

Ken Hale: A Life in Language

edited by Michael Kenstowicz



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Chapter 4

Infixation versus Onset Metathesis in Tagalog, Chamorro, and Toba Batak

Morris Halle

4.1 Introductory Remarks

According to Bloomfield (1933, 218), the relationship between such Tagalog forms as /sulat/ ‘a writing’, on the one hand, and /sumulat/ ‘one who writes’ and /sinulat/ ‘that which is written’, on the other, is one of infixation, where the sequences /um/ and /in/, respectively, are “added before the first vowel of the underlying form.” This account of the Tagalog facts, which can be found in most treatments of the language, is however not the only logically possible one. Identical results are obtained if we posit that the affixes are prefixes of the form /mu/ and /ni/, respectively, and that words with these prefixes are subject to Onset Metathesis, which permutes the onsets of the first two syllables of the words; that is, /mu-sulat/ → /su-mulat/ and /ni-sulat/ → /si-nulat/.

I begin by noting that from the point of view of syntax, morphemes are indivisible, atomic pieces. The syntax is systematically oblivious of phonological aspects of the morphemes. In the theory of Distributed Morphology (Halle and Marantz 1993) this obliviousness is formally reflected by the absence—in syntactic representations—of the phonetic exponents of the morphemes. In the syntax proper, morphemes are nothing but complexes of syntactic and semantic features; their phonetic exponents are inserted by Vocabulary Insertion, which is part of the morphology. Since the phonetic exponents of morphemes are thus not present in the syntax, it is literally impossible within the syntax to infix /um/ or /in/ before the first vowel of the Tagalog stem. This can only be done in the morphology or phonology, after the phonetic exponents of the morphemes have been spelled out.

Morphologically, Tagalog *sumulat* and *sinulat* are composed of the verb base (VBase) *sulat* and the affixes *um/mu* and *in/ni*, respectively. The

words thus differ from English *writer* and *writing* primarily in that the affix is a suffix in English, but a prefix in Tagalog. What needs to be determined in addition is whether the morphophonology of Tagalog infixes these prefixes before the first vowel of the stem, as Bloomfield and others have thought, or whether the onset of the prefix and that of the following syllable undergo metathesis, as suggested above.

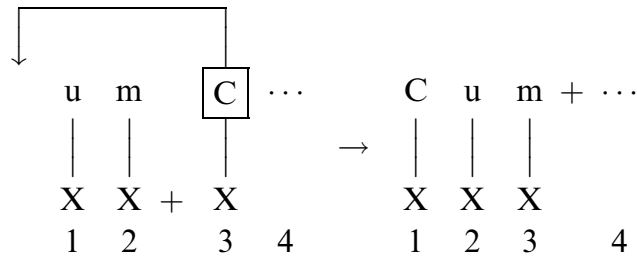
Metathesis operations are well attested in the phonology of different languages. Among the better-known metathesis phenomena are the *liquid metathesis* of the Slavic languages (for some discussion, see Breuer 1961, 76ff.; Blevins and Garrett 1998); the metathesis in the Tiberian Hebrew *hitpaʕe:l*, which affects stems beginning with a coronal continuant or affricate (e.g., /hit-sadde:r/ → /his-tadde:r/ ‘to arrange oneself’, but /hit-raxe:c/ ‘to wash oneself’); and the /y-C/ → /C-y/ permutation in Zoque discussed at length in Dell 1973.

Onset metathesis, such as the one proposed below for Tagalog and Chamorro, is less widely attested in the phonology of ordinary languages, but has been found in various language games, which Bagemihl (1989, 1995) refers to as *ludlings*. Bagemihl (1989, 490) cites two ludlings—one in Javanese and the other in Chasu—where onsets of consecutive syllables are permuted, as illustrated in (1).

