Reduplicative Opacity in Malay Revisited: Preliminary Phonetic Evidence for Variable "Recopying" and BRCT

Jian-Leat Siah[a], Sam Zukoff[a], Feng-fan Hsieh[b]
[a]UCLA, [b]National Tsing Hua University

1 Introduction

What is the right theory of reduplication? The debate over this question has focused in large part on *opaque reduplication-phonology interactions*, which largely fall into one of the following two categories:

(1) **Overapplication:** A process *applies* in a reduplicated word even though the environment *isn't met*.

(2) **Underapplication:** A process *doesn't apply* in a reduplicated word even though the environment *is met*.

Different theories differ in exactly which types of patterns they predict. Understanding the empirical landscape is crucial to decide between theories. One putative pattern stands out: **nasal spreading in Malay**. As reported by Onn (1976), it constitutes "recopying" overapplication — overapplication where the trigger for the process is contained within the reduplicant itself. It is widely recognized that such a pattern can only be accounted for when a mechanism like Base-Reduplicant (BR) Correspondence is incorporated into the theory (McCarthy & Prince 1995; Ahmad 2005). Proponents of alternative theories of reduplication — which reject BR correspondence, and seek to generate some of its results instead through some version of serialism — have questioned the veracity of this data (Inkelas & Zoll 2005, Kiparsky 2010, McCarthy et al. 2012). To our knowledge, the pattern has not been phonetically documented. It is urgent to resolve this question.

This paper reports new acoustic documentation of the interaction between nasal spreading and reduplication in Malay. Our preliminary findings confirm the existence of the putative recopying pattern reported by Onn (1976), but as part of a system of free variation. We supplement McCarthy & Prince (1995)'s Base-Reduplicant Correspondence Theory (BRCT) analysis of this pattern with partially-ordered constraints (Anttila, 1997) in order to account for the observed variation. Crucially, the confirmation of the recopying pattern bolsters the argument for the inclusion of BR correspondence in reduplicative theory.

2 Background

Malay (*Bahasa Melayu*) is a Western Malayo-Polynesian (Austronesian) language (Blust, 2013:30–32). It is primarily spoken in Malaysia, Brunei, Singapore and Indonesia. In Malay, nasalization on vowels and glides is fully allophonic, resulting in iterative rightward nasal spreading (3,4):

(3) a. Nasal stops trigger iterative rightward spread of nasalization onto vowels and glides.
b. Spread is blocked by supralaryngeal consonants (e.g., *k*, *s*, *r*, etc.).
c. All other vowels/glides surface as oral.

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(4) Distribution of nasalized vowels/glides in Johore Malay (Onn, 1976:69–70)[1]

‘to drink’	[mĩnõm]		
‘to eat’	[mãkan]	(*[mãk**ã**n], *[m**a**kan])	
‘to rise’	[baŋõn]	(*[b**ã**ŋõn], *[baŋ**o**n])	
‘to be luxurious’	[mẽw̃ãh̃]	(← /mewah/)	
‘supervision’	[pəŋãw̃ãsan]	(← /pəŋ-awas-an/)	**Alternations**
‘central focus’	[pənə̃ŋãh̃ãn]	(← /pəŋ-təŋah-an/)	

Malay has a variety of reduplication patterns (Onn 1976:104–107, 152–182, Ahmad 2005:137–179). We focus on cases of total reduplication without further affixation, which can be used to indicate a variety of categories, including plurals, reciprocals, repetitive action, and intensification (Onn, 1976:105).[2] The question of interest is how nasal spreading interacts with total reduplication. The kind of root that will be most probative of this question is a root like /waŋi/ (→ [waŋĩ]) ‘fragrant’, which has a trigger of nasal spreading (/ŋ/) in its second syllable and a target of nasal spreading (/wa/) in its first syllable. Putting aside our expectations about nasal spreading, when total copying produces a string *waŋi-waŋi*, there are (at least) four conceivable ways of (not) applying nasalization to the various spans of potential undergoers:

(5) Potential outputs

		BASE	
		Oral	**Nasal**
REDUPLICANT	**Nasal**	d. [w̃ãŋĩ-waŋĩ]	c. [w̃ãŋĩ-w̃ãŋĩ]
	Oral	a. [waŋĩ-waŋĩ]	b. [waŋĩ-w̃ãŋĩ]

