EMERGENCE OF THE FAITHFUL BY CONSONANT COPYING
IN A TAGALOG LANGUAGE GAME

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Abstract
The Tagalog language game Tadbaliks transposes the last syllable to the beginning of the word –
tagálog → logtága (‘Tagalog’, N). Suffixed words exhibit ‘consonant copying’ – palít-án → tânpalít (‘exchange [object focus]’, V); while corresponding root words do not – palít → lítpá (‘exchange’, V). Suffixation is the conditioning factor, not number of syllables, consonant versus vowel finality, or stress. Where previous analyses of Tadbaliks (Bagemihl 1989; Sanders 2000) do not speak to consonant copying, and previous research on language games (Ito, Kitagawa & Mester 1996; Borowsky & Avery 2009) has identified cases of The Emergence of The Unmarked (TETU) (McCarthy & Prince 1995), this paper offers an Optimality Theory (Prince & Smolensky 1993) analysis of Tadbaliks consonant copying where emergent faithfulness to the root is the driving force.

Keywords: Tagalog, language game, phonology, The Emergence of The Faithful, The Emergence of The Unmarked.

ISO 639-3 codes: tgl

1 Introduction
Tadbaliks1 is one of a number of language games (Garcia 1934; Conklin 1956) – or ‘ludlings’ (Laycock 1972) – played by speakers of Tagalog (Austronesian, Philippines). The game transposes the last syllable to the beginning of the word, as underlined in (1), and schematised in (2):

(1) tagálog → logtága Tagalog, N

(2) σ₁ … σₙ₋₁ σₙ → σₙ σ₁ … σₙ₋₁

Suffixed words exhibit ‘consonant copying’ of the final consonant of the root, exemplified in (3). In words suffixed with either of Tagalog’s two suffixes, -in or -an, the final consonant of the root is syllabified with the suffix. Descriptively, when the game is played on suffixed words, the final consonant of the root moves along with its syllable to the beginning of the word, as expected; but in addition, a copy of the consonant remains in the original root-final position:

(3) (a) palít → lítpá *lítpál exchange, V

(b) palít-án → tânpalít *tânpalí exchange (object focus), V

The Tadbaliks data reported in this article were collected by the author from two native speakers of Tagalog.2 Both speakers were born and raised in the Philippines and played Tadbaliks as children. They

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1 The name Tadbaliks is derived from baligtad ‘reverse’ by (2), plus optional game -s and voicing assimilation; cf. the similar French language game Verlan (Lefkowitz 1991; Plénat 1995; i.a.) from l’envers, ‘the reverse’.
2 Tagalog words Tadbaliks words; transposed syllables underlined; copied consonants in bold; part of speech abbreviations: A = adjective, N = noun, Num = number, P = preposition, V = verb.
3 See Treiman and Danis (1988) for experimental results of a last-to-first syllable game in (2) in English.
4 Many of the data points in this paper were inspired by Tagalog data in French (1992), Sabbagh (2004), and Zuraw (2012).
subsequently emigrated – one to Singapore, the other to the United States – and are now in their mid-20s. Following some variation in early elicitation, the stable pattern is reported here.

In outline, §2 demonstrates that it is suffixation that conditions consonant copying, rather than number of syllables, consonant versus vowel finality, or stress. §3 offers an Optimality Theory (Prince & Smolensky 1993) analysis of Tadbaliks consonant copying where emergent faithfulness to the root is the driving force. Emergence of the faithful is compared with The Emergence of the Unmarked (TETU) (McCarthy & Prince 1995) in §4. Previous analyses other alternatives are considered in §5, one of which precipitates a more precise characterisation of root faithfulness in §6. §7 concludes.

2 Suffixation conditions consonant copying

§3 will put forward an Optimality Theory analysis of consonant copying in Tadbaliks as motivated by emergent faithfulness to the root. The root faithfulness analysis of consonant copying will correctly predict that copying applies in suffixed words, and not root words. But before concluding that suffixation is the conditioning factor, we should rule out other possibilities: (i) the number of syllables in the word; (ii) whether the word ends in a consonant or a vowel; and (iii) the position of stress.

First, the number of syllables. It could be that consonant copying is only possible in words beyond a certain length, perhaps due to a pressure against repetition over shorter distances. However, in (4) consonant copying applies to suffixed words regardless of whether they are three (a) or two (b) syllables in length; but not to root words, regardless of whether they are three (c) or two (d) syllables in length. Note additionally the contrast between suffixal -an in (a) and root -an in (c), which shows that consonant copying is not conditioned by the phonological form -an.

(4) Number of syllables? No.

(a) 3 syllables, suffixed, ✓ copying
hawák-an → kanháwak take hold of something, V
(b) 2 syllables, suffixed, ✓ copying
tren-in → nintrén travel somewhere by train, V
(c) 3 syllables, root, ✗ copying
tahánan → nantáha home, N
(d) 2 syllables, root, ✗ copying
háwak → wákha grip, N

Second, whether the word ends in a consonant or a vowel. It could be that consonant copying is motivated by the desire to maintain word shape, such that a consonant-final Tagalog word remains consonant-final in Tadbaliks. However, while copying applies in (5) to consonant-final suffixed (a), it does not to consonant-final root (b), nor vowel-final (c). Thus the C/V nature of the final segment does not condition consonant copying.