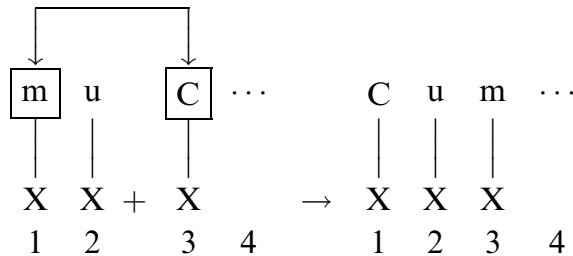
- (1) a. *Javanese*
 sa.tus → ta.sus ‘one hundred’
 ɖu.wit → wu.ɖit ‘money’
 b. *Chasu*
 na.so → sa.no ‘five’
 ke.nda → nde.ka ‘nine’

Since Onset Metathesis is thus an attested phenomenon in actually spoken languages, Universal Grammar (UG) must include devices that permute the linear order both of consecutive phonemes and of onsets of consecutive syllables. The precise nature of the formal mechanism involved in these operations is yet to be established definitively (for some proposals, see Kenstowicz and Kisseberth 1979, 370; Bagemihl 1989; and especially Raimy 1999). In (2), I show the different effects produced by the two processes. In (2a), I illustrate the effects of Infixation—that is, of preposing the onset of the stem before the vowel-initial prefix. In (2b), I illustrate the effects of Onset Metathesis—that is, of a process that permutes the phonetic features linked to the onsets of two consecutive morphemes.

(2) a. *Infixation (Stem Onset Preposing)*



b. *Onset Metathesis*



I will show that Onset Metathesis rather than Infixation applies in Tagalog (section 4.2) and Chamorro (section 4.3), whereas both Infixation (Stem Onset Preposing) and Onset Metathesis apply in Toba Batak (section 4.4).

The interest of these results is twofold. On the one hand, they imply that the widely held view about the centrality of infixation in the morphophonology of Tagalog and Chamorro is mistaken, and they suggest that accounts of infixation processes in some other languages might need to be similarly revised. On the other hand, they raise questions about the validity of the inferences for phonological theory that have been drawn from the supposition that the Tagalog facts are instances of infixation. For example, Prince and Smolensky (1993, 34) adopt the popular functionalist explanation that “infixation after a word-initial C results in a considerably more satisfactory syllable structure than prefixation would” and claim as one of the virtues of Optimality Theory that it “allows us to make this insight the keystone of a significantly improved theory of edge-oriented infixation.” If the Onset Metathesis alternative illustrated in (2b) is correct, this supposed advantage of Optimality Theory vanishes, for, on that account, the syllable structure of the output form does not differ from that of the input; instead, what changes is the sequential order of the onsets, for which Prince and Smolensky’s functionalist explanation is clearly irrelevant.

4.2 Tagalog

In discussing the facts of Tagalog, it is important to keep in mind that most studies, including such excellent scientific descriptions of the language as Schachter and Otones (S&O) 1972, represent most words in conventional Tagalog spelling, which systematically omits the glottal stop /ʔ/ and represents /h/ only in syllable onsets. S&O write:

The phoneme /ʔ/ is not represented in conventional spelling. . . . When /ʔ/ occurs word initially, however, its presence may be inferred from the conventional spelling, which, in such cases, always begins with a vowel letter. . . . When a syllable-initial glottal stop occurs after a prefix that ends in a consonant, a hyphen is placed after the prefix . . . (1972, 57; see also 19)

Failure to note this simple fact leads to misunderstandings of various sorts. For example, Crowhurst (1998, 590) states that in Tagalog, “a verbal morpheme *um* surfaces as prefix before V-initial stems (e.g., *um-asim* ‘turn sour’), but as an infix with C-initial stems (e.g., *t-um-awag* ‘call’).” Once the actually occurring stem-initial glottal stop is restored, the distinction between prefixed and infixed *um* vanishes. Crowhurst’s special treatment of putatively vowel-initial stems thus does not reflect a phonological fact of the language; it reflects only a confusing aspect of Tagalog orthography.

The omission of /h/ in non-onset position leads to different distortions of the phonological data. S&O write:

Word final /h/ is lost in the middle of a phrase. Thus, *baga* /ba:gah/ ‘ember’, but *Bagah ba?* /ba:ga bah/ ‘(Is it) an ember?’ Before the suffixes *-an* and *-in*, however, final /h/ is retained. . . . [A]lthough neither word-final /h/ nor word-final /ʔ/ is retained in the middle of a phrase, the contrast between them is preserved, /h/ being lost altogether, but /ʔ/ being replaced by vowel length . . . (1972, 23)

Moreover, they observe that

since neither /ʔ/ nor word-final /h/ is represented in conventional spelling, pairs of words that differ only in that one of them ends in /ʔ/ and the other in /h/ are spelled in the same way. (1972, 57)

For example, orthographic *bata* stands for both phonological /bataʔ/ ‘child’ and /batah/ ‘bathrobe’, and orthographic *vaya* stands for both phonological /vayaʔ/ ‘invitation’ and /vayah/ ‘nurse’. In the transcriptions of Tagalog forms below, both the glottal stop and the /h/ that are omitted in the official orthography have been restored.