Option 1: [waŋĩ-waŋĩ] (5a), where base- and reduplicant-initial spans are both oral; this constitutes UNDERAPPLICATION of nasal spreading, because there is no spread across juncture, even though the context for further spreading is met. **Option 2:** [waŋĩ-w̃ãŋĩ] (5b), where the base-initial span is nasalized but the reduplicant-initial span is oral; this constitutes NORMAL APPLICATION of nasal spreading, as it fully obeys the typical allophonic distribution seen outside of reduplication. **Option 3:** [w̃ãŋĩ-w̃ãŋĩ] (5c), where base- and reduplicant-initial spans are **both nasal**; this constitutes OVERAPPLICATION of nasal spreading, because the reduplicant-initial span is nasal even though there is no local trigger — this is termed “**recopying**” by Kiparsky (2010:3). **Option 4:** [w̃ãŋĩ-waŋĩ] (5d), where the base-initial span is oral but the reduplicant-initial span is nasal; this is a pathological output, since nasalization appears in only the wrong place.

According to Onn (1976:180), Malay chooses **Option 3**, [w̃ãŋĩ-w̃ãŋĩ] (5c), the recopying overapplication output, as shown in (6):

(6) Nasalization in Malay reduplication (Onn 1976:180, Ahmad 2005:157)

	Root in isolation	**Reduplicated form**
‘fragrant/(intensified)’	[waŋĩ]	[**w̃ã**ŋĩ-w̃ãŋĩ]
‘germ/germs’	[hamə̃]	[**h̃ã**mə̃-h̃ãmə̃]
‘reverie/ambition’	[aŋãn]	[**ã**ŋãn-ãŋãn]
‘wind/unconfirmed news’	[aŋẽn]	[**ã**ŋẽn-ãŋẽn]
‘to look down upon’	[hinə̃]	[**h̃ĩ**nə̃-h̃ĩnə̃]
‘purple’	[uŋũ]	[**ũ**ŋũ-ʔ̃ũŋũ]
‘termites’	[anãj̃]	[**ã**nãj̃-ãnãj̃]
‘henna’	[inãj̃]	[**ĩ**nãj̃-ĩnãj̃]

[1] We assume that glottal consonants /h,ʔ/ are undergoers, but an analysis which treats them as transparent segments is also feasible. When we refer to “glides”, we mean to include /h,ʔ/.

[2] We treat the lefthand constituent as the reduplicant, though nothing substantive changes if we assume the opposite.

This is significant because process ordering theories cannot derive this pattern. McCarthy & Prince (1995:43–46) show that no ordering of nasalization and copying can derive recopying overapplication:

(7) Copy > Nasalization = NORMAL

Input	/ RED-waŋi /
Rule 1: Copy	**waŋi**-waŋi
Rule 2: Nasalization	waŋ**ĩ**-**w̃ãŋĩ**
Output:	[[wa]ŋĩ-w̃ãŋĩ]

(8) Nasalization > Copy = UNDER[3]

Input	/ RED-waŋi /
Rule 1: Nasalization	RED-waŋĩ
Rule 2: Copy	**waŋĩ**-waŋĩ
Output:	[[wa]ŋĩ-[wa]ŋĩ]

Derivational/serial theories without further mechanisms would thus *undergenerate* this pattern, if it truly exists. Proponents of such theories have thus questioned whether this data has been accurately reported. We conducted an acoustic experiment to determine which output or outputs are actually attested.

3 Experiment

3.1 *Procedure* We conducted an online production study with 9 native speakers of Peninsular Malay. Speakers produced 9 target words in reduplicated and unreduplicated form. The first syllables of the target words consisted of three different strings that undergo nasal spread, with three words of each type, given in (9). All words were embedded in a carrier sentence (10) that had no nasal segment, to avoid any extraneous contextual nasalization.

(9) Target roots

wa	***ha***	***a***
/waŋi/	/hama/	/aŋan/
/wajaŋ/	/haiwan/	/ajam/
/waruŋ/	/haram/	/araŋ/

(10) Carrier sentence

Sila tulis ____ satu kali lagi.
"Please write ____ one more time."

