Rapa Nui: A Case for Correspondence in Reduplication

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Squibs and Discussion

Rapa Nui: A Case for Correspondence in Reduplication

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Abstract: This squib argues for the role of correspondence in reduplication by examining the vowel length alternations in Rapa Nui reduplication. The analysis shows that vowel shortening in the base after reduplication is due to the enforcement of vowel length identity through Base-Reduplicant correspondence, while the motivation of vowel shortening is problematic for theories without surface-to-surface correspondence. The findings suggest that reduplication-phonology interactions cannot be handled solely by serialism or cyclicity, and a parallel Optimality Theory evaluation with BR correspondence is supported.

Keywords: reduplication, reduplication-phonology interactions, correspondence, parallelism, serialism, backcopying

Since the inception of Base-Reduplicant Correspondence Theory (BRCT; McCarthy and Prince 1995), one of the most debated issues about reduplication theories is whether correspondence among elements in an output is a necessary component of grammar. The major advantage of BRCT, as defended in McCarthy and Prince 1995, 1999, is the ability to predict various types of reduplication-phonology interaction, including overapplication and underapplication, due to the mechanisms of symmetric BR correspondence. However, some recent studies question the necessity of BR correspondence by arguing that some claimed predictions of BRCT either lack empirical support or can be reanalyzed without resorting to correspondence (e.g., Inkelas and Zoll 2005, Kiparsky 2010, Saba Kirchner 2010, Bermúdez-Otero 2012, Zimmermann 2013, 2017, Inkelas 2014). Two representative theories of reduplication that take this line are Minimal Reduplication (MR; Saba Kirchner 2010, 2013; see also, e.g., Bermúdez-Otero 2012, Bye and Svenonius 2012) and Serial Template Satisfaction (STS; McCarthy, Kimper, and Mullin 2012). Both MR and STS hold that reduplication is the realization of empty prosodic templates rather than the

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reduplicative morpheme RED, and BR correspondence and BR identity no longer exist. For MR, the reduplication-phonology interaction can be handled by stratal ordering. For STS, which is couched in Harmonic Serialism, the key insight is that reduplication is the stepwise realization of a prosodic template, and the attested misapplication patterns can be resolved by manipulating the order of application between phonological operations and operations of Copy(X) and Insert(X).

In this squib, I will present some newly reported data from Rapa Nui, a Polynesian language spoken on Easter Island, Chile, which pose challenges to the theories of reduplication without BR correspondence. In what follows, I will introduce the patterns of Rapa Nui reduplication from Kieviet's (2017) corpus study (section 1). I will then address the pattern of reduplication that involves vowel length alternations to demonstrate the advantages of BR correspondence (section 2), show how the language data from Rapa Nui pose problems for MR and STS (section 3), and offer closing remarks (section 4).

1 Reduplication Patterns of Rapa Nui

1.1 Stress and Metrical Structure

Rapa Nui has 12 consonant phonemes (/p, t, k, ʔ, m, n, ŋ, h, v, ɾ, f, s/) and 10 vowel phonemes (/a, i, u, e, o, aː, iː, uː, eː, oː/). The syllable structure of Rapa Nui is (C)V(ː) in general, and codas are not allowed except in loanwords. In terms of syllable weight, (C)V is light and (C)Vː is heavy. There are no diphthongs in Rapa Nui, so vowel sequences belong to separate syllables: for example, [ˈho.a] 'to throw' (Kieviet 2017:28–37).

The foot type in Rapa Nui is a moraic trochee. Feet are constructed from right to left, and the rightmost foot of a word receives the primary stress (e.g., [ma.(ˈŋoː)] 'shark', [(ˌke.ɾe).(ˈtuː)] 'pumice', [(ˌha.ŋu).(ˈpo.tu)] 'younger child') (Kieviet 2017:45).[1] For some words that contain five light syllables, the secondary stress can freely vary between the first and the second syllable, such as [va.ˌna.va.ˈna.ŋa] and [ˌva.na.va.ˈna.ŋa] 'to chat' (reduplicated word); however, no variation is reported for other words of the same shape (e.g., [ˌo.ro.ma.ˈtu.ʔa] 'priest'). The variation of secondary stress observed in longer words is not crucial to the core issue of this squib, so I put it aside.[2] Note that clash avoidance in Rapa Nui holds between a pair of adjacent stressed moras, rather than syllables, so that adjacent stressed syllables such as in [ˌpaː.ˈpa.ʔi] 'to write' and [ˌhaː.ˌna.u.ˈta.ma] 'pregnant' are

[1] These word shapes are unattested: HL, LHLH, HLLL, HLLLH (Kieviet 2017:39). It is noteworthy that all of these shapes are incompatible with exhaustive binary parsing.