4.2.1 The [+realis] Morpheme /ni/

Tagalog verb forms consist of a verb base (VBase), a topic marker (TM), and a number of other affixes reflecting tense, aspect, mood, transitivity, and so on. Of particular interest here is the exponent of the [+realis] mood, which distinguishes the imperfective and perfective forms of the verb from their [–realis] counterparts, the contemplative mood and the neutral basic form. The exponent of the [+realis] mood appears in absolute initial position of the word, with one important exception: it may be preceded by the benefactive TM /ʔi/. In the literature, the [+realis] exponent is said to have the form /in/ and to be subject to infixation. This is illustrated with the perfective forms in (3) (examples from S&O 1972, 370).

- (3) in-ʔawit → ʔ-in-awit ‘sang’
 in-bigy-an → b-in-igy-an ‘gave to’
 ʔi-in-bilih → ʔi-b-in-ilih → ‘bought for’
 ʔi-in-ka-takboh → ʔi-k-in-a-takboh ‘caused to run for’

As noted in section 4.1, if we assume that the [+realis] exponent is of the form /ni/ and is subject to Onset Metathesis (2b), rather than to Infixation (Stem Onset Preposing) (2a), we obtain outputs that are phonologically identical, but that differ in their effects on both the morphological structure and the syllable structure of the strings. This is illustrated in (4).

- (4) ni-ʔawit → ʔi-nawit ‘sang’
 ni-bigy-an → bi-nigy-an ‘gave to’
 ʔi-ni-bilih → ʔi-bi-nilih ‘bought for’
 ʔi-ni-ka-takboh → ʔi-ki-na-takboh ‘caused to run for’

S&O (1972, 365) remark that Infixation/Metathesis is optional where the [+realis] morpheme is followed by a nonnasal sonorant, that is, /ʔ h r l w y/. This exceptional treatment is obligatory in cases where /ni/ is preceded by the benefactive TM /ʔi/ and is followed by /ʔ/ or /h/. Importantly, in all cases where the process does not take place, the [+realis] morpheme surfaces not as /in/, but as /ni/. This is illustrated in (5).

- (5) a. ni-ligaw-an *or* li-ni-gaw-an ‘paid court to’
 ʔi-ni-yam-an *or* ʔi-yi-nam-an ‘caused to get rich’
 ʔi-ni-regalo *or* ʔi-ri-negalo ‘gave as a present’
 ni-hatid *or* hi-natid ‘delivered’ <absence of /ʔi/ TM>
 b. ʔi-ni-hatid ‘delivered to’
 ʔi-ni-ʔuwi ‘took home’

As shown in (5), if the morpheme is assumed to be of the form /ni/, we need to state only that these forms are exceptions to Onset Metathesis. If, on the other hand, the morpheme is assumed to be of the form /in/, it is necessary to stipulate in addition that in cases where infixation is blocked, the morpheme /in/ changes shape to /ni/.¹ The need for this additional stipulation constitutes a compelling argument against positing /in/ as the underlying form of the [+realis] morpheme and consequently also against infixation as a process accounting for the output forms reviewed here.

4.2.2 The Agent Topic Marker /mu/

As observed in section 4.1, infixation has been posited not only for the [+realis] morpheme in Tagalog, but also for the agent topic marker /mu/ (respectively /um/). The evidence against infixation given just above is an a priori reason for assuming that the agent TM is underlyingly /mu/ and that it, like the [+realis] morpheme /ni/, is subject to Onset Metathesis. Additional considerations for this proposition are presented below.

An important phonological process involving the /ni/ morpheme concerns its effect on a following morpheme beginning with /m/. According to S&O (1972, 364), “[w]hen present in a formation whose basic form begins with a prefix with initial /m/, N is realized as a replacement of this /m/ by /n/. Thus, ... N + *mag-* /mag/ → *nag-* /nag/ ...,” where N is S&O’s symbol for the [+realis] morpheme. This is illustrated in (6) (cf. S&O 1972, 364, 367), where S&O’s abstract N has been replaced with its phonological exponent /ni/.