Participants produced each sentence once, in randomized order, yielding 162 tokens in total. 4 tokens were excluded due to measurement error. Crucially, each word was a disyllable with a nasal stop (trigger of nasal spreading) in the second syllable and a vowel/glide span (target of nasal spreading) at its left edge.

A1−P0 values were used as an acoustic measure of nasality (Chen 1997, Styler 2017). A1−P0 measures are most reliable with low vowels, which is why all our stimuli had /a/ as the target vowel. A1−P0 values were extracted at the midpoint of the [a] in the first syllable of the target words/constituents, of which there were three:

(11) i. $\mathbf{a}_U$: In unreduplicated context /w[a_U]ŋi/
ii. $\mathbf{a}_R$: In reduplicated context in the first constituent (the reduplicant) /w[a_R]ŋi-wa_Bŋi/
iii. $\mathbf{a}_B$: In reduplicated context in the second constituent (the base) /wa_Rŋi-w[a_B]ŋi/

In order to determine whether a vowel in the reduplicated context was "nasalized", A1−P0 values were normalized by subtracting the A1−P0 value of the vowel in the unreduplicated context:

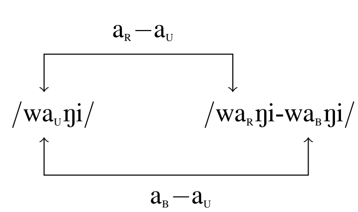


Figure 1: Calculating normalized A1−P0 values

[3] Persistent nasalization would also derive normal application.

3.2 *Results* The aggregated results are given in Figure 2 below. We observe that the [a] vowel in the base (a_B) has a higher degree of nasality (lower A1−P0 value) than does the corresponding vowel in the reduplicant (a_R). This seems to point to normal application as the typical output (i.e. Option 2: [waŋĩ-w̃ãŋĩ]). However, we can also observe from the long tails in Figure 2 that there is a substantial amount of variation.

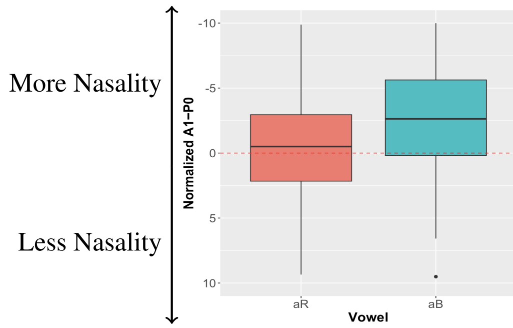


Figure 2: Overall nasality of a_R and a_B

Figure 3 visualizes the aggregated results as a scatter plot. (Upper quadrants indicate nasalization of the reduplicant-initial span; right-hand quadrants represent nasalization of the base-initial spans.) We can now see that, in reality, 3 out of the 4 quadrants (corresponding to our four potential outputs from above) are populated. Of greatest interest to the present investigation is the robust attestation of points in quadrant one. These datapoints represent productions where *both* the reduplicant-initial span *and* the base-initial span have been nasalized. This is our recopying overapplication output, e.g., [w̃ãŋĩ-w̃ãŋĩ]. This comports with Onn (1976)'s original claim. However, we also see substantial attestation of the underapplication output (quadrant 3, [waŋĩ-waŋĩ]) and the normal application output (quadrant 4, [waŋĩ-w̃ãŋĩ]). (Interestingly, the only output which is not attested — save one or two datapoints, which may reasonably be viewed as exceptions or speech errors — is the one which we identified earlier as pathological (quadrant 2, [w̃ãŋĩ-waŋĩ] = Option 4), as it nasalizes only the wrong initial span.) This affirms that we are dealing with a case of output variation.

