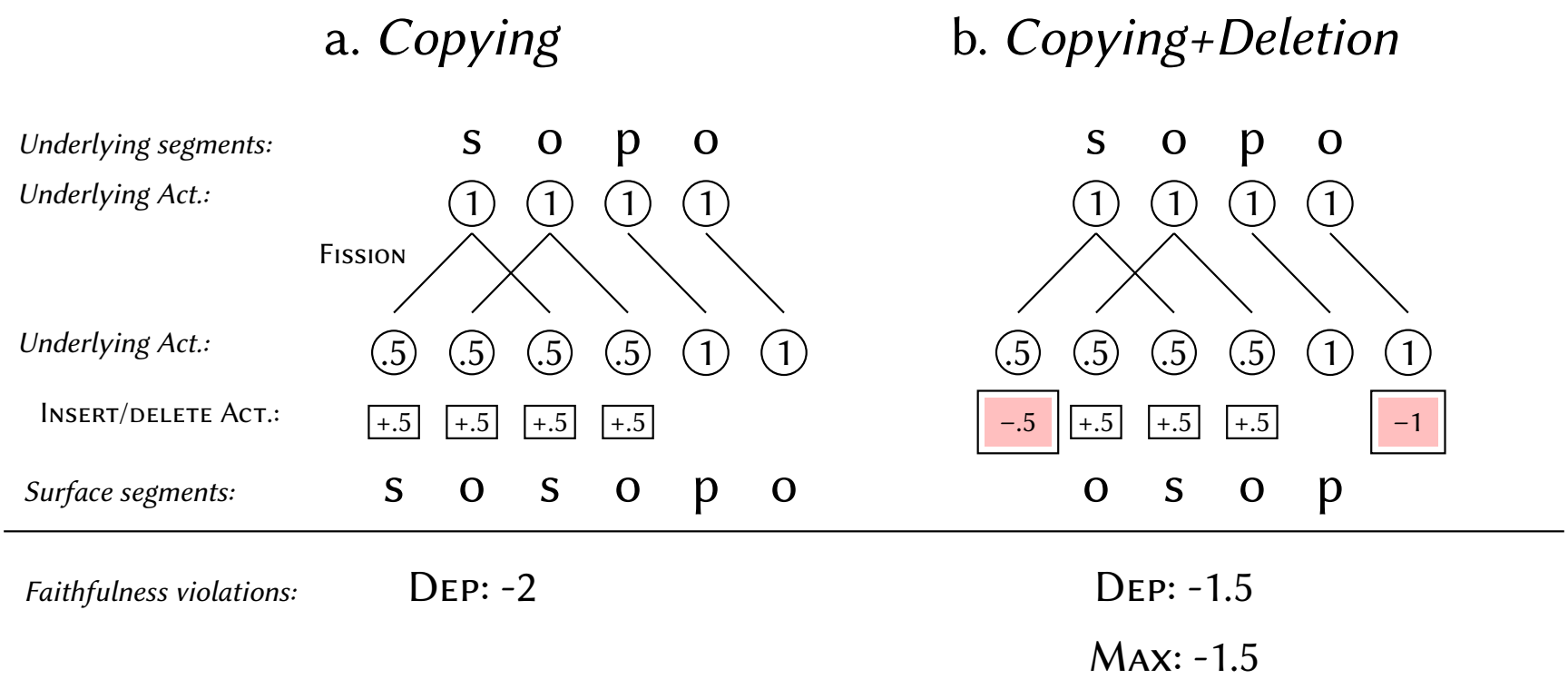


→ **copying weakens gradiently**

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)



Predicted Typology: Reduction Thresholds

(34)

Weaker
=Less protected by MAX, IDENT
=More penalized by DEP

	No Reduplication	1 x Reduplication	2 x Reduplication	
Lg 1	Reduction			e.g. Palauan
Lg 2	No Reduction	Reduction		e.g. Lushootseed
Lg 3	No Reduction		Reduction	e.g. Sikaiana
Lg 4	No Reduction			e.g. Papapana

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 .3̄ .3̄ .3̄ .3̄ .3̄ .3̄ ① ① +.6̄ +.6̄ +.6̄ +.6̄ +.6̄ +.6̄	-1		
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	