(5) Consonant or vowel finality? No.

(a) C-final, 3 syllables, suffixed, ✓ copying
hawák-an → kanháwak take hold of something, V
(b) C-final, 3 syllables, root, ✗ copying
tahánan → nantáha home, N

5 There are no vowel-final suffixed words in Tagalog.
Third, the position of stress. In Tagalog, primary stress can fall on the final or penultimate syllable (French 1988). It could be that words with final stress trigger consonant copying, since stressed syllables are more prominent for triggering phonological processes (Beckman 1998: ch.3). However, in (6) consonant copying applies to suffixed words, regardless of whether the moving syllable was unstressed (a) or stressed (d); but not to root words, again without regard to unstressed (b, c) versus stressed (e, f). Thus stress does not condition consonant copying.


(a)   Unstressed, 3 syllables, suffixed, ✓ copying
      hawák-an → kanháwak  take hold of something, V

(b)   Unstressed, 2 syllables, root,  x copying
      háwak → wákha  grip, N

(c)   Unstressed, 3 syllables, root,  x copying
      tahánan → nátáha  home, N

(d)   Stressed, 3 syllables, suffixed, ✓ copying
      takip-án → pántakíp  cover, V

(e)   Stressed, 2 syllables, root,  x copying
      takip → kiptá  cover, N

(f)   Stressed, 3 syllables, root,  x copying
      mabilís → lisnábi  quick, A

Rather, the correct conditioning factor is suffixation. As seen in (4)-(6), but more explicitly in the pairs in (7), root words (i) do not exhibit consonant copying, but corresponding suffixed words (ii) do. Note also that the type of consonant does not condition copying: the broad range of consonants that are copied in the (ii) examples in (7) – [t, k, p, y, l, n] – do not form a natural class smaller than that of consonants.

(7)  Suffixation – Yes!

(a)  (i)  palít → litápá  exchange, V
     (ii)  palit-án → tánpalít  exchange (object focus), V

(b)  (i)  háwak → wákha  grip, N
     (ii)  hawák-an → kanháwak  take hold of something, V

(c)  (i)  takip → kiptá  cover, N
     (ii)  takip-án → pántakíp  cover, V

(d)  (i)  ?áway → wáy?a  fight, N
     (ii)  ?away-án → yán?away  fighting (one another), N

(e)  (i)  sampál → pulsám  slap on the face, N
     (ii)  sampal-ín → linsampál  slap someone, V
In sum, consonant copying is conditioned by suffixation. The rest of this paper argues that consonant copying is motivated by the desire to remain faithful to the root. Descriptively, consonant copying in suffixed words allows a faithful representation of the root to appear in the output, since the moved syllable is mostly an affix. Taking (7a) as an example, the root form palít appears in the suffixed game form tân palít by virtue of copying the final consonant of the root. By contrast, root faithfulness is hopelessly violated when the game applies to root words, because the moved syllable is all part of the root. The next section formalises a root faithfulness analysis of consonant copying.

3 Analysis

This section proposes an analysis of Tadbaliks consonant copying consisting of five Optimality Theoretic constraints (Prince & Smolensky 1993). The crux of the analysis is a root faithfulness constraint, which emerges when assessing candidates for suffixed words, and drives consonant copying. After introducing the constraints, we will see how they play out in tableaux.

The first two constraints are those involved in playing Tadbaliks:

(8) LAST-σ-1st

Assign a violation if there is no movement of the last syllable of the Tagalog output to the beginning of the Tadbaliks output.

(9) LINEARITY

No metathesis. (McCarthy & Prince 1995)

Undominated LAST-σ-1st is the ‘game constraint’: it is an ‘anti-faithfulness’ constraint that ensures the last-to-first syllable transposition game is played. LAST-σ-1st is transderivational (Benua 1997) in that it takes as its input the syllabified output of non-game Tagalog phonology rather than the underlying form. Since it operates on syllables, the input to LAST-σ-1st must be syllabified. For example, the underlying form /palít/ is syllabified as [pa.lit] by non-game Tagalog phonology, so LAST-σ-1st returns [lit.pa], not *[it.pal].

LINEARITY is the low-ranked faithfulness constraint corresponding to undominated LAST-σ-1st. LINEARITY is inevitably violated in playing the game. The all-or-nothing formulation in (9) suffices for our purposes – any amount of metathesis is punished by a single violation mark <*> – since LINEARITY does not play any explanatory role in the analysis.

Three further constraints are involved in consonant copying:

(10) *STRUC(σ) (Riggle 2006; Zoll 1993, 1994)

Assign one violation per syllable in the output.

(11) ID-ROOT

Assign a violation if any segment of the underlying Tagalog root is not faithfully represented in the Tadbaliks output in linear order.

(12) INTEGRITY (McCarthy & Prince 1995)7

Assign one violation for each segment in the input that has multiple correspondents in the output.