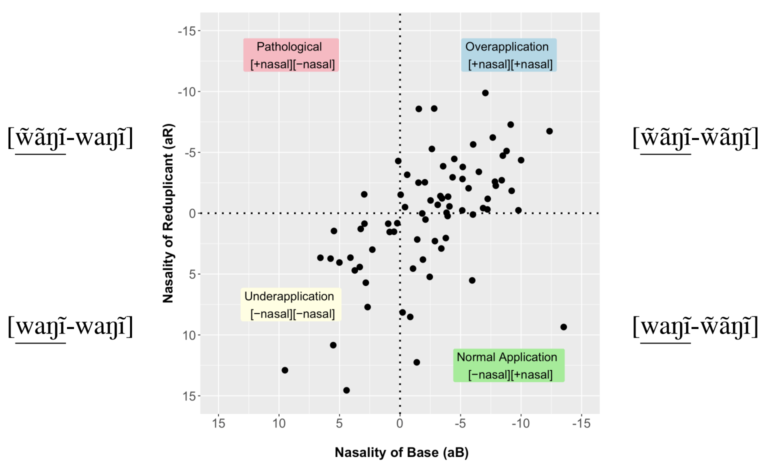


Figure 3: Scatter plot of aggregated results

This variation seems to be truly free variation, as demonstrated in Figures 4 and 5. Figure 4 shows the data broken down by speaker. What we see here is that individual speakers demonstrate substantial *intra*speaker variation. For example, Speaker F6 (filled square) vacillates between over-, under- and normal application in her production. The same variation is seen in individual words. Figure 5 shows the data broken down by word across speakers. We see here that, for example, the reduplicated word /waŋi-waŋi/ (filled triangle) is variably produced with over-, under- and normal application of nasal spreading.

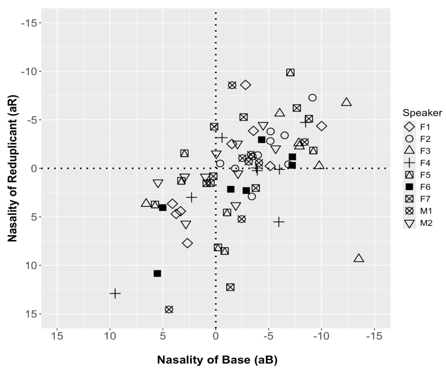


Figure 4: Scatter plot of results by speaker

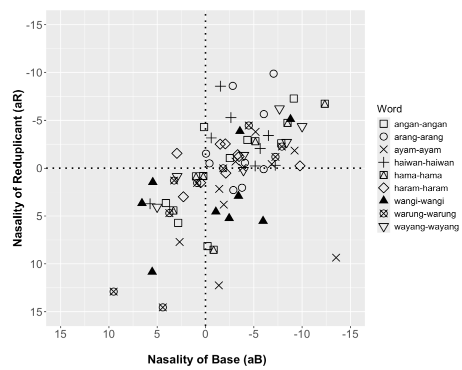


Figure 5: Scatter plot of results by word

We will now proceed to extend McCarthy & Prince (1995)'s BRCT analysis to account for this newly observed variation.

4 Analysis

We model the experimental results using Optimality Theory ([OT]; Prince & Smolensky 1993). As discussed in Section 2, the recopying overapplication output is only derivable in a theory with BR correspondence or some similar mechanism. For this reason, we model reduplication and its interaction with phonology with Base-Reduplicant Correspondence Theory ([BRCT]; McCarthy & Prince 1995 [M&P]). To account for the variable outputs, we will propose a grammar with partially-ordered constraints (Anttila, 1997). The structure of the analysis is as follows. First we will present M&P's OT analysis of the basic allophonic spreading pattern. Then we will give our adaptation of M&P's BRCT analysis of the reduplication pattern, supplemented to account for the newly observed variation.

4.1 *Analysis of Spreading* M&P (p. 42) derive the allophonic distribution using the constraints in (12), ranked as in (13). This analysis derives the correct result for the static distribution of nasality (14), as well as cases involving iterative spread and alternations (15).

(12) a. ***NV (*[+nas][−nas,−cons]):** Assign a violation * for each non-nasal vowel or glide which immediately follows a nasal(ized) segment.

b. ***Ṽ (*[+nas,−cons]):** Assign a violation * for each nasalized vowel or glide.

c. **IDENT[±nas]-IO:** Assign a violation * for each segment whose output value of [±nasal] does not match its input value.

