Morphophonology of the Maung Language*

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Abstract

This thesis aims to elucidate phenomena in the morphophonology of Maung, an Australian
language with an estimated 260 speakers. Using cross-linguistic typological patterns as a
framework, this paper discusses phonological phenomena that occur when two-consonant and
two-vowel clusters form across a morpheme boundary. Major topics include consonant cluster
reduction, sonority of onsets, and nasal place assimilation. Additionally, phonological processes
are prioritized in a manner conducive to future Optimality Theoretic analysis.

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1 Introduction

Maung (sometimes written Mawng) is an Australian language which has only about 260 speakers according to a 2006 census but is relatively well transmitted from parents to children. Maung is spoken on Goulburn Island, off the coast of the Northern Territory, Australia. It belongs to the subset of Yiwardic languages in the Yiwardjan group, of which all others are threatened or extinct. Prior to 1990, the only major published source on Maung was Capell and Hinch's 1970 grammar (henceforth CH70), though in recent years fieldwork has resumed, focusing primarily on Maung morphology and syntax (Singer 2006; Hewett 1990). Therefore, the major source of phonological information on Maung remains CH70. However, CH70 is not without its problems; for example, it posits a series of morphophonological rules, some of which do not appear to be backed up by its own data. Furthermore, though Singer 2006 is not primarily focused on phonology, it does take issue with a few of CH70's phonemic analyses. While the focus of this thesis is to reanalyze the data as it is presented in CH70, Singer 2006 will occasionally be referenced as a means of clarifying conflicting descriptions.

The goal of this thesis is to reanalyze a subset CH70's morphophonological data, confirming and improving upon its the formulation of its claims. Chapters 1 and 2 of CH70 address Maung phonology and morphophonology respectively, the latter discussing some phenomena which are purely phonemic and some which stem from syntax and morphology. In particular, it shows how certain particles, affixes, and verb formations cause phonological alternations. However, this thesis will primarily focus upon purely phonological changes that occur across the language, regardless of the types of morphemes involved. Specifically, this thesis will address phonological processes that act upon underlying two-consonant and two-vowel sequences that cross a morpheme boundary.

Despite its problems, CH70 is a thorough source on Maung morphophonology, making it possible to apply current theories in phonetics and phonology to the old data (e.g. Evans (1998) performs a historical analysis of Iwaidjan morphophonology using CH70 as his sole source on Maung). Since the debut of Optimality Theory in Prince and Smolensky 1993, no one seems to have published an Optimality Theoretic analysis of Maung phonology. And while it is not within the scope of this thesis to perform this analysis, my descriptions of Maung morphophonology have been structured in a manner that is meant to facilitate such an analysis in the future.
Maung has an inventory of 18 consonant phonemes (see Table 1) according to CH70. Singer disputes this, stating that the retroflex trill is in fact two alveolar flaps in a row or potentially an allophonically retroflex flap (2006:318-319). However, this debate is largely tangential to the analysis at hand and occurrences of the phoneme in question will be retained from CH70 (e.g. Table 2). In representing Maung’s sounds, particularly the consonants, CH70 uses certain typographic conventions which I have chosen to deviate from, for various reasons. As indicated in Table 1, CH70 uses the symbols b, d, dj, d, and g to represent sounds which are voiceless but lenis. By contrast, I have chosen symbols which reflect the voiceless quality of these sounds. I will also conform to IPA standards concerning retroflexes and palatals. For example I use η rather than CH70’s η, and CH70’s nj will be expressed as n’. Finally, the sound CH70 represents with j “for the sake of convenience” (p. 18) is described as an alveolo-palatal semi-vowel as well as “phonemically...[f]”. However, it does not show lateral behavior, and Singer (2006) describes it as corresponding to the IPA consonant j. Thus j will henceforth be used to represent this sound.

<table>
<thead>
<tr>
<th>Consonants</th>
<th>Bilabial</th>
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<th>Retroflex</th>
<th>Palatal</th>
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<td>t (d)</td>
<td>d (dj)</td>
<td>k (g)</td>
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<tr>
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<td>η (η)</td>
<td>n’ (nj)</td>
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<tr>
<td>Approximants</td>
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</tbody>
</table>

Table 1: Consonant phonemes in Maung. Based on Capell and Hinch 1970:17 with some typographic and terminological modifications. Characters in parentheses indicate the corresponding notation used in CH70.

CH70 includes a table (adapted here as Table 2, with the typographic modifications described above) illustrating the phonological processes that occur when consonants meet each other across a morpheme boundary (p. 36). The columns of this chart correspond to what CH70 calls the “mutable consonants,” that is, those consonants which are capable of mutating from an underlying form to a different surface form.
Table 2: Consonantal morphophonology in Maung. Illustrates changes to the surface representations of consonant clusters that occur across a morpheme boundary. Based on Capell and Hinch 1970:36 with typographic modifications.

