

Reduplication as Weakening: Explaining the Overapplication of Reduction

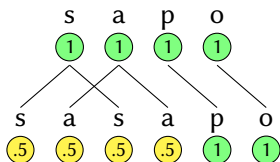
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(Slides available at <https://evazimmermann.com/talks.html>)

Main Claim

1. **Copying symmetrically weakens all copied elements** and overapplication of reduction exist for copy exponents, copied bases, or both.
2. Copying in the phonology is **distribution of underlying activity**.



1. Empirical Evidence: The Copying-Weakening Correlation
2. Copying as Weakening: Theoretical Modeling
 - 2.1 Assumptions
 - 2.2 Predictions
 - 2.3 Case Studies: Symmetric Reduction
3. Discussion and Conclusion

1. Empirical Evidence: The Copying-Weakening Correlation

The Copying-Weakening Correlation

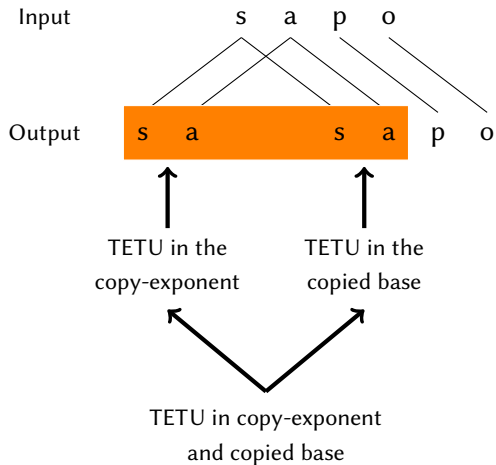
- (1) *The Copying-Weakening-Correlation (=CWC)*
Every copy operation weakens all the elements involved in the copying.
- A. Copying weakens **symmetrically**
 - reduction in the copy-exponent, the copied base, or both
 - B. **More copying implies more weakening**
 - different thresholds: reduction only for copied elements, reduction only for elements that are copied twice,...

B. More copying implies more weakening (Zimmermann, to appear)

Examples for reduction only under multiple copying

- complete avoidance of multiple reduplicants in S. Wakashan (Stonham, 1994, 2004; Davidson, 2002; Kim, 2003)
- complete avoidance of multiple reduplicants in Toqabaqita (Lichtenberk, 1945)
- reduction of a CV-copy exponent to C in Sikaiana (Donner, 2012; Zimmermann, to appear)

A. Symmetric Weakening of all Copied Elements



A1. C-Reduction in the Copy Exponent: Gitksan (Brown, 2008)

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

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

dzap	dz i p	~	dz a p	'make, do'
ʔisx ^w	ʔ a s	~	ʔ i s x ^w	'stink, smell'

- deaffricativization, deglottalization (+predictable voicing), and depalatalization in the copy-exponent
- no such reduction outside of reduplication contexts

(3) 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
k ^w o:tx	g ^w i t	~	k ^w o: t x	'to be lost, gone'			
mafx ^w	m i s	~	m a ʃ x ^w	'white'	ʃ	→	s

A2. V-Reduction in the Copied Base: Lushootseed

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

- ↻ alternation between fixed vowel reduplication /Ci-/ and /CV-/
- ↻ if the base-vowel is copied, it is reduced in the copied base

(4) Diminutive Reduplication

(Urbanczyk, 2001, 195-207)

a. *Fixed V in copy-exponent*

dú:k ^w	‘knife’	d í ~ d u:k ^w	‘small knife’
g ^w ədíl	‘sit’	g ^w í ~ g ^w ədíl	‘sit down briefly’

b. *V-Reduction without fixed V*

júbil	‘die, starve’	jú ~ jə bil	‘small animal dies’
s-túlək ^w	‘river’	s- tú ~ tə lək ^w	‘creek’

c. *V-Deletion without fixed V*

pástəd	‘white person’	pá ~ p stəd	‘white child’
ʔúsil	‘dive’	ʔú ~ ʔ sil	‘shallow dive’

A3. Reduction in Copy Exponent or Copied Base: Kwak'wala

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

- suffixation of /m'u:t/ 'refuse, useless' accompanied by reduplication

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

- | | | | | | |
|----|-------|----------------|------------|--------|--------------------------|
| a. | k'a:p | '(mouse) gnaw' | k'a: ~ k'ə | pm'u:t | 'gnawings of mouse' |
| | ti:ɬ | 'bait' | ti: ~ tə | ɬm'u:t | 'remains of bait' |
| b. | səl | 'drill' | səl ~ sə | mu:t | 'left after drilling' |
| | kən | 'scoop up' | kən ~ kə | mu:t | 'left after scooping up' |