(13) **Ranking:** *NV ≫ *Ṽ ≫ IDENT[±nas]-IO

The ranking of *NV above *Ṽ yields nasal vowels/glides after nasals: (14b) ≻ (14a,c). The ranking of *Ṽ above IDENT[±nas]-IO in turn ensures that all other vowels/glides are oral: (14b) ≻ (14d).[4]

(14) Static distribution of nasalization in Malay (with maximally unfaithful input)

/makãn/	*NV	*Ṽ	IDENT[±nas]-IO
a. makan	*!		*
b. ☞ mãkan		*	**
c. makãn	*!	*	
d. mãkãn		**!	*

[4] We need a high-ranked constraint against denasalization of nasal stops (e.g. IDENT[±nas]/[+cons]-IO) to prevent trigger effacement, i.e. /makan/ → *[bakan]. We omit this to simplify the analysis.

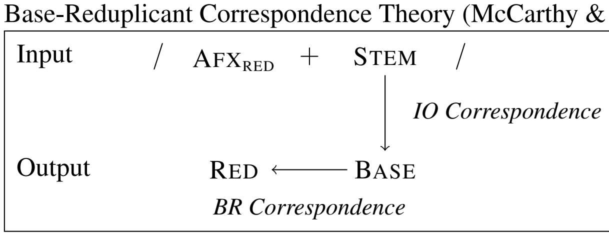
The same ranking causes nasality to spread iteratively when there is an extended vowel/glide span (15). In /pəŋ-awas-an/, the prefix /ŋ/ induces a *NV violation when concatenated with the root (15a). *NV ≫ *Ṽ prefers nasalizing the root-initial /a/: (15d) ≻ (15a). But to fully alleviate the *NV violation, the whole span must be nasalized, ruling out candidates like (15b,c) which nasalize only part of the span. Spreading terminates at the [+consonantal] segment /s/, because the string [ãs] doesn't violate *NV (*[+nas][−nas,−cons]). This means that the /a/ following the /s/ doesn't nasalize: (15d) ≻ (15e). Likewise, since the /ə/ of the prefix does not follow a nasal consonant, it doesn't nasalize either: (15d) ≻ (15f). This is worth making explicit, because this is the same kind of position where we find nasalization in the recopying overapplication output in reduplication.

(15) Iterative nasal spreading in Johore Malay

/pəŋ-awas-an/			*NV	*Ṽ	Ident[±nas]-IO
a.		pəŋ-awas-an	*!		
b.		pəŋ-ãwas-an	*!	*	*
c.		pəŋ-ãw̃as-an	*!	**	**
d.	☞	pəŋ-ãw̃ãs-an		***	***
e.		pəŋ-ãw̃ãs-ãn		****!	****
f.		pə̃ŋ-ãw̃ãs-an		****!	****

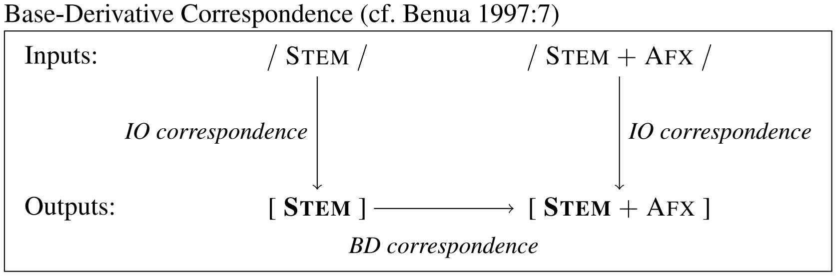
4.2 *Analysis of Reduplication* To generate recopying overapplication in reduplication, we need to adopt Base-Reduplicant Correspondence Theory [BRCT]. BRCT posits that a correspondence relation (BR) holds between the output base and the output reduplicant. Faithfulness constraints act over this relation to encourage similarity between the base and the reduplicant.

(16) Base-Reduplicant Correspondence Theory (McCarthy & Prince, 1995:4)