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

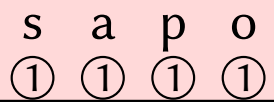
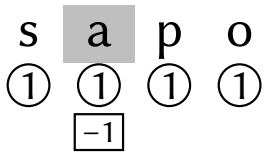
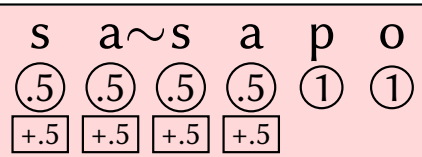
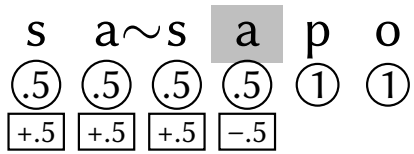
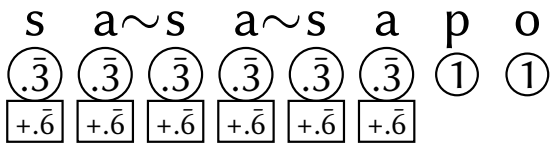
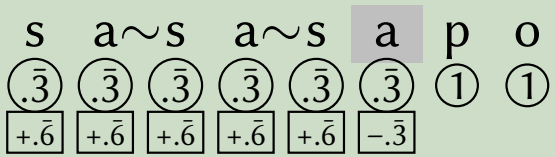
Lg 2: Only Reduction if Reduplication (e.g. Lushootseed)

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

		DELETEPENULT! 99	MAX 100	
☞ NoRed-a.	s a p o ① ① ① ①	-1		-99
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		-99
☞ 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		-99
☞ 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 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. 	-1		-99
NoRed-b. 		-1	-200
☞ 1xRed-a. 	-1		-99
1xRed-b. 		-0.5	-100
2xRed-a. 	-1		-99
☞ 2xRed-b. 		-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 .3̄ .3̄ .3̄ .3̄ .3̄ .3̄ ① ① +.6̄ +.6̄ +.6̄ +.6̄ +.6̄ +.6̄	-1		-100
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	-333.3̄

2.3. Example 1: Lushootseed

Lushootseed Reduction (simplified)

Pattern

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

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

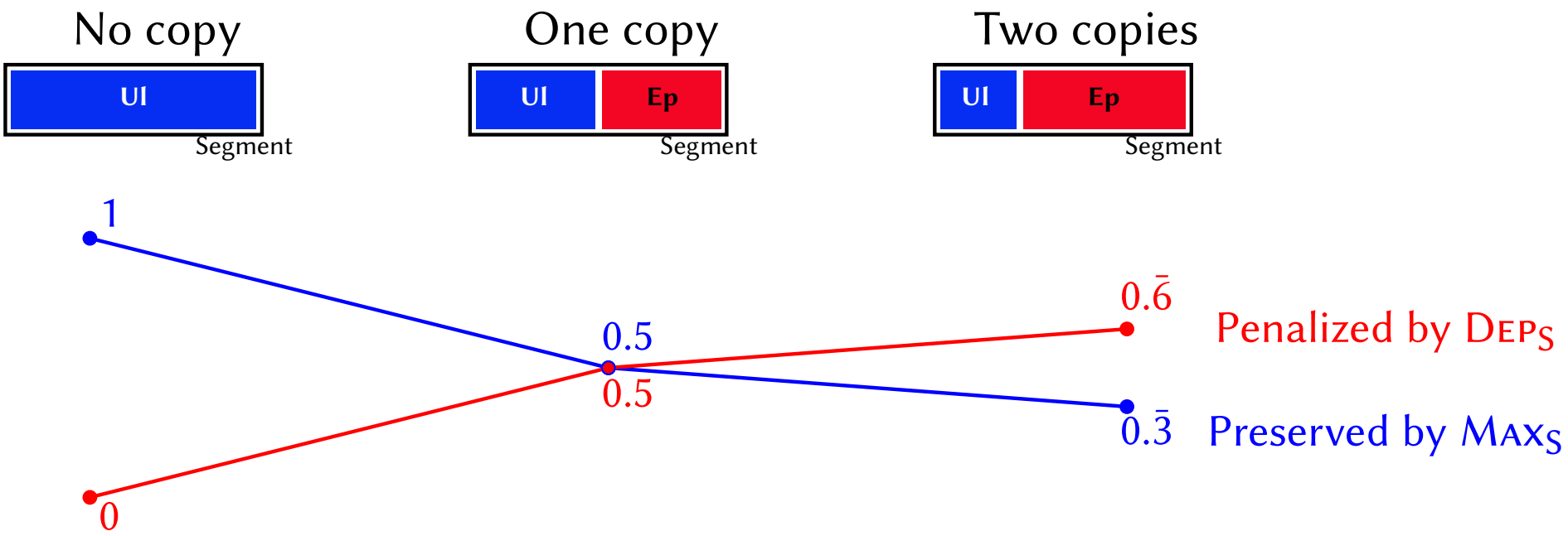
	Id-V	*UnstrV	Dep	
	40	30	10	
a.		-2	-2	-80
b.	-1	-1	-2	-90
☞ c.	-0.5	-1	-2	-70