- (6) ni-ma-ʔintindih-an → n-a-ʔintindih-an ‘understood’ (367)
 ni-mag-ʔaral → n-ag-ʔaral ‘studied’ (367)
 ni-ma-ka-gawa → n-a-ka-gawa ‘was/were able to do’ (367)

To account for the forms in (6), I propose that such forms are subject to the two simple rules in (7).

- (7) a. V → ∅ in the morpheme /ni/
 b. [+cons] → ∅ in env. [+cons] + ____

I assume that (7a) is a readjustment rule that applies to the prefix /ni/ (and, as I will argue directly below, also to /mu/) in certain morphologically restricted contexts. By contrast, (7b) is a phonological rule, which applies across morpheme boundaries but not morpheme-internally and is subject to further restrictions. Since (7a) is part of the Readjustment component, it precedes all phonological rules, including in particular

Onset Metathesis, which therefore can never affect forms subject to (7a). The effects of the rules in (7) are illustrated in (8).

- (8) a. ni-ma-ka-ʔaral $\xrightarrow{(7a)}$ n-ma-ka-ʔaral $\xrightarrow{(7b)}$ n-a-ka-ʔaral
 b. ni-ma-ʔinitindih-an $\xrightarrow{(7a)}$ n-ma-ʔinitindih-an $\xrightarrow{(7b)}$ n-a-ʔinitindih-an

A Tagalog verb form has exactly one TM, which may be (1) a suffix of the VBase, as in /bigy-an/ ‘give to’ ← /bigy/ ‘give’ + /an/ locative TM, or as in /bilh-in/ ‘buy’ ← /bilih/ ‘buy’ + /in/ object TM, or (2) a prefix, as in /ʔi-bilih/ ‘buy for’ ← /ʔi/ benefactive TM + /bilih/ ‘buy’, or as in /ʔu-malis/ ‘leave’ ← /mu/ agent TM + /ʔalis/ ‘leave’, where /mu/ undergoes Onset Metathesis.

According to S&O (1972, 364), the [+realis] /ni/ prefix is deleted before /mu/, and, as shown in (9), the contrast between the [+realis] perfective form and the [–realis] base form of the verb is then lost.

- (9) a. /ni/ [+realis] + /mu/ agent TM + /ʔalis/ ‘leave’ → mu + ʔalis →
 ʔu + malis
 b. NULL [–realis] + /mu/ agent TM + /ʔalis/ ‘leave’ → ʔu + malis

The deletion of an affix in morphologically defined contexts (as in (9a)) is not uncommon. For example, in Russian, the perfective suffix /nu/ is deleted—obligatorily or optionally—in the past tense as well as in the active participle and gerund of many verbs (e.g., *po-gib-nu-t* (inf.) vs. *po-gib-l-a* (past), *po-gib-š-ij* (act. part.) ‘perish’; *ot-verg-nu-t* (inf.) vs. *ot-verg-l-a* or *ot-verg-nu-l-a* (past), *ot-verg-š-ij* or *ot-verg-nu-v-š-ij* (act. part.) ‘reject’). In parallel fashion, the Tagalog /ni/ prefix is deleted before verbs with the TM /mu/.²

There is, however, an important exception to the deletion of /ni/ before /mu/: deletion does not take place if /mu/ is followed by /pag/ (transitivizer). The preservation of /ni/ before /mu/ in these forms immediately explains the contrast between the forms in (10) and those in (11), which I have copied from Maclachlan 1989, 71.

- (10) n-ag-lutoʔ ‘cooked’
 n-ag-tipon ‘collected’
 n-ag-rayos ‘arranged’
 n-ag-banat ‘stretched’
 n-ag-tunaw ‘dissolved’
- (11) du-mating ‘arrived’
 ku-maway ‘waved at’
 du-maʔing ‘complained’

gu-malaw ‘wandered’
 lu-mangoy ‘swam’

As shown in the derivations in (12), when /ni/ does not delete, it undergoes rule (7a), which in these forms also applies to /mu/. These forms are then subject to rule (7b), which deletes all but the last in a string of consecutive consonants.

