

Syllable Structure in Imyan Tehit*

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1 Introduction

Tehit is spoken by approximately 8,500 people, the majority of whom live in the district of Teminabuan in the regency of Sorong in Irian Jaya, Indonesia. It is one of five Papuan (non-Austronesian) languages located in the western Bird's Head (Doberai) Peninsula comprising the West Bird's Head Family (also known as the Toror Language Group). It is classified as part of the West Bird's Head Stock of the West Papuan Phylum (Voorhoeve 1975, Wurm and Hattori 1981, Heikkinen and Silzer 1984). Like other languages of the Bird's Head Peninsula, it has SVO word order and simple morphology, unlike the majority of Papuan languages.

Tehit is composed of eight major dialects: Jit, Mbolfle, Saifi, Imyan, Sfaryere, Fkar, Sawiat, and Salmeit (Flassy and Stokhof 1979). The language exhibits extensive geographic lexical chaining among its 30 villages, with variance in lexical non-cognates reaching 40% between north and south or east and west boundary extremes (Hesse and Jung 1988). This study concentrates on the lexically and geographically central Imyan Tehit dialect spoken by approximately 2,000 people living in six villages in the subdistricts of Haha and Sawiat.

In recent years, a number of studies dealing with the West Papuan Phylum have appeared. Flassy, linguist and native speaker of Tehit Jit, has documented the phonology of

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focusing on sonorant – consonant clusters (6a) and (6b). Such clusters begin with liquids or nasals and are not very common.

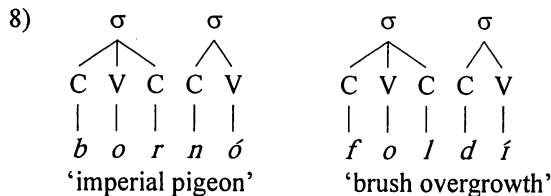
Consider the following words with liquids in cluster-initial position:

- 7) Liquid – Consonant Clusters
- | | |
|-----------------|--------------------|
| <i>marφít</i> | ‘strainer’ |
| <i>t-arφí</i> | ‘I go upstream’ |
| <i>φirφíri</i> | ‘just now’ |
| <i>worsé</i> | ‘type of fish’ |
| <i>qarmáq</i> | ‘bird of paradise’ |
| <i>qarná</i> | ‘hibiscus flower’ |
| <i>bornó</i> | ‘imperial pigeon’ |
| <i>erwás</i> | ‘animal’ |
| <i>φoldí</i> | ‘brush overgrowth’ |
| <i>talhén</i> | ‘hot’ |
| <i>alwoqáφe</i> | ‘wave’ |

I will argue that these clusters are heterosyllabic by arguing against the tautosyllabic alternative. Two lines of evidence indicate that the liquid – consonant clusters in (7) should not be interpreted as complex onsets. First, such an interpretation would be in violation of the Sonority Sequencing Generalization (Greenberg 1978:261-270; Bell and Saka 1983:259), which prefers decreasing sonority with increasing distance from the syllable’s nucleus, just the opposite of much of the above data under a complex onset analysis. Sonority reversal alone, however, is insufficient evidence to discount the possibility of a complex onset.⁹ Weightier evidence against a complex onset interpretation comes from the fact that there are no word-initial consonant clusters beginning with a liquid. If a language exhibits word-medial complex onsets, one should also find them in word-initial position.

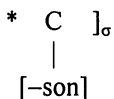
Since the possibility that the liquid – consonant clusters are complex codas is ruled out by the UCSC, the only possible interpretation left is that these consonant clusters are heterosyllabic, as shown in (8):

⁹ An extreme case in point is Quiégolani Zapotec, a Southern Zapotec language of Oaxaca, Mexico, which is analyzed as consisting of predominantly monosyllabic words with a majority of consonant clusters exhibiting sonority reversal with respect to the syllable peak (Regnier 1993).



This analysis of word-medial consonant clusters indicates that Imyan Tehit has a single consonant slot in coda position. An initial attempt at specifying a coda condition might be to restrict membership to sonorants, as indicated below:

- 9) Initial Coda Condition: Obstruents are excluded from coda position.



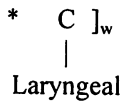
Not all sonorants, however, are permitted in coda position, as I will now show. Consider word-medial consonant clusters of the second type. The first consonant is a nasal and the second a homorganic stop. Here the clusters are presented in their surface form:

- 10) Word-Medial Nasal – Stop Clusters

<i>sampe</i>	‘type of sago palm’
<i>qampo</i>	‘canoe flooring’
<i>qompojó</i>	‘type of palm’
<i>endi</i>	‘canoe outrigger crossbar’
<i>hendás</i>	‘wow!’
<i>qandehe</i>	‘type of song’
<i>qantaraq</i>	‘pineapple’
<i>qinti</i>	‘sand’
<i>montiq</i>	‘woven basket’
<i>w-onggir</i>	‘it (pig) grunts’
<i>moggot</i>	‘large prawn’

The coda condition as currently stated allows for nasals in coda position, which implies a heterosyllabic interpretation for nasal – stop clusters (**qin.ti* ‘sand’). The problem with this interpretation lies in the restricted class of consonants permitted to follow a nasal. One would expect to find nasal codas followed by any consonant class (stop, continuant, or sonorant), as is the case with liquid codas in (7). If nasal – stop clusters are heterosyllabic,

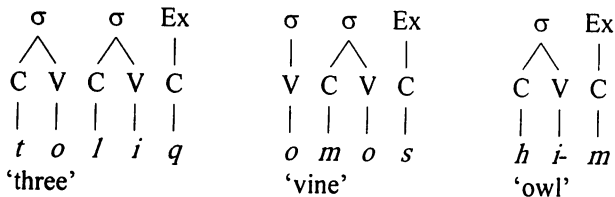
- 13) Word-Final Single Consonant Condition: Stops with voice and /h/ cannot occur word-finally.



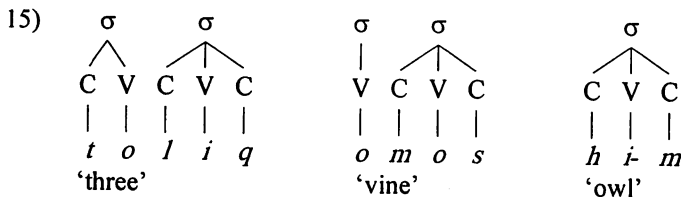
For monomorphemic and non-suffixed words, the set of restricted word-final consonants is extended to include the bilabial nasal /m/ and the glides [w j] (from /o i/). These phonemes are specifically reserved as consonantal word-final suffixes for a system of third person noun phrase number/gender marking (see section 3.4.4). Only a single suffix slot is indicated in Tehit morphology. Thus, those consonants allowed root-finally are the voiceless obstruents (/t q φ s/) and the coronal consonantal sonorants (/n l r/).

Because of the general Coda Condition (11), obstruents, nasals, and glides cannot be prosodically licensed. Instead, these segments must be extraprosodically licensed in accordance with the Word-Final Single Consonant Condition. In this way, they are protected from stray erasure during any lexical derivation cycles:

- 14) Word-Final C Extraprosodic Licensing



Postlexically, extraprosodic licensing no longer applies and the previously extraprosodically licensed segments are allowed to link up as word-final codas:

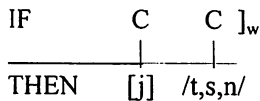


2.4.2 *Word-Final Consonant Clusters.* Clusters of two consonants may also occur word-finally. These clusters consist of the glide [j] followed by /t s n/. The vowel preceding them is always stressed. Examples are given in (16):

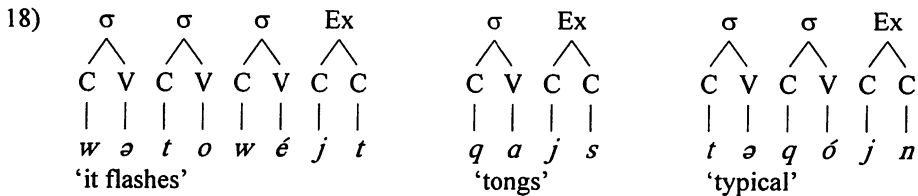
16)	<i>dajt</i>	'not'
	<i>hə.nájt</i>	'worm'
	<i>wə.qójt</i>	'tree'
	<i>tə.lójt</i>	'I enter'
	<i>nə.téjt</i>	'your leg'
	<i>wə.to.wéjt</i>	'it flashes'
	<i>qajs</i>	'tongs'
	<i>tə.bájs</i>	'I cut off'
	<i>m-.sójs</i>	'she gives birth'
	<i>mə.qo.dójs</i>	'its bone'
	<i>mə.réjs</i>	'by self'
	<i>wə.sə.qa.léjs</i>	'he trades'
	<i>hajn</i>	'louse'
	<i>wə.sájn</i>	'he wraps in leaves'
	<i>tə.qójn</i>	'typical'
	<i>n-.sə.rójn</i>	'you write'
	<i>qejn</i>	'first'
	<i>wə.te.réjn</i>	'he's diligent'

In consideration of the above data I posit the following rule:

- 17) Word-Final Consonant Cluster Condition: A word-final consonant cluster can only consist of the glide [j] followed by a coronal nasal or coronal voiceless obstruent:

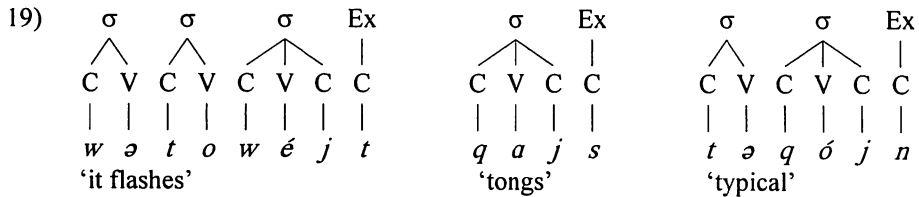


2.4.3 *Multisegment Extraprosodicity*. The above data indicate that word-final consonant clusters must be extraprosodically licensed as a unit, as shown below:



Such multiple-segment licensing at word boundaries is a significant deviation from standard extraprosodic licensing, which assumes room for only a single segment. But it seems there are no alternative approaches. If one were to relax the general coda condition to

permit glides as codas, this would leave the final consonant to be licensed by standard single-segment Extraprosodicity as follows:



With such a relaxed coda condition, however, one would expect to find glides as codas in any position in the word (**aj.ta*, **taj.sa*, **rej.na*, **qoj.to*, etc.). But this is clearly not the case; they are only found in word-final syllables. For the same reason, the glide cannot be incorporated as a vowel into a revised syllable template [CCVVVC], implying a branching nucleus. If this were so, one would predict that non-word-final falling diphthong nuclei are possible, but there are none.

If it is assumed that only one segment of a word-final consonant cluster is allowed to be extraprosodically licensed, then the remaining consonant must either be deleted by stray erasure, or incorporated through stray epenthesis. Neither of these processes, however, are observed to be operating word-finally, and the complex glide-consonant coda remains. The Imyan Tehit data indicate that the domain of word-final extraprosodicity is not limited to a single segment, but includes the entire sub-syllabic domain of coda.

2.5 Onsets

2.5.1 Simple Onsets. Unlike the coda, no restrictions apply to simple onsets; any consonant is possible, as (20) illustrates.

- | | |
|-----------------|----------------------------|
| 20) <i>mpar</i> | ‘sago stem’ |
| <i>qa.mpo</i> | ‘canoe flooring’ |
| <i>bol</i> | ‘house’ |
| <i>to.ba</i> | ‘type of marriage cloth’ |
| <i>ti.tir</i> | ‘wall’ |
| <i>qa.taq</i> | ‘sole’ |
| <i>dajt</i> | ‘not’ |
| <i>a.da</i> | ‘domestic breadfruit tree’ |
| <i>qa</i> | ‘taro root’ |
| <i>sa.qa</i> | ‘third cloth payment’ |
| <i>φa.tar</i> | ‘bridge’ |
| <i>a.φan</i> | ‘grub’ |

<i>sa.be</i>	'tree kangaroo'
<i>ba.sáq</i>	'in the future'
<i>ha.nas</i>	'louse nit'
<i>qa.hat</i>	'spear'
<i>ma.baq</i>	'raft'
<i>qo.min</i>	'wind'
<i>not</i>	'cloth'
<i>da.nít</i>	'handle'
<i>laq</i>	'two'
<i>ta.li</i>	'sun'
<i>ra.da</i>	'palm frond base'
<i>ba.ret</i>	'floor'
<i>wa.mar</i>	'hornbill bird'
<i>to.wá</i>	'bee'
<i>ja.har</i>	'ten'
<i>qe.já</i>	'bag'

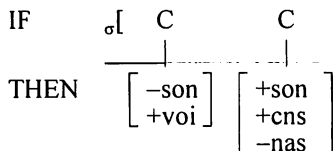
2.5.2 *Complex Onsets*. Complex onsets are not uncommon in Imyan Tehit although they are only found in stressed syllables. They always consist of a voiced stop followed by a liquid, as seen in (21).

21) <i>breϕ</i>	'jaw harp'
<i>blen</i>	'nipa palm'
<i>ta.brá</i>	'jungle'
<i>qə.bri.miq</i>	'live coals'
<i>wə.qa.blóq</i>	'he's naked'
<i>t-sa.blít</i>	'my esophagus'
<i>t-a.blé</i>	'my buddy'
<i>dret</i>	'blackbird'
<i>dle</i>	'myna bird'
<i>se.drár</i>	'type of vine'
<i>ba.dlí</i>	'imperial pigeon'
<i>o.dló</i>	'nightjar (bird)'

The voiced stop – liquid clusters in word-medial position shown above cannot be parsed as heterosyllabic (**tab.ra*). Stops are never followed by obstruents or nasals. Under heterosyllabic parsing, any attempt to account for these facts would violate the principle of Locality. Neither can these clusters be parsed as complex codas word-medially (**tabr.a*) because that would violate both the UCSC and the Sonority Sequencing Generalization.