[2] There are insufficient data to discuss the variable positions of secondary stress in Rapa Nui, but this variation is not limited to reduplicated forms. Since Hawaiian shows a similar variation, and the pattern (ˌLL)L(ˈLL) appears to be dominating rather than L(ˌLL)(ˈLL) (Alderete and MacMillan 2015:3), in the following discussion I assume (ˌLL)L(ˈLL) is the output in Rapa Nui.

possible, but adjacent stressed moras (light syllables) as in *[ˌma.ˈu.ku] ([ma.ˈu.ku] ‘grass’) are not. The observed patterns can be derived by a set of standard metrical constraints (McCarthy and Prince 1993, Prince and Smolensky 2004), as listed in (1); see the tableaux in (2). I propose that degenerate feet are not allowed in Rapa Nui, so foot binarity is given priority over parsing all syllables into feet (i.e., FtBin outranks Parse).[3] An exhaustively parsed candidate such as *[(ˌma).(ˈu.ku)] is ruled out by FtBin and is omitted below.

(1) a. Parse: Assign a violation for each syllable that is not parsed by a foot.
    b. Align(Ft, R, PrWd, R): Every foot stands at the right edge of the prosodic word. (All-Ft-R)
    c. Align(Hd, R, PrWd, R): The head foot is rightmost in the prosodic word. (Rightmost)
    d. Align(PrWd, L, Ft, L): Every prosodic word begins with a foot. (Align-L)
    e. Ident-IO-μ: Assign a violation mark if two vowels standing in input-output correspondence are not associated with an equal number of moras.

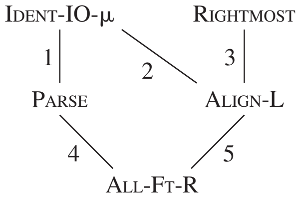
(2) Input /oɾomatuʔa/ ‘priest’, /haːnautama/ ‘pregnant’, /mauku/ ‘grass’

/oɾomatuʔa/	Id-IO-μ	Rtmost	Parse	Align-L	All-Ft-R
☞ a. (ˌo.ɾo).ma.(ˈtu.ʔa)			1		3
b. o.(ˌɾo.ma).(ˈtu.ʔa)			1	1W	2L
c. (ˌoː).(ˌɾo.ma).(ˈtu.ʔa)	1W		L		6W
/haːnautama/	Id-IO-μ	Rtmost	Parse	Align-L	All-Ft-R
☞ d. (ˌhaː).(ˌna.u).(ˈta.ma)					6
e. (ˌhaː).na.u.(ˈta.ma)			2W		4L
/mauku/	Id-IO-μ	Rtmost	Parse	Align-L	All-Ft-R
☞ f. ma.(ˈu.ku)			1	1	
g. (ˈma.u).ku		1W	1	L	1W
h. (ˌmaː).(ˈu.ku)	1W		L	L	2W

First, the candidate in (2b) fatally violates Align-L as compared with (2a), which satisfies Align-L at the expense of an additional All-Ft-

[3] Kieviet (2017:38, 45) claims that degenerate feet are allowed in Rapa Nui. However, degenerate feet are usually only allowed in languages that also allow degenerate-size monosyllabic content words (Hayes 1995:88), while in Rapa Nui, words that contain only a light syllable are limited to certain grammatical particles (Kieviet 2017:39).

R violation, indicating Align-L ≫ All-Ft-R. The candidate in (2c) that lengthens the initial syllable is ruled out by the ranking Ident-IO-μ ≫ Parse. For another crucial input, /haːnautama/ ‘pregnant’, the fully parsed candidate (2d) is favored over (2e), which incurs fewer violations of All-Ft-R, indicating Parse ≫ All-Ft-R. Since (2g) satisfies Align-L but violates Rightmost, the constraint Rightmost should outrank Align-L in order to make (2f) the winner. Further, the ranking Ident-IO-μ ≫ Align-L is established by (2f) ≻ (2h), the latter of which parses every syllable into binary feet by lengthening the first syllable, violating Ident-IO-μ. The rankings of the metrical constraints are summarized in (3).

(3)


1. (2a) ≻ (2c)
2. (2f) ≻ (2h)
3. (2f) ≻ (2g)
4. (2d) ≻ (2e)
5. (2a) ≻ (2b)

1.2 Reduplication in Rapa Nui

One of Rapa Nui’s two types of reduplication is derivational and used for intensification, repetition, or conversion (Kieviet 2017:69–72); I will refer to it as *intensifying reduplication* in this squib.[4] The size of the reduplicant for intensifying reduplication always amounts to two moras: either a heavy syllable (H) or two light syllables (L). For monosyllabic and disyllabic roots, full reduplication is observed, as exemplified in (4).[5]

(4) Intensifying reduplication: Monosyllabic and disyllabic roots (Kieviet 2017: 64, 70)