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

- | | | | | | |
|----|---------------------|---------------------|--------------------------------------|----------------------|-------------------------------------|
| a. | q ^w a:l' | 'scorch' | q ^w ə ~ q ^w a: | l'əmu:t | 'embers' |
| | sa:q ^w | 'peel bark' | sə ~ sa: | q ^w əmu:t | 'left after peeling bark' |
| b. | məndz | 'cut kindling wood' | mə ~ mən | dzəmu:t | 'left after cutting kindling woods' |
| | c'əm' | 'melt' | c'ə ~ c'əm' | əm'u:t | 'left after melting' |

A3. Reduction in Copy Exponent or Copied Base: Kwak'wala

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

(7)

e.g.	*expected			surface	
	H	H	H	H	LH
a. səl	(səl)	(səl)	(mu:t)	(səl)	(sə .mu:t)
b. məndz	(mən)	(mən)	(dzə.mu:t)	(mə . mən)	(dzə.mu:t)

- these repairs are bound to copy exponents and copied bases

(8)

surface			*repair	
H	H	H	LH	LH
(ts'ó:)	(l'əm)	(y'á:)	(ts'ə.l'əm)	(y'ə.y'á:)

A3. Laryngeal Reduction in Copy-Exponent and Copied Base: Tagalog

- disyllabic bases with /h/ or /ʔ/ between two like vowels reduce in both copy-exponent and copied base
- outside of reduplication, those structures surface faithfully (e.g. /daʔán/ ‘road’)
- Cf. Schachter and Otnes (1983):97 for a slightly different final laryngeal reduction

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

a.	mag-basat	‘get broken’	mag-	basat	~	basat	‘get thoroughly broken’
	mag-sugat	‘have sores’	magka-	sugat	~	sugat	‘thoroughly covered with sores’
b.	laʔás	‘cracked’	las	~	lás	‘ripped’	
	láhád	‘opening of the hand’	lad	~	lád	‘opened’	
	suʔóŋ	‘advance against odds’	suŋ	~	sóŋ	‘go against wind’	

A. Summary: Symmetric Weakening of all Copied Elements

A 1. Reduction in the copy-exponent*

□ + sapo ⇨ sə ~ sa po

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

e.g. Gitksan, Shuswap, Sanskrit...

2. Reduction in the the copied base

□ + sapo ⇨ sa ~ sə po

(Shaw and Howe, 1999; Struijke, 2000)

e.g. Tohono O'odham, Heiltsuk, Lushootseed,...

3. 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)

2. Copying as Weakening: Theoretical Modeling

Copying as Weakening: Assumptions

Main Claim: Fission is distribution of activity

- all phonological elements have an underlying activity (=GSR)
- reduplication results from fission which is defined as **equal distribution of underlying activity**

Background Assumptions

1. **Gradient Symbolic Representation**
(Smolensky and Goldrick, 2016; Rosen, 2016)
2. Reduplication Results from Prosodic Affixation
(Marantz, 1982; Pulleyblank, 2009; Saba Kirchner, 2010, 2013a,b)
3. Harmonic Grammar
(Legendre et al., 1990; Potts et al., 2010)
4. Containment
(Prince and Smolensky, 1993/2004)

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

(10)

	b a t - p	*CC	MAX	DEP
a.		-1		-0.5
b.			-0.5	
c.			-1	-0.5

X = ‘deleted’ elements
that are not realized
(=zero activity)

Proposal: Fission is Distribution of Activity

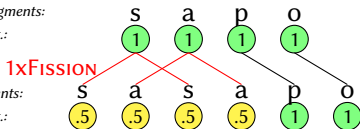
(11) GEN restriction on fission

Input element S_1 with activity A corresponds to x output elements S_1 with underlying activity A/x .