- (12) a. [+realis] + AGENT TM + TRANS? + Verb
 ni + mu + pag + luto? $\xrightarrow{(7a)}$
 n + m + pag + luto? $\xrightarrow{(7b)}$
 n + \emptyset + \emptyset ag + luto?
- b. [+realis] + AGENT TM + INTRANS + Verb
 ni + mu + NULL + dating $\xrightarrow{/ni/ Del/}$
 \emptyset + mu + dating $\xrightarrow{Ons Met}$
 du + mating

This account depends crucially on the assumption that the exponent of the agent TM is /mu/ rather than /um/, for rule (7a) would fail to apply to /um/, resulting in the output /n-um-ag-luto?/, which is evidently wide of the mark. I conclude that the exponent of the agent TM is of the form /mu/ and that like the [+realis] morpheme /ni/, /mu/ is subject to Onset Metathesis rather than Infixation (Stem Onset Preposing).

4.3 Chamorro

Chamorro, as described by Topping (1973), presents additional evidence for Onset Metathesis and against Infixation (Stem Onset Preposing). Like Tagalog, Chamorro has traditionally been said to have the two infixes *-um-* and *-in-*, which in Chamorro have a variety of morphological functions. However, Topping (1973, 170ff.) has argued compellingly that these morphemes must be treated as the prefixes /mu/ and /ni/, just like their counterparts in Tagalog. Even though Topping’s book is a main source for most subsequent work on Chamorro, all writers—including Topping himself in other parts of his book—maintain the traditional infixation analysis. Below I restate Topping’s arguments against infixation.

Topping writes:

It is interesting that the canonical form of both of these affixes is just the opposite of what one would expect in a language that is basically CVCV. It is tempting to posit underlying prefixes *mu-* and *ni-* for these infixes with appropriate rules of metathesis. There appears to be some evidence to support such a hypothesis. (1973, 170)

According to Topping, in Chamorro, *mu-/um* is the exponent of an “action” morpheme “because whenever it is used the emphasis is on the actor or the action” (1973, 184). The morpheme appears as /mu/ if the following stem begins with a nasal; elsewhere, /mu/ undergoes Onset Metathesis. This is illustrated by the contrast between the forms in (13a) that have nasal-initial stems and do not undergo Onset Metathesis and the forms in (13b) that have stems beginning with nonnasal phonemes and do undergo Onset Metathesis.³

- (13) a. mu-ŋelo? ‘peeps’
 mu-naŋo ‘swims’
 mu-na? ‘causes’
 b. gu-mupu ‘flew’ (gupu ‘fly’)
 tu-mohge ‘stoop up’ (tohge ‘stand’)
 du-mankolo ‘became big’ (dankolo ‘big’)

On the Infixation (Stem Onset Preposing) account, it would be necessary to posit two exponents for this morpheme (/mu/, before stems beginning with nasals, and /um/, elsewhere), and it would have to be stipulated that Infixation applies only in the latter case. The facts can also be accounted for by positing just one prefix, /mu/, which is subject to Infixation before an obstruent or nonnasal consonant, but not elsewhere. Strings undergoing Infixation would in addition be subject to a metathesis rule that turns /mu/ into /um/. Both of these Infixation alternatives involve extra complications that do not arise in the Onset Metathesis proposal.

Topping’s argument for preferring /ni/ over /in/ as the representation of this morpheme concerns the interaction of Onset Metathesis with two other rules of Chamorro phonology: Nasal Place Assimilation and Deletion of postnasal obstruents. As illustrated in (14) (from Topping 1973, 173), Nasal Place Assimilation (NPA) applies before Deletion (Del).

- (14) fan-chomma? $\xrightarrow{\text{NPA}}$ fañ-chomma? $\xrightarrow{\text{Del}}$ fañ-omma?
 fan-chupa $\xrightarrow{\text{NPA}}$ fañ-chupa $\xrightarrow{\text{Del}}$ fañ-upa ‘tobacco field’
 man-pokkat $\xrightarrow{\text{NPA}}$ mam-pokkat $\xrightarrow{\text{Del}}$ mam-okkat ‘walk’

Now consider the word *chinemma?* ‘forbidden thing’, which contains the VBase *chomma?* ‘forbid’. The vowel change /o/ → /e/ is the result of vowel harmony, which applies to a stressed back vowel “preceded by one of several particles that has a front vowel” (Topping 1973, 52). Among the particles that trigger fronting is the /ni/ ~ /in/ affix, which in the construction under discussion functions as a nominalizing morpheme.