CH70 outlines the conditions of these mutations (as follows):

In summary, when two consonants (C₁ and C₂) meet:
C₁ remains; C₂ becomes:
1. non-plosive → plosive unless C₁ is nasal
2. lateral and alveolar nasal disappear and are replaced by C₁
But if C₁ is η then η + 1 → nt ; η + p → ηk (p. 35)

However, these rules do not entirely reflect the patterns seen in Table 2, and since the examples given on pp. 36-37 of CH70 are in agreement with the data in Table 2 and not with the rules, it seems reasonable to assume that the table should be trusted over the rules. Rule 1 does not act in all cases where it conceivably could (for example /pw/ reduces to [p] rather than becoming [pp]), and a few stipulations need to be added to make it accurate where it does act (/nw/ becomes [np] even though preceding nasal consonants are supposed to be exceptions to rule 1). Worse, rule 2 is never accurate; nowhere in Table 2 is there a geminate consonant. In fact, Chart IV in CH70, which shows possibilities for word-medial consonant clusters (p. 26), also never shows a geminate consonant, and the grammar does
not discuss consonant length. Thus, modifications are necessary to understand phonological processes in Maung. Where a two-consonant cluster occurs across a morpheme boundary, the processes are actually far more complex than indicated in CH70 and will be addressed in two sections. Section 3 will address cluster reduction, where a two-consonant cluster surfaces as a single consonant. Section 4 will address clusters that do not reduce, with subsections addressing several types of changes within this classification.

First, however, I address two cells of Table 2 which I believe contain typographical errors on the part of Capell and Hinch. The first is the consonant cluster /mn/, which is shown in Table 2 to have a faithful surface representation, [mn]. Yet Chart IV in CH70 (p. 26), which shows permissible word-medial two-consonant clusters in Maung, indicates that the cluster [mn] is not permitted. This inconsistency seems to point towards a typographical error in one of the two tables. Singer (2006) also contains data on the subject of consonant clusters across a morpheme boundary (p. 57) and confirms that /mn/ → [mn], so most likely the error is with Chart IV in CH70. However, the analysis of this thesis remains unchanged either way.

The second typographical error is less obvious, but more pertinent to the following discussions. Chart VI in CH70, off of which Table 2 here is based, shows that at the meeting of /kl/ and /lj/ across a morpheme boundary, /j/ results. I believe this should read tl/. /j/ instead of tl/ would indeed be an easy error to produce and a hard one to spot in revisions. Chart VI in CH70 never shows cluster reduction occurring where C2 is /lj/, except in this instance, with /kj/. Additionally, Singer (2006) lists /kj/ as becoming [tll] rather than [tll]. For these reasons, I judge /kj/ → [tll] to be the result of a typographical error where the resultant surface form should read tl/. My analysis has been conducted as though the error had not been committed, and Table 2 reflects this.

Lastly, Chart VI in CH70 (again, the basis for Table 2) contains dashes in a number of cells and does not explain these. It is possible that a dash indicates no change, though the chart does have explicit entries in a few cases where no change occurs; it seems odd to use a dash for some cases of no change while explicitly listing others. It is also possible that the authors had no data to confirm what happens in such cases, or that there are no cases within the language where morphemes meet to create these clusters. The following analysis assumes the last explanation.

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1Singer (2006) uses a system of notation unlike that of Capell and Hinch and unlike the one used here. When looking at Singer’s chart on p. 57, it is important to understand that Singer’s /j/ corresponds to the /dj/ in CH70 and /’/ in this text.
3 The curious case of Maung CC reduction

As shown in Table 2, there are several places where underlying two-consonant clusters reduce to a single consonant. There are two important questions concerning this data; Firstly, what are the conditions in Maung phonology that cause these clusters to reduce, while others remain faithful or change in ways that still retain two sounds? Secondly, for cases where cluster reduction is the optimal solution, in what way does reduction happen? What phonological process produces a single sound where there were two underlying sounds?

3.1 Production of single-consonant surface forms

Let us first turn to the latter question. When looking at the clusters /pw/ and /wp/, which reduce to [p] and [w] respectively, it appears that the first consonant is retained and the second one deleted. This explanation also leads to the correct surface forms for the reduced clusters /pp/, /pm/, /py/, and /py/ which all become [p]; /tl/ and /tn/, which become [t]/; /t/ which becomes [t]; /kd/, /kn/, /ky/, and /ky/, which all become [k]; and /ny/ and /ny/ which become [n]. However, this explanation is in direct opposition to a few important typological patterns found cross-linguistically. McCarthy (2008b: 272) writes:

“In many languages, consonant clusters simplify by deleting the first consonant, but never the second one[...] In many languages, clusters assimilate by changing the first consonant to match the second one, but not the other way around[...] In short, the would-be coda is often targeted for deletion or assimilation, but the would-be onset never is.”