	Root	Gloss	Reduplicated form	Gloss
a.	paː	‘to fold’	(ˌpaː).(ˈpaː)	‘to fold repeatedly’
b.	kiː	‘to say’	(ˌkiː).(ˈkiː)	‘to say repeatedly’
c.	ho.a	‘to throw’	(ˌho.a).(ˈho.a)	‘to throw various things’
d.	ho.no	‘to patch’	(ˌho.no).(ˈho.no)	‘to patch various things’

For trisyllabic roots, however, either the first or the last two syllables of the root can be copied; these are termed *left-edge copying* / *right-edge copying*, respectively. There are two major configurations for trisyllabic roots in Rapa Nui, as exemplified in (5): HLL (5a–d) and LLL (5e–g). Another three types of trisyllabic roots—LLH, HHH, and LHH—are relatively rare. For LLH words, only left-edge copying

[4] It is labeled *Type 2 reduplication* in Kieviet 2017:69.

[5] Note that most monosyllabic words in Rapa Nui are bimoraic, with the exception of some functional particles (Kieviet 2017:39).

is observed, while no reduplicated forms are identified for HHH and LHH words. For some roots in (5), both left-edge copying and right-edge copying exist (e.g., (5a–b, e–f)), while for some others, only one of the two patterns is observed (e.g., (5c–d, g)). This variation needs further investigation and is not the focus of the current discussion, but Kieviet (2017:63) points out that right-edge copying is more common in Rapa Nui. Nevertheless, regardless of whether the base is HLL or LLL, left-edge copying always yields LLLLL and right-edge copying always yields HLLLL.

The major concern of this squib lies in the alternation of vowel length after reduplication. When the root undergoes left-edge copying, as in the boxed examples in (5a–c), the long vowel in the root is shortened in the reduplicated form: for example, /**hoː**.ɾo.u/ → [(ˌho.ɾo).**ho**.(ˈɾo.u)] (*[(ˌho.ɾo).(ˌ**hoː**).(ˈɾo.u)]). In contrast, when right-edge copying takes place in (5a–b, d), no modification of syllable weight is observed. This form is of special interest since the template of the reduplicant seemingly affects the vowel length in the base, resulting in shortening of the input long vowel. In comparison, for the LLL roots in (5e–g), when a root undergoes right-edge copying, as in /**ha**.ʔe.ɾe/ → [(ˌ**haː**).(ˌʔe.ɾe).(ˈʔe.ɾe)], the vowel in the first syllable of the output is lengthened, making it a complete foot. When left-edge copying occurs, as in /**ha**.ʔe.ɾe/ → [(ˌha.ʔe).**ha**.(ˈʔe.ɾe)], no quantity change is observed.

(5) Intensifying reduplication: Trisyllabic roots (Kieviet 2017:64, 70)

	Root	Gloss	Reduplicated form		Gloss
			Left-edge copy	Right-edge copy	
a.	vaː.na.ŋa	‘to talk’	(ˌva.na).va.(ˈna.ŋa)	(ˌvaː).(ˌna.ŋa).(ˈna.ŋa)	‘to chat’
b.	hoː.ɾo.u	‘hurry’	(ˌho.ɾo).ho.(ˈɾo.u)	(ˌhoː).(ˌɾo.u).(ˈɾo.u)	‘to hurry very much’
c.	maː.ʔe.a	‘stone’	(ˌma.ʔe).ma.(ˈʔe.a)	–	‘stony, rocky’
d.	paː.ho.no	‘answer’	–	(ˌpaː).(ˌho.no).(ˈho.no)	‘argumentative’
e.	ha.ʔe.ɾe	‘to walk’	(ˌha.ʔe).ha.(ˈʔe.ɾe)	(ˌhaː).(ˌʔe.ɾe).(ˈʔe.ɾe)	‘to stroll’
f.	po.ɾe.ko	‘to be born’	(ˌpo.ɾe).po.(ˈɾe.ko)	(ˌpoː).(ˌɾe.ko).(ˈɾe.ko)	‘(different kids) to be born’[6]
g.	ti.ŋa.ʔi	‘to kill’	–	(ˌtiː).(ˌŋa.ʔi).(ˈŋa.ʔi)	‘to kill several people’

[6] The form [po.ɾe.po.ɾe.ko] is found in Kieviet’s (2017) corpus (Mtx-5-05.008), which was originally documented in Métraux 1971.

Regarding these observations, I propose here that the enforcement of identity through BR correspondence plays a crucial role in accounting for vowel length alternations. Further, it does not seem that an alternative analysis without correspondence, such as MR or STS, could analyze the patterns without incorporating extra stipulative components.