The plural of *chinemma* ‘forbidden thing’ is formed by prefixing *fan*, which is phonetically identical with the prefix in (14), but has a different function. In this case, the prefix + noun combination surfaces as *fan-chinemma?*, without undergoing either Nasal Place Assimilation or Deletion. As Topping points out, this can be readily accounted for if we assume that the underlying form has the prefix *ni*, which—as already established—is subject to Onset Metathesis. That is, *fan-ni-chemma?* → *fan-chi-nemma?*, without undergoing either Nasal Place Assimilation or Deletion. This is achieved by ordering Nasal Place Assimilation and Deletion before Onset Metathesis (OM), as shown in (15).

(15) $\text{fan-ni-chemma?} \xrightarrow{\text{NPA}} \text{DNA} \xrightarrow{\text{Del}} \text{DNA} \xrightarrow{\text{OM}} \text{fan-chi-nemma?}$

QED

If instead we had assumed that Infixation (Stem Onset Preposing) was at work here and that it was ordered before Nasal Place Assimilation and Deletion, the incorrect output *fan-iñ-emma?* would have been generated. This is shown in (16).

(16) $\text{fan-in-chemma?} \xrightarrow{\text{NPA}} \text{fan-iñ-chemma?} \xrightarrow{\text{Del}} \text{fan-iñ-emma?} \xrightarrow{\text{Inf}} \text{DNA} \longrightarrow \text{***fan-iñ-emma?}$

Things are not improved by ordering Infixation before Nasal Place Assimilation and Deletion, as shown in (17a), or between Nasal Place Assimilation and Deletion, as shown in (17b).

(17) a. $\text{fan-in-chemma?} \xrightarrow{\text{Inf}} \text{fan-ch-in-emma?} \xrightarrow{\text{NPA}} \text{fañ-ch-in-emma?} \xrightarrow{\text{Del}} \text{***fañ-in-emma?}$
 b. $\text{fan-in-chemma?} \xrightarrow{\text{NPA}} \text{fan-iñ-chemma?} \xrightarrow{\text{Inf}} \text{fan-ch-iñ-emma?} \xrightarrow{\text{Del}} \text{***fan-iñ-emma?}$

4.4 Toba Batak

The fact that Infixation (Stem Onset Preposing) must be ruled out in Chamorro and Tagalog does not rule out Infixation as a morphophonological process in other languages. In particular, as shown below, in Toba Batak /um/-Infixation is a bona fide morphophonological process.

In Toba Batak, both /ni/ and /um/ figure as independent morphemes, which occur as prefixes in some contexts and as infixes elsewhere. In addition, the nominalizing morpheme /a/ shares with /um/ and /ni/ the property of appearing as a prefix in some contexts and as an infix elsewhere. The distributions are reviewed below.⁴

An important difference between Tagalog and Chamorro, on the one hand, and Toba Batak, on the other, is that Tagalog and Chamorro have no vowel-initial syllables, whereas Toba Batak admits vowel-initial syllables freely.

Like Tagalog and Chamorro, Toba Batak has a /ni/ morpheme, which in certain environments undergoes Onset Metathesis. Toba Batak /ni/'s primary function is that of exponent of the passive completive mode (N74). As illustrated in (18), before vowel-initial stems, the morpheme appears in its underlying /ni/ form; before consonant-initial stems, /ni/ is subject to Onset Metathesis.

- (18) ni-ulÓs-an ‘have been covered’ ((completive passive) from *úlOs* ‘blanket’) (N69)
 bi-núat ‘has been taken’ ((completive passive) from *ni* + *búat* ‘take’ (N69))
 ji-noú-an ‘have been called repeatedly’ ((completive passive) from *ni* + *jóu* ‘call’ + *an*) (N71)

As in Tagalog and Chamorro, the argument for viewing these alternations as the result of Onset Metathesis rather than of Infixation (Stem Onset Preposing) is that the Infixation analysis requires stipulating in addition that the prefix is subject to the change /ni/ → /in/, whereas the Onset Metathesis account does not.

Unlike /ni/, the morpheme /al/ is a bona fide infix. As illustrated in (19), it appears in that shape as a prefix before vowel-initial roots, but as an infix before consonant-initial roots (see also (20a)).

- (19) b-al-átuk ‘ladder’ (N94)
 al-ógo ‘wind’ (N94)

The prefix /um/ is the phonetic exponent of a number of apparently diverse grammatical morphemes. On the one hand, /um/ functions as the exponent of the completive active-participial mode of the verb (N74) (see (20a)). But it also serves as the exponent of the comparative marker in adjectives (see (20b)) and of the primary derivational affix of some intransitive stems (see (20c)).