Deleting the second consonant, as suggested above for Maung, contradicts McCarthy’s statement about deletion preferentially “targeting” codas rather than onsets. It also goes against the finding that left edges of morphemes are less likely targets of deletion than right edges (Bye and de Lacy 2000). Thirdly, CH70 describes the morphophonemics of Table 2 as being “phonologically defined” rather than “morphologically defined”. That is, the patterns of Table 2 occur whether at a prefix-root boundary or a root-suffix boundary. Yet in languages around the world, phonological changes to the underlying form of a root are less likely than changes to affixes (Beckman 1999: 191). Thus, if the cluster /pw/ were to reduce to [p] across a prefix-root boundary, /w/ deletion would be a direct counter-example to three patterns of phonological change that occur cross-linguistically.

Fortunately, there is another possible explanation for how cluster reduction occurs. Let us look at two cases of cluster reduction in Table 2 which are not explained by the deletion of the second consonant; both /pl/ and /pn/ reduce to [t], not the expected [p]. Rather than
deletion, this appears to be coalescence, where the product has the manner and voicing of the first consonant but the place of articulation of the second consonant (see Figure 1).

\[
\begin{array}{c}
/p+1/ \\
\text{ vs. } \\
[t] \\
\end{array}
\quad vs. 
\begin{array}{c}
/p+1/ \\
\text{ or } \\
[t] \emptyset \\
\end{array}
\quad \emptyset [t]
\]

Figure 1: A schematic view of potential pathways to cluster reduction: coalescence (left), C₂ deletion (center), and C₁ deletion (right)

To illustrate this further, let’s look at how [p] and [w] can arise from /pw/ and /wp/ through coalescence rather than deletion. The sound [p] is a voiceless labial plosive, while [w] is a voiced labial approximant. If the underlying cluster is /pw/ and we take the manner and voicing from C₁ and the place attributes of C₂, the result is a voiceless plosive that is labial. Hence, [p]. Conversely, if the underlying cluster is /wp/ and we take the manner and voicing from C₁ and the place attributes of C₂, the result is a approximant that is labial. Hence, [w].

There is one other stipulation that needs to be added to make this second explanation consistently accurate, however. The apparent exceptions to the coalescence explanation are /t[ ]; /kl/ and /kn/, which surface as [t], [k] and [k] respectively. Both velar and retroflex sounds both involve retraction of the tongue body (Bhat 1974; Hamann 2002, 2003). It can therefore be said that where cluster reduction occurs, the consonant produced has the manner and voicing of the first consonant and the place of the second consonant unless one of the sounds involves retraction of the tongue body. In this case, the sound that surfaces retains that tongue retraction, whether it comes from the first or second consonant. To demonstrate, take the example of [k] arising from /kl/. The sound [k] is a voiceless velar plosive, and [l] is a voiced alveolar lateral. If we were to take the manner and voicing from C₁ and the place attributes of C₂, the result would be a voiceless alveolar plosive, i.e. [t]. However, C₁ has a retracted tongue root, and this attribute must be preserved. Thus, the sound that surfaces takes the manner, voicing, and place attributes of C₁. In other words, it is [k].

Therefore, in contrast to the deletion explanation of how Maung cluster reduction happens, the coalescence explanation doesn’t directly oppose cross-linguistic typological patterns, and it covers all cases of cluster reduction seen in Table 2.

3.2 Conditions leading to cluster reduction

Let us now turn to the question of why consonant cluster reduction occurs where it does, and why other faithful or other non-faithful representations of the underlying forms do
not suffice in these situations. In Table 2, the most common change from underlying to surface representations is one partially outlined in CH70: the second consonant in a cluster often changes to a plosive. Setting aside the fact that CH70 does not explain changes to the first consonant in the cluster, nor why the place of the second consonant sometimes changes as it becomes a plosive, that simple statement covers a lot of ground in explaining the phenomena of Table 2. Additionally, it makes sense that this is a common process. The second consonant in a cross-morphemic cluster is the onset to a syllable, and languages tend to favor onsets that place relatively low on the sonority scale, on which plosives are the lowest. So why does cluster reduction sometimes occur instead of this process?

CH70 contains a chart (Chart IV, not reproduced here, Capell and Hinch 1970: 26) that shows all of the word medial two-consonant clusters that appear in Maung. Chart IV shows that in 13 of 15 cases which produce a reduced consonant cluster, the underlying representation of that cluster is a disallowed combination. Furthermore, in 12 of those 15 cases, if the second consonant were to change to a plosive with the same place of articulation as its underlying form, the cluster formed would be one that does not appear in Maung. Thus, it appears as though cluster reduction is a backup plan when faithfulness and plosive-creation are not possible.

Through this analysis, it also becomes apparent that there are at least three clusters that are permitted word-medially in Maung (according to Chart IV) but avoided across a morpheme boundary. These are [pk], [wp], and [kŋ], and further discussion of the reasons for avoiding these clusters can be found in §4.7, §4.3, and §4.3 respectively.