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6 Monosyllabic words are unaffected by syllable transposition for my speakers. However, in other dialects of Tadbaliks (Garcia 1934, Conklin 1956) the last-to-first syllable manipulation rule is supplemented by a rule particular to monosyllables, which inverts the order of the segments, e.g. mag → gam ‘to’, P. The French language game Verlan works similarly (Lefkowitz 1991; Plénat 1995; i.a).

7 cf. Itô, Kitagawa & Mester’s (1996: 258f.) implementation of vowel copying in the Japanese ludling Zuuja-go as violating BIJECTIVITY.
ID-ROOT is the heart of the analysis: it drives consonant copying in the Tadbaliks game output by enjoining faithfulness to the underlying Tagalog root. For example, Tagalog [pa.li.tan] becomes Tadbaliks [tan.pa.lit], which includes a faithful representation of the underlying Tagalog root /palit/. ID-ROOT is a positional faithfulness constraint that privileges the root (McCarthy and Prince 1995; Beckman 1998, especially ch. 4). The details of the definition in (11) are justified in § 6, where we will see that ID-ROOT is (i) all-or-nothing in enjoining faithfulness to every segment of the underlying root; and (ii) sensitive to the linear order rather than the contiguity of said segments.

Satisfaction of ID-ROOT must be economical: copying a single consonant is fine, but any more is too much. Hence ID-ROOT is ranked above INTEGRITY, a constraint that punishes copying; but below *STRUC(σ), a constraint that punishes (extra) syllables. In other words, if copying just a single consonant will satisfy ID-ROOT, then do so; but if copying any syllabic material would be necessary to satisfy ID-ROOT, then don’t.

With the ranking presented in the tableaux below, we correctly predict no copying when Tadbaliks is played on root words (13), but consonant copying when it is played on suffixed words (14):8

(13) palit → lîtpâ exchange, V

<table>
<thead>
<tr>
<th>/palit/ [pa.li.t]</th>
<th>LAST-σ-1st</th>
<th>*STRUC(σ)</th>
<th>ID-ROOT</th>
<th>INTEGRITY</th>
<th>LINEARITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. palit</td>
<td>*!</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. itpal</td>
<td>*!</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. ✈lîtpa</td>
<td>**</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. lîtpal</td>
<td>**</td>
<td>*</td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>e. lîtpalît</td>
<td>***!</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(14) palit-án → tânpalît exchange (object focus), V

<table>
<thead>
<tr>
<th>/palit-an/ [pa.li.tan]</th>
<th>LAST-σ-1st</th>
<th>*STRUC(σ)</th>
<th>ID-ROOT</th>
<th>INTEGRITY</th>
<th>LINEARITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. palitan</td>
<td>*!</td>
<td>***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. anpalit</td>
<td>*!</td>
<td>***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. tânpalît</td>
<td>***</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. ✈tânpalît</td>
<td>***</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. tânpalîtan</td>
<td>****!</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In both (13) and (14), LAST-σ-1st forces the game to be played, ruling out no (a) or partial (b) movement of the last syllable to the beginning of the word. In satisfying LAST-σ-1st, all remaining candidates violate low-ranked LINEARITY. The question is whether ID-ROOT should be satisfied. Satisfying ID-ROOT by repeating the whole syllable (e) loses on *STRUC(σ). The difference between (13) and (14) comes in their treatment of the plain candidate (c) and the consonant copying candidate (d). With the root word input in (13), ID-ROOT is hopelessly violated by both (c) and (d); so plain (c) is preferred over consonant copying (d) by INTEGRITY. With the suffixed word in (14), on the other hand, consonant copying (d) economically satisfies ID-ROOT – tânpalît realises /palit/; so consonant copying (d) is preferred over plain (c), despite violating INTEGRITY.

Analysing consonant copying in this way makes a correct prediction about the behaviour of epenthetic [h] (15). In Tagalog, h-epenthesis resolves hiatus between a root-final vowel and a vowel-initial suffix. In Tadbaliks, the epenthetic [h] moves with its syllable to the beginning of the word, but is not copied:9

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8 Though not shown in the tableaux, I assume high-ranking MAX to temper *STRUC(σ). For two-syllable inputs, as in (13), a monosyllabic candidate such as lit would lose on LAST-σ-1st, since syllable transposition would not be recoverable. But for longer inputs, as in (14), a two-syllable candidate tanpa would satisfy LAST-σ-1st and win on *STRUC(σ) – were it not for high-ranking MAX punishing deletion of lit.

9 See §5.4 on word-final -h.
Interestingly, this consonant copying in minority outputs in Nevins and Vaux’s (1995) Take the emergence of ONSET → *172), played in the language Dholuo (West Nilotic, western Kenya). Syllable reversal should yield ONSET Emergence of the Unmarked (TETU) (McCarthy and Prince 1996 on *STRUC(σ), and gratuitous consonant copying (d) on INTEGRITY, leaving plain (c) as the winning candidate.10

With the analysis established, the next section considers how the effects of ID-ROOT can be characterised as ‘the emergence of the faithful’.