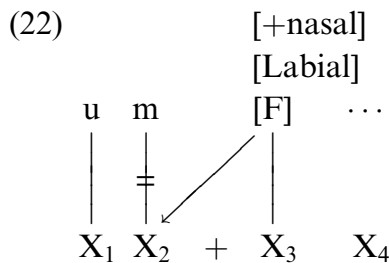
- (20) a. j-um-óu-i ‘have called repeatedly’ ((completive active) from *jóu* ‘call’) (N71)
 up-pásak ‘has beaten’ ((completive active) from *um-pásak*) (N74)
 g-um-al-útcán ‘be in violent wavy motion’ ((intransitive) from [um-[al-[gutcan]]]) (N92) (with repeated cyclic application of Infixation (Stem Onset Preposing))

- b. d-um-áo ‘farther’ (from *daó* ‘far’) (N72)
 up-padditá ‘more preacherlike’ (from *padditá* ‘preacherlike’) (N72)
 umm-úli ‘more beautiful’ (from *ulí* ‘beautiful’) (N64)
- c. h-um-Órdit ‘make slight movement’ (from root *hÓrdit*) (N98)
 g-um-ÓrsiN ‘(has) become brown’ (from *gOrsíN* ‘brown’) (N100)

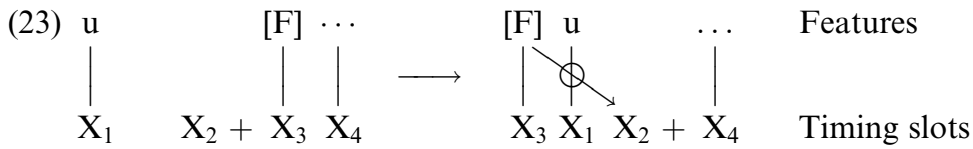
As illustrated in (2a), Infixation is the result of Onset Preposing. The preposed onset need not be part of the verb root; it can instead come from a prefix, as shown in (21b). As illustrated in (21a), /ha/ is a prefix used in forming nouns. Noun stems formed with /ha/ may in turn take the prefix /um/, which undergoes Infixation as shown in (21b).

- (21) a. ha-súbba ‘indigo’ (N94)
 ha-úma ‘rice field’ (N94)
- b. [um-[ha-tioN]] → h-um-a-tíoN ‘run to and fro excitedly’ (N98)
 [um-[ha-tiltal]] → h-um-a-tíltal ‘prance about’ (N98)

The /um/ prefix triggers two phonological rules. Before vowel-initial stems, affix-final /m/ is geminated (examples in (20b)). Moreover, before labial and nasal consonants, affix-final /m/ undergoes full assimilation to the following stem-initial consonant (e.g., /up-pasak/ ‘beat’, /up-padditá/ ‘more preacherlike’ (20a–b)). I assume that the assimilation rule has the form in (22), where the features linked to the timing slot X_3 are spread to the timing slot X_2 .



As established by Hayes (1986a,b) and Schein and Steriade (1986), geminate consonants behave exceptionally with regard to a variety of processes, a fact Hayes calls “inalterability.” As I now show, in the present instance, inalterability is a straightforward consequence of the general prohibition against the crossing of association lines (Sagey 1988). To see what is involved, it is necessary to make explicit the effect of Infixation (Stem Onset Preposing) (2a) on a phoneme sequence that includes a geminate resulting from assimilation (22).



The phonological representation in (23) consists of two autosegmental sequences: one composed of feature bundles and the other, of timing slots. The units in one of the sequences are linked to those in the other by means of “association lines.” When Infixation (2a) is applied to the string on the left in (23), both the feature bundle [F] and the timing slot X₃ must be moved to the left of /u/ and its timing slot X₁. As shown in (23), the effect of this is that the line associating the feature bundle [F] to the timing slot X₂ crosses the line associating the features of /u/ to the timing slot X₁. Since this output violates the basic coherence for a notation in which timing slots and their feature composition are projected on separate lines, such representations must be ruled out whenever they arise. A direct consequence of this prohibition is that changes such as those illustrated in (23) are universally excluded. It is this fact that underlies the inalterability of these geminate consonants.

Crowhurst (1998) reports that in recent years, Toba Batak has generalized the assimilation process (22), so that at present /um/ is subject to assimilation before all consonant-initial stems, not only those that begin with labials or nasals, as in (22). Crowhurst reports that this generalization of the assimilation process was already noticed in a 1981 study by Percival, but at that time the generalization was an optional process, as illustrated in (24) with examples from Crowhurst.