(12) Copying weakens **symmetrically**

Underlying segments:

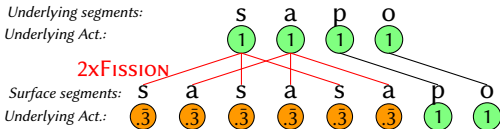
Underlying Act.:



(13) **More copying = more weakening**

Underlying segments:

Underlying Act.:



Prediction: Weakening = More Reduction

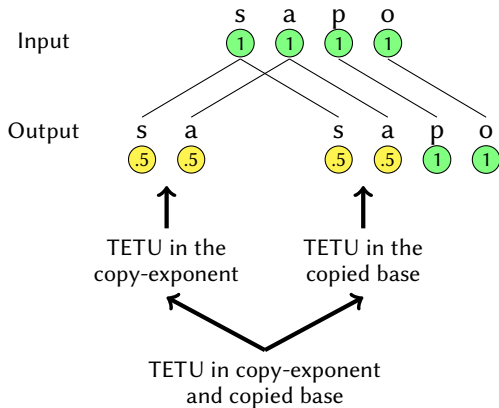
- elements that are weakened by copying are more prone to markedness reduction

(14)

	μ s a p o (1) (1) (1) (1)	IDENT	MAX
a.	s a s a b o (.5) (.5) (.5) (.5) (1) (1) +5 +5 +5 +5	-1	Change of a non-copied C
b.	s a z a p o (.5) (.5) (.5) (.5) (1) (1) +5 +5 +5 +5	-0.5	Change of a copied C
c.	s a s a p o (.5) (.5) (.5) (.5) (1) (1) +5 +5 +5 +5 -1	-1	Deletion of a non-copied C
d.	s a s a p o (.5) (.5) (.5) (.5) (1) (1) +5 +5 -5 +5	-0.5	Deletion of a copied C

Prediction 1: Symmetric Weakening of all Copied elements

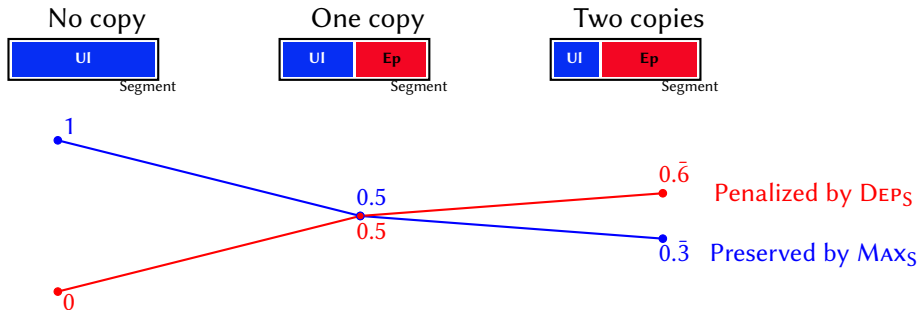
(15)



Prediction 2: Copied Elements are Dispreferred

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

(16) Being copied: Decreasing the chances of surfacing



- predicts avoidance of copied elements just because they are copied

Prediction 3: Thresholds for Symmetric Reduction

(17)

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

*in copy-exponent and/or copied base

Lushootseed: V-Reduction in the Copied Base

Pattern

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

- (18)
- a. *UNSTRV:
Assign -1 violation for every unstressed full V (=place features).
 - b. ID-V:
For every input vowel with activity I, assign -I violations if the corresponding output vowel has a different place feature specification.

Lushootseed: V-Reduction in the Copied Base

- (19) a. ID-V > *UNSTRV No reduction for non-copied vowels
 b. *UNSTRV > -0.5xID-V Reduction for copied V

(20)

	μ	ID-V	*UNSTRV	DEP	
		40	30	10	
a.			-2	-2	-80
b.		-1	-1	-2	-90
c.		-0.5	-1	-2	-70

Tagalog: Reduction for All Copied Laryngeals

Pattern

- glottals between like vowels are reduced in both copy-exponent and copied base but never outside of reduplication contexts

- (21) a. *Glottal:
Assign -1 violation for every glottal C (/ʔ/ or /h/).
- b. MAXC:
For every input consonant with activity I and its corresponding output consonant with activity O, assign -I-O violations.
- additional vowel 'deletion': *Hiatus and only coalescence of like vowels is a possible repair; laryngeal reduction between unlike vowels is blocked

Tagalog: Reduction for All Copied Laryngeals

- (22) a. $\text{MaxC} > * \text{Glott}$ No reduction for non-copied /ʔ/
 b. $* \text{Glott} > 0.5 \times \text{MaxC}$ Reduction for copied /ʔ/

(23)

	σ σ l a ʔ a s 1 1 1 1 1	MaxC	*Glott	
		50	40	
a.	σ σ l a ʔ a s l a ʔ a s .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 +.5 +.5 +.5 +.5 +.5 +.5 +.5 +.5 +.5 +.5		-2	-80
b.	σ σ l a ʔ a s l a ʔ a s .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 +.5 +.5 -.5 -.5 +.5 +.5 +.5 +.5 +.5 +.5	-0.5	-1	-65
c.	σ σ l a ʔ a s l a ʔ a s .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 +.5 +.5 -.5 -.5 +.5 +.5 +.5 -.5 -.5 +.5	-1		-50

*Containment assumption crucial: Copying+Deletion (cf. appendix).