4 Emergence of the faithful

Pace Vaux (2011: 727), plenty of language game effects are limited by considerations of naturalness or markedness, to an extent Optimality Theory would predict. Language games often present cases of The Emergence of the Unmarked (TETU) (McCarthy and Prince 1995). Take the emergence of the constraint ONSET in segment reversal in the otherwise syllable reversing ludling Dhochi (Borowsky and Avery 2009: 172), played in the language Dholuo (West Nilotic, western Kenya). Syllable reversal should yield čier → *erči, ‘to rise from the dead’. Instead, the onsetless first syllable is repaired by segment reversal, yielding čier → reči. This repair is made despite Dholuo elsewhere permitting onsetless first syllables; hence TETU of ONSET.11, 12

The fact that epenthetic [h] does not undergo consonant copying is predicted by the root faithfulness analysis, as demonstrated for (15a) in (16):

<table>
<thead>
<tr>
<th>/sabi-in/</th>
<th>LAST-σ-1st</th>
<th>*STRUC(σ)</th>
<th>ID-ROOT</th>
<th>INTEGRITY</th>
<th>LINEARITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. sabihin</td>
<td>*!</td>
<td>***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. insabih</td>
<td>*!</td>
<td>***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. hinsabi</td>
<td></td>
<td>***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. hinsabih</td>
<td></td>
<td>***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. hinsabihin</td>
<td></td>
<td>****</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As above, LAST-σ-1st rules out no (a) or partial (b) movement of the last syllable to the beginning of the word, and all remaining candidates violate low-ranked LINEARITY. All remaining candidates additionally satisfy ID-ROOT, since all somewhere realise /sabi/ – epenthetic [h] not being part of the root. Gratuitous syllable repetition (e) loses on *STRUC(σ), and gratuitous consonant copying (d) on INTEGRITY, leaving plain (c) as the winning candidate.10

More complicated is the behaviour of the linker morpheme /ŋ/. The linker indicates semantic relatedness, such as between an adjective and a noun. At first glance, it might seem that the linker morpheme undergoes consonant copying as in (i). Since the linker is not part of the root, copying of the linker would go against the root faithfulness analysis. However, in (ii) the second [ŋ] in the game word is not in a position to be copied, as the coda rather than the onset of the moved syllable; i.e., any consonant copying would have applied to [k], not [ŋ]. Rather, [ŋ] seems to have been re-inserted (for syntactico-semantic reasons) after syllable manipulation has applied. Reanalysing (i) as reinsertion (iii) rather than copying deflected the challenge posed to the root faithfulness analysis:

(i) mabanŋ = mabanŋ → ŋoŋmabą̯ fragrant, A + linker
(ii) malak+ŋ = malakĩ̯ → kınmaláŋ great, A + linker
(iii) mabanŋ+ŋ = mabanŋ → ŋoŋmabą̯ fragrant, A + linker

11 TETU of ONSET could also account for consonant copying in minority outputs in Nevins and Vaux’s (2003) survey of Pig Latin (ig-pay atin-lay), e.g. 1% enter → ter-ent-ay; pace their serial Steriadean (1988) full copy plus deletion analysis.

12 For another example, see Itô, Kitagawa & Mester (1996) on TETU of optimal prosodic foot structure in the Japanese ludling Zuuja-go through the interaction of prosodic markedness and minimal distortion of base. Interestingly, this
In contrast to TETU, consonant copying in Tadbaliks could be viewed as ‘the emergence of the faithful’ (cf. Lee 1996). Moving the last syllable to the front of the word usually ruins any reasonably economical chance of realising a faithful form of the root in the output. But with suffixed words, all but the onset of the last syllable of the word is an affix. In moving this (mostly) affixed syllable, it is possible to both play the game and faithfully realise the root by copying just one consonant. Thus the opportunity to be faithful emerges under suffixation, where it does not present itself elsewhere in the game. Compare Vaux’s (2011: 736) claim that language games show learning is aggressive, and that “speakers frequently overapply phonological generalizations, resulting in unnecessary violations of surface faithfulness”. With consonant copying in Tadbaliks, we have a case of a language game restoring faithfulness to the root where the opportunity to do so emerges.

Emergence of the faithful by consonant copying in language games may not be limited to Tadbaliks. Jahr (2003: 294) reports on the Norwegian last-to-first syllable ludling Smoi. Though the data set is small, it seems that consonant copying occurs when the transposed syllable is predominantly a suffix, offering the opportunity to faithfully realise the root; e.g. the suffixal definite article in bank-en \(\rightarrow\) kenbank ‘the bank’.

5 Alternative analyses

On the analysis in §3, consonant copying economically satisfies an emergent root faithfulness constraint when Tadbaliks is played on suffixed words. This section compares the root faithfulness analysis against five alternatives. Three previous analyses are found wanting: (i) a correspondence theoretic analysis (Sanders 2000), which does not speak to consonant copying, and is conceptually questionable; (ii) an analysis in terms of crossing association lines (Bagemihl 1989), which incorrectly predicts consonant copying to be impossible; and (iii) a directed graph model of precedence relations (Raimy 2000), which can formally implement copying, but does not predict when it should occur. In addition to these previous proposals, I consider two further possible analyses: (iv) in terms of a constraint against word-final open syllables, which cannot explain why root and suffixed words behave differently with respect to consonant copying; and (v) in terms of a correspondence theoretic anchoring constraint independently active in Tagalog foot-sized reduplication. This last analysis fares equally with the root faithfulness analysis, until further data are considered in §6.