They unequivocally indicate a complex onset (*ta.bra*), which is subject to the following condition:

- 22) Branching Onset Condition: A cluster of two consonants may function as a syllable onset if the first consonant is a voiced stop and the second is a liquid.



2.5.3 Obligatory Onset Condition. An important condition on the Tehit syllable template, however, is the stipulation that onsets are obligatory except in word-initial position, a requirement that eliminates the possibility of non-word-initial V and VC syllables. For a starting point, I posit obligatory onsets, minus the word-initial exception:

- 23) Initial Obligatory Onset Condition: A syllable cannot begin with a vowel.

* σ [V

The onset requirement is deduced from the Universal Core Syllable Condition (UCSC) coupled with the observation that no true vowel sequences (**ae*, **ea*, **aa*, **ee*) exist in Tehit words. The UCSC states that a CV sequence is universally tautosyllabic, and the absence of vowel sequences eliminates the possibility of a heterosyllabic junction of vowels (V.V).

The Obligatory Onset Condition, as currently stated, would rule out words beginning with vowels. Yet, vowel-initial words are not uncommon in Tehit, accounting for some five percent of all words:

- 24) Vowel-Initial Words

<i>a.sa</i>	‘sugar cane’
<i>a.φis</i>	‘trap’
<i>om</i>	‘she’
<i>o.φir</i>	‘type of snail’
<i>ej</i>	‘they’
<i>e.rén</i>	‘fish’
<i>i.φót</i>	‘turtle’
<i>i.lit</i>	‘type of sago palm’

A logical attempt at salvaging the Obligatory Onset Condition is to construct the rule with sufficient context to identify and only operate on non-word-initial syllable boundaries:

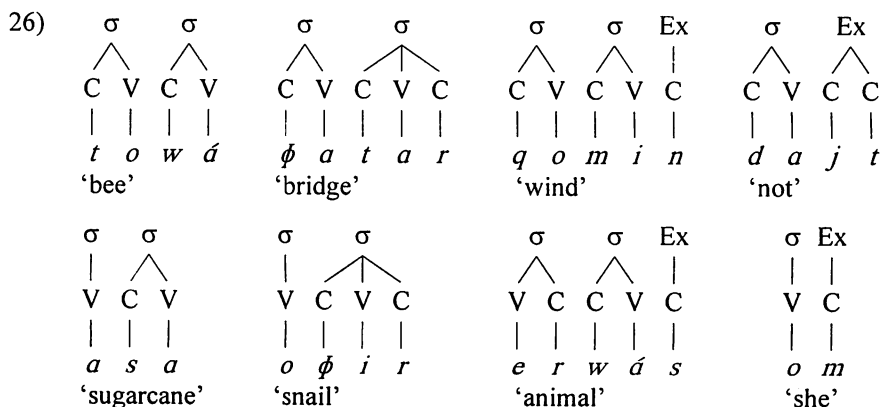
- 25) Revised Obligatory Onset Condition: Non-word-initial syllables cannot begin with a vowel.

*]_σ σ[V

The apparent problem with this approach, however, is that the necessary context lies outside the syllable in question, and as such constitutes a breach of the Locality principle. Strict adherence to Locality requires that rules be blind to the existence of other syllables, and consequently to syllable position within a word.

Instead of having to abandon the Obligatory Onset Condition with its powerful restriction on vowel sequences, the solution to the apparent dilemma hinges on the recognition that the above condition is more than just a syllable structure condition; it is also a word structure constraint. And as such it is operative in a unique domain, the subset of the prosodic domain which excludes the first syllable.¹⁴ The formulation of this rule necessarily ignores Locality at the syllable level.

There is no need to posit word-initial extraprosodicity for Imyan Tehit. The prosodic licensing of words beginning with and without onsets is illustrated in (26). Those without onsets are permitted because the Revised Obligatory Onset Condition excludes the word-initial syllable from its domain of operation.



¹⁴ Itô (1986:157) hints at, but does not develop, a word-initial extraprosodic solution for Axininca Campa which also has obligatory onsets except word-initially: "Axininca [only] permits onsetless syllables in word-initial position. Some version of initial extraprosodicity might be invoked to account for this. We could assume that the domain in which all syllables must satisfy the syllable structure conditions starts from the head (i.e. the vowel) of the initial syllable. This requires word-medial syllables to have onsets."

2.6 *Branching Nuclei*

There are three types of consonant clusters that may precede a syllable peak: stop – liquid, consonant – glide, and nasal – stop. Stop – liquid clusters form complex onsets, as was seen in the previous section. Even more common, however, is the consonant – glide cluster, consisting of a consonant followed by the front glide [j], as illustrated in (27) below. There are no limitations on consonants which may precede [j]. Note also that *Cj* clusters only occur in stressed syllables:

27) <i>bje.le</i>	‘garden’
<i>si.bjár</i>	‘wasp’
<i>ti.tjo.qo</i>	‘coconut’
<i>djo</i>	‘type of hawk’
<i>a.dját</i>	‘squash’
<i>qje.φen</i>	‘type of flower’
<i>sa.qjén</i>	‘head hair’
<i>φjen</i>	‘together’
<i>tə.qa.φjén</i>	‘I carry on shoulder’
<i>sja.man</i>	‘type of fern’
<i>a.mi.sjá</i>	‘echidna (anteater)’
<i>hje</i>	‘I feel for you!’
<i>qa.mjí</i>	‘very’
<i>tə.qa.njét</i>	‘I measure’
<i>la.ljé</i>	‘ant’
<i>tə.wjén</i>	‘I go get’
<i>qə.mpjé</i>	‘fish fence’

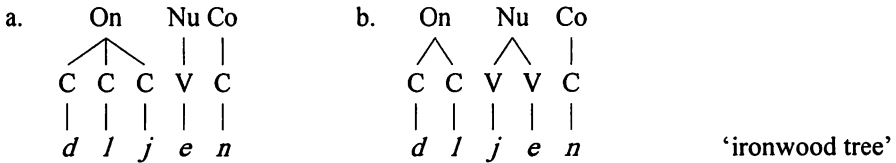
Just like other word-medial two consonant clusters, *Cj* clusters cannot be interpreted as complex codas because that would violate the UCSC and the Sonority Sequencing Generalization. In addition, the following are reasons for interpreting word-medial *Cj* clusters as tautosyllabic rather than heterosyllabic clusters:

- 1) Tehit has clear cases of words that begin with consonant-glide clusters, indicating that complex onsets or complex nuclei occur in the language (i.e. [bjéle], [djo], [qjéφen], [sjáman], etc. as seen above). Not all *Cj* combinations are found word-initially, but enough do exist to establish this pattern for word-medial clusters as well.
- 2) Any consonant except [j] may precede the glide. This pattern of non-restriction aligns closely with the freedom exhibited by simple onsets, whereas codas are shown to be considerably restricted, both word-medially and word-finally.

3) Recall that only four types of consonant clusters are attested word-medially in Imyan Tehit (as listed in (6) above). In some cases, the classes of consonants permitted to form a cluster are extremely limited. Voiceless obstruents, for example, can only be followed by the high front glide [j]. If *Cj* clusters are interpreted as heterosyllabic, then the restriction that voiceless obstruent codas be followed only by glide onsets violates the principle of Locality. Thus the only remaining alternative is a tautosyllabic analysis.

Having established that consonant – glide clusters are tautosyllabic and come before the peak, there remains the interesting question about the domain into which the glide falls. Should it be interpreted as the final constituent of a complex onset, as in (28a), or as the first constituent of a complex nucleus, as depicted in (28b)? Or does it really matter?

28) Possible Analyses of Prevocalic Glide



First, it was noted that *Cj* clusters only occur in stressed syllables. This was also true of complex onsets and word-final complex codas (*j* followed by /t, s, n/). Evidently, word stress is attracted to any syllable having a branching subsyllabic structure, whether onset, coda, or nucleus. If stress placement rules are sensitive to branching subsyllabic structures, then there is no advantage in incorporating the glide under a branching onset, as opposed to a branching nucleus. The same scansion mechanism must also identify a branching coda, so the placement of the branching subsyllabic structure does not seem relevant.

Second, it is not the presence of a prevocalic glide alone that attracts stress, but rather a true branching structure. In the examples below, the single glide is obviously not responsible for syllable stress, as the stress alternations indicate:

- | | |
|------------------|------------------------------|
| 29) <i>a.jen</i> | ‘bait’ |
| <i>a.jí</i> | ‘type of clam’ |
| <i>ba.jaq</i> | ‘type of rattan’ |
| <i>tə.bi.ján</i> | ‘I slit skin (bloodletting)’ |
| <i>t-a.jaq</i> | ‘I turn off (path)’ |
| <i>t-e.jáq</i> | ‘I fish by torch’ |
| <i>qe.je</i> | ‘type of rattan’ |
| <i>qa.já</i> | ‘last’ |
| <i>wa.je</i> | ‘mango’ |

<i>wi.já</i>	‘palm cockatoo’
<i>qo.jin</i>	‘crab’
<i>φo.jon</i>	‘fungal skin disease’

In these cases the glide is functioning as a simple onset, outside the nucleus, as required by the Obligatory Onset Condition. Only in word-initial position, where onsets are not obligatory, is the word-initial glide consistently followed by a stressed vowel, as seen in (30). There are no three syllable words, however, with initial syllables of *yV*.

30) Word-Initial Onset Glide Always Indicates Stress

<i>ja.har</i>	‘ten’
<i>je.do</i>	‘type of sago palm’
<i>ji.lit</i>	‘type of sago palm’
<i>ji.hen</i>	‘type of tree’
<i>jo.woq</i>	‘leech’

The consistent word-initial syllable stress for monomorphemic words beginning with glide [j] seem to indicate that these word-initial syllables do not have onsets, but rather consist entirely of a branching nucleus. If this observation is born out by additional data, then the branching nucleus interpretation is favored. On the other hand, if the branching nucleus analysis is abandoned, the glide is considered a simple onset, and the consistent stress pattern is unexplained.

Third, branching onsets can also be followed by the glide [j], as seen in (31). This would be expected if the glide belongs to a branching nucleus. There can be no restrictions placed on onset – nucleus combinations because they constitute separate and independent subsyllabic entities.

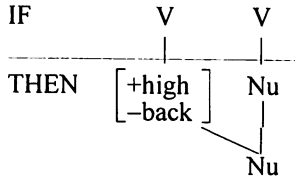
31) <i>brje.men</i>	‘vine bean’
<i>brján</i>	‘type of tree’
<i>qa.brjá</i>	‘type of frog’
<i>dljen</i>	‘ironwood tree’
<i>mə-.qa.dlján</i>	‘it’s horizontal’

Finally, there is no advantage, but rather distinct disadvantage, in trying to always incorporate a prevocalic glide into the onset. Doing so would only complicate the structural descriptions of permissible complex onsets, forcing disjunction in the formalism of the complex onset condition. The simpler route is to allow prevocalic glides not constrained to onset position to come under the domain of the nucleus.

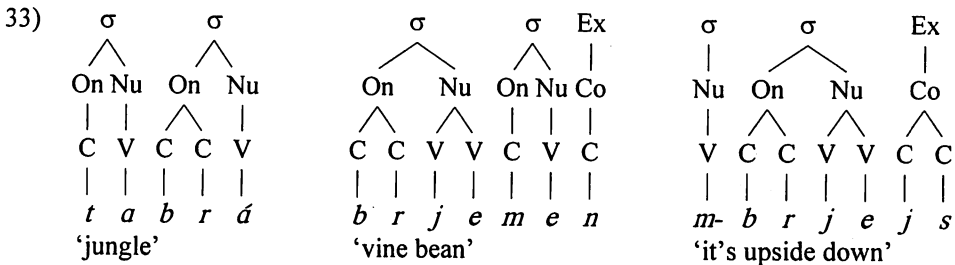
Thus, the maximal syllable template I have chosen for Imyan Tehit, [CCVVC], follows the branching nucleus interpretation of prevocalic glides (28b) rather than a branching onset interpretation which would require a three consonant onset and single vowel position

[CCCVC]. It also requires an additional specification on the first vowel slot, limiting it to /i/ and restricting it from being the head of the nucleus:

- 32) Branching Nucleus Condition: The first vowel of a two-vowel sequence must be /i/ and cannot function as the nucleus head.



As would be expected, branching nuclei of this type (rising diphthong) can follow any onset, i.e. there are no limitations. The syllabification of several words having complex material before the nucleus head is illustrated below in (33), showing the detail of their subsyllabic branching structures:



2.7 Nasal – Stop Sequences

Having established that branching subsyllabic structures (onset, nucleus, or coda) attract syllable stress, I am now in a position to evaluate the status of nasal – stop sequences. Do they constitute single segments, or are they two-segment sequences? If they are two segment sequences, then the condition on branching onsets would need modification to cover their inclusion.

Although an onset nasal – stop sequence violates the Sonority Sequence Generalization, it was seen in section 2.3 that the Locality principle and the UCSC justify the tautosyllabic onset interpretation of nasal – stop sequences. This position is further strengthened by their occurrence in word-initial position, as illustrated in (34).