2 The Correspondence Approach to Reduplication

In this section, I present an analysis of vowel length alternations in Rapa Nui reduplication using BR correspondence (McCarthy and Prince 1995, 1999). This analysis shows that IDENT-BR-μ, which requires identity in length between corresponding vowels in BASE and RED, plays a crucial role in vowel alternations, especially vowel shortening.

The core question is what triggers vowel shortening in the base in left-edge copying. I propose that this results from IDENT-BR-μ, ranked in the top tier. It is noteworthy that both shortening and lengthening can be viewed as derived-environment effects since neither is a regular process in nonreduplicative monomorphemic words. To limit these alternations to derived environments only, I make use of output-output faithfulness (OO-FAITH) with recursive evaluation (e.g., Benua 1997), following the treatment of a similar pattern in Hawaiian by Alderete and MacMillan (2015). Since the reduplicant for intensifying reduplication in Rapa Nui is exactly two moras in length, I posit a constraint RED = FT for convenience.[7] The interaction between RED = FT and MAX-BR can capture the shape of RED. The relevant BR identity and OO faithfulness constraints are defined in (6).

(6) a. IDENT-BR-μ: Assign a violation mark if two vowels standing in BR correspondence are not associated with an equal number of moras.
b. OO-PROSMATCH: The left edge of the main stress foot in the underived stem must have a correspondent at the left edge of some foot in the base of the reduplicated word. (Alderete and MacMillan 2015:19)
c. RED = FT: Assign a violation for a reduplicant that is not a bimoraic foot.
d. MAX-BR: Every segment in BASE has a correspondent in RED.

[7] This constraint is used for conciseness, though there have been arguments against templatic constraints (e.g., McCarthy and Prince 1999). There are other approaches that can derive the template without resorting to templatic constraints (e.g., Downing 2006).

The effect of Ident-BR-μ on shortening is demonstrated in (7) with recursions of a single grammar. I assume familiarity with the mechanism of recursive evaluation. The recursions are labeled *(A)* and *(B)*, respectively. Variation in the position of RED will be discussed later.

(7) Shortening driven by Ident-BR-μ: Left-edge copying

(A) vaːnaŋa	RED = Ft	Max-BR	Id-BR-μ	Id-IO-μ	Parse	All-Ft-R
☞ a. (ˌvaː).(ˈna.ŋa)						2
b. (ˌvaː).(ˈna.ŋa)						2
c. (ˌvaː).(ˈna.ŋa)						2
d. (ˌvaː).(ˈna.ŋa)						2
e. (ˌvaː).(ˈna.ŋa)						2
f. va.(ˈna.ŋa)				1W	1W	L
→ (B) RED + vaːnaŋa	RED = Ft	Max-BR	Id-BR-μ	Id-IO-μ	Parse	All-Ft-R
a′. (ˌva.na).va.(ˈna.ŋa)		2		1	1	3
b′. (ˌva.na).(ˌvaː).(ˈna.ŋa)		2	1W	L	L	5W
c′. (ˌva.na).(ˌva.na).(ˈŋaː)		2		2W	L	4W
d′. (ˌvaː).(ˌvaː).(ˈna.ŋa)		4W		L	L	5W
e′. (ˌva.na).(ˌŋa.va).(ˈna.ŋa)	1W	L		1	L	6W
f′. (ˌva.na).va.(ˈna.ŋa)		2		1	1	3

The role of Ident-BR-μ is illustrated by paradigms (7a) and (7b), where the winner (7a) satisfies Ident-BR-μ due to vowel shortening in recursion (B), though Ident-IO-μ and Parse are violated. For (7c), the derived word *[(ˌva.na).(ˌva.na).(ˈŋaː)] has both shortening and lengthening, which incurs one more violation of Ident-IO-μ than the winner.[8] Paradigm (7d) is ruled out by Max-BR, while paradigm (7e) does not satisfy RED = Ft. Finally, paradigm (7f) fatally violates Ident-IO-μ in the dominant recursion.

[8] This candidate also violates OO-ProsMatch, which is not shown in the tableau.

The role of recursive evaluation and OO-ProsMatch (OO-PM) is important for derived-environment lengthening, as demonstrated in (8) (RED = Ft is omitted).

(8) Derived-environment lengthening: Right-edge copying

	(A) haʔeɾe	Max-BR	Id-BR-μ	OO-PM	Id-IO-μ	Parse	All-Ft-R
☞	a. ha.(ˈʔe.ɾe)					1	
	b. ha.(ˈʔe.ɾe)					1	
	c. (ˌhaː).(ˈʔe.ɾe)				1W		2W
→	(B) haʔeɾe + RED	Max-BR	Id-BR-μ	OO-PM	Id-IO-μ	Parse	All-Ft-R
	a′. (ˌhaː).(ˌʔe.ɾe).(ˈʔe.ɾe)	2			1		6
	b′. (ˌha.ʔe).ɾe.(ˈʔe.ɾe)	2		1W	L	1W	3L
	c′. (ˌhaː).(ˌʔe.ɾe).(ˈʔe.ɾe)	2			1		6

The higher-ranked Ident-IO-μ bans lengthening in the underived form. Paradigm (8c) is thus ruled out due to its violation of Ident-IO-μ in the dominant recursion. For (8b), where there is no lengthening, the left edge of the head foot in [ha.(ˈʔe.ɾe)] (nonderivative) corresponds to a foot-medial segment in the base of [(ˌha.ʔe).ɾe.(ˈʔe.ɾe)] (derivative), and therefore paradigm (8b) loses to the winner (8a) on the basis of OO-ProsMatch.