5.1 Correspondence Theory

McCarthy and Prince (1995) developed Correspondence Theory to account for reduplication, with constraints enjoining Base-Reduplicant correspondence – output-output correspondence between the surface forms of the base and the reduplicant, an underlyingly empty affix RED.13 Correspondence Theory has been applied to syllable transposition language games as Base-Game (Barlow 1997, Barlow 2001), Base-Argot (Ito, Kitagawa and Mester 1996; Borowsky and Avery 2009), or Base-Ludligant (Sanders 1999, 2000; Friesner 2005) correspondence.

Sanders (2000) applies Correspondence Theory to Tadbaliks. The empty morpheme LUD, or ‘ludligant’ \(\lambda\), is affixed to a stem, and realised by movement out of linear order of some phonological material of the base. Last-to-first movement arises from the interaction of two constraints: movement is to the beginning of the word due to ALIGN-LEFT(\(\lambda\), PrWd), which requires the left edge of \(\lambda\) to align with the left edge of prosodic word; while movement is from the end of the word due to IO-ANCHOR-RIGHT(BASE, \(\lambda\)), which requires the rightmost segment of base to be rightmost segment of ludligant.

Sanders’ analysis is empirically incomplete and conceptually questionable. Empirically, consonant copying is not reported, and would in fact be punished by one of Sanders’ constraints, *COPY. More problematically, Tadbaliks manipulates syllables; yet while the correspondence theoretic constraints derive last-to-first movement, they say nothing about how much material should move. Movement of a single segment is in fact the most harmonic option in Sanders’ system, since it incurs the fewest violations of LIN(earity). Further constraints would be needed to ensure that the ludligant is a syllable in size.

Conceptually, correspondence theoretic analyses of language games like Tadbaliks essentially equate syllable transposition with reduplication; but are reduplication, where material is copied, and transposition, can result copying – though of vowels rather than consonants – as in (iv), where a single mora base is rendered in optimal three-mora form:

(iv) \(hi \rightarrow i:hi\), ‘cigarette light, lit. fire’

where material is moved, operationally so alike? More broadly, such analyses make an implicit claim to naturalness in their use of alignment and anchoring constraints that are standardly posited among Optimality Theory’s universal constraint set, CON. However, while the crucial alignment and anchoring constraints are of an independently motivated format, they remain fundamentally game-specific in content. In referring to the ludligant λ, they are no less game specific than LAST-σ-1° – our ‘game constraint’ from §3. Game constraints are much more likely spontaneous than members of CON (cf. Vaux 2011: 734).

In sum, a correspondence theoretic account of Tadbaliks, as in Sanders (2000), does not speak to the empirical phenomenon of consonant copying, and makes conceptually questionable pretensions to naturalness.

5.2 Crossing Constraint
Bagemihl’s (1988, 1989) analysis in terms of the Crossing Constraint predicts consonant copying to be impossible. The Crossing Constraint is the central tenet of autosegmentalism (Goldsmith 1976) and states that association lines must not cross.14 Bagemihl proposes to parameterise the Crossing Constraint in order to account for language games. Whereas the Crossing Constraint is enforced as its unmarked setting in normal language, it is switched to its opposite in language games, requiring association lines to cross. Further parametric granularity is claimed to generate all and only the full range of ludlings.

In last-to-first syllable transposition games, including Tadbaliks (Bagemihl 1989: 513ff.), the Crossing Constraint is set to maximal crossing at the syllable level. A prefixed empty syllable template is filled by crossing association lines maximally through to the last syllable of the word. The original syllable is then deleted, resulting in the appearance of movement. Bagemihl (1989: 514) illustrates for Tadbaliks in (17):

(17) maganda → damagan beautiful, A

\[\begin{align*}
\text{a. NL form} & \quad \text{b. Prefixation} \\
\sigma & \quad \sigma + \\
C & \quad C & \quad C & \quad C & \quad C & \quad C & \quad V \\
m & \quad a & \quad g & \quad a & \quad n & \quad d & \quad a \\
\rightarrow & \quad C & \quad V & \quad C & \quad V & \quad C & \quad V & \quad V \\
\sigma & \quad \sigma & \quad \sigma & \quad \sigma & \quad \sigma & \quad \sigma & \quad \sigma \\
m & \quad a & \quad g & \quad a & \quad n & \quad d & \quad a \\
\end{align*}\]