To sum up, it seems that decreasing onset sonority is a priority ranked above certain types of faithfulness, but that onset sonority is in turn dominated by the prevention of certain cross-morpheme consonant clusters, including a few which are ostensibly permitted word-medially.

4 Morphophonology of consonant surface clusters without reduction

There are several patterns of phonological change that lead to the two-consonant surface clusters found in Table 2. The following sections will discuss phonological processes which occur unconditionally, those which occur often, and those which occur in just a few specialized cases.

4.1 Preservation of palatals and retroflexes

The first element of Maung morphophonology to emphasize is that geminate consonants never surface. Where they exist in underlying forms or would be created through some
phonological process, another process prevents them from appearing in the surface form.

The next unconditional process of Maung morphophonology is that an underlying palatal always surfaces as palatal. As discussed in §3.2, the second consonant in a cluster often becomes a plosive. Where that consonant is /j/ it becomes [t̚], retaining its palatal place. In most of these cases, the first consonant also changes, becoming alveolar, though it retains its nasal/oral identity. That is to say, in most cases, if C₂ is a nasal consonant, it becomes the nasal alveolar [n], while if C₂ is an oral consonant, it becomes the alveolar plosive [t]. Thus, /nj/ becomes [nt̚] because /n/ remains a nasal alveolar and /j/, the second consonant, becomes its plosive corollary [t̚], as it always does. By comparison, /rj/ becomes [r̚t̚] because /r/ is an oral consonant and thus changes to the alveolar plosive [t], while /j/, again, surfaces as the plosive palatal [t̚]. The latter is shown in example (1) below.

(1) kar-jama → katt̚ama, *karjama

‘we work’

However, since underlying palatals always surface as such, when the first consonant is a palatal, it cannot change to become alveolar. This means that /n̚j/ surfaces as [n̚t̚] rather than [nt̚]. The underlying sequence /t̚j/ is an interesting case as well; the first consonant must retain its palatal identity, but no geminate consonants may surface, as in *[t̚t̚]. CH70 represents the result of this underlying combination with an ambiguous dash.

It is important to note that while palatal sounds cannot lose this feature, a non-palatal sound can become palatal. Both /nl̚/ and /np̚/ surface as [n̚l̚].

Table 2 shows few consonant clusters with retroflexes. However, where they appear, these sounds are always preserved. As discussed in §3.1, cluster reduction usually occurs by taking the manner of the first consonant and the place of the second. However, where the underlying cluster is /t̚l/, this is not the case. The retroflex attribute of /t̚/ is preserved and the result is [t̚]. No non-retroflex phoneme ever surfaces as retroflex in Table 2.

Thus, three unconditional processes of Maung morphophonology are as follows:

(2) No geminate consonants ever surface
(3) Palatal phonemes always surface as palatals, without coalescence
(4) Retroflex identity is always retained, sometimes as part of coalescence

4.2 Progressive place assimilation of nasal-plosive clusters

Another process occurring unconditionally is that, where a mutable plosive, of which /p/ is the only one, follows a nasal, the plosive takes the place attributes of the preceding nasal.
(5) Mutable plosives *always* take on the place features of a preceding nasal, without coalescence.

After /m/, /p/ remains labial, but it changes to be alveolar, palatal, or velar depending on the preceding nasal. That is, /mp/ → [mp], /np/ → [nt], /n̥p/ → [n̥t̊]/ŋp/, and → /ŋk/.

### 4.3 Place features of adjacent consonants

Excepting cases of nasal place assimilation (§4.2), nowhere on Table 2 does a two-consonant cluster appear where both sounds have the same place features. It is possible that this is an effect of the obligatory contour principle for place (cf. McCarthy 1986). These sorts of clusters are avoided when they exist in the underlying representation, as well as when they would result from another morphophonological process. As alluded to in §3.2, [wp] and [kʃ] do not surface across a morpheme boundary—cluster reduction occurs instead. Avoidance of these sorts of clusters can also cause other unexpected results besides cluster reduction, as will be described in §4.4. Thus, while not an unconditional stipulation in Maung morphophonology:

(6) Clusters with two consonants of the same place are *strongly* avoided

This may be a result of limitations posed by listeners: if two adjacent sounds have the same place of articulation, they are more likely to be mistakenly interpreted as a single sound. But while [kʃ] is disallowed across a morpheme boundary, [ŋk] surfaces through place assimilation. Nasals are overall harder to distinguish from one another than are plosives, and nasal place assimilation is a common cross-linguistic result of this (Jun 1995; Kawahara and Garvey 2014). Perceptual distinctness is simply less important when it comes to nasal-plosive clusters.