- (24) ud-dátu, d-um-átu ‘wiser’
 us-sÓmal, s-um-Ómal ‘more usual’
 ug-gógo, g-um-ógo ‘stronger’
 ul-lógo, l-um-ógo ‘drier’

According to Crowhurst’s informant, in the contemporary language, assimilation is now obligatory, and as a consequence, there is no longer any need for Infixation (Stem Onset Preposing) in Toba Batak. Crowhurst (1998, 595) describes the change as consisting of two independent parts: “first ... infixes have been migrating to prefix position in Toba Batak; second, as this happens, the pattern of consonant assimilation observed only with labial- and nasal-initial stems in Nababan’s dialect is being extended to consonants at all places of articulation.” On this account, in the underlying representation, which was also that found in the output at

a historically earlier time, /um/ appeared inside consonant-initial stems. Subsequently, /um/ “migrate[d] to prefix position,” first only in labial- and nasal-initial stems and later in all consonant-initial stems. The prefixed /um/ then undergoes assimilation.

Central to Crowhurst’s account is the assumption that the infix /um/ appeared inside the adjective stem and subsequently “migrate[d] to prefix position.” As noted in section 4.1, a morpheme cannot appear inside another morpheme in underlying representations. In view of this, Crowhurst’s account must implicitly assume that at some point, /um/ was infixated into the adjective only to “migrate to prefix position” at a subsequent point. This is highly implausible, and since Crowhurst offers no argument in support of her account, it cannot compete with the straightforward account presented above.

4.5 The Moral

1. Neither Tagalog nor Chamorro is subject to Infixation (Stem Onset Preposing). Instead, both languages are subject to Onset Metathesis (2b). The evidence supporting this conclusion is detailed in sections 4.2 and 4.3.

2. Infixation viewed as Stem Onset Preposing (2a) is—or until recently was—an active process in Toba Batak. Since it changes the phonological exponents of the morpheme to which /um/ is prefixed, Infixation must apply at a point where the morphemes are supplied with phonetic exponents. This cannot be part of the syntax of a language, because the syntax does not have access to the phonological properties of the morphemes.

3. The interaction in Toba Batak between Infixation (Stem Onset Preposing) and the assimilation rule (22) provides a strong argument for ordered rules and derivations. In a derivational account, no restriction needs to be imposed on Infixation, if it is ordered after assimilation. In a nonderivational account without rule ordering, it is necessary to state either that assimilation takes place before labials and nasals, whereas Infixation affects only nonlabial or nonnasal consonants, or that Infixation affects consonants that are nonnasal and nonlabial, and that assimilation is computed on the surface representation. The first alternative stipulates an aspect of the solution that follows automatically on a derivational account; the second effectively introduces rule ordering into the derivation by stipulating that assimilation is computed on the surface representation.

4. Since it does not alter the syllable structure of the output string, Onset Metathesis (2b) does not affect the syllable structure of the output

string in any significant way. As noted in section 4.1, this conclusion is important in view of the fact that the Tagalog data have been widely cited as an instance where differences between underlying and surface structure are the result of the tendency of language to improve the syllabic well-formedness of surface strings over that of underlying sequences. Since no such difference between underlying and surface strings is involved in the solution that is to be preferred on general grounds, this suggested explanation is not valid.

Notes

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1. The need for an additional rule turning /in/ into /ni/ in these cases was noted specifically by French (1988, 42–43).
2. A similar situation arises in Tagalog, where the object TM suffix /in/ is deleted in all [+realis] forms. For example, the stem /linis-in/ ‘clean’ has the /in/ suffix in the [–realis] base form /linis-in/ and the contemplative form /lilinis-in/, but deletes /in/ in the [+realis] perfective form /ni-linis/ and the imperfective form /ni-lilinis/.
3. Topping states that /mu/ appears only before nonlabial nasals. As Michael Kenstowicz has observed (personal communication), the exclusion of labial nasals is unnecessary since Onset Metathesis is vacuous before labial nasals: for example, *mu-metgot* ‘become big’ (*metgot* ‘big’).
4. The discussion below is based on the somewhat sketchy information in Nababan 1981 and must therefore be taken as less than fully reliable. Numbers in parentheses preceded by *N* refer to pages in Nababan 1981 (e.g., (N74) = Nababan 1981, 74).

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