2.4. Example 2: Sikaiana

Copied Elements: Too Weak to Surface

- realizing copied elements is **costly** (=adding of activity) and deleting them does violate MAX$_S$ only partially

(43) Being copied: Decreasing the chances of surfacing



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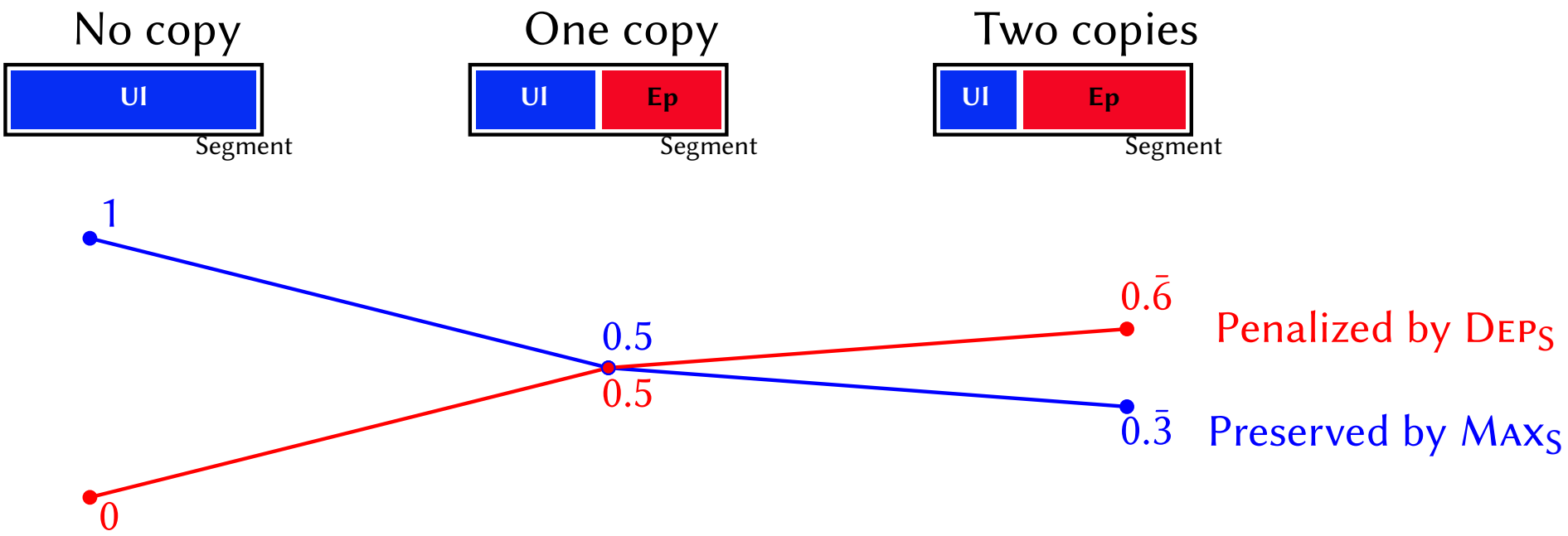