### 4.4 Oral consonants preceding nasals

When an oral consonant precedes a nasal stop, the nasal becomes a plosive. The prototypical case is illustrated in (7), where /tm/ surfaces as [ṭp]. However, while the plosive produced usually has the same place features as the underlying nasal, this is not always the case: if /tm/ surfaced as *[ṛt]*, the two consonants would have the same place of articulation, violating the generalization in (6). Instead, [ṛk] is produced. Additionally, a reduced cluster is sometimes the result of an /oral-consonant + nasal/ cluster, as in (8), *[pų]*, which is not a cluster that exists in Maung, surfaces instead as [k].

(7) ŋat-mi-n → ŋat[pin], *ŋatmin
   ‘we say, do, be’
4.5 Clusters consisting of two nasal stops

When an underlying cluster consists of two nasal stops, the surface representation is usually faithful, as seen in (9). Exceptions exist where a geminate would be created, and two different strategies of avoiding gemination are evident in Table 2. The sequence /nn/ becomes [n̂] while /ŋŋ/ reduces to [ŋ̂]. Thus, the output can either contain two consonants, including faithful and modified versions of the underlying sounds, or reduction can happen. It should be noted that in the formation of nasals, the velum is lowered. This means that nasals involving full velar closure are, in terms of articulatory ease, likely to be produced. When /nn/ becomes [n̂], the first sound is based off of the underlying form, and the second is an easily articulated alternative to faithfulness. However, this strategy still results in gemination when used with /ŋŋ/, so the cluster reduces. This is further evidence (as in §3.2 and as will be seen in §4.7) that cluster reduction is avoided where changing one sound in the cluster produces a harmonious result, but that gemination is avoided at all costs.

(9) kan-mi-n → kanmin

‘you say, do, be’

4.6 Underlying consonant-glide clusters

(10) ar-wun-wana-ma → arpunpanama, *arwunwanama

‘we will take them’

Clusters containing /w/ as the second consonant behave somewhat similarly to those with the second consonant /j/, discussed in §4.1. In both cases, the glide becomes a plosive regardless of whether the preceding consonant is nasal or oral. In both cases, the glide retains its place features (/w/ behaving as a labial, never a velar). However, while the first consonant usually changes to a an alveolar nasal or an alveolar plosive before /j/ (as described fully in §4.1), /C₁/ surfaces faithfully when preceding /w/. Compare how /rj/ becomes [tt̂] in example (1) with how /rwm/ becomes [rp], the emphasized consonant cluster in (10). When followed by /w/, as in the latter case, /r/ surfaces faithfully as the first consonant and /w/ in turn becomes a plosive. On the other hand, when followed by /j/, /t/ surfaces as [t̂], though /j/ undergoes the same process as /w/ and becomes a plosive, [t̂].
4.7 /γ/ as the second consonant and derived environment effects

Interestingly, the surface forms that appear when /γ/ is the second consonant are exactly the same as when /η/, its nasal relative, is the second consonant. Underlying /γ/ surfaces as a velar plosive after an oral consonant and as a velar nasal after another nasal. When either of these processes would result in a geminate consonant, cluster reduction occurs. Cluster reduction also occurs, as mentioned briefly in §3.2, where these processes would cause [pk] to surface from /py/.

On a related note, both /tγ/ and /tη/ surface as [rk]. While we would expect the second consonant to become [k] given the other processes at work in Table 2, /t/ surfacing as [r] is not seen elsewhere. One explanation for this is that, like /pk/, /tk/ is a cluster that is permitted in roots but avoided across morpheme boundaries. Both of these clusters involve a plosive towards the front of the mouth preceding a plosive towards the back of the mouth; this means that air pressure has to build up fully, twice. On the other hand, in a cluster like [kt], the pressure built up at the back of the mouth can be stopped again towards the front. In other words, the air travels forward and is obstructed twice, creating two sounds. Thus, [kt] takes less time and pulmonic effort than [tk] or [pk], which are, by comparison, marked phonological structures.

Marked structures are less likely to surface in affixes than within roots (Beckman 1999: 191), and because Table 2 describes phonological processes that occur regardless of the types of morphemes involved, either or both of the consonants in a sequence could be part of an affix. The avoidance of /pk/ and /tk/ across the morpheme boundary is therefore not unexpected. And while /tk/ is avoided by changing /t/’s values for sonorancy, continuancy, and voicing, the same is not possible for /pk/. A move from /p/ to [w] would involve an additional change: the value of the consonantal feature. While non-Consonantal sounds often become consonantal in Table 2 (in order to produce a low sonority onset), the reverse never happens. Therefore, /pk/ reduces instead. Put schematically, the above information can be expressed:

(11) /η/ and /γ/ surface as a velar nasal or velar plosive when preceded by a nasal or oral consonant respectively

(12) clusters of a relatively-front-plosive and [k] are undesirable and never surface across a morpheme boundary

(13) if possible, these are prevented from surfacing by changing the first consonant’s values for sonorancy, continuancy, and voicing
a sound may not change from consonantal to non-consonantal: where this stipulation limits process (13), clusters of a relatively-front-plosive and [k] are avoided through cluster reduction.