- 34) Word-Initial Nasal – Stop Sequences
- | | |
|----------------|------------------|
| <i>mpar</i> | 'sago palm stem' |
| <i>mpa. we</i> | 'type of tree' |

<i>mpa.sé</i>	'canoe outrigger float'
<i>mpe.res</i>	'canoe anchor stick'
<i>mpe.rit</i>	'crowned pigeon'
<i>mpe.jas</i>	'type of pandanus plant'
<i>mpi.di</i>	'tinder'
<i>mpo.tor</i>	'type of tree'
<i>mpo.mpom</i>	'ground dove'
<i>m-ba</i>	'she hit'
<i>m-bet</i>	'it's muddy'
<i>m-bot</i>	'it's good'
<i>n-ta.la</i>	'you cut'
<i>n-te.he</i>	'you draw (water)'
<i>n-ti.li</i>	'you unwrap'
<i>n-to</i>	'you say'
<i>n-di</i>	'you fall'
<i>n-deje</i>	'you cough'
<i>n-djolo</i>	'you hunt'

Note that for all cases other than [mp], the nasal – stop sequence is actually bimorphemic, a junction of a verbal root with its subject agreement prefix. One would also expect to find monomorphemic words, the biggest class of which is alienable nouns, beginning with [mb], [nt], and [nd], but this is not the case.¹⁵

Two lines of evidence point to a single segment analysis of [mp]. First, if /mp/ were two segments, then the phonemic status of both /m/ and /p/ should be able to be substantiated independently. There is no evidence, however, for /p/ as an independent phoneme. The phone [p] is never observed in Imyan Tehit words without a preceding [m], indicating that the sequence is linked together as a single segment, a prenasalized stop.

¹⁵ One reason for this discrepancy might lie with the fact that it is essential that the two agreement prefixes /m-/ 'third person singular feminine' and /n-/ 'second person' not assimilate to the point of articulation of a root-initial stop. If this were the case, important semantic information would be lost. The non-assimilating nature of nasal agreement prefix is evidenced by /n-ba/ 'you hit' versus /m-ba/ 'she hits'. Perhaps the absence of monomorphemic nasal stop sequences other than [mp] can be attributed to a tendency in Tehit to ease the identification of verbs and keep the tracking of concord to distinct phonetic signals. Under this hypothesis, [mp] is allowed as a surface word-initial sequence only because there is no voiceless bilabial stop phoneme /p/ that could cause confusion as a verbal root.

Second, if [mp] were in fact two segments, then one would expect all syllables with /mp/ onsets to be stressed, according to the previous findings for complex onsets. But this is not the case; many are unstressed as shown in (35).

- 35) *qa.mpo* 'canoe flooring'
qo.mpo.jó 'type of palm'
sa.mpe 'type of sago'
mpa.sé 'canoe outrigger float'

In the same manner, a significant number of other nasal – stop sequences, whose stop phonemes are independently established, also fail to attract the syllable stress expected of a branching onset, as shown in (36).

- 36) *tə.le.nde* 'type of fish'
e.ndi 'canoe outrigger crossbar'
sə.ri.ntan 'jambu fruit'
gi.nti 'sand'
mo.ntik 'basket'
ŋga.réϕ 'arrow'
w-o.ŋgir 'it grunts (pig)'
mo.ŋgot 'large prawn'

If monomorphemic nasal – stop sequences in Imyan Tehit are analyzed as prenasalized stops, however, then one would not expect stress to be attracted to syllables containing them.¹⁶ The above data indicate a single segment interpretation, which is illustrated in (37).

- 37)
- | | | | | | | | | | |
|----------------|---|----------------|---|----------------|---|-----------------------|---|---|----|
| σ | σ | σ | σ | σ | σ | σ | σ | σ | Ex |
| ∧ | ∧ | ∧ | ∧ | ∧ | ∧ | ∧ | ∧ | ∧ | |
| C | V | C | V | C | V | C | V | C | V |
| | | | | | | | | | |
| s | a | ⁿ p | e | q | i | ⁿ t | i | t | ə |
| | | | | | | | | | |
| [sámpe] | | [gínti] | | [tələnde] | | [ⁿ garéϕ] | | | |
| 'type of sago' | | 'sand' | | 'type of fish' | | 'arrow' | | | |

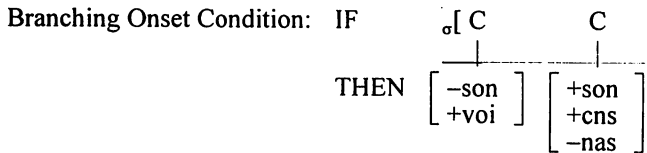
¹⁶ Prenasalized stops are not uncommon in Papuan languages. As to the existence of prenasalized voiceless stops, Foley (1986:214-229) posits a Proto Lower Sepik reconstruction having voiced and voiceless prenasalized stops. Languages in four other language families he deals with (Marind, Marind Family; Iatmul, Ndu Family; Nasioi, South Bougainville Family; and Fore, Gorokan Family) exhibit monomorphemic homorganic nasal and voiceless stop sequences in word initial positions, some in contrast with nasal – voiced stop sequences.

2.8 Summary

I have developed the maximal syllable template for Imyan Tehit and its associated well-formedness conditions (summarized below in (38)) based on the characteristics of word-medial consonant clusters and the application of prosodic theory and universal principles. I have shown that the syllable template supports both branching onset and nucleus, and that branching structures attract stress. Based on this, I interpret nasal – stop sequences in Imyan Tehit to be single segment prenasalized stops rather than a cluster of two consonants. Particularly significant to nonlinear theory, I have shown that word-final consonant clusters in Imyan Tehit indicate that the domain of extraprosodic licensing must extend beyond the theoretical limit of a single segment to include an entire branching coda.

38) Imyan Tehit Syllable Analysis:

- a. CV Template: [C C V V C]
- b. Obligatory Onset Condition: *]_σ σ[V
(Onset obligatory except word-initially)



(Permitted Cluster: voiced stop – liquid)

- c. Branching Nucleus Condition: IF V V
- THEN $\left[\begin{array}{c} +\text{high} \\ -\text{back} \end{array} \right] \text{Nu}$
- Nu
-

(Permitted Cluster: /i/ V → [j] V)

- d. Coda Condition: IF C]_σ
- THEN $\left[\begin{array}{c} +\text{son} \\ +\text{cns} \\ -\text{nas} \end{array} \right]$
-

(Permitted Segment: liquid)

Extraprosodic Conditions:

- e. Word-Final Simple Coda: * C]_w
 |
 Laryngeal
 (Disallowed Segment: voiced stop; /h/)
- f. Word-Final Complex Coda: IF C C]_w
 _____ | _____
 THEN [j] /t,s,n/

3 Lexical Syllabification

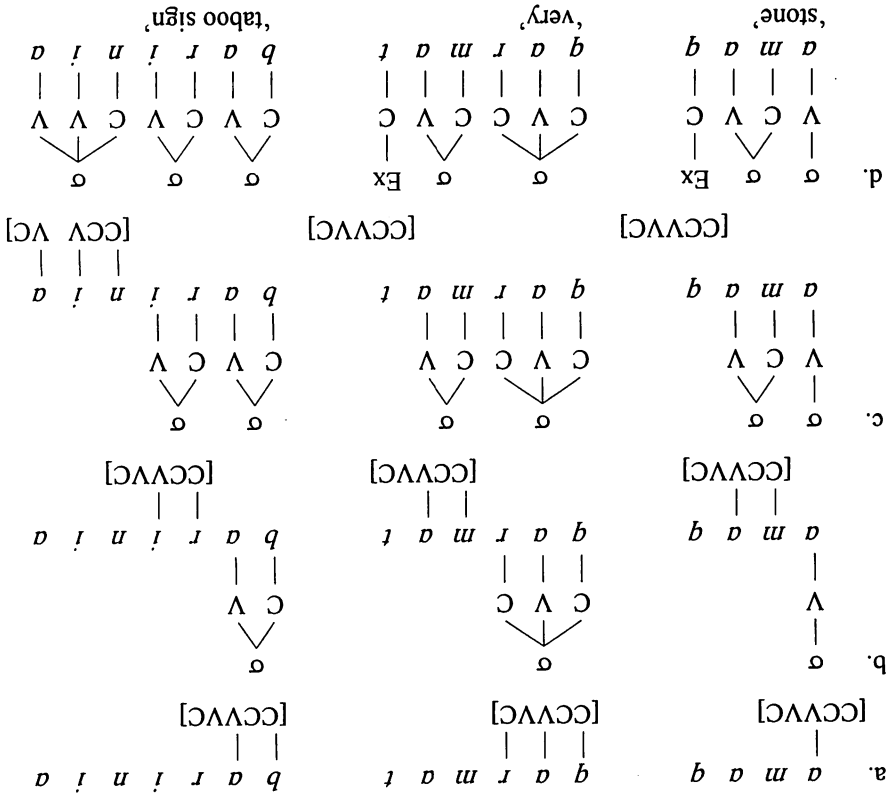
Having established the Imyan Tehit syllable template along with its conditions on onset, nucleus, and coda, I now apply these facts to the syllabification process, which is briefly explained below.

3.1 *The Syllabification Process*

The universal phonological process begins with the lexical stage, the construction of words from their component morphemes. Throughout this stage, the lexical inputs are continually subject to the syllabification process, which constructs the nonlinear syllable structures according to the language-specific syllable template and associated well-formedness conditions. The principle of Structure Preservation monitors, and if necessary, modifies (by initiating desyllabification and resyllabification), the output of any lexical rules during the lexical derivational cycles. At the end of each lexical cycle, material which remains unsyllabified (non-prosodically licensed) and is not extraprosodically licensed, is subject to the operations of stray epenthesis, if permitted by the language, followed by stray erasure.

The syllabification process invokes the Universal Association mechanism that links vocalic segments with V slots on the skeletal tier and consonantal segments with C elements. Following Itô's templatic approach, the syllable template proceeds along the unsyllabified phonemic string in a single direction, identifying (with the help of existing syllable conditions) and mapping valid syllable structures as it goes along. I show syllabification in sequential steps in (39) and then discuss the process. For the sake of clarity, I leave out the subsyllabic tier, which results automatically from the template.

39) Left to Right Syllabification



meets the coda requirement in step (a), it is prevented from syllabifying as coda by the presence of the following vowel /i/ and the Obligatory Onset Condition. Recall also, that the UCSC requires CV sequences to be tautosyllabic. So the /r/ syllabifies as onset of the middle syllable. In step (c) the double vowel sequence meets the branching nucleus condition of an initial /i/, and syllabifies as a single syllable (*nja*), instead of two (*ni.a*), which would have been disallowed by the Obligatory Onset Condition.

3.2 *Templatic Identification Of Glides*

A particularly significant and powerful aspect of the Imyan Tehit syllable template and its associated conditions is its capability of distinguishing glides [j] and [w] from their underlying “ambiguous” vowel phonemes /i/ and /o/ (as opposed to “true” vowels /e/ and /a/). Deligiorgis (1990) defines true vowels as those that always form syllable nuclei and maintain that position throughout a lexical derivation. Non-true or ambiguous vowels, on the other hand, are those whose syllable position is subject to universal and/or language-specific considerations of syllable structure.

In Imyan Tehit, the potentially dual status of /i/ and /o/ as vowel or glide is disambiguated by linking with the template skeletal tier units V or C, respectively. Linking to V slots as vowels is the norm. If necessary, however, the high vowels will link to the non-syllabic-peak C slots in order to yield a valid syllabification for the entire lexical input string. The syllable well-formedness conditions and other universal principles guide the process, steering syllabification away from invalid or poorly fabricated structures.

Glide disambiguation in Imyan Tehit appeals to the Sonority Sequencing Generalization, a principle I have already applied in consonant cluster analysis, as well as the principle of Maximality. As I show below, the SSG is used to avoid tautosyllabic geminate glide clusters. Tautosyllabic geminates violate the SSG because they imply a sonority hiatus as opposed to a constant increase in sonority towards the syllable’s nuclear peak. The principle of Maximality prefers prosodic licensing to extraprosodic licensing. It is simply stated as follows:

40) Maximality: Maximize the prosodic licensing domain.

Given two possible syllable structures, Maximality chooses the structure with the least amount of extraprosodic licensing.

For every example of glide disambiguation that follows, the correct analysis is given in (a). Invalid alternative syllabifications are listed to the side along with the reason for their failure. Bold face type denotes the segment or segments in violation:

- 2) if heterosyllabic, create an onsetless syllable, in violation of the obligatory onset condition, as evident in (41-47b, 48b-d, 49d-e, and 50e).

The one exception to the above generalization is the complex nucleus. If the ambiguous vowel phoneme is preceded by the vowel /i/, then it can be linked as a vowel to the same syllable nucleus to form the peak of a branching nucleus, as seen in (44a). If in so doing, however, other conditions are violated, the structure will not stand, as seen in (48c).

An interesting case arises when the high front vowel /i/ links up as an onset [j], followed by a valid branching nucleus jV (see 48e and 50b), thus creating a geminate glide structure [jjV]. Tautosyllabic geminates, however, violate the Sonority Sequencing Generalization, which requires that adjacent segments on the segmental tier exhibit change in sonority, increasing in the direction of the syllable peak. Thus an alternate syllabification is indicated.

In some cases, two structures are possible, but the principle of Maximality selects the one which maximizes the prosodic licensing domain, avoiding the structure exhibiting the most extraprosodic licensing, as seen in (44c, 46e, 47d, and 50d). Example (47) is instructive because it shows that the correct syllabification prefers a single extraprosodically licensed segment over two segments outside the prosodic domain.

The remaining invalid attempts at syllabification were excluded on the basis of violating onset (45d) and coda (46d, 47c, 48f, and 50c,f) conditions.