- predicts avoidance of copied elements just because they are copied

Sikaiana Syncope

Pattern

- syncope for the monosyllabic copy-exponent is
  - optional for single reduplication (so∼sopo / s∼sopo) and
  - obligatory for multiple reduplication (sopo∼s∼sopo)

Sikaiana Syncope

Pattern

- syncope for the monosyllabic copy-exponent is
  - optional for single reduplication (so∼sopo / s∼sopo) and
  - obligatory for multiple reduplication (sopo∼s∼sopo)

- copying triggered by σ>V and μ>V
- copy-exponent deletion since **copied V's are preferably avoided**
  - copied elements filling affixed σ*: never deleted (=high weight of $\boxed{\sigma{>}V}_P$)
  - copied elements filling affixed μ: can be deleted (=lower weight of $\boxed{\mu{>}V}_P$)

*Or those already prosodified/dominated by a σ in the input.

Sikaiana: No Syncope for Single Reduplication (bisyllabic)

(44) $\boxed{\sigma{>}V}_P$ + 0.5xMax ≫ 0.5xDep

		$\boxed{\sigma{>}V}_P$	Dep	Max	$\boxed{\mu{>}V}_P$	
	σ σ σ σ s o p o (1) (1) (1) (1)	100	36	20	8	
☞ 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			-144
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]	-1	-3.5	-0.5		-236

Sikaiana: Optional Syncope for Single Reduplication (monosyllabic)

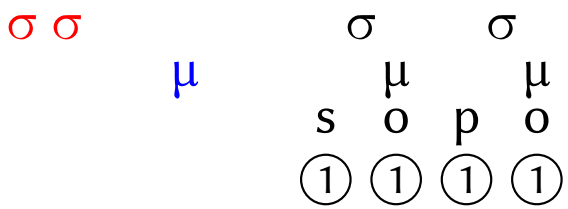
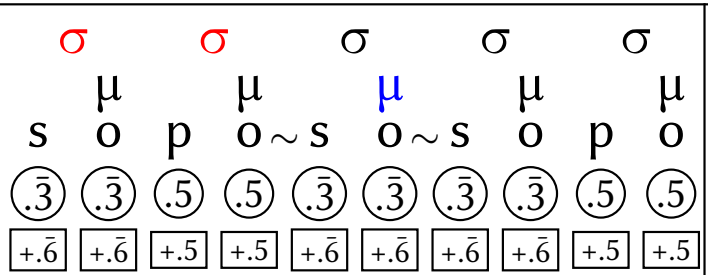
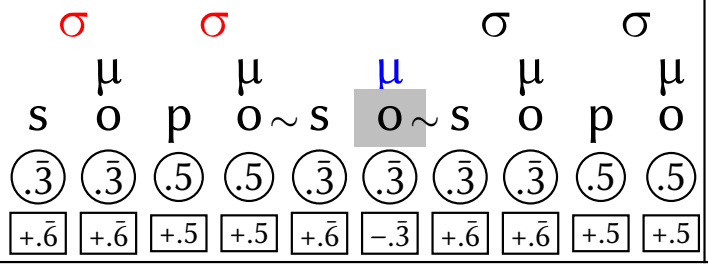
(45) $\boxed{\mu{>}V}_P$ + 0.5xMax ∼ 0.5xDep

	μ s o p o (1 1 1 1)	$\boxed{\sigma{>}V}_P$	Dep	Max	$\boxed{\mu{>}V}_P$	
		100	36	20	8	
☞ a.	μ μ μ s o∼s o p o (.5 .5 .5 .5 1 1) [+.5 +.5 +.5 +.5]		-2			-72
☞ b.	μ μ μ s o∼s o p o (.5 .5 .5 .5 1 1) [+.5 −.5 +.5 +.5]		-1.5	-0.5	-1	-72

*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) $0.\bar{6}\times$Dep + $\text{OCP}_C \gg 0.\bar{3}\times$Max

		$\boxed{\sigma>V}_P$	Dep	Max	$\boxed{\mu>V}_P$	
		100	36	20	8	
a.			-5.$\bar{9}$			-215.$\bar{9}$
☞ b.			-5.$\bar{3}$	-0.$\bar{3}$	-1	-206.$\bar{6}$