### 4.8 The tangled web of Maung alveolar morphophonology

While most of the morphophonology concerning Maung alveolars has already been described, there are a few elements of Table 2 which have not been addressed, and which are connected to the others around it in a somewhat complex way. Consequently, this section will synthesize and add to the information concerning that data, repeated in Table 3 below.

<table>
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<tr>
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</table>

Table 3: A subsection of Table 2, used to illustrate the complexities of Maung alveolar morphophonology.

The sequence [rk] shows up frequently in Table 3, despite the absence of underlying /rk/. It seems that in Maung, when certain clusters must be avoided, [rk] is often similar enough to (and more harmonious than) the underlying form. As discussed in §4.7, velar nasals and fricatives often become /k/, and this change triggers /ı́/ to become [r]. Additionally, underlying /ı́/ remains faithful. Thus, we have explanations for the underlined results in Table 3.

One datum that has not yet been addressed is that /ı́/ surfaces as [rk]. However, it is possible to make sense of this result; as with /ı́/ (discussed in §4.4), if the second consonant merely became a plosive, the product would be */ı́l/, which is not a permitted cluster in Maung. Thus, /ı́l/ changes to [k] following /ı́/. The sound /ı́l/ also becomes [k] when it follows /ı́l/, producing [nk]. In this case, though, it is unclear why. /ı́l/ surfacing as [nt] would require no change in /ı́l/’s place features, and [nt] is not only a permitted cluster in Maung, it is also the product of /ı́/1/. Thus, it can appear across morpheme boundaries. Furthermore, it seems very strange that /ı́l/ would surface as the unassimilated nasal-plosive cluster [nk] while /ı́l/ surfaces with progressive place assimilation and /ı́l/ surfaces with regressive place assimilation. There is no obvious reason why these forms should be behaving so differently.
4.9 Summary

Maung consonantal morphophonology is thus far more complex than is indicated by CH70. Consonant clusters formed across a morpheme boundary are rarely entirely faithful to the underlying sounds, and a surprising number of processes act upon them to produce the surface forms seen in Table 2. Contrary to cross-linguistic typological patterns, the second consonant in the cluster (thus, a left edge, an onset, and sometimes the first sound in a word root) is usually the one to surface unfaithfully. As seen in §3.1, it is possible to explain Maung consonant cluster reduction such that the second consonant has not been deleted. However, the fact remains that the second consonant in an underlying cluster is often subject to change. Usually, it becomes a plosive, though the place features of this plosive are not always predictable. Additionally, in the few cases where the first consonant does not surface faithfully, its form is relatively unpredictable.

This is not to say that patterns do not emerge from the data. They do, and some of them line up with phonological processes observed cross-linguistically. It is also possible to put these processes into a loose schema of priority. Each of the following statements is outranked by the ones preceding it, except as indicated by the words ever or always. Each statement is preceded by the section(s) in which it is primarily discussed.

(15) §4.1 No geminate consonants ever surface
(16) §4.1 Palatal phonemes always surface as palatals, without coalescence
(17) §4.1 Retroflex identity is always retained, sometimes as part of coalescence
(18) §4.2; §4.3 Mutable plosives always take on the place features of a preceding nasal, without coalescence
(19) §4.3 Clusters with two consonants of the same place are strongly avoided
(20) §4.7 Clusters of [fronter-plosive + backer-plosive] are always avoided
(21) §4.7 Sonorancy, continuancy and voicing of a phone can be altered to accomodate the above
(22) §3.2; §4.7 Low sonority onsets are favored except where it violates the above
(23) §4.7 A sound may change from non-consonantal to consonantal, but not the reverse
(24) §3.2; §4.5; §4.7 Both underlying sounds in a cross-morphemic cluster should surface, as long as the above priorities do not pose limitations on this
(25) §3.1 If cluster reduction must happen, an underlying sound with a retracted tongue body will always surface as such
§3.1 If neither /C₁/ nor /C₂/ involves a retracted tongue body, the sound that surfaces will have the manner and voicing of /C₁/ and the place of /C₂/.

While the primary goal of this thesis is to improve upon and elucidate the phenomena of Maung morphophonology as described in CH70, the secondary goal is to facilitate future Optimality Theoretic analyses of these data. Some adjustments to the above schema will be necessary to situate certain points within an OT framework. For example, Optimality Theoretic constraints are not permitted to discuss the relationship between underlying and surface representations, as in (23) (McCarthy 2008a:38). Generally, however, the content of §3 and §4 should serve as a suitable foundation for a future OT analysis of Maung consonantal morphophonology.