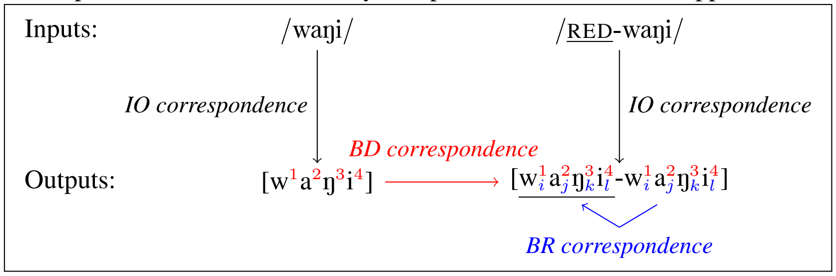
To capture the underapplication and normal application outputs, we adopt an additional component of Correspondence Theory: Output-Output / Base-Derivative (BD) correspondence (Benua 1995, 1997, Burzio 1996, Kenstowicz 1996, Kager 1999, *et seq.*). In this approach, a morphologically complex derivative corresponds to, and may be faithful to, its morphological base, i.e., the output of its stem in isolation. This is a parallelist alternative for capturing cyclic effects. Insofar as it applies to the current pattern, we can therefore understand underapplication and normal application in this case as cyclic effects.

(17) Base-Derivative Correspondence (cf. Benua 1997:7)



One subsidiary (and, as far as we know, novel) claim that we must make is that the BD correspondence relation in Malay reduplication (indicated with red superscript numerical correspondence indices in (18) below) must hold between the morphological base (the unreduplicated output root) and **both** (i) the reduplicative base, and (ii) the reduplicant. (The motivation for this claim will be explained below.)

(18) Correspondence relations in Malay reduplication (nasalization suppressed)



Following our experimental results, we want to model variation between three outputs:

(19) a. **Option 1:** [waŋĩ-waŋĩ] UNDERAPPLICATION: Nasalize just the /i/'s following the [ŋ]'s
b. **Option 2:** [waŋĩ-w̃ãŋĩ] NORMAL APPLICATION: Do iterative nasal spreading like normal
c. **Option 3:** [w̃ãŋĩ-w̃ãŋĩ] OVERAPPLICATION ("recopying"): Do iterative nasal spreading like normal, *and* nasalize the reduplicant-initial span to match the base

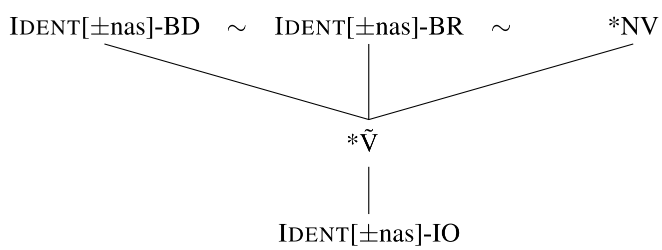
The only new constraints that we need to add to M&P's basic analysis of allophonic nasal spreading are the IDENT[±nasal] constraints defined over these two new correspondence relations (20, 21). M&P employ IDENT[±nasal]-BR in their analysis, which is sufficient to derive recopying overapplication. We add IDENT[±nasal]-BD, as it is necessary to account for the newly identified underapplication and normal application outputs.

(20) **IDENT[±nas]-BR:** Assign a violation * for each segment in the reduplicant whose value of [±nasal] does not match its correspondent in its reduplicative base.

(21) **IDENT[±nas]-BD:** Assign a violation * for each segment in the derivative whose value of [±nasal] does not match its correspondent in its morphological base.

The observed variation is derived via a variable ranking (cf. Anttila 1997) between IDENT[±nasal]-BD, IDENT[±nasal]-BR, and *NV (all ranked above *Ṽ and IDENT[±nas]-IO), as shown in (22). The factorial resolution of the three mutually unranked top constraints leads to our three attested outcomes.

(22) **Ranking**



The following tableau shows the violation profile of the relevant candidate outputs:

(23) Variable realization of nasalization in Malay reduplication

MORPH BASE: [waŋĩ] / INPUT: /RED, waŋi/	IDENT[±nas]-BD	IDENT[±nas]-BR	*NV	*Ṽ
a. ☞ waŋĩ-waŋĩ UNDER			* (ĩ-w)	**
b. ☞ waŋĩ-w̃ãŋĩ NORMAL	** (w̃,ã)	** (w,a)		****
c. ☞ w̃ãŋĩ-w̃ãŋĩ OVER	**** (w̃,ã,w̃,ã)			******
d. w̃ãŋĩ-waŋĩ	** (w̃,ã)	** (w,a)	* (ĩ-w)	****
e. waŋi-waŋi	** (i,i)		** (ŋi, ŋi)	
f. waŋi-waŋĩ	* (i)	* (i)	* (ŋi)	*