Thus while association lines must cross during the derivation, they are uncrossed by ‘movement’. This is crucial, argues Bagemihl (1989), since crossing association lines are fundamentally ill-formed and must be undone to restore non-contradictory precedence and overlap relations (Sagey 1986, 1988); that is, movement must be total. But this rules out consonant copying (Nevins & Vaux 2003; Vaux 2011: 740), which we saw in Tadbaliks in §2. Thus Bagemihl’s (1989) account in terms of the Crossing Constraint is fatally flawed, since it incorrectly predicts that consonant copying will never occur in a transposition game like Tadbaliks.15

5.3 Directed graphs
Bagemihl’s (1989) model does not admit consonant copying, since total movement is needed to eliminate contradictory precedence relations. Other models can formally implement copying. For instance, Raimy’s (1999, 2000) directed graph model of precedence relations as serial rule-based loops in underlying temporal

15 Bagemihl’s (1989: 513, note 26) empty syllable affixes are inspired by McCarthy and Prince’s (1986) theory of reduplication; though in reduplication there is no movement to uncross the association lines.
precedence structures could yield \textit{palit-án} \rightarrow \textit{tánpalit} with consonant copying as in (18) – skipping from the start symbol \# to \textit{t}, from \textit{n} back to \textit{p}, and from \textit{t} to the stop symbol \%).\footnote{For other copy-(and-truncation)-type models, see references in Nevins and Vaux (2003).}

\begin{equation}
\text{(18)} \quad \\
\begin{align*}
\text{\#} & \rightarrow \text{p} \\
\text{a} & \rightarrow \text{l} \\
\text{i} & \rightarrow \text{t} \\
\text{a} & \rightarrow \text{n} \\
\%
\end{align*}
\end{equation}

However, while such a model may work well for implementing reduplication and copying, it has nothing to say about when or why it should occur. The model does not encode any instructions for when to introduce certain precedence arrows, and when others. By contrast, the analysis from §3 motivates repetition of the consonant in the precedence relations – i.e. copying – when it will economically satisfy root faithfulness.

Having dismissed three previous analyses, the rest of this section considers two additional analytical possibilities.

5.4 \textit{FINAL-C}

It is debated whether word-final syllables are ever truly open in Tagalog, or closed with [h] (Llamzon 1966, Schachter and Otanes 1972, French 1988, Coombs 2017). If the latter, the data in (3) would be revised as in (19), with final -h on the Tadbaliks word in (a).

\begin{equation}
\text{(19)} \quad \\
\begin{align*}
\text{(a)} & \quad \text{palít} \rightarrow \text{litpáh} \quad *\text{litpá} \quad \text{exchange, V} \\
\text{(b)} & \quad \text{palit-án} \rightarrow \text{tánpalit} \quad *\text{tánpálih exchange (object focus), V}
\end{align*}
\end{equation}

From this perspective, Tadbaliks consonant copying might look to be TETU of \textit{FINAL-C}, a markedness constraint requiring syllables to be closed. However, such an analysis could not explain the difference in behaviour between root words – \textit{h}-epenthesis – and suffixed words – root-consonant copying: if \textit{h}-epenthesis closes the open word-final syllable in (a), why wouldn’t it also do so in (b)?

5.5 \textit{R-ANCHOR}

On a final alternative analysis, Tadbaliks consonant copying could be driven not by ID-ROOT, but by emergent R-ANCHOR along the lines in (20):

\begin{equation}
\text{(20)} \quad \text{R-ANCHOR} \\
\text{Assign a violation if the rightmost segment of a Tadbaliks word is not the same as the rightmost segment of the underlying Tagalog root.}
\end{equation}

\text{In other words, a Tadbaliks word should ideally end with the same segment as the Tagalog root it was formed from. For example, Tagalog [pa.li.tan] becomes Tadbaliks [tan.pa.lit], whose rightmost segment [t] is the same as the rightmost segment of /palit/.

§5.1 argued that there are conceptual problems with using a correspondence theoretic constraint like R-ANCHOR to account for a transposition language game. But R-ANCHOR has Occam’s Razor on its side since R-ANCHOR is independently active in Tagalog foot-sized reduplication. In general, only CVCV is reduplicated (21); but with disyllabic consonant-final roots, CVCVC is reduplicated (22), since by R-ANCHOR the rightmost segment of the reduplicant is anchored to the rightmost segment of the base:

\begin{equation}
\text{(21)} \quad \text{CVCV foot-sized reduplication} \\
\text{(a) (i) dalawa two, Num} & \quad \text{(ii) dala-dalawa two-by-two, A} \\
\text{(b) (i) baligtad reversed, A} & \quad \text{(ii) mag-pa-bali-baligtad to tumble, V}
\end{equation}
CVCVC foot-sized reduplication on disyllabic C-final roots

(a) (i) jakap embrace, V (ii) jakap-jakap lovingly embrace, V
(b) (i) patid broken, A (ii) patid-patid disjointed, A

If Tadbaliks consonant copying could be ascribed to R-ANCHOR, it would still be emergent faithfulness, since ANCHOR constraints are faithfulness constraints in Correspondence Theory (McCarthy and Prince 1995). 17

So far, we have not encountered data that can distinguish between R-ANCHOR and ID-ROOT: replacing ID-ROOT with R-ANCHOR in the tableaux in (13), (14) and (16) would not change the crucial violation profiles. But the two constraints are distinct in how much of the root they care about: R-ANCHOR only cares about the root-final consonant, whereas ID-ROOT cares about the whole underlying root. The next section provides evidence that ID-ROOT is the correct constraint for Tadbaliks.