5 Maung vocalic morphophonology

CH70 appears to indicate that Maung has five vowel phonemes (pp. 22-24). However, its chart on vowel morphophonemics (Chart IX, p. 39) shows only three underlying vowel phonemes, /i/ /a/ and /u/. By virtue of this small number, Maung vowel morphophonology is simpler than that of the consonants. Table 4 (based on Chart IX) shows the surface representations that result from the meeting of two vowels across a morpheme boundary.

<table>
<thead>
<tr>
<th>V₁</th>
<th>V₂</th>
<th>i</th>
<th>a</th>
<th>u</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>i</td>
<td>ɪ</td>
<td>ju</td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>ɛ</td>
<td>a</td>
<td>u</td>
<td></td>
</tr>
<tr>
<td>u</td>
<td>wi</td>
<td>o</td>
<td>u</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Vocalic morphophonology in Maung. Illustrates changes to the surface representations of vowel clusters that occur across a morpheme boundary. Based on Chart IX in Capell and Hinch 1970 (p. 39) with the modification that the cell for /iu/ has been made to reflect surrounding descriptions from CH70.

Following these data, there appear to be four processes which act on such /VV/ formations. These will be discussed in §5.1-§5.4. Beforehand, however, an apparent error in CH70 must be addressed.

There appears to be an typographic mistake in Chart IX, which indicates that /iu/ becomes [u]. By contrast, the preceding prose states that “assimilation and cluster reduction may occur, with the exception of the sequences u + i and i + u, as may be seen in Chart
IX” (CH70:39). Put simply, /iu/ should not be subject to cluster reduction. Additionally, an example on page 40 of CH70 supports the prose, rather than the chart:

(27) η-i-utpa-n → ηjutpan, *ŋjutpan *ŋutpan
    ‘I put him’

In (27), the underlying representation does not surface faithfully, nor does it surface with [u] in lieu of /iu/. For these reasons, Table 2 has been modified to show that /iu/ surfaces as [ju].

5.1 Vowel shortening

CH70 states that vowel length varies but carries no meaning. Thus, underlying duplicate vowels can be articulated as long, but they do not systematically do this more than other, non-duplicate vowels. As shown in (28), /ku + utpa/ becomes [kutpa] rather than *[kuutpa]. This process of shortening applies across the board, to all combinations of duplicate vowels.

(28) ku-utpa → kutpa, *kuutpa
    ‘you put it’

5.2 The first of two high vowels becomes a glide

A second rule that applies across the board is that exemplified in (29). When two different high vowels create a cluster across morphemes, the first becomes the corresponding glide. The second high vowel surfaces faithfully. That is, /i/ becomes [j] before /u/ (which surfaces faithfully in this position) and /u/ becomes [w] before /i/ (ditto). Thus, /kuikpi/ surfaces as [kwikpi].

(29) ku-ikpi → kwikpi, *kuikpi
    ‘you waken him’

5.3 [u] wins out

As shown in (30), when /u/ is the second vowel in a cluster across a morpheme boundary, only [u] surfaces. However where the underlying form is /iu/, process (29) takes precedence and (30) does not act. In that case, [ju] is produced rather than [u]. Additionally, it is not possible to tell which process causes /uu/ to surface as [u]. It may be process (30), causing the second /u/ to surface while suppressing the first. On the other hand, it may be process (28) at work, reducing the duplicate vowel.

This process may be related to the preference for backness seen with consonants; retracted tongue bodies always surface in cluster reduction (§3.1), [r̩k] is the alternative
that surfaces to avoid *[rt] (§4.4 and §4.7), and the list continues. There may therefore be a
general preference for back sounds in Maung that has effects on both two-consonant and
two-vowel clusters across a morpheme boundary.

(30) ku-wana-utpa → kuwanutpa, *kuwanautpa
‘you will put it’

5.4 Vowel coalescence

Vowel coalescence, as seen in (31), acts upon three underlying vowel sequences; where
the underlying forms are /ai/ and /ia/, the result is the front open-mid vowel [e]. Where the
underlying representation is /ua/, however, the result of coalescence is a back vowel [ə].
Theoretically, we might expect coalescence to occur where the underlying representation is
/au/, producing [ə]. However, in this case, as shown in (30), [u] is the form that surfaces.
Thus, the process exemplified in (31) only occurs where processes (28-30) cannot act.

(31) ki-ŋa-irka → kiŋərka, *kiŋairka
‘she spears him’

5.5 Summary

There are certain parallels that appear between consonantal and vocalic morphophonology.
Both occasionally exhibit a preference for back sounds, coalescence appears to be an
important process with regards to both, and geminate sounds, whether consonants or vowels,
are not permitted in Maung. As with consonants, it is possible to turn the above discussions
concerning vowels into a prioritized list of phonological processes.