Although the analysis so far specifies the position of RED in the input, it is possible to derive the variable RED positions through constraint interaction, as in (9) and (10). For conciseness, only the relevant part of the complete tableaux is demonstrated below.

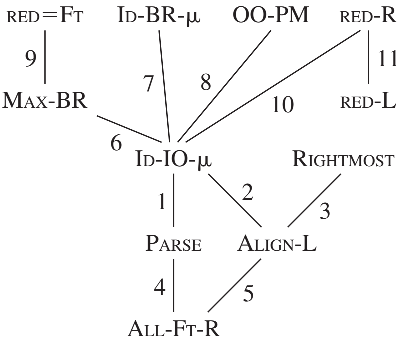
(9) Align-RED-{L, R}: Align the left/right edge of RED with the left/right edge of the PrWd. (RED-L, RED-R)

(10) The position of RED

	RED, vaːnaŋa	Id-BR-μ	RED-R	RED-L	Id-IO-μ	Parse
☞	a. (ˌvaː).(ˌna.ŋa).(ˈna.ŋa)			3		
	b. (ˌva.na).va.(ˈna.ŋa)		3W	L	1W	1W
	c. (ˌva.na).(ˌvaː).(ˈna.ŋa)	1W	3W	L		
	RED, haʔeɾe	Id-BR-μ	RED-R	RED-L	Id-IO-μ	Parse
☞	d. (ˌhaː).(ˌʔe.ɾe).(ˈʔe.ɾe)			3	1	
	e. (ˌha.ʔe).ha.(ˈʔe.ɾe)		3W	L	L	1W
	f. (ˌha.ʔe).(ˌhaː).(ˈʔe.ɾe)	1W	3W	L	1	

When RED-R ≫ RED-L, as in (10), the candidates that show left-edge copying are ruled out (10b–c, e–f). The constraint IDENT-BR-μ is satisfied in (10a) and (10d) when right-edge copying occurs. When the ranking is reversed to RED-L ≫ RED-R, (10b) and (10e) are the winners instead. The variation can be predicted by partially ranked constraints (e.g., Anttila 1997), and in this case, RED-L and RED-R are proposed to be freely ranked.[9]

Summing up, the constraint interaction in the analysis above is illustrated in (11), including the metrical constraints discussed in section 1.

(11)


Stress: 1. (2a) ≻ (2c); **2.** (2f) ≻ (2h); **3.** (2f) ≻ (2g); **4.** (2d) ≻ (2e); **5.** (2a) ≻ (2b); **Length alternations: 6.** (7a) ≻ (7d); **7.** (7a) ≻ (7b); **8.** (8a) ≻ (8b); **RED shape and position: 9.** (7a) ≻ (7e); **10.** (10d) ≻ (10e); **11.** (10a) ≻ (10b), (10d) ≻ (10e)

For the hierarchy in (11), the focus of the analysis—namely, vowel shortening during reduplication—is directly related to the ranking MAX-BR, IDENT-BR-μ ≫ IDENT-IO-μ ≫ PARSE, which shows the crucial role of correspondence in reduplication.

3 Rapa Nui Reduplication without Correspondence

The success of the analysis in the previous section relies on two properties of BRCT, correspondence and a parallel evaluation of the complete derivation in one fell swoop. In this section, I will discuss another two theories, Minimal Reduplication (Saba Kirchner 2010, 2013) and Serial Template Satisfaction (McCarthy, Kimper, and Mullin 2012). Each of these lacks one or both of the abovementioned properties and is challenged by the data of Rapa Nui.

3.1 Minimal Reduplication

In Minimal Reduplication (MR), reduplication arises by affixing deficient prosodic templates instead of an underlying RED morpheme. For

[9] One candidate, [va.na.ŋa.va.na], can be ruled out by LOCALITY (Nelson 2005:146; cf. Yu 2005:452); another candidate [va.na.va.na.ŋa], which shows infixation, is penalized by CONTIGUITY (McCarthy and Prince 1995:123).