Candidates (23a–c) are our three attested outputs as detailed in (19). These are the three candidates which will win under the set of resolutions of the variable ranking in (22). Candidate (23d), where the reduplicant-initial span is nasalized but the base-initial span is not, is harmonically bounded by (23a) and (23b). This is a desired result, as it is equivalent to the pathological quadrant from our experimental results in Figure 3 above. Candidates (23e,f) are additional suboptimal candidates, each showing failure to apply sufficient nasal spreading, which will not win under any ranking resolution. Candidates (23d–f) are omitted moving forward.

Underapplication is derived by the ranking conditions in (24). The underapplication output (25a) maintains the isolation form of the root (satisfying IDENT[±nasal]-BD) — in both base and reduplicant — at the expense of a nasal-oral sequence at the juncture (violating *NV). Both other outputs nasalize segments which were oral in the morphological base, violating IDENT[±nasal]-BD.[5]

(24) **Underapplication ranking:** IDENT[±nas]-BD ≫ *NV[6]

(25) Variable realization: UNDERAPPLICATION[7]

MORPH BASE: [waŋĩ] / INPUT: /RED, waŋi/	IDENT[±nas]-BD	IDENT[±nas]-BR	*NV	*Ṽ
a. ☞ waŋĩ-waŋĩ UNDER			* (ĩ-w)	**
b. waŋĩ-w̃ãŋĩ NORMAL	*!* (w̃,ã)	*!* (w,a)		****
c. w̃ãŋĩ-w̃ãŋĩ OVER	*!*** (w̃,ã,w̃,ã)			******

Normal application is derived by the ranking conditions in (26). Normal application (27b) occurs when it is least important to maintain identity between base and reduplicant (i.e., it is tolerable to violate IDENT[±nasal]-BR). *NV must rank highest, so as to force spreading across the juncture, ruling out the underapplication candidate (27a). In order to distinguish between the normal application candidate (27b) and the overapplication candidate (27c), it needs to be the case that not just the reduplicative base portion of the output, but also the reduplicant stand in BD correspondence with the morphological base. Under these assumptions about the correspondence relations, the normal application candidate has 2 fewer violations of IDENT[±nas]-BD than does the overapplication candidate, allowing the ranking of IDENT[±nas]-BD over IDENT[±nas]-BR to select normal application. In the absence of this assumption, normal application would not be derivable with the current constraints.

(26) **Normal application ranking:** *NV ≫ IDENT[±nas]-BD ≫ IDENT[±nas]-BR

(27) Variable realization: NORMAL APPLICATION

MORPH BASE: [waŋĩ] / INPUT: /RED, waŋi/	*NV	IDENT[±nas]-BD	IDENT[±nas]-BR	*Ṽ
a. waŋĩ-waŋĩ UNDER	*! (ĩ-w)			**
b. ☞ waŋĩ-w̃ãŋĩ NORMAL		** (w̃,ã)	** (w,a)	****
c. w̃ãŋĩ-w̃ãŋĩ OVER		***!* (w̃,ã,w̃,ã)		******

[5] Bruce Hayes suggests to us that we might be able to view BD-faithfulness constraints as general purpose "blockers" for triggering reduplicative underapplication. M&P (p. 92) demonstrate that underapplication can be derived in BRCT when a higher-ranked constraint (a "blocker") rules out an otherwise ideal overapplication candidate. We agree with Hayes's assessment, and plan to investigate this further in future work.

[6] When this ranking condition holds, the relative ranking of IDENT[±nas]-BR with respect to the other two constraints is not relevant. Due to the graphical limitations of a tableau, the tableau in (25) summarizes over only two of the three possible ranking resolutions consistent with IDENT[±nas]-BD ≫ *NV. The other total ranking that derives underapplication is IDENT[±nas]-BD ≫ *NV ≫ IDENT[±nas]-BR.

[7] The notation "|:|" is meant to indicate the resolution of an underlyingly variable ranking.