(32) No two-vowel clusters may surface
(33) §5.1 Duplicate vowels may reduce
(34) §5.2 A high vowel preceding another high vowel may become [−syllabic]
(35) §5.3 A cluster where /N2/ is /u/ surfaces as [u] (excepting above environments)
(36) §5.4 Clusters containing a high vowel and /a/ coalesce regardless of order (excepting
above environments)

While currently in a format similar to ordered SPE-type rules (Chomsky 1968), this
list could serve as the basis for an Optimality Theoretic analysis of Maung vocalic mor-
phophonology.
6 Conclusion

While Capell and Hinch 1970 provides a good data set for exploring phonologically determined processes in Maung, its own analysis of these processes is incomplete and in some places contradictory. The goal of this thesis is therefore twofold. The primary objective is to parse out different elements of Maung consonantal and vocalic morphophonology, and to elucidate processes acting upon underlying cross-morphemic clusters. Second, by performing this analysis in a way that emphasizes the hierarchy of these processes, this thesis aims to provide the groundwork for a further analysis of the data using an Optimality Theoretic framework. Ideally, that analysis should delve into the issue of “mutable consonants” and the types of consonant clusters that are permitted to appear word medially (though perhaps not across a morpheme boundary). It would also hopefully clarify why Maung nasal place assimilation sometimes occurs progressively, sometimes occurs regressively, and why in one case, an assimilated nasal is prevented from surfacing.

Thus, there is still work to be done with this complex set of data. However, this thesis forms a conceptual bridge between fieldwork originally published several decades ago and research that can take place in the future, research that will be able to apply newer, up-to-date theories to old data.

Appendix

Examples of consonantal morphophonology

The following examples are based off of data given on pp. 36-37 of CH70. Typological modifications have been made so that they match the notation used in this thesis, except in (40) where, because of a potential typological error in CH70, the original notation has been used. Emphasis has been placed on the source of confusion.

There also appears to be a typological error in CH70 concerning the pronunciation of ‘heavy’, as seen in (50). The appendix lists ‘heavy’ as lagbi (here, lakpi) while on p. 37 of CH70 the morpheme in isolation is written as labgi (here, lapki). The morpheme in combination with other particles is written (p. 37) with the sequence gb (kp), in agreement with the appendix, so it is likely that this is the correct combination. Example (50) below is written as though the error had not been committed.

(37) ɲat-mi-n → ɲatpin, *ɲatmin
   ‘we say, do, be’
(38) ɲat-jama → ɲattama, *natjama
(39) ɲat-laŋali → ɲataŋali, *ɲatlaŋali
‘we work’

(40) ɲar-ginjga → ɲarginjga
‘we stand’

(41) kar-wun-ma → karpunma, *karwunma
‘we talk’

(42) kar-mi-n → karpin *karmin
‘we take them’

(43) kar-jama → kattlama, *karjama
‘we say, do, be’

(44) kar-laŋali → karkaŋali, *karlaŋali
‘we work’

(45) kar-ŋalju → karkalju, *karŋalju
‘we stand’

(46) kan-wun-ma → kanpunma, *kanwunma
‘we are crooked’

(47) kan-mi-n → kanmin
‘you take them’

(48) ar-wun-wana-ma → arpunpanama, *arwunwanama
‘you say, do, be’

(49) ninl-wuyi → ninlbuyi, *ninlwuyi
‘we will take them’

(50) nuŋ-lakpi → nuŋtakpi, *nuŋtakpi
‘she is worn out’

(51) ninl-ŋitalk → ninlŋitalk
‘it is heavy’

(52) nuk-lari → nukari, *nuklari
‘her body’

(53) nulj-lakpi → nuljtakpi, *nuljtakpi
‘your limb’
(53) nuk-mawur → nukbawur, *nukmawur
   ‘your arm’
(54) ŋ-ap-ma → ŋapa, *ŋapma
   ‘I take it’
(55) kap-ŋa-ma → kakama, *kapŋama
   ‘she takes it’
(56) nap-liri → natiri, *nap-liri
   ‘it is hot’

Examples of vocalic morphophonology

The following examples are based off of data given on p. 40 of CH70. Typological modifications have been made so that they match the notation used in this thesis.

(57) ŋ-i-inš-t — → ŋinšt i, *ŋinšt i
   ‘I examine him’
(58) ŋ-i-aja-n — → ŋejan, *ŋiajan
   ‘I see him’
(59) ŋ-i-utpa-n — → ŋutpan, *ŋjutpan
   ‘I put him’
(60) ki-ŋa- irka — → kiŋerka, *kiŋairka
   ‘she spears him’
(61) an-wana-alju — → anbanalju, *anwanaalju
   ‘you will hear’
(62) ku-wana-utpa — → kuwanutpa, *kuwanutpa
   ‘you will put it’
(63) ku-ikpi — → kwikpi, *kuikpi
   ‘you waken him’
(64) ku-atpi — → kɔtpi, *kuatpi
   ‘you hold it’
(65) ku-utpa — → kutpa, *kuutpa
   ‘you put it’
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