Rapa Nui, the phonological exponent of intensifying reduplication can be analyzed as an empty foot template (Ft). Since BR identity constraints (e.g., IDENT-BR-μ) are not available in this approach, a motivation for vowel shortening is lacking. Consider the tableau in (12), assuming left-edge copying takes place.

(12) Input /Ft + vaːnaŋa/ and nonreduplicated input /vaːnaŋa/

/Ft + vaːnaŋa/	ID-IO-μ	PARSE	ALIGN-L	ALL-FT-R	*Vː
a. (ˌva.na).va.(ˈna.ŋa)	1	1		3	
b. (ˌvaː).(ˌvaː).(ˈna.ŋa)				5	2
💣 c. (ˌva.na).(ˌvaː).(ˈna.ŋa)				5	1
/vaːnaŋa/	ID-IO-μ	PARSE	ALIGN-L	ALL-FT-R	*Vː
☞ d. (ˌvaː).(ˈna.ŋa)				2	1
e. va.(ˈna.ŋa)	1W	1W	1W	L	L

In this approach, the empty foot is realized via reduplication through the pressure of high-ranked MAXFLOAT (Wolf 2007), which penalizes deletion of input floating elements (here the Ft), at the sacrifice of low-ranked INTEGRITY (McCarthy and Prince 1995:124) (both MAXFLOAT and INTEGRITY are omitted). Similarly to what we see in tableau (7), the grammar is required to produce vowel shortening in reduplicative contexts only. I assume that *Vː, which penalizes long vowels, rules out candidate (12b), [(ˌvaː).(ˌvaː).(ˈna.ŋa)]. However, under the ranking that has been established for stress (i.e., IDENT-IO-μ ≫ PARSE, ALIGN-L ≫ ALL-FT-R), the grammar wrongly selects (12c) for the reduplicative form.

One way to circumvent this issue is to introduce a constraint that bans both [(ˌvaː).(ˌvaː).(ˈna.ŋa)] (12b) and [(ˌva.na).(ˌvaː).(ˈna.ŋa)] (12c) without affecting the other candidates. Kieviet (2017:42, 66) observes that heavy syllables are more common word-initially, and therefore (12b–c) could be disfavored by violating this tendency. Nevertheless, as Kieviet (2017:42) also notes, "[Of] all 329 three- or four-foot words . . . , 164 have initial H, 47 have one or two medial H, while 35 have final H." The statistics suggest that the tendency to avoid noninitial heavy syllables is not very strong for longer words (164 initial H vs. 82 noninitial H). Furthermore, some reduplicated words do end with a heavy syllable. For a LLH-type root such as [ʔa.u.eː] 'to cry out', the reduplicated form is [ʔa.u.ʔa.u.eː] 'to cry repeatedly' (Kieviet 2017:63). This direction therefore does not seem promising.

Another avenue to pursue is to assume a different ranking for reduplication. In MR, which lacks BR identity, Stratal OT (e.g., Kiparsky 2000) can be adopted for reduplication-phonology interaction (Saba Kirchner 2010, Bermúdez-Otero 2012). Assuming that reduplication is a word-level stratum, for the same set of constraints in (12) we can rank ALIGN-L and ALL-FT-R above IDENT-IO-μ in this stratum, and therefore (12a) can be selected as the winner. However, this approach will overproduce shortening in other scenarios due to the pressure of ALL-FT-R. For instance, when /vaːnaŋa/ 'to talk' undergoes right-edge copying, vowel shortening will be triggered (i.e., *[(ˌva.na).ŋa.(ˈna.ŋa)] rather than [(ˌvaː).(ˌna.ŋa).(ˈna.ŋa)] as in (10a)), since the former candidate incurs fewer violations of ALL-FT-R. Also, the reduplicated form of /ʔa.u.eː/ 'to cry out' will be predicted to be *[(ˌʔa.u).ʔa.(ˈu.e)]. An account that relies solely on metrical constraints and stratal ordering thus faces difficulties without surface-to-surface correspondence such as BR identity.[10]

3.2 Serial Template Satisfaction

In Serial Template Satisfaction (STS; McCarthy, Kimper, and Mullin 2012), reduplication comes about through the stepwise realization of empty prosodic templates in Harmonic Serialism (McCarthy 2000, 2002, 2007). The crucial mechanisms to populate the affixal prosodic template include Copy(X) and Insert(X). Both of the mechanisms are motivated by a markedness constraint, HEADEDNESS(X), which penalizes any prosodic constituent of type X (e.g., σ) without a head of type (X−1) (e.g., nucleus). The input is gradually altered in each step. An example to briefly illustrate the core mechanism of STS is given in (13).