In general, the correct syllabification of the above examples (by default the only structure not to violate any syllable and universal conditions) resulted in a pattern of alternating C and V slots dominating the contiguous span of previously ambiguous segments.¹⁷

3.3 *The Status of Schwa*

3.3.1 *Schwa Epenthesis.* Many words in Imyan Tehit contain one or two short syllables which have the mid lax vowel schwa [ə] filling the nucleus slot. Usually, these syllables are located at the beginning of the word. The schwa nucleus is interpreted as be-

¹⁷ There are four words that yield ambiguous syllabification. All have the phonemic sequence oV : /t-oien/ [tə.wyén], *[to.jén] 'I go get', /oion/ [wión], *[o.jón] 'male initiation', /m-toiaq/ [mə.tə.wiáq], *[mətojáq] 'it broke', and /φ-ioia/ [phi.wiá], *[φə.jo.já] 'we (include.) are startled'. The correct forms maximise the syllable nucleus ([jV]). The maximisation of any or all subsyllabic domains (onset, nucleus, and coda) is subsumed under the fundamental principle of maximising mapping (i.e. the total number of links) to the whole syllable template. The net effect is a syllabification that maximises syllable structure and/or minimises the total number of syllables in the prosodic domain.

ing non-phonemic, i.e. a degenerate epenthetic vowel. It does not share the full characteristics of the true phonemic vowels /i e a o/. First, it is audibly shorter in length than either stressed or unstressed phonemic vowels. Second, it is never stressed, always being found in an unstressed syllable. Third, its distribution is restricted to pretonic position, i.e. it is only able to occur in syllables preceding the stressed syllable. Because non-compound words in Tehit carry only one stressed syllable, this means that schwa is never found in a word-final syllable or in monosyllabic words.

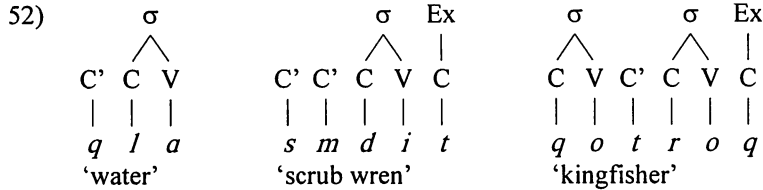
Words containing these degenerate syllables are interpreted as having underlying consonant clusters. The following examples illustrate one and two degenerate syllables in word-initial position (51a-b), and also in word-medial position (51c):

51) Epenthetic Schwa Word-Initial and Word-Medial

a.	/tbió/	[təbió] ¹⁸	'fire starter'
	/tho/	[təhó]	'fish net'
	/qsa/	[qəsá]	'manufactured'
	/qla/	[qəlá]	'water'
	/φqeit/	[φəkéjt]	'freshwater crab'
	/sraq/	[səráq]	'type of marriage cloth'
	/hlit/	[həlít]	'sago pudding'
	/mdis/	[mədís]	'pandanus plant species'
	/mno/	[mənó]	'pandanus plant species'
	/qrmoq/	[qərmóq]	'moss'
b.	/qmnién/	[qəmənjin]	'type of fish'
	/qnoai/	[qənəwáj]	'sea gull'
	/qtqe/	[qətəké]	'gecko lizard'
	/qtle/	[qətəlél]	'jambu fruit'
	/smdit/	[səmədít]	'scrub wren'
	/qnoato/	[qənəwáto]	'cliff overhang'
c.	/aφlili/	[aφəlíli]	'type of long bean'
	/satqaφa/	[satəkáφa]	'type of bat'
	/satmór/	[satəmór]	'quiet'
	/oaqrió/	[wəkərjód]	'ground dove'
	/qotróq/	[qotəróq]	'kingfisher'
	/taqdáq/	[təkədáq]	'warbler (bird)'
	/mamlé/	[mamələ]	'master'

¹⁸ See Appendix 2.3.2. for a discussion of glide assimilation.

The consonant clusters in the above examples do not fit the requirements for complex syllable onsets in (a,b) or codas in (c). Furthermore, because of the absence of phonemic vowels, they cannot syllabify unless a nucleus slot is supplied through an epenthetic operation. Initial syllabification of the above yields partially syllabified words, with stray (un-syllabifiable) consonants marked as C' below:

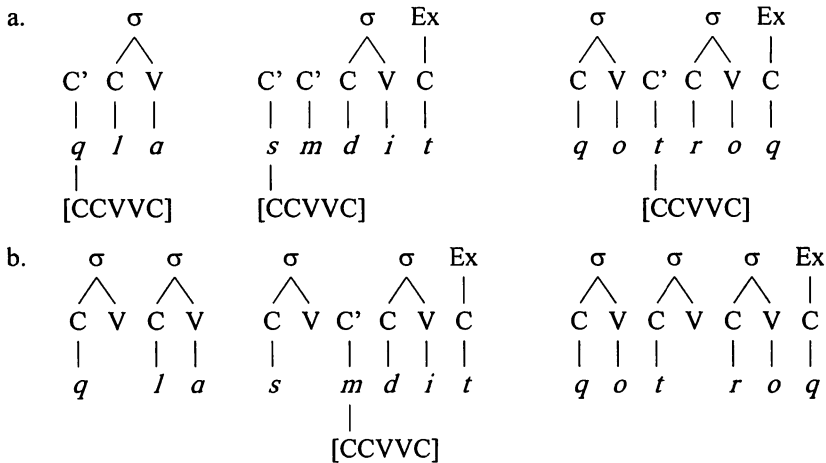


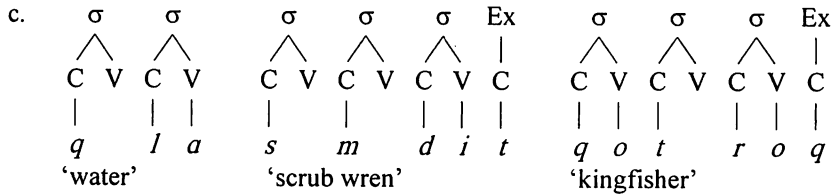
If stray epenthesis were not operative in Imyan Tehit, the process of stray erasure, which is claimed to be operative in every language at the end of each lexical cycle, would yield **la* 'water', **dit* 'scrub wren' and **qoroq* 'kingfisher' for the above examples. But stray epenthesis is parameterized as "on" or functional for Tehit, according to the following epenthesis directive:

53) Map stray consonants to the syllable template.

Stray epenthesis is ordered directly before stray erasure in the lexical cycle and in essence bleeds any visible effects of the universal stray erasure mechanism with respect to stray consonants. The process is illustrated below:

54) The Stray Epenthesis Process





In step (54a) above, the syllable template docks next to the unsyllabified consonant. There is no ambiguity as to whether the stray consonant must link up as onset or coda, due to the coda condition restricting all but liquids. The nuclear slot of the syllable is guaranteed because it is universally obligatory. Hence, the specifications for a minimal syllable are met, as seen in step (54b). Default rules later fill in the epenthetic vowel quality as schwa in the postlexical stage. The epenthesis operation necessarily creates two syllables for /smdit/ 'scrub wren' because of the three consonant cluster /smd/, none of which can function as coda.

Itô (1986:10) claims that the nonlinear principle of directionality plays an explanatory role in syllable mapping theory, making it possible to correctly parse ambiguous intervocalic consonant clusters and correctly predict the insertion sites for complex systems of epenthesis. Left-to-right template mapping maximally incorporates segments into the coda, whereas right-to-left mapping maximizes the onset.

It is not necessary, however, for all languages to be parameterized for directionality. Imyan Tehit is such a case. Because its syllable template and associated well-formedness conditions are sufficiently complex, a unique syllabification results, regardless of the direction of template application. Thus, for Imyan Tehit, directionality offers no useful role in the syllable structure and does not need to be referred to in the grammar. Although the above derivations of initial syllabification and epenthesis depict the mapping process as proceeding from left to right, the same results would have been obtained by proceeding in the opposite direction.

3.3.2 Excrescent Vowel Hypothesis. An alternative interpretation for Tehit schwa is that it is an excrescent non-phonemic vowel, as opposed to epenthetic non-phonemic vowel. This interpretation would follow Hyman (1990) in assuming that not all languages have exhaustive syllabification. Bagemihl (1991), for example, holds this position for Bella Coola, a Salish language from coastal British Columbia. Segments which could not syllabify would simply be left as stray and Tehit would become another exception to Itô's claim that stray erasure is universal. Phonetically, the insertion of the excrescent vowel would be triggered, not by stray consonants, but rather by the need to mediate a transition between two adjacent articulations having constriction in the oral tract.

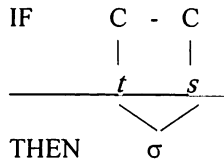
3.4.1 *Obstruent Prefixes*. Also as expected, the obstruent prefixes (/t-/ and /ɸ-/) syllabify as onsets of degenerate syllables when prefixed onto consonant-initial roots, as seen in (58).

58)	<i>t-ba</i>	[təbá]	'I hit'
	<i>ɸ-ba</i>	no data	'we (incl.) hit'
	<i>t-to</i>	[tətó]	'I say'
	<i>ɸ-to</i>	[ɸətó]	'we (include.) say'
	<i>t-di</i>	[tədí]	'I fall'
	<i>ɸ-di</i>	[ɸədí]	'we (include.) fall'
	<i>t-qesi</i>	[təʔési]	'my aunt'
	<i>ɸ-qesi</i>	[ɸəʔési]	'our (incl.) aunt'
	<i>t-ɸlan</i>	[təɸəlán]	'I stab'
	<i>ɸ-ɸlan</i>	no data	'we (incl.) stab'
	<i>t-sese</i>	[tsése]	'I run'
	<i>ɸ-sese</i>	[ɸəsése]	'we (incl.) run'
	<i>t-hot</i>	[təhót]	'I see'
	<i>ɸ-hot</i>	[ɸəhót]	'we (include.) see'
	<i>t-mlan</i>	[təməlán]	'I'm light weight'
	<i>ɸ-mlan</i>	[ɸəməlán]	'we're light weight'
	<i>t-noq</i>	[tənoq]	'I know'
	<i>ɸ-noq</i>	[ɸənoq]	'we (include.) know'
	<i>t-leli</i>	[tələli]	'I sit'
	<i>ɸ-leli</i>	[ɸələli]	'we (include.) sit'
	<i>t-rana</i>	[tərána]	'I tell'
	<i>ɸ-rana</i>	[ɸərána]	'we (incl.) tell'
	<i>t-oare</i>	[təwáre]	'I wash'
	<i>ɸ-oare</i>	[ɸəwáre]	'we (incl.) wash'
	<i>t-iit</i>	[təjít] ¹⁹	'I sharpen'
	<i>ɸ-iit</i>	[ɸəjít]	'we (incl.) sharpen'

The one exception to the above pattern is /t-/ prefixed onto a root-initial /s/. The /t/ is incorporated into the initial syllable of the root, and the /ts/ cluster forms a complex onset, as seen in /t-sese/ [tsése] 'I run'. Such clusters are only known to occur word-initially, as a result of the agreement morphology. This necessitates a secondary onset condition that applies after the initial lexical cycle:

¹⁹ The fact that /t-iit/ does not surface as *[tjit] is evidence that roots are not allowed to resyllabify on later lexical cycles. Thus, in the first cycle *iit* syllabifies as CVC. On the next cycle the agreement morpheme is added, but cannot be syllabified with the following C, thus triggering epenthesis.

- 59) An alveolar voiceless stop – fricative cluster /ts/ spanning a morpheme boundary is tautosyllabic:



3.4.2 *Vowel Prefixes*. The vowel prefixes (/o-/ ‘3sm’ and /i-/ ‘3p’) syllabify either as glide onsets or vowel nuclei, depending on the class of consonant-initial roots onto which they prefix. For the most part, /o-/ syllabifies as an onset glide [w], creating a degenerate syllable, as shown below:

60) <i>o-bot</i>	[wəbót]	‘he’s good’
<i>o-to</i>	[wətó]	‘he said’
<i>o-dihár</i>	[wədihár]	‘he looks for’
<i>o-qaq</i>	[wəxáq]	‘he died’
<i>o-φlan</i>	[wəφəlán]	‘he stabs’
<i>o-salo</i>	[wəsálo]	‘he speaks’
<i>o-hot</i>	[wəhót]	‘he sees’
<i>o-molo</i>	[wəmólo]	‘he dives (fishing)’
<i>o-noq</i>	[wənóq]	‘he knows’
<i>o-loq</i>	[wəlóq]	‘he picks up’
<i>o-ri</i>	[wəri]	‘it is yellow’
<i>o-oet</i>	[wəwét]	‘he is small’
<i>o-ian</i>	[wiján]	‘he rubs’

Remember that onsetless syllables are allowed word-initially in Imyan Tehit. Because the agreement morpheme in the data does not surface as a word-initial vowel, I conclude that underlyingly it is prelinked to a C slot in the lexicon:

61) C	
o	‘3sm’

Occasionally, however, the data include examples with /o-/ syllabified as a syllable nucleus, as given below:

62) <i>o-ba</i>	[obá]	‘he hits’
<i>o-φot</i>	[oφót]	‘it is done’
<i>o-mian</i>	[omián]	‘it is dark’

<i>o-oaq</i>	[owáq]	'he names'
<i>o-soro</i>	[osóro]	'its current'
<i>o-looá</i>	[oluwá]	'he's amiable'

I propose that these roots form a separate class which require an essentially suppletive allomorph, a nuclear /o/. Schwa epenthesis therefore does not apply.