6 Root faithfulness
On the analysis in §3, Tadbaliks consonant copying is driven by the emergent effect of ID-ROOT:

(11) ID-ROOT
Assign a violation if any segment of the underlying Tagalog root is not faithfully represented in the Tadbaliks output in linear order.

This section justifies the details of this constraint definition, elaborating on what it takes to satisfy ID-ROOT; in other words, what it means to be faithful to the root in Tadbaliks. First, ID-ROOT is all-or-nothing, since words where part of the root has been deleted do not exhibit consonant copying. This fact argues in favour of ID-ROOT over R-ANCHOR. Second, ID-ROOT is sensitive to linearity, not contiguity, since infixed words – where linearity is maintained but contiguity is broken – do exhibit consonant copying.

6.1 ID-ROOT is all-or-nothing
In some Tagalog words, the root-final vowel deletes under suffixation. These shortened suffixed words do not exhibit consonant copying in Tadbaliks, as in (23):

(23) Shortened suffixed words, \(^\times\) copying

(a)\(^18\) (i) bukās \(\rightarrow\) kābū open, A
(ii) buks-ān \(\rightarrow\) sanbūk *sanbūks to open something, V

(b)\(^19\) (i) lagāy \(\rightarrow\) gaylā to put, V
(ii) lagy-ān \(\rightarrow\) yanlāg *yanlāgy to put somewhere, V

This absence of consonant copying in shortened suffixed words suggests that ID-ROOT is an all-or-nothing constraint: since root faithfulness has already been destroyed by vowel deletion, there is no point to consonant copying. Characterising ID-ROOT in this all-or-nothing manner means the tableau in (24) makes the correct prediction for (23aii):

\(^17\) On the other hand, the data in (19) could equally well be interpreted in terms of ID-ROOT: where the opportunity emerges to realise a faithful copy of the whole root as the reduplicant by copying just one consonant more, do so.

\(^18\) Final -ks would not be ill-formed. Recall Tadbaliks from footnote 1, with optional game final -s. Hence we cannot rely on a constraint along the lines of *CC\(_c\), or *COMPLEXCODA \(\rightarrow\) * (word-final) consonant clusters – to rule out consonant copying in (20aii). This stylistic -s was semi-productive, though seemingly unsystematically, for one of my speakers; e.g. pālitān \(\rightarrow\) tāpyalīts ‘exchange (object focus)’, V.

\(^19\) Compare (23b) with its unreduced form, which has a different meaning, and does exhibit consonant copying: lagāy-ān \(\rightarrow\) yanlāgay ‘place where you put something’, N.
As in §3, (a) and (b) don’t play the game, so fall to LAST-σ₁⁺; while syllable copying (e) falls to "STRUC(σ). Vowel deletion means the syllabified Tagalog output [buk.san] already violates ID-ROOT to /bukas/, so consonant copying (d) and plain (c) tie in violating ID-ROOT, and plain (c) is preferred by INTEGRITY. Candidates (f)-(i) reintroduce the /a/ of /bukas/, but fall to "STRUC(σ) before any positive impact on ID-ROOT can be felt.

The absence of consonant copying in shortened suffixed words shows that ID-ROOT cares about faithfulness to all segments of the underlying root, and not just the final consonant – as R-ANCHOR would have it. Replacing ID-ROOT with R-ANCHOR in (25) incorrectly predicts consonant copying (d) to be the winning candidate.

Candidates (a) and (b) fall to LAST-σ₁⁺, and syllable copying (e) and (f)-(i) to "STRUC(σ). Now R-ANCHOR wants the Tadbaliks version of Tagalog [buk.san] to have the same rightmost segment as the underlying root /bukas/, i.e. [s]. Consonant copying (d) has rightmost [s] where plain (c) does not, so (d) incorrectly wins on R-ANCHOR. Therefore all-or-nothing ID-ROOT, with its requirement for a faithful representation of every segment of the root, is preferable to R-ANCHOR in accounting for consonant copying in Tadbaliks.

### Table 1

<table>
<thead>
<tr>
<th>/bukas-an/ [buk.san]</th>
<th>LAST-σ₁⁺</th>
<th>&quot;STRUC(σ)</th>
<th>R-ANCHOR</th>
<th>INTEGRITY</th>
<th>LINEARITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. buksan</td>
<td>*!</td>
<td>**</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. anbuks</td>
<td>*!</td>
<td>**</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. sanbuk</td>
<td>*!</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. sanbuks</td>
<td>**</td>
<td>*</td>
<td>*</td>
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<td></td>
</tr>
<tr>
<td>e. sanbuksan</td>
<td>***!</td>
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<td>***</td>
<td>*</td>
<td></td>
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<tr>
<td>f. buksan</td>
<td>*!</td>
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</tr>
<tr>
<td>g. sanbuka</td>
<td>***!</td>
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<tr>
<td>h. sanbukas</td>
<td>***!</td>
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<td></td>
</tr>
<tr>
<td>i. sanbuksan</td>
<td>**<em>!</em></td>
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</tr>
</tbody>
</table>