(13) The step of copying in STS (adapted from McCarthy, Kimper, and Mullin 2012:193)

σ + pa.ta	HEADEDNESS(σ)	*INSERT(seg)	*CODA	*COPY(seg)
☞ a. pa.pa.ta				1
b. pat.pa.ta			1W	1
c. ə + pa.ta		1W		L
d. σ + pa.ta	1W			L

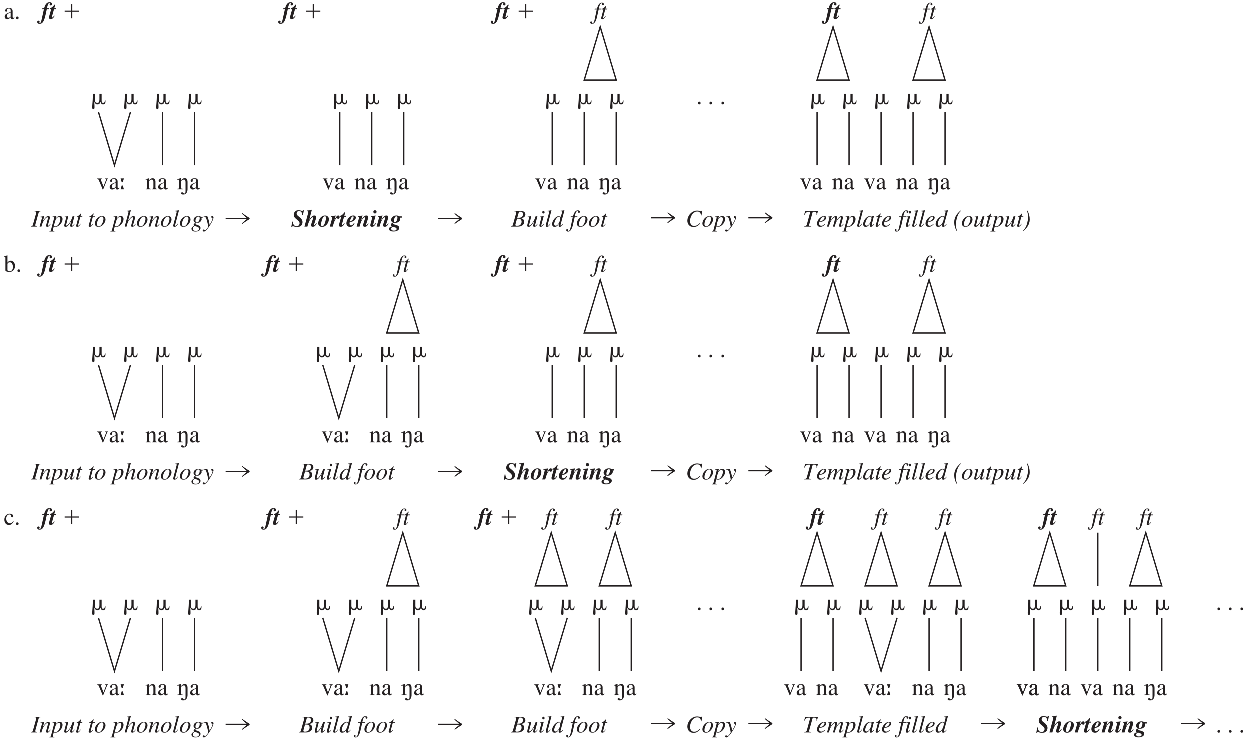
[10] Other types of surface-to-surface correspondence can fulfill a function similar to that of BR correspondence in reduplication (e.g., Struijke 2002, Yu 2005, Stanton and Zukoff 2016, 2018), and they can be potentially combined with the MR analysis. I will save this alternative for future work.

In this example, the input of the current step contains a syllable template. The dominating constraint HEADEDNESS(σ) eliminates (13d), where the template is not headed. The Insert(seg) operation results in epenthesis (13c), violating *INSERT(seg). The constraint *CODA prevents a CVC reduplicant (13b), while the Copy(seg) operation incurs one violation of *COPY(seg).[11]

For Rapa Nui, the major issue with the STS analysis lies in *when* and *why* vowel shortening should take place. In STS, the input to phonology contains the phonological exponent of the root (e.g., /vaːnaŋa/) and empty prosodic template for reduplication (e.g., foot). McCarthy, Kimper, and Mullin (2012:182) state that "reduplicative templates are affixed to fully prosodified stems. . . . [I]t is not possible to concatenate a template consisting solely of prosodic structure with a stem that lacks prosodic structure," which implies that the prosodic structure of the root needs to be built before the affixal template is populated. Based on the theoretical proposal, several potential derivations of Rapa Nui reduplication are illustrated in (14) (syllable structures are omitted), and vowel shortening could possibly take place at different steps. In (14), I follow the Strict Inheritance assumption regarding foot construction in Harmonic Serialism, namely, that GEN can only build one foot at each iteration and cannot remove or alter any previously built feet (Pruitt 2010:486).