Avoidance of Multiply Copied Segments: Sikaiana

- in Sikaiana multiply-copied segments are so weak that they are only tolerated under affix-syllables*, not affix-moras
- that **only vowels are deleted**, not consonants: only $\textsc{Dep}_V$ is important and $\textsc{Max}_V$ less important enough; the weighting for $\textsc{Dep}_C$ and $\textsc{Max}_C$ is different

Footnote: This is an instance of 'anti-anti-gemination'
(Odden, 1988; Bakovic, 2005; Rose, 2000)

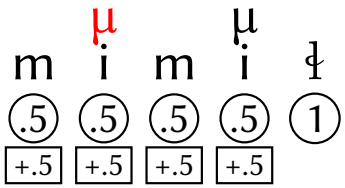
- attested in other Austronesian languages (e.g. Nukuoro, Carroll and Soulik, 1973)
- could alternatively triggered by an OCP that is violated by C_1VC_1 but not by C_1C_1 (=a geminate), cf. Rose (2000)

*And within the stem that is already prosodified prior to affix concatenation.

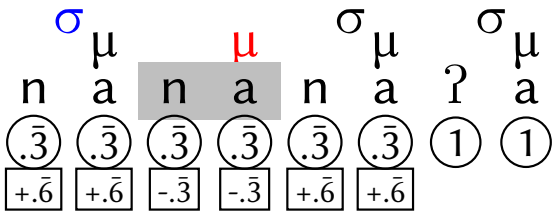
Avoidance of Multiply Copied Segments: Ahousaht Nuuchahnulth

- we see the expected deletion of **all multiply copied elements** (under certain affix nodes): $\textsc{Dep}_C$/$\textsc{Dep}_V$ and $\textsc{Max}_C$/$\textsc{Max}_V$ have same weight

(47) a. No Deletion under affixed μ: Single copying



b. Deletion under affixed μ: Multiple copying



3. Discussion and Conclusion

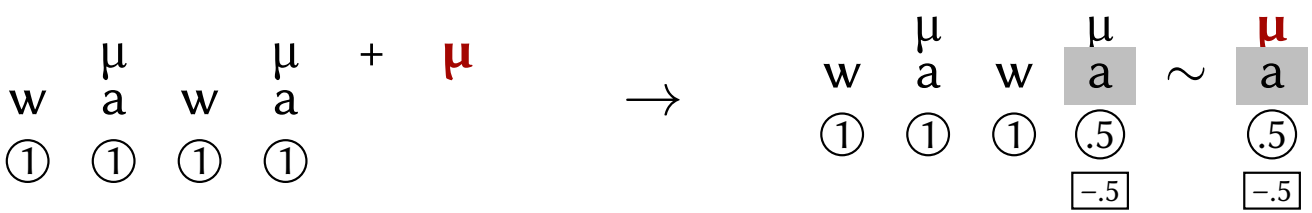
Further Prediction 1

- **Complete reduction** in copy-exponent and copied base (e.g. Siakaiana'/Ahousaht')?

Further Prediction 1

- **Complete reduction** in copy-exponent and copied base (e.g. Siakaiana'/Ahousaht')?
  - systematically attested as **subtraction** of prosodically defined portions to express morphological category
    (e.g. Dressler, 2000; Arndt-Lappe and Alber, 2012; Zimmermann, 2017*c*)
  - e.g. Aymara accusative /wawa + Acc/ –> [waw]
    (Briggs, 1976; Hardman, 2001; Coler, 2010)

(48) Aymara subtraction as 'reduplication'



Further Predictions 2-4

- 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)

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- 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)

Further Prediction 5

- **Phonetic differences** between elements with different (underlying) activity?
  - gradient phonetic effects are well-attested: e.g. subphonemic gradience in word-final devoicing, nasal place assimilation, flapping (e.g. Braver, 2013), vowel harmony is gradient; gets weaker the farther it spreads (McCollum, 2018),...
  - optional deletion in Sikaiana single reduplication might in fact be a phonetic effect rather than optional phonological deletion (and optional variation between /$C_1V_1 \sim C_1V_1$.../ and /$C_1 \sim C_1V_1$.../ is well-attested in Austronesian, e.g. Hoava (Davis, 2003; Blevins, 2005) or Doku (Unger, 2018))