Even greater variability is exhibited by the third person plural agreement morpheme /i-/. Consider the following:

63) <i>i-ba</i>	[jəbá]	'they hit'
<i>i-bot</i>	[ibót]	'they're good'
<i>i-teit</i>	[jətéjt]	'their legs'
<i>i-to</i>	[itó]	'they said'
<i>i-dahan</i>	[jədáhan]	'they're dirty'
<i>i-driq</i>	[idrík]	'they enter'
<i>i-qaq</i>	[jəkáq]	'they died'
<i>i-φlan</i>	[jəφəlán]	'they stab'
<i>i-φla</i>	[iφəlá]	'they possess (spirit)'
<i>i-sain</i>	[jəsájɲ]	'they wrap in leaves'
<i>i-sret</i>	[isərét]	'they're wet'
<i>i-hot</i>	[jəhot]	'they see'
<i>i-mhes</i>	[jiməhés]	'they're smooth'
<i>i-ne</i>	[jəné]	'they carve'
<i>i-noq</i>	[inóq]	'they know'
<i>i-laq</i>	[jəláq]	'they assemble'
<i>i-leli</i>	[iléli]	'they sit'
<i>i-rana</i>	[jərána]	'they tell'
<i>i-roq</i>	[eróq]	'they are many'
<i>i-oás</i>	[jəwás]	'they are delicious'
<i>i-oere</i>	[iwére]	'they turn aside'
<i>i-iiit</i>	[ijít]	'they sharpen'

Again, the majority of verbal roots take non-nuclear degenerate syllable agreement. I will assume, then, that the plural agreement morpheme is prelinked to a C slot in the lexicon, as depicted in (64).

64)	C	
	i	'3p'

Those roots requiring nuclear agreement of /i-/, then, are relegated to a special class, specifically marked in the lexicon, which take a suppletive vocalic allomorph.

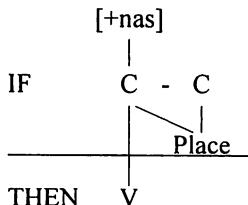
3.4.3 *Nasal Prefixes*. The nasal prefixes function as syllable nuclei if the following root begins with a consonant having the same point of articulation, as illustrated in (65). Otherwise, schwa epenthesis generally occurs.

65) Syllabic Nasal – Homorganic Consonant Agreement

<i>m-bait</i>	[m̩bájt]	*[məbájt]	'she plays'
<i>n-bait</i>	*[n̩bájt]	[nəbájt]	'you play'
<i>m-mro</i>	[m̩məró]	*[məməró]	'she longs for'
<i>n-mro</i>	*[n̩məró]	[nəməró]	'you long for'
<i>m-oare</i>	[m̩wáre]	*[məwáre]	'she washes'
<i>n-oare</i>	*[n̩wáre]	[nəwáre]	'you wash'
<i>m-tono</i>	*[m̩tóno]	[mətóno]	'it is still'
<i>n-tono</i>	[n̩tóno]	*[nətóno]	'be still!'
<i>m-dehe</i>	*[m̩déhe]	[mədéhe]	'we fence it off'
<i>n-dehe</i>	[n̩déhe]	*[nədéhe]	'you fence it off'
<i>m-noq</i>	*[m̩nóq]	[mənóq]	'she knows'
<i>n-noq</i>	[n̩nóq]	*[nənóq]	'you know'
<i>m-laq</i>	*[m̩láq]	[məláq]	'she puts it down'
<i>n-laq</i>	[n̩láq]	*[nəláq]	'you put it down'
<i>m-rana</i>	*[m̩rána]	[mərána]	'she tells'
<i>n-rana</i>	[n̩drána]	*[nərána]	'you tell'
<i>m-qaʔe</i>	*[m̩kʰáʔe]	[məkʰáʔe]	'she carries'
<i>n-qaʔe</i>	*[n̩kʰáʔe]	[nəkʰáʔe]	'you carry'
<i>m-hot</i>	*[m̩hót]	[məhót]	'she sees'
<i>n-hot</i>	*[n̩hót]	[nəhót]	'you see'
<i>m-ian</i>	*[m̩ján]	[miján]	'she rubs'
<i>n-ian</i>	*[n̩ján]	[niján]	'you rub'

To handle the above cases of nasal agreement, I posit the following rule which applies before schwa epenthesis in the lexical cycle. The existence of the morpheme boundary ensures that it is not operative in the initial lexical cycle:

- 1) Syllabic Nasal – Homorganic Consonant Agreement: A nasal agreement morpheme followed by a homorganic root-initial consonant is syllabic:



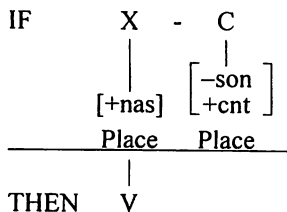
Roots beginning with fricatives are a special case, as the data in (67) illustrate:

67) <i>m-φolo</i>	[m̥φólo]	*[məφólo]	'she chops'
<i>n-φolo</i>	[n̥φólo]	[nəφólo]	'you chop'
<i>m-φrio</i>	[m̥φərjó]	*[məφərjó]	'it blows'
<i>n-φrio</i>	[n̥φərjó]	*[nəφərjó]	'you blow'
<i>m-smit</i>	[m̥səmít]	*[məsəmít]	'she looks at'
<i>n-smit</i>	[n̥səmít]	*[nəsəmít]	'you look at'
<i>m-sat</i>	[m̥sát]	[məsát]	'she cuts'
<i>n-sat</i>	[n̥sát]	*[nəsát]	'you cut'

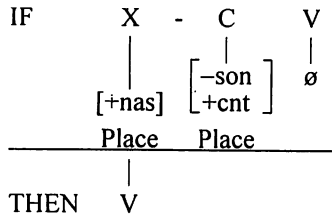
If the agreement morpheme and root-initial fricative differ in point of articulation, the nasal can optionally syllabify as a nucleus. If, however, the root-initial fricative is followed by another consonant, rather than a phonemic vowel, schwa epenthesis separates the root-initial cluster in the first lexical cycle, and in the second cycle, the nasal agreement morpheme must syllabify as nuclear peak, as seen in /n-φrio/ [n̥φərjó], *[nəφərjó] 'you blow', and /m-smit/ [m̥səmít], *[məsəmít] 'she looks at'.

To handle the above cases of nasal agreement with fricative roots, I posit two additional rules which apply after (66) but before schwa epenthesis in the lexical cycle.

- 68) Optional Syllabic Nasal – Non-homorganic Fricative Agreement: A nasal agreement morpheme followed by a non-homorganic root-initial fricative, may optionally be syllabic.



- 69) Syllabic Nasal – Non-homorganic Fricative Cluster Agreement: A nasal agreement morpheme followed by a root-initial degenerate syllable (V linked to \emptyset) with a fricative non-homorganic onset is syllabic:



3.4.4 *Suffix Morphology*. The Imyan Tehit noun phrase can be marked for number and gender with a simple suffix, using the same third person morphemes which are used by the prefix agreement set:

70) Tehit Suffix Morphemes

- m 3sf (third person singular feminine)
- o 3sm (third person singular masculine)
- i 3p (third person plural)

In brief, third person gender/number marking only occurs on vowel-final roots. If the last word of a noun phrase ends in a vowel, that word may include the suffix denoting the gender and number of the head noun. Also, if a transitive verb ends in a vowel and the object noun phrase does not follow, the verb may include the suffix, denoting the number and gender of the displaced, missing or understood object. Both cases are illustrated below:

- | | | |
|-----------------|-----------|-------------------------|
| 71) <i>na-m</i> | [nam] | ‘person (fem.)’ |
| <i>na-o</i> | [naw] | ‘person (masc.)’ |
| <i>na-i</i> | [naj] | ‘people’ |
| <i>na qo-m</i> | [na qom] | ‘this person (fem.)’ |
| <i>biele-o</i> | [bjélew] | ‘garden (masc.)’ |
| <i>m-bahe-m</i> | [m̩báhem] | ‘she orders her/it’ |
| <i>m-bahe-o</i> | [m̩báhew] | ‘she orders him’ |
| <i>m-bahe-i</i> | [m̩báhej] | ‘she orders them’ |
| <i>ϕ-ba-m</i> | [ϕəbám] | ‘we (incl.) hit her/it’ |
| <i>ϕ-ba-o</i> | [ϕəbáw] | ‘we (incl.) hit him/it’ |
| <i>ϕ-ba-i</i> | [ϕəbáj] | ‘we (incl.) hit them’ |
| <i>t-slo-m</i> | [tsəlóm] | ‘I pound it (fem.)’ |
| <i>t-slo-o</i> | [tsəlów] | ‘I pound it (masc.)’ |
| <i>t-slo-i</i> | [tsəlój] | ‘I pound them’ |

Because gender/number marking only occurs on vowel-final roots, the ambiguous vowel suffixes /-o/ '3sm' and /-i/ '3p' always syllabify as word-final codas, not as syllable nuclei.

3.5 Summary

I have shown how the syllabification process creates well-formed syllables from the lexical inputs using the Imyan Tehit maximal syllable template and its associated conditions. Because of its unique structural conditions, Imyan Tehit does not need to appeal to the principle of directionality to guide the process.

Syllabification was also shown to correctly distinguish the glide allophones [j w] from their underlying vowel phonemes /i o/. Potentially ambiguous syllabification is disambiguated by application of the principle of Maximality which favors prosodic over extraprosodic licensing.

Schwa is seen to be non-phonemic and is argued to be the result of epenthesis in the lexical cycle, salvaging stray, unsyllabified consonants from erasure. An alternative non-phonemic interpretation of schwa as phonotactic excrescence is ruled out because schwa contributes to the environment of a postlexical rule.

Additional lexical rules preceding schwa epenthesis were found to be necessary to distinguish syllabic and non-syllabic manifestations of nasal prefix morphemes. Vowel prefix morphemes take a suppletive syllabic form for certain classes of inflected roots. Finally, suffix morphemes never function as syllable nuclei because they are restricted to vowel-final roots.

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INDONESIA

Appendix 1: Evidence For Contrasts

This section provides evidence for contrasts between suspicious pairs of sounds in Imyan Tehit. The data are given both in phonemic and phonetic representation. Morpheme boundaries are indicated by hyphens. The phonemic representation indicates word stress (written with acute accent over the vowel) only if it does not fall on the penultimate syllable of the root morpheme. In the phonetic transcription, word stress is always indicated on multi-syllabic words.

For the consonant phoneme contrasts, the first pair of words from each set of suspicious pairs show contrast in word-initial position. The next pair show contrast in word-internal but root-initial position. Next come examples of morpheme-internal contrast, and then examples of word-final contrast, if possible. Note that voiced stops /b d/, prenasalized stops, and /h/ do not occur word-finally, and therefore cannot be contrasted in this environment.

Labials

In this section, where /o/ occurs as a syllable onset or coda, it is contrasted with other labials as a consonant.

<i>"p : b</i>	/ ^m pidi/	[m̥pídi]	'tinder'
	/bi/	[bi]	'smoke'
	/ ^m pasé/	[m̥pasé]	'outrigger float'
	/basáq/	[basáq]	'in the future'
	/sa ^m pe/	[sámpe]	'type of sago palm'
	/sabe/	[sábe]	'tree kangaroo'
	/q ^m pas/	[qəmpás]	'type of tree'
	/qbar/	[qəbár]	'type of bird'
<i>b : φ</i>	/bis/	[bis]	'type of tree'
	/φis/	[φis]	'palm fiber'
	/i-bot/	[ibót]	'they're good'
	/i-φot/	[iφót]	'they're gone'
	/m-abo/	[mábo]	'it's moldy'
	/m-aφo/	[máφo]	'her older sister'
<i>b : m</i>	/bet/	[bet]	'mud'
	/met/	[met]	'bamboo cup'
	/m-bot/	[m̥bót]	'it's good'
	/m-mot/	[m̥mót]	'it's bitter'
	/t-ebe/	[tébe]	'my chest'
	/t-eme/	[téme]	'my mother'
<i>b : o</i>	/bet/	[bet]	'mud'
	/oet/	[wɛt]	'child'
	/t-birit/	[təbírit]	'I throw'
	/t-oirit/	[təwírit]	'I wave'
	/sibar/	[síbar]	'wasp'
	/sioar/	[síwar]	'fruit bat'
<i>φ : m</i>	/φoq/	[φoq]	'wild banana'
	/moq/	[moq]	'moon'

	/ɸ-ese/	[ɸése]	'we (incl.) sleep'
	/m-ese/	[mése]	'we (excl.) sleep'
	/t-ɸolo/	[təɸólo]	'I slash'
	/t-molo/	[təmólo]	'I dive'
	/saɸar/	[sáɸar]	'storm'
	/oamar/	[wámar]	'hornbill (bird)'
	/ɸaɸ/	[ɸaɸ]	'we (include.)'
	/ɸa-m/	[ɸam]	'the sago'
<i>ɸ: o</i>	/ɸaqa/	[ɸáɰa]	'type of banana'
	/oaqa/	[wáɰa]	'how many'
	/ɸ-noq/	[ɸənóq]	'we (incl.) know'
	/o-noq/	[wənóq]	'he knows'
	/t-ɸit/	[təɸít]	'I pelt'
	/t-oít/	[tuwít]	'I call'
	/t-siɸit/	[tsíɸit]	'I carry on the head'
	/sioit/	[síwit]	'afternoon'
	/ɸaɸ/	[ɸaɸ]	'we (include.)'
	/sɸa-o/	[səɸáw]	'the mountain'
<i>m: o</i>	/met/	[met]	'bamboo glass'
	/oet/	[wet]	'child'
	/m-ono/	[móno]	'her father'
	/o-ono/	[wóno]	'his father'
	/t-mait/	[təmájt]	'my brother-in-law'
	/t-oain/	[tuwájɲ]	'I request'
	/simar/	[símar]	'mangrove tree'
	/sioar/	[síwar]	'fruit bat'
	/om/	[om]	'she'
	/oo/	[ow]	'he'
	/qla-m/	[qəlám]	'big water'
	/qla-o/	[qəláw]	'small water'