Candiates (a) and (b) fall to LAST-σ₁⁺, and syllable copying (e) and (f)-(i) to "STRUC(σ). Now R-ANCHOR wants the Tadbaliks version of Tagalog [buk.san] to have the same rightmost segment as the underlying root /bukas/, i.e. [s]. Consonant copying (d) has rightmost [s] where plain (c) does not, so (d) incorrectly wins on R-ANCHOR. Therefore all-or-nothing ID-ROOT, with its requirement for a faithful representation of every segment of the root, is preferable to R-ANCHOR in accounting for consonant copying in Tadbaliks.

### Table 2

<table>
<thead>
<tr>
<th>/bukas-an/ [buk.san]</th>
<th>LAST-σ₁⁺</th>
<th>&quot;STRUC(σ)</th>
<th>R-ANCHOR</th>
<th>INTEGRITY</th>
<th>LINEARITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. buksan</td>
<td>*!</td>
<td>**</td>
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<td></td>
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</tr>
<tr>
<td>b. anbuks</td>
<td>*!</td>
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<tr>
<td>c. sanbuk</td>
<td>*!</td>
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<tr>
<td>d. sanbuks</td>
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<tr>
<td>e. sanbuksan</td>
<td>***!</td>
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<tr>
<td>f. buksan</td>
<td>*!</td>
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<tr>
<td>g. sanbuka</td>
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<td>h. sanbukas</td>
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<tr>
<td>i. sanbuksan</td>
<td>**<em>!</em></td>
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</tr>
</tbody>
</table>

Candiates (a) and (b) fall to LAST-σ₁⁺, and syllable copying (e) and (f)-(i) to "STRUC(σ). Now R-ANCHOR wants the Tadbaliks version of Tagalog [buk.san] to have the same rightmost segment as the underlying root /bukas/, i.e. [s]. Consonant copying (d) has rightmost [s] where plain (c) does not, so (d) incorrectly wins on R-ANCHOR. Therefore all-or-nothing ID-ROOT, with its requirement for a faithful representation of every segment of the root, is preferable to R-ANCHOR in accounting for consonant copying in Tadbaliks.

### (11) ID-ROOT

*Assign a violation if any segment of the underlying Tagalog root is not faithfully represented in the Tadbaliks output in linear order.*
6.2 ID-ROOT is sensitive to linearity, not contiguity

Tagalog features infixation; e.g. -in- for directional focus. When suffixed, infixed words continue to exhibit consonant copying in Tadbaliks (26):

\[
\begin{align*}
(26) \quad (a) \quad (i) & \quad \text{palít} + \text{-in-} + \text{-an} ('exchange', \text{perfect, directional focus}) \\
& \rightarrow \text{tànplejí} \\
(ii) & \quad \text{pinalítan} \rightarrow \text{tànplejí} \\
(b) \quad (i) & \quad \text{táwag} + \text{-in-} + \text{-an} ('call', \text{perfect, directional focus}) \\
& \rightarrow \text{gantínáwa} \\
(ii) & \quad \text{tínawágan} \rightarrow \text{gantínáwa} \\
\end{align*}
\]

Infixation preserves linearity, but destroys contiguity: in (a(ii)), the infix -in- does not change the fact that the [p] of the root precedes the [a] of the root; but it does mean that they are no longer next to one another. Since consonant copying is unaffected by infixation, and consonant copying is driven by ID-ROOT, it follows that ID-ROOT does not care that the contiguity of underlying /palít/ is destroyed in \textit{pinalítan} \rightarrow \textit{tànplejí}; only that the linear order of [p], then [a], then [l], [i], [t] is preserved. In other words, ID-ROOT enjoins faithfulness to relations of precedence – though not immediate precedence – among root segments:

\[(11) \quad \text{ID-ROOT} \]

\begin{itemize}
\item Assign a violation if any segment of the underlying Tagalog root is not faithfully represented in the Tadbaliks output in linear order.
\end{itemize}

To summarise, root faithfulness has been at the core of our analysis of Tadbaliks consonant copying, and this section has made the ID-ROOT constraint more precise in two ways: (i) it is all-or-nothing in being violated by deletion (so R-ANCHOR is inadequate for Tadbaliks); and (ii) it enjoins faithfulness to the linearity rather than contiguity of root segments in being unaffected by infixation.

7 Conclusion

This paper offered an optimality theoretic analysis of consonant copying in the Tagalog syllable-transposition language game Tadbaliks. Suffixed words exhibit consonant copying while corresponding roots do not, since with suffixed words the opportunity emerges to faithfully yet economically realise the root. This emergence of the faithful was contrasted with The Emergence of the Unmarked (TETU). Alternative analyses were considered and dismissed, though deciding in favour of ID-ROOT over R-ANCHOR led to a more precise characterisation of root faithfulness as all-or-nothing and sensitive to linearity rather than contiguity.

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References