Conclusion

- extending a phonological account of reduplication based on segmental fission with the assumption that **fission is distribution of underlying activity** correctly predicts
  - that reduplication involves **symmetrical weakening** of all elements involved in the copying and reduction can affect copy-exponents and/or copied bases
  - the **gradient weakening of every copy operation** that can result in more reduction under multiple copying
    (main advantage over an alternative based on Existential Faithfulness (Struijke, 2000))

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Sikaiana, tested with the Maxent Grammar Tool (Hayes, 2009)

Weights

MAX$_C$: 39.510925583659265
MAX$_V$: 17.130320954981542
DEP$_C$: 0.0
DEP$_V$: 17.143113638603637
μ>V P: 0.0
σ>V P: 3.62370715560716 63
CONT: 5.91793226522023

Probabilities

σ+ sopo
so∼sopo: 0.9998680938615468 ☜
sop<o>∼sopo: 7.225023388204955E-5
so<po>∼sopo: 1.9017384152256463E-13
<sopo>∼sopo: 4.995851293881543E-21
μ+ sopo
so∼sopo: 0.49773317757419294 ☜
s<o>∼sopo: 0.5009270527781152 ☜
<so>∼sopo: 4.900172127756463E-7
o∼sopo: 0.0013392796304789309
σ+ μ+ sopo
sopo∼so∼sopo: 0.0020702788740010795
sopo∼s<o>∼sopo: 0.995297845849349 ☜
sopo∼<so>∼sopo: 0.0026318752766498273

Contiguous Morpheme Copying

(49) MCont

For every pair of output elements O_1 and O_2 corresponding to input elements I_1 and I_2 that belong to the same morpheme and I_1 directly precedes I_2:
Assign * for every O_1 that is not directly followed by O_2 and for every O_2 that is not directly preceded by O_1.

- a non-existential version demanding **contiguous linear order for all instances of an element** and hence subsumes (50-a+b)

(50) Contiguity (McCarthy and Prince, 1995, 123)
I-Contig ('No skipping')
The portion of S_1 standing in correspondence forms a contiguous string.
O-Contig ('No intrusion')
The portion of S_2 standing in correspondence forms a contiguous string.

Contiguous Morpheme Copying

		[σ>V]$_P$	MCont	Dep	Max	Int	
	σ σ σ σ s o p o ① ① ① ①	100	50	36	20	5	
☞ 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		-4	-164
b.	σ σ σ σ o o∼s o p o .5 .5 ① .5 ① .5 +.5 +.5 +.5 +.5		-3	-2		-2	-232
c.	σ σ σ σ o p o∼s o p o .5 .5 .5 ① .5 .5 .5 +.5 +.5 +.5 +.5 +.5 +.5		-1	-3		-3	-173

Laryngeal Reduction in Copy-Exponent and Copied Base: Tagalog

- 'Contractions of this type never occur in non-reduplicated bases such as /daʔán/ 'road' or /buIhok/ 'hair', nor (as already noted) do they occur in reduplicated disyllables that do not contain a laryngeal consonant between like vowels' (Blust, 2007, 7)

(51) Reduplication in Tagalog (Blust, 2007, 7)

búhos	'pouring'	b-al-usbós	'grain spilled from package'
laʔáb	'spreading flame'	l-ag-abláb	'noisy conflagration'
laʔás	'cracked'	laslás	'ripped'
láhad	'opening of the hand'	ladlád	'opened'
sáhaŋ	'potency'	saŋsáŋ ∼ sansáŋ	'strong agreeable odor'
súhol	'bribe'	sulsól	'instigation to do evil'
suʔóŋ	'advance against odds'	suŋsóŋ	'go against wind'
tahán	'cessation'	tantán	'cessation'

V shortening in Copy-Exponent and Copied Base: Hausa

(52) Adjectival reduplication (Inkelas and Zoll, 2005, 87)

gishiriː	'salt'	gishiri-gishiri	'salty'
búhuː	'sack'	búhu-búhu	'sacklike'
gáːriː	'flour'	gáːri-gáːri	'powdry'