Alveolars

<i>ⁿt: t</i>	/qa ⁿ taraq/	[qantáraq]	'pineapple'
	/batara/	[batára]	'abroad'
	/qi ⁿ ti/	[gínti]	'sand'
	/t-biti/	[təbítɪ]	'my ancestor'
<i>ⁿd: d</i>	/e ⁿ di/	[éndi]	'outrigger crossbar'
	/t-qedi/	[təxédi]	'my name'

	/tɬe ⁿ de/	[təlɛnde]	'type of fish'
	/hrede/	[hərəde]	'door'
	/t-o ⁿ dié/	[tondjé]	'I forget'
	/odió/	[odjó]	'wing (of bird)'
	/o-qa ⁿ díq/	[wəxandík]	'he open-mouth clicks'
	/o-qa ⁿ disen/	[wəxadísɛn]	'it's the last one'
<i>"t: "d</i>	/qi ⁿ ti/	[gínti]	'sand'
	/e ⁿ di/	[éndi]	'outrigger crossbar'
	/qa ⁿ taraq/	[qantáraq]	'pineapple'
	/o-qa ⁿ dáq/	[wəxandáq]	'he shut-mouth clicks'
<i>t: d</i>	/taloq/	[táloq]	'fire pit'
	/daloq/	[dáloq]	'type of tree'
	/n-teie/	[ntéje]	'you send'
	/n-deie/	[ndéye]	'you cough'
	/n-ate/	[náte]	'your grandparent'
	/n-ade/	[náde]	'give!'
<i>t: s</i>	/tioit/	[tíwit]	'peninsula'
	/sioit/	[síwit]	'afternoon'
	/ɸ-tot/	[ɸətót]	'our (incl.) uncle'
	/ɸ-sot/	[ɸəsót]	'we (incl.) see'
	/t-ate/	[táte]	'my grandparent'
	/t-ase/	[táse]	'I sleep'
	/m-bot/	[m̀bót]	'she's good'
	/m-bos/	[m̀bós]	'she kisses'
<i>t: n</i>	/tomot/	[tómot]	'stick tool'
	/nomiq/	[nómik]	'type of sago'
	/t-hano/	[təháno]	'my younger sister'
	/n-hano/	[nəháno]	'your younger sister'
	/o-ta/	[wətá]	'it's end'
	/o-na/	[wəná]	'his arm'
	/m-ate/	[máte]	'her grandparent'
	/m-ane/	[máne]	'island-ward'
	/t-lit/	[təlít]	'I visit'
	/t-lin/	[təlín]	'I skin (an animal)'
<i>d: n</i>	/don/	[don]	'cuscus (a marsupial)'
	/not/	[not]	'cloth'
	/m-de/	[mədə]	'until'

	/m-ne/	[mənɛ́]	'she strips'
	/m-todo/	[mətódo]	'it's stuck'
	/m-tono/	[mətóno]	'it's calm'
<i>t: l</i>	/toliq/	[tólik]	'three'
	/loliq/	[lólik]	'valley'
	/n-toq/	[ntóq]	'take it out!'
	/n-loq/	[nlóq]	'pick it up!'
	/m-φoto/	[m̩φóto]	'she crosses'
	/m-φolo/	[m̩φólo]	'she cuts'
	/bot/	[bot]	'soon'
	/bol/	[bol]	'house'
<i>d: l</i>	/dait/	[dajt]	'not'
	/lait/	[lajt]	'evil spirit'
	/t-di/	[tɛ́dɪ]	'I fall'
	/t-li/	[tɛ́lɪ]	'I wiggle'
	/qda/	[qɛ́dɔ́]	'wall partition'
	/qla/	[qɛ́lɔ́]	'water'
<i>t: r</i>	/toliq/	[tólik]	'three'
	/ronit/	[rónit]	'cloth sieve'
	/m-tit/	[mɛ́tít]	'it's traditional'
	/m-rit/	[mɛ́rít]	'she lights a fire'
	/t-ate/	[táte]	'my grandparent'
	/t-are/	[táre]	'my father-in-law'
	/φ-sot/	[φɛ́sót]	'we (incl.) see'
	/φ-sor/	[φɛ́sór]	'we (incl.) sew'
<i>d: r</i>	/daoon/	[dávɔ́n]	'butcherbird'
	/raoor/	[ráwɔ́r]	'type of cuscus'
	/m-di/	[mɛ́dɪ]	'it fell'
	/m-ri/	[mɛ́rɪ]	'it's yellow'
	/ada/	[áda]	'breadfruit'
	/ara/	[ára]	'type of palm'
<i>l: r</i>	/la/	[la]	'two'
	/ra/	[ra]	'up there'
	/m-li/	[mɛ́lɪ]	'it wiggles'
	/m-ri/	[mɛ́rɪ]	'it's yellow'
	/t-ala/	[tála]	'I cut down'
	/t-ara/	[tára]	'I crawl'

	/heiál/	[hejál]	‘type of cord’
	/oiiár/	[wijár]	‘crocodile’
<i>n : l</i>	/naq/	[naq]	‘wild breadfruit’
	/laq/	[laq]	‘two’
	/t-noq/	[tənoq]	‘I know’
	/t-loq/	[təloq]	‘I pick up’
	/m-tono/	[mətono]	‘it’s calm’
	/m-tolo/	[mətolo]	‘it’s enough’
	/leoen/	[léwen]	‘initiation grounds’
	/leoel/	[léwɛl]	‘cassowary tree’
<i>n : r</i>	/na/	[na]	‘person’
	/ra/	[ra]	‘up there’
	/i-noq/	[inoq]	‘they know’
	/i-roq/	[iroq]	‘they’re many’
	/m-rono/	[mərono]	‘her mother-in-law’
	/m-roro/	[məroɾo]	‘it quivers’
	/t-ron/	[təron]	‘I live long’
	/t-ror/	[təroɾ]	‘I raise animals’

Back Consonants

<i>q : ʔg</i>	/aɔo/	[áɔo]	‘up there’
	/a ⁿ ɔo/	[áŋɔo]	‘down there’
	/ooqir/	[wóɣɪr]	‘heron’
	/o-o ⁿ gir/	[wónɣɪr]	‘it grunts (pig)’
	/oqit/	[óɣit]	‘Moi race’
	/ho ⁿ gi/	[hónɣi]	‘type of fish’
	/m-oqo/	[móɔo]	‘she burns the garden’
	/mo ⁿ got/	[mónɣot]	‘large prawn’
<i>q : h</i>	/qlit/	[qəlít]	‘slope’
	/hlit/	[həlít]	‘sago pudding’
	/t-qoq/	[təkóq]	‘I shave’
	/t-hoq/	[təhóq]	‘I enter’
	/w-aqa/	[wákɛa]	‘he comes’
	/w-aha/	[wákɛa]	‘he refuses’

Fricatives

<i>ϕ : s</i>	/ϕan/	[ϕan]	‘trail’
	/san/	[san]	‘type of bamboo’

	/o-φolo/	[wəφólo]	'he cuts'
	/o-solo/	[wəsólo]	'he asks for help'
	/m-aφí/	[majφí]	'it's new'
	/m-así/	[majsí]	'it goes downstream'
	/toφ/	[toφ]	'crest'
	/φos/	[φos]	'skin boil'
<i>s : h</i>	/saq/	[saq]	'knife'
	/haq/	[haq]	'palm frond'
	/o-sat/	[wəsát]	'he cuts'
	/o-hat/	[wəhát]	'he's angry'
	/asa/	[ása]	'sugar cane'
	/t-aha/	[táha]	'I refuse'

Nasals

<i>m : n</i>	/mam/	[mam]	'we (excl.)'
	/man/	[man]	Relativizer
	/nan/	[nan]	'you (pl.)'
	/na-m/	[nam]	'the woman'
	/t-amaq/	[támaq]	'I wear on the neck'
	/t-anaq/	[tánaq]	'my friend'

Vowels

Where possible, vowel phoneme contrasts are shown in word-initial, word-medial, and word-final positions, in stressed and unstressed pairs. Very few monomorphemic words begin with front vowels /i/ and /e/.

<i>i : e</i>	/iφót/	[iφót]	'turtle'
	/eφót/	[eφót]	'type of fish'
	/m-iió/	[mijó]	'we (excl.) put away'
	/m-eió/ ¹	[mejó]	'she puts away'
	/o-liliq/	[wəlɪlik]	'he rolls it'
	/o-leleq/	[wəléləəq]	'he turns it over'
	/m-esi/	[mési]	'it's cooked'
	/m-ese/	[mése]	'we (excl.) sleep'
	/mri/	[mərɪ]	'there'
	/mre/	[mərə]	'one'

¹ The verb root in contrast here is partially suppletive, indicating number. The singular root form is /eió/ whereas the plural root form is /iió/.

<i>i: a</i>	/iφót/	[iφót]	'turtle'
	/aφé/	[aφé]	'or'
	/m-lis/	[məlís]	'she's tall'
	/m-las/	[məlás]	'its leaf'
	/sioit/	[síwit]	'afternoon'
	/sioat/	[síwat]	'type of banana'
	/ni/	[ni]	'thing'
	/na/	[na]	'person'
	/t-ali/	[táli]	'I fold'
/t-ala/	[tála]	'I cut down'	
<i>i: o</i>	/ilit/	[ílit]	'type of sago'
	/oli/	[óli]	'again'
	/iφót/	[iφót]	'turtle'
	/oφó/	[oφó]	'then'
	/t-lis/	[təlís]	'I'm tall'
	/t-los/	[təłós]	'I pick (harvest)'
	/o-amin/	[wámin]	'he spool-wraps'
	/o-amon/	[wámon]	'his older brother'
	/m-sli/	[m̩səlí]	'it's dry'
	/m-slo/	[m̩səló]	'she pounds'
	/m-aφi/	[máφi]	'it's sour'
/m-aφo/	[máφo]	'her older sister'	
<i>e: a</i>	/aœt/	[áwœt]	'cockatoo'
	/eœr/	[éwœr]	'competition'
	/n-ese/	[nése]	'you (pl.) sleep'
	/n-ase/	[náse]	'you sleep'
	/m-ané/	[mané]	'that one'
	/m-enís/	[menís]	'she blows her nose'
	/sebe/	[sébe]	'war chief'
	/sabe/	[sábe]	'tree marsupial'
	/oedlá/	[wedlá]	'bachelor'
	/oadlá/	[wadlá]	'man'
	/sqe/	[sœké]	'type of bird'
	/sqa/	[sœká]	'torch'
	/m-are/	[máre]	'she raises (animal)'
/m-ara/	[mára]	'she crawls'	
<i>e: o</i>	/emi/	[émi]	'type of tree'
	/omiq/	[ómik]	'incessant'

	/eφó/	[eφó]	‘type of fish’
	/oφó/	[oφó]	‘and then’
	/t-selo/	[tsélo]	‘I throw’
	/t-solo/	[tsólo]	‘I ask for help’
	/φ-ese/	[φése]	‘we (incl.) sleep’
	/φ-oso/	[φóso]	‘we (incl.) hear’
	/qe/	[qe]	‘these’
	/qo/	[qo]	‘this’
	/m-abe/	[mábe]	‘for’
	/m-abo/	[mábo]	‘it’s moldy’
<i>a: o</i>	/aoo/	[áwo]	‘type of rattan’
	/óoo/	[ówo]	‘type of tree’
	/asá/	[asá]	‘type of tree’
	/osió/	[osjó]	‘trainee’
	/qariq/	[qárik]	‘type of snail’
	/qoriq/	[qórik]	‘pig’
	/amaq/	[ámaq]	‘stone’
	/amoq/	[ámoq]	‘night’
	/qa/	[qa]	‘taro plant’
	/qo/	[qo]	‘this’
	/t-aqa/	[táqa]	‘I come’
	/t-aqo/	[táqo]	‘I drink’

Appendix 2: Allophonic Rules

In this appendix, the allophonic rules of Imyan Tehit are presented. Consonant allophones are discussed in A2.1, focusing first on the back stop, followed by optional processes involving consonants (section A2.2). Vowel allophones are discussed in section A2.3.

A2.1 Consonant Allophones

A2.1.1 Back Stop. The back stop /q/ has four allophones: voiceless uvular stop [q], voiced uvular fricative [ɣ], voiced velar stop [g], and voiceless velar stop [k]. Many youths, however, reduce the two uvular allophones to glottal stop [ʔ]. The distribution of the back stop allophones depends on position in the word and the adjacent vowel.