[11] See McCarthy, Kimper, and Mullin 2012:179ff. for the evaluation of *COPY(seg).

(14) Potential derivations in STS: Vowel shortening of HLL roots in left-edge copying



Again, the prosodic template for Rapa Nui intensifying reduplication is treated as a foot (in bold). The major issue in the derivations is related to the shortening process, and all the derivations in (14) face certain problems. For (14a–b), shortening is supposed to take place before copying, which may eventually produce the expected output [(ˌva.na).va.(ˈna.ŋa)]. However, the constraints that trigger vowel shortening, if there are any, need to be ranked above IDENT-IO-μ and HEADEDNESS(Ft) that drives reduplication. This will result in overprediction: namely, an input with a monomorphemic HLL root outside reduplication will undergo vowel shortening as well. Besides, we also need to ensure that no shortening occurs in right-edge copying.

For (14c), the motivation for vowel shortening may also be problematic, which can be further illustrated by the tableaux in (15). In Steps 1 and 2 of (15), feet of the root are gradually constructed while vowel shortening is prevented by the top-ranked IDENT-IO-μ. However, the current ranking cannot further improve the structure through vowel shortening, as shown in Step *n* of (15). Specifically, there needs to be another top-ranked constraint that penalizes (15f), but without affecting the candidates in previous steps. Nevertheless, this would run into a problem similar to the one discussed in section 3.1. Though I offer some speculation in that section, it does not seem satisfactory to eliminate (15f) with any ad hoc constraint. In fact, given the Strict Inheritance assumption of GEN (Pruitt 2010:486), the expected output [(ˌva.na).va.(ˈna.ŋa)] can never be produced in the derivation of (14c), for none of the established feet in [(va.na).(vaː).(na.ŋa)] are allowed to be removed.

(15) Potential grammar for the derivation in (14c)

Step 1: Build foot

	Ft + vaːnaŋa	ID-IO-μ	PARSE	HEADEDNESS(Ft)
☞ a.	Ft + vaː.(ˈna.ŋa)		1	1
b.	Ft + vaː.na.ŋa		3W	1
c.	Ft + va.na.ŋa	1W	3W	1

Step 2: Build foot

	Ft + vaː.(ˈna.ŋa)	ID-IO-μ	PARSE	HEADEDNESS(Ft)
☞ d.	Ft + (ˌvaː).(ˈna.ŋa)			1
e.	Ft + va.(ˈna.ŋa)	1W	1W	1

. . . Copying and filling the template (omitted) . . .

Step *n*: Shortening

	(ˌva.na).(ˌvaː).(ˈna.ŋa)	ID-IO-μ	PARSE	HEADEDNESS(Ft)
💣 f.	(ˌva.na).(ˌvaː).(ˈna.ŋa)			
g.	(ˌva.na).(va).(ˈna.ŋa)	1		

In sum, it is unclear when and why vowel shortening takes place in STS derivations. If vowel shortening occurs early, as in (14a–b), a problem of overprediction will arise. If the process occurs later, as in (14c), there is no satisfactory motivation, and the grammar is unable to produce the expected output [(ˌva.na).va.(ˈna.ŋa)] due to Strict Inheritance. Admittedly, the Strict Inheritance assumption is controversial, and some works choose to allow GEN to make multiple changes in terms of metrical structure (e.g., McCarthy 2008). Nevertheless, whichever assumption of GEN is made, the abovementioned problem of overprediction and the puzzling motivation of vowel shortening persist.

4 Closing Remarks

This squib focuses on the vowel alternations in Rapa Nui reduplication, and the observed patterns can be correctly predicted by the proposed BRCT analysis. The data and analysis are related to a core property of reduplication, the identity effect. As such, they bear on a long-standing debate on whether the identity effect is coerced by BR correspondence or is an epiphenomenon due to stratal ordering or other means. This squib shows that the vowel-shortening pattern is straightforward when attributed to the high-ranked constraint IDENT-BR-μ in a parallel analysis, while the motivation of vowel shortening is problematic for theories without BR correspondence, such as MR and STS. For MR, an ad hoc constraint to penalize a noninitial heavy syllable is not empirically well-supported. For STS, the derivation in Harmonic Serialism leads to various issues when there is vowel shortening, either a problem of overprediction or unsatisfactory motivation about vowel shortening. This squib thus also contributes to work that calls into question the adequacy of STS (e.g., Zukoff 2017, Wei and Walker 2020). In the BRCT literature, the vowel-shortening process in Rapa Nui could be characterized as an instance of "backcopying" since the long vowel in the base is shortened to match its correspondent in the reduplicant. Although many recent studies have questioned the necessity of BR correspondence and claim that most of the reported cases of "backcopying" can be reanalyzed via stratal ordering or similar means, the Rapa Nui data provide additional information with which to further consider the role of correspondence in reduplication.

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