3. Discussion and Conclusion

Alternative Accounts and the Copying-Weakening Correlation

Standard BR-correspondence theory (McCarthy and Prince, 1995)

- cannot explain reduction in only the copied base: There is **no 'special' IO-relation for the base**
- cannot explain that more copying implies more reduction

Existential faithfulness (Struijke, 2000)

- cannot explain reduction in both copy-exponent and copied base: Input information must be preserved in at least one of them
- cannot explain that more copying implies more reduction

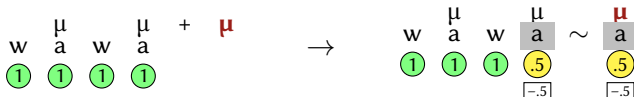
Morphological Doubling (Inkelas and Zoll, 2005; Inkelas, 2008)

- cannot explain reduction in the copied base: A certain cophonology needs to be only relevant if a morphologically more outwards morpheme involves doubling
- cannot explain that more copying implies more reduction

Further Prediction

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

(24) Aymara subtraction as ‘reduplication’ (copying+radical reduction)



Conclusion

- the Copying-Weakening Correlation is evidence for redefining fission as **distribution of underlying activity** and for adopting a phonological account to reduplication
- the systematic weakening of all copied elements predicts that **copy-exponent, copied base, or both are in principle more prone to reduction**

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Containment (Prince and Smolensky, 1993/2004)

- no literal deletion; elements with **zero activity** remain unrealized
- non-realized elements can be enough to fill prosodic nodes
(Trommer, 2011; Trommer and Zimmermann, 2014; Zimmermann, 2017)

(25) $\mu > V$:
Assign -1 violation for every μ that does not dominate a vowel.

(26) $\boxed{\mu > V}_P$:
Assign -1 violation for every μ that does not dominate a **phonetically interpreted** vowel.

Containment (Prince and Smolensky, 1993/2004)

(27) Copying and deletion of copied elements

μ s a p o ① ① ① ①	$\mu > V$ 500	DEP 100	MAX 20	$\mu > V$ _P 20	INT _S 10	
a. μ s a p o ① ① ① ①	-1			-1		-520
b. s a s a p o ⑤ ⑤ ⑤ ⑤ ① ① +5 +5 +5 +5		-2			-2	-220
c. μ s a s a p o ⑤ ⑤ ⑤ ⑤ ① ① +5 -5 +5 +5	○	-1.5	-0.5	-1	-2	-200

Thresholds: More Copying = More Reduction

(28) Deletion: Cheaper for copied element

	μ s a p o (1) (1) (1) (1)	Max
a.	μ s a s a p o (.5) (.5) (.5) (.5) (1) (1) (+.5) (+.5) (-.5) (+.5)	-0.5
b.	μ s a s a p o (.5) (.5) (.5) (.5) (1) (1) (+.5) (+.5) (+.5) (+.5) (-1)	-1

(29) Deletion: Even cheaper for multiply copied element

	μ μ s a p o (1) (1) (1) (1) (1)	Max
a.	μ μ s a s a s a p o (.3) (.3) (.3) (.3) (.3) (.3) (1) (1) (1) (+.6) (+.6) (+.6) (+.6) (-.3) (+.6)	-0.3
b.	μ μ s a s a s a p o (.3) (.3) (.3) (.3) (.3) (.3) (1) (1) (1) (+.6) (+.6) (+.6) (+.6) (+.6) (+.6) (-1)	-1

MAX and DEP and GSR

- (30)
- 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.

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)
- 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 $/C_1V_1\sim C_1V_1\dots/$ and $/C_1\sim C_1V_1\dots/$ is well-attested in Austronesian, e.g. Hoava (Davis, 2003; Blevins, 2005) or Doku (Unger, 2018))