Allophones [k] and [g]

A back stop adjacent to a high front vowel /i/ is fronted to velar position and is voiced everywhere except in word-final position (i.e., voiced [g] as onset, voiceless [k] as coda). The data in (1) below shows /q/ voiced in non-final positions, while (2) shows /q/ as voiceless word-finally:

- 1) Non-Word-Final Fronted /q/ → [g]
- | | | |
|-----------|------------|----------------------------|
| /qiφolo/ | [giφólo] | ‘coucal bird’ |
| /qinti/ | [gínti] | ‘sand’ |
| /qien/ | [gjin] | ‘hair’ |
| /qiet/ | [gjet] | ‘mouth’ |
| /qieφen/ | [gjeφen] | ‘type of flower’ |
| /m-aqi/ | [máigi] | ‘she died’ |
| /oqit/ | [ógit] | ‘Moi people’ |
| /o-oqin/ | [wógin] | ‘it is black’ |
| /m-qit/ | [mægít] | ‘she scratches’ |
| /m-φqi/ | [mφəgi] | ‘it is “asleep” (arm/leg)’ |
| /φaqiét/ | [φəgiét] | ‘type of banana’ |
| /oliqlén/ | [oligəlén] | ‘swallow (bird)’ |
| /sisiqár/ | [sisigár] | ‘scrub wren’ |
| /m-siqá/ | [mʌsigá] | ‘it is bad’ |
- 2) Word-Final Fronted /q/ → [k]
- | | | |
|----------|-----------|---------------------|
| /iiq/ | [jik] | ‘sky’ |
| /qoriq/ | [qórik] | ‘pig’ |
| /qdoliq/ | [qədólik] | ‘cucumber’ |
| /qiniq/ | [gínik] | ‘sago thorn’ |
| /t-amiq/ | [támik] | ‘my aunt’ |
| /nomiq/ | [nómik] | ‘type of sago palm’ |
| /t-sriq/ | [tsərík] | ‘I bathe’ |

Allophone [ɣ]

The fricative allophone [ɣ] (voiced uvular fricative) occurs in all remaining intervocalic positions (i.e. those not adjacent to /i/), as seen in (3) below. In many cases, the intervocalic environment is the result of schwa epenthesis during lexical syllabification.

- 3) /n-aqa/ [náɣa] ‘come!’
- /i-oqo/ [jóɣo] ‘they drink’
- /t-aqqa/ [təɣáɣa] ‘I put it in (container)’
- /t-qni/ [təɣəní] ‘I swim’

/i-qoqo/	[jə̀bóko]	'they're sick'
/o-iaqa/	[wɨ́jáɸa]	'he's wicked'
/o-qoliooo/	[wə̀bo jówo]	'he's tired'
/ɸqe/	[ɸə̀ɸé]	'type of clam'
/ɸqeit/	[ɸə̀ɸéjt]	'freshwater crab'
/sqe/	[sə̀ɸé]	'honeyeater (bird)'
/sqemit/	[sə̀ɸémit]	'imperial pigeon'
/oaqe/	[wáɸe]	'when'
/m-qedi/	[mə̀ɸédi]	'it is middle'
/t-qeɸin/	[tə̀ɸéɸin]	'I carry on my back'
/qaqois/	[qə̀ɸójs]	'tear duct'
/qtqe/	[qə̀tə̀ɸé]	'gecko lizard'
/o-qesiq/	[wə̀ɸésik]	'he loves'
/o-qaliq/	[wə̀ɸálik]	'his side'
/m-qataq/	[mə̀ɸátaq]	'it is wide'
/n-qohoq/	[nə̀ɸóhoq]	'you're rich'
/sqaboq/	[sə̀ɸábuq]	'wompoo fruit dove'

Allophone [q]

The allophone [q] (voiceless uvular stop) occurs elsewhere (i.e. at word boundaries without adjacent /i/), as seen below:

4) /qbahaq/	[qə̀báhaq]	'type of lizard'
/qsiaq/	[qə̀sjáq]	'bark'
/qasanaq/	[qə̀sánaq]	'type of frog'
/qatoq/	[qátoq]	'type of clam'
/qohoq/	[qóhoq]	'poison'
/amoq/	[ámoq]	'night'
/qais/	[qajs]	'tongs'
/qeɸeis/	[qéɸejs]	'slanted'
/qemit/	[qémit]	'headband'
/qeois/	[qéwis]	'type of rattan'
/qehit/	[qéhit]	'type of fruit'
/qeiá/	[qejá]	'carrying bag'
/qein/	[qejn]	'first'

The distribution of back stop allophones can be summarized very informally in (5) where % indicates mirror image environment.

5) Back Stop Distribution

- a. $q \rightarrow k \% i$ (Fronting)
- b. $k \rightarrow g / _ V$ (Voicing)
- c. $q \rightarrow \varkappa / V _ V$ (Voicing and Spirantization)

The above data indicate three processes operating on the back stop: fronting, voicing and spirantization. Fronting and voicing are both induced by proximity to a high front vowel. Spirantization and voicing occur together intervocally when a high front vowel is not present. These processes can be stated more formally and economically as shown in the following rules:

- 6) Fronting: A back stop adjacent to a high front vowel is fronted to velar position.

$$\begin{array}{c} C \\ [+back] \end{array} \rightarrow [+high] \% \begin{array}{c} [+high] \\ [-back] \end{array}$$

- 7) Spirantization: A back non-high segment becomes fricative intervocally.

$$\begin{array}{c} C \\ [+high] \\ [-back] \end{array} \rightarrow [+cont] / V _ V$$

- 8) Voicing: A back high stop or back non-high fricative becomes voiced before a voiced segment.

$$\begin{array}{c} C \\ [+back] \\ [\alpha high] \\ [-\alpha cont] \end{array} \rightarrow [+voi] / _ [+voi]$$

All three of the above rules are crucially ordered with respect to each other: Fronting bleeds Spirantization and feeds Voicing. Spirantization also feeds Voicing. Schwa Epenthesis during lexical syllabification feeds both Spirantization and Voicing. Consider the following derivations:

9) Derivation of Back Stop Allophones

Underlying Form	/qiniq	m-siq	qriq	qtqe/
Schwa Epenthesis	—	—	qəriq	qətəqe
Fronting	kinik	msika	qərik	—
Spirantization	—	—	—	qətəxe
Voicing	ginik	msiga	—	qətəɛe
Surface Form	[ginik	msiga	qərik	qətəɛe]
	'thorn'	'it's bad'	'yam'	'lizard'

One cannot reorder Schwa Epenthesis with respect to the following rules since they occur in different domains – the lexical and postlexical stages of the phonology. In the following derivation the crucial ordering between Fronting and Spirantization is reversed, and /m-siqa/ ‘it is bad’ emerges with an incorrect surface form.

10) Derivation with Incorrect Rule Ordering

Underlying Form	/m-siqa/
Spirantization	msixá
Fronting	msixá
Surface Form	* [msixá]

Thus, Fronting must precede Spirantization.

Variant [ʔ]

Although most adults adhere to the above processes, many of the younger generation of Haha village, as well as a few younger adults, use a glottal stop [ʔ] instead of the non-fronted back stop allophones [q] and [ɣ], as shown:

11) Speaker:	Older	Younger	
/qo/	[qo]	[ʔo]	‘here’
/qlen/	[qəlén]	[ʔəlén]	‘bird’
/qʔata/	[qəʔáta]	[ʔəʔáta]	‘sago grub’
/qtqe-m/	[qətəkém]	[ʔətəʔém]	‘the gecko lizard’
/qbalaq/	[qəbálaq]	[ʔəbálaʔ]	‘thigh’
/n-hnaq/	[nəhənáq]	[nəhənáʔ]	‘you give’
/n-qoró/	[noɣoró]	[noʔoró]	‘you stand’
/n-aqa/	[náɣa]	[náʔa]	‘you come’
/maqán/	[maɣán]	[maʔán]	‘dog’

If the back stop is fronted by adjacency to a front high segment, the usual velar allophones result, and there is no distinction between speaker group:

12) Speaker:	Older	Younger	
/qoriq/	[qórik]	[ʔórik]	‘pig’
/qiniq/	[gínik]	[gínik]	‘sago thorn’
/t-qit/	[təgít]	[təgít]	‘I scratch’
/m-aqi/	[mági]	[mági]	‘she died’
/m-siqa/	[m̀sigá]	[m̀sigá]	‘it is bad’
/mo ⁿ got/	[mónɣot]	[mónɣot]	‘large prawn’

Thus, for younger speakers, the following rule applies. The perception among adults, however, is that the process is becoming more deeply rooted among adolescents, and that a growing number of young adults do not speak “correctly.”

- 13) Glottal Stop: A back segment not adjacent to a high segment is reduced to glottal stop.

Other [g]

There still remain several words having an intervocalic velar stop [g] where the uvular fricative [ɣ] would be expected. It is interesting to note that these exceptions fit into a definite pattern. They only occur in two-syllable words where the first vowel is stressed and back and the second vowel is /o/ and word-final, as seen in (14).

- | | | |
|----------|---------|-------------------------------------|
| 14) /aɔ/ | [áɔ] | ‘up there’ |
| /saɔ/ | [sáɔ] | ‘upward’ (/se aɔ/ = to up there)? |
| /naɔ/ | [náɔ] | ‘God’ (/na aɔ/ = the one up there)? |
| /oɔ/ | [óɔ] | ‘banana’ |
| /soɔ/ | [sóɔ] | ‘type of snake’ |
| /na oɔ/ | [na óɔ] | ‘Serui person’ |

Where the back stop does not fit the unique and restrictive environment above, it takes on the expected voiced fricative form:

- | | | |
|------------|-----------|--------------|
| 15) /n-aɔ/ | [náɣa] | ‘you come’ |
| /titioɔ/ | [titjóɣo] | ‘coconut’ |
| /m-φaɔ/ | [mφáɣo] | ‘it is damp’ |
| /t-ɔoɔ/ | [təɣóɣo] | ‘I ache’ |
| /sɔ/ | [səɣó] | ‘over there’ |

There are two exceptions to the above pattern, seemingly contrasting [g] and [ɣ]:

- | | | |
|--------------------|-------------|---|
| 16) a. /t-aɔ sala/ | [táɔo sála] | ‘I burn (garden)’ (/aɔo sala/ = up fire)? |
| /t-aɔo ɣla/ | [táɣo ɣelá] | ‘I drink water (I drown)’ |
| b. /oɔ/ | [óɔ] | ‘banana’ |
| /i-oɔo/ | [jóɣo] | ‘they drink’ |

A2.1.2 Unreleased Stop. Stops in word-final position (/t ɣ/) are unreleased. Optionally, an unreleased stop may release onto a following vowel-initial word.

- | | | |
|----------------|------------------|-----------------|
| 17) /m-iɔ ana/ | [mik kána] | ‘over there’ |
| /m-leleɔ oli/ | [mələléleɔ ɣóli] | ‘it turns back’ |
| /m-iɔ a/ | [mik ka] | ‘at uh...’ |

/ni i-eit o/	[ni jɛjt to]	‘the food’
/m-hot a/	[mähót ta]	‘we see uh...’

A2.2 Optional/Idiolectal Palatal Influences

A2.2.1 Fricative Voicing. There are several processes in Imyan Tehit involving the environment of /i/ that are either optional or idiolectal. One such process is the voicing of fricatives that precede /i/, as seen in (18):

18) Pronunciation:	A	B	
/n-eɸiq/	[néɸik]	[néβik]	‘you chop’
/m-eɸit/	[méɸit]	[méβit]	‘she calls’
/sisi/	[sísi]	[sízi]	‘together’
/t-qesi/	[tæési]	[tæézi]	‘my aunt’
/o-asiq/ ¹	[wájsik]	[wájzik]	‘he defecates’

As seen for [sízi] ‘together’, the process only occurs word-medially. The rule for optional fricative voicing is given below:

19) Fricative Voicing: A word-medial fricative followed by /i/ is optionally voiced.

$$\left[\begin{array}{c} \text{C} \\ \text{-son} \\ \text{+cont} \end{array} \right] \rightarrow [+voi] / X \text{ — } \left[\begin{array}{c} \text{V} \\ \text{+high} \\ \text{-back} \end{array} \right]$$

A2.2.2 Coronal Affrication. Another optional process takes the voiced coronal stop [d] and makes it into an affricate [dʒ] when preceding a high front segment:

20) Pronunciation:	A	B	
/adi/ ²	[ájdí]	[ájdʒi]	‘down there’
/m-di/	[mədí]	[mədʒí]	‘she falls’
/ɸoldi/	[ɸóldí]	[ɸóldʒi]	‘underbrush’
/qadiq/	[qádík]	[qádʒík]	‘pandanus plant’
/t-adiq/	[tádík]	[tádʒík]	‘I carry’
/o-adiq/	[wádík]	[wádʒík]	‘spinach’

Similarly, the sequence [dj] can be replaced by [dʒ]:

¹ The derivation of /o-asiq/ [wájsik] ‘he defecates’ also involves optional *j*-Epenthesis.

² The derivation of /adi/ [ájdí] ‘down there’ also involves optional *j*-Epenthesis.

21) /adiát/ ³	[ajdját]	[ajdʒát]	‘squash’
/qadió/	[qadjó]	[qadʒó]	‘everything’
/m-idián/	[midján]	[midʒán]	‘it is heavy’
/t-diere/	[tədjére]	[tədʒére]	‘I meet’
/n-φidiáq/	[nφidjáq]	[nφidʒáq]	‘you vomit’

For the data in (20), a single rule is sufficient:

- 22) Alveolar Spirantization: A word-medial voiced alveolar stop [d], if followed by a high front segment /i/ or [j], may optionally become [dʒ].

$$\left[\begin{array}{c} \text{C} \\ \text{Coronal} \\ -\text{son} \\ +\text{voi} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{cont} \\ -\text{anter} \\ +\text{strid} \end{array} \right] / X \text{ — } \left[\begin{array}{c} \text{V} \\ +\text{high} \\ -\text{back} \end{array} \right]$$

For the data in (21), however, an additional rule is required to apply after Alveolar Spirantization to delete the glide:

- 23) Glide Deletion: A high front glide is deleted following [dʒ].

$$\left[\begin{array}{c} \text{C} \\ +\text{high} \\ -\text{back} \end{array} \right] \rightarrow \emptyset / \left[\begin{array}{c} \text{C} \\ \text{Coronal} \\ -\text{anter} \\ +\text{strid} \end{array} \right] \text{ —}$$

A2.2.3 j-Epenthesis. One of the most interesting optional processes involves the anticipation of a high front vowel or segment. Specifically, the high front segment in either the onset or the nucleus of a word-final syllable is copied back to form the coda of a penultimate open syllable. In column B of (24) I show *j*-Epenthesis being triggered by a word-final nuclear [i] or [j], whereas in (25) the coda epenthesis is triggered by a word-final onset [j]:

- 24) *j*-Epenthesis Triggered by Nuclear *i* or *j*

Pronunciation:	A	B	
/o-aqi/	[wáqi]	[wájgi]	‘he died’
/t-así/	[tasí]	[tajsí]	‘I go downstream’
/qoli/	[qóli]	[qójli]	‘forest spirit’
/todi/	[tódi]	[tójdi]	‘lowland’
/t-asiq/	[tásik]	[tájsik]	‘I defecate’
/m-qasiq/	[mæásik]	[mæájsik]	‘she inserts’

³ The derivation of /adiát/ [ajdját] ‘squash’ also involves optional *j*-Epenthesis.