Lastly, recopying overapplication is derived by the ranking conditions in (28). Recopying overapplication (29c) occurs when maintaining BD-identity is least important. Realizing nasalization on the reduplicant-initial span both eliminates all nasal-oral sequences *and* maintains BR identity. This comes at the expense of diverging from the root in isolation. Crucially, this nasalization is not locally triggered (i.e., not directly spurred by a *NV violation in the reduplicant), but rather through correspondence and faithfulness to other output constituents, driven by the BR faithfulness constraint IDENT[±nas]-BR. As noted already by M&P, this interaction is derivable only in a framework with BR correspondence.

(28) **Overapplication ranking:** *NV, IDENT[±nas]-BR ≫ IDENT[±nas]-BD

(29) Variable realization: OVERAPPLICATION

MORPH BASE: [waŋĩ] / INPUT: /RED, waŋi/	*NV	IDENT[±nas]-BR	IDENT[±nas]-BD	*Ṽ
a. waŋĩ-waŋĩ UNDER	*! (ĩ-w)			**
b. waŋĩ-w̃ãŋĩ NORMAL		*!* (w,a)	** (w̃,ã)	****
c. ☞ w̃ãŋĩ-w̃ãŋĩ OVER			**** (w̃,ã,w̃,ã)	******

5 Conclusion

Our acoustic experiment revealed three attested outputs for the interaction between nasal spreading and reduplication in Malay, in free variation:

(30) a. **Option 1:** [waŋĩ-waŋĩ] (UNDERAPPLICATION)

b. **Option 2:** [waŋĩ-w̃ãŋĩ] (NORMAL APPLICATION)

c. **Option 3:** [w̃ãŋĩ-w̃ãŋĩ] (Recopying OVERAPPLICATION)

While this paints a more complex picture than what was originally reported by Onn (1976), it importantly **confirms the existence of the recopying overapplication pattern**, which has been of great interest in the theoretical literature. We showed that an extension of M&P's original BRCT analysis can generate all three outputs in a grammar with variable constraint ranking. This crucially relies on BR-correspondence.

Recopying overapplication is a significant phenomenon for reduplicative theory because it cannot be derived serially (M&P:43–46) in the absence of a representational mechanism equivalent to BR-correspondence. This is demonstrated below (repeated from Section 2 above) with a rule-based approach to serial process ordering, but the same problem holds of most recent constraint-based serial theories, developed as alternatives to BRCT. This includes Morphological Doubling Theory (Inkelas & Zoll, 2005:221, n. 18), Reduplication in Stratal OT (Kiparsky, 2010:3–4), and Serial Template Satisfaction in Harmonic Serialism (McCarthy et al., 2012:203), whose proponents have contested the existence of the recopying overapplication data in Malay, alongside acknowledgments that the pattern cannot be generated by their theory.

(31) Copy > Nasalization = NORMAL

Input	/ RED-waŋi /
Rule 1: Copy	**waŋi**-waŋi
Rule 2: Nasalization	waŋ**ĩ**-**w̃ãŋĩ**
Output:	[waŋĩ-w̃ãŋĩ]

(32) Nasalization > Copy = UNDER

Input	/ RED-waŋi /
Rule 1: Nasalization	RED-waŋĩ
Rule 2: Copy	**waŋĩ**-waŋĩ
Output:	[waŋĩ-waŋĩ]

On the other hand, this literature unanimously agrees that BRCT *can* derive recopying overapplication, because of its use of BR-correspondence. It seems possible that certain other theories that make use of similar representational devices, such as the looped representations used by Raimy (2000:16–18, 2011:2398–2399) or the linked representations used by Frampton (2009), may be able to derive this pattern, even though they are serial and ruled-based.[8] This makes clear that it is BR-correspondence that is the crucial element in deriving these results, rather than parallelism *per se*.

The opponents used the dubious attestation of the Malay pattern, and thus the potential non-existence of a true recopying overapplication pattern, as an argument *against* BRCT on the basis of overgeneration, as it would predict a pattern that was not attested in the world's languages. Now that we have shown that the pattern does exist, the argument reverses: these non-BRCT alternatives suffer from an undergeneration problem, failing to derive an attested pattern. Our verification of the Malay recopying overapplication pattern is therefore a strong argument against these alternatives, and in favor of BRCT, as it is the only theory which embraces BR-correspondence.

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[8] Further work is needed to determine whether and how these frameworks could handle the newly observed variation.