/o-nalit/	[wənálit]	[wənájlit]	'he signals'
/n-alin/	[nálin]	[nájlin]	'you go on ahead'
/asiá/	[asjá]	[ajsjá]	'type of clam'
/adiát/	[adját]	[ajdját]	'squash'

25) *j*-Epenthesis Triggered by Onset *j*

/n-saie/	[nśáje]	[nśájje]	'you carry at side'
/m-oio/	[mójo]	[mójjo]	'she cooks'
/qaiá/	[qajá]	[qajjá]	'few'
/aií/	[ají]	[ajjí]	'type of clam'
/baiaq/	[bájaq]	[bájjaq]	'type of rattan'
/naiar/	[nájar]	[nájjar]	'type of hawk'
/qaién/	[qajín]	[qajjín]	'rain'

Note that the final syllable glide [j] in (25) must be interpreted as an onset rather than the first segment of a branching nucleus, because the later position would violate the Obligatory Onset Condition. *j*-Epenthesis in /aií/ 'type of clam' is triggered by either onset or nucleus.

An alternate analysis would posit an underlying *j* coda that optionally deletes when followed by a word final syllable containing a high front non-coda segment. The problem with this analysis is that there are no examples in Imyan Tehit of penultimate syllables with a [j] coda followed by word-final syllables which do not have a high front vowel nucleus (**qajda*, **qajdo*, **qajde*, etc.). The systematic absence of *j* codas except in the environment described above argues for *j*-Epenthesis rather than *j*-Deletion.

There are a number of limitations placed on the anticipatory *j*-Epenthesis process. First, the process has only been observed to apply to penultimate syllables having back vowels /a o/, as was seen in (24) and (25) above. It may be that the front vowels /i e/ are also included in the process, but that I could not phonetically distinguish [ej] from [e] or [ij] from [i]. The non-phonemic schwa, however, is definitely excluded from *j*-Epenthesis, as seen in (26), a fact that may argue against the supposed status of CV "syllables" created by schwa epenthesis in the lexical phonology.

26) Pronunciation:	A	B	
/m-φqi/	[mφəgí]	*[mφəjgí]	'it is "asleep"'
/o-tli/	[wətəlí]	∅	'he opens it'
/φsi/	[φəsí]	∅	'type of vegetable'
/qrit/	[qərít]	∅	'type of yam'
/qsiaq/	[qəsjáq]	∅	'bark'
/sris/	[sərís]	∅	'mouse'

Second, *j*-Epenthesis is blocked in penultimate closed syllables:

27)	/ʔoldí/	[ʔoldí]	*[ʔojldí]	‘brush overgrowth’
	/t-arʔí/	[tarʔí]	∅	‘I go upstream’

Third, the process has not been observed to cross a labial onset, as illustrated in (28):

28)	<i>j</i> -Epenthesis Blocked by Labial Onsets			
	Pronunciation:	A	B	
	/qabí/	[qabí]	*[qajbí]	‘area under house’
	/ʔobi/	[ʔóbi]	∅	‘land’
	/ʔabit/	[ʔábit]	∅	‘bandage’
	/t-ábien/	[tábjin]	∅	‘I pull’
	/m-aʔi/	[máʔi]	∅	‘it is sour’
	/qaʔiq/	[qáʔik]	∅	‘scrotum’
	/ʔ-saʔit/	[ʔəsáʔit]	∅	‘we dance’
	/t-qáʔien/	[təxáʔjin]	∅	‘I carry’
	/n-amiq/	[námik]	∅	‘your aunt’
	/t-amin/	[támin]	∅	‘I spool-wrap’
	/qamií/	[qamjí]	∅	‘very’
	/qaoí/	[qawí]	∅	‘heel’

Fourth, *j*-Epenthesis does not occur if the high segment does not belong to the onset or nucleus of the ultimate syllable, as seen in (29) below. Since the word-final glides in the following examples are in the coda, *j*-Epenthesis does not apply. This distinction between prevocalic [j] and postvocalic [j] supports the analysis presented in this analysis. Prevocalic [j] and syllabic [i] may both occur in the syllable nucleus; postvocalic [j] is in the coda.

29)	Pronunciation:	A	B	
	/blaléin/	[blaléjn]	*[blajléjn]	‘type of fern’
	/qabléis/	[qabléjs]	∅	‘type of tree’
	/qaqóis/	[qaʔójs]	∅	‘tear duct’
	/t-sqaléis/	[tsəxaléjs]	∅	‘I trade’

Fifth, the process is blocked if the penultimate vowel is /o/ and the word-final syllable is closed, as in (30), but the process is operative if the word-final syllable is open, as in (31).

30)	Pronunciation:	A	B	
	/qdoliq/	[qədólik]	*[qədójlik]	‘cucumber’
	/o-oqin/	[wógin]	∅	‘it is black’

/ronit/	[rónit]	ø	'cloth sieve'
/oφir/	[óφir]	ø	'type of snail'
31) /bosi/	[bósi]	[bójsi]	'maybe'
/qoli/	[qóli]	[qójli]	'forest spirit'
/todi/	[tódi]	[tójdi]	'lowland'

Finally, the process is not operative in antepenultimate syllables, as shown in (32), because the trigger /i/ must occur in the word-final syllable onset or nucleus.

32) Pronunciation:	A	B	
/amisiá/	[amisjá]	*[ajmisjá]	'echidna (anteater)'
/t-alioét/	[talíwét]	ø	'younger sibling'
/taφiqát/	[taφigát]	ø	'pitohui (bird)'
/bariniá/	[barinjá]	ø	'taboo sign'
/qadioro/	[qadjóro]	ø	'back side'
/qahiliá/	[qahiljá]	ø	'last one'
/t-qoliooo/	[təxoljówo]	ø	'I'm tired'
/t-sqadihóq/	[tsəxadihóq]	ø	'I speak'

In consideration of all the above data, I summarize with the following rule for anticipatory *j*-Epenthesis:

- 33) *j*-Epenthesis: A non-coda high front segment in word-final syllable may assimilate back across a non-labial onset to form the coda of a penultimate open syllable, except that the process is blocked for a penultimate nucleus /o/ if the word-final syllable is closed.

A2.3 Vowel Allophones

A2.3.1 *Allophone* [ɛ]. The non-high front vowel /e/ becomes lax [ɛ] in simple closed syllables of non-suffixed words, as shown in (34):

34) /t-qader/	[təxáder]	'I scream'
/n-eoer/	[néwer]	'move!'
/eroás/	[erwás]	'animal'
/ahel/	[áhel]	'cuckoo dove'
/leoel/	[léwɛl]	'cassowary tree'
/qaφel/	[qáφɛl]	'mudhopper (fish)'
/nen/	[nɛn]	'you'
/oesen/	[wésɛn]	'rainbow'
/o-hares/	[wəháɾɛs]	'he's generous'

/m-hes/	[məhés]	‘she’s shy’
/qma tes/	[qəmə té:s]	‘houseboat’
/breφ/	[bréφ]	‘jaw harp’
/ ^m garéφ/	[ŋgaréφ]	‘arrow’
/aoet/	[áwɛt]	‘cockatoo’
/bet/	[bet]	‘mud’

If, however, /e/ occurs before the suffix coda [m w j] which denotes third person referent number and gender, laxing does not apply:

35) /m-bahe-m/	[m̩báhem]	‘she orders her/it’
/t-φe-m/	[təφém]	‘I own it (fem.)’
/t-φe-o/	[təφéw]	‘I own it (masc.)’
/biele-o/	[bjélew]	‘garden (masc.)’
/m-bahe-i/	[m̩báhej]	‘she orders them’
/t-φe-i/	[təφéj]	‘I own them’

Neither does /e/ laxing occur before the glide of a complex coda:

36) /φ-eit/	[φéjt]	‘we eat’
/t-heit/	[təhéjt]	‘I stay’
/qreit/	[qərəjt]	‘type of sago palm’
/m-brieis/	[m̩brjéjs]	‘it is upside down’
/qaφeis/	[qáφejs]	‘boil’
/t-bieis/	[təbjéjs]	‘I dig by hand’
/o-hein/	[wəhéjn]	‘he carves’
/blalein/	[blaléjn]	‘type of fern’
/t-qein/	[təɛéjn]	‘I pull’

The fact that laxing does not occur before the high glides [w j] is not surprising since these consonants carry the advanced tongue root [+ATR] attribute of their corresponding high vowels. The anomalous non-laxing of /e/ before heteromorphemic /m/ may indicate that the suffix is a clitic. The above data is accounted for by the following rule:

- 37) Lax /e/: The non-high front vowel /e/ becomes lax before a tautosyllabic consonantal.

$$\left[\begin{array}{c} \text{V} \\ \text{[-high]} \\ \text{[-back]} \end{array} \right] \rightarrow \text{[-ATR]} / \text{---} \left[\begin{array}{c} \text{C} \\ \text{[+cns]} \end{array} \right]]_{\sigma}$$

Two options exist for syllable-nuclear /e/ with back stop codas: either schwa epenthesis or laxing, as seen in (38).

38) Pronunciation	A	B	
/t-heq/	[təhéəq]	[təhéq]	'my tooth'
/m-treq/	[mətəréəq]	[mətéréq]	'it is muddy'
/sdeq/	[sədéəq]	[sədəq]	'small'
/qleq/	[qəl'éəq]	[qələq]	'crack'
/m-qar'éq/	[məkar'éəq]	[məkar'éq]	'she's stingy'
/m-qleq/	[məkəl'éəq]	[məkələq]	'it is torn'
/o-qeseq/	[wəkéseəq]	[wəkéseq]	'he peels it'
/m-φaleq/	[mφál'éəq]	[mφələq]	'it is empty'
/m-eleq/	[méleəq]	[méleq]	'it is white'
/lemeq/	[lémeəq]	[lémeq]	'pounding tool'

The more common process is the epenthesis of schwa between the nucleus and coda, functioning as a phonetic glide assisting in the transition from front to back articulation. Of interest here, is that schwa epenthesis blocks the nucleus from laxing because it is no longer adjacent to the coda. In the absence of schwa epenthesis, laxing applies.

Transitional schwa epenthesis also occurs across word boundaries, as illustrated in (39).

39) /t-rie qa/	[tərjé əqá]	'I uproot taro'
/biele qo/	[bjéle əqó]	'this garden'
/m-se qla/	[mʂséə qəlá]	'to the water'
/φe qma-m/	[φ'éə qəmám]	'for the canoe'
/o-ase qat/	[wáse əqát]	'he lives far away'
/ni hre qe/	[ni həre əqé]	'these things'

The rule for transitional schwa epenthesis, given in (40), is postlexical, operating in phrasal domain environments that may cross word boundaries.

- 40) Transitional Schwa Epenthesis: A schwa may optionally epenthesize between a non-high front tense vowel and a following back stop.

$$\emptyset \rightarrow \text{ə} / \left[\begin{array}{l} \text{V} \\ \text{-high} \\ \text{-back} \\ \text{+ATR} \end{array} \right] \text{ — } \left[\begin{array}{l} \text{C} \\ \text{+back} \end{array} \right]$$

In addition to /e/ laxing in closed syllables, the allophone [ɛ] also occurs in open syllables before /r/, as seen in (41). In open syllables preceding /l/, however, laxing does not apply. These facts are accounted for by (42).

41) /erén/	[ɛrén]	'fish'
/ ⁿ perit/	[mpérit]	'crowned pigeon'
/t-erés/	[tɛrés]	'I open'

/deri/	[déri]	‘just’
/o-bere/	[wəbére]	‘he commands’
/n-siere/	[ɲsjére]	‘cross over!’
/sieren/	[sjéren]	‘papaya’
/qdiere/	[qədjére]	‘cliff’
/m-oere/	[mʷére]	‘she turns off (path)’
/t-leli/	[tələli]	‘I sit’
/n-elin/	[nélin]	‘you (pl.) lead’
/biele/	[bjéle]	‘garden’
/m-eleq/	[méleq]	‘it is white’
/n-selo/	[ɲsélo]	‘you throw’

42) /r/ Induced Lax /e/: A non-high front vowel /e/ preceding /r/ becomes lax.

$$\begin{bmatrix} \text{V} \\ \text{-high} \\ \text{-back} \end{bmatrix} \rightarrow \text{[-ATR]} / \text{---} \begin{bmatrix} \text{C} \\ \text{+son} \\ \text{+cons} \\ \text{-nas} \\ \text{-lat} \end{bmatrix}$$

A2.3.2 *Allophone* [ɪ]. The dependence of Imyan Tehit vowel allophones on syllable structure is evidenced by the front vowels, which are subject to laxing in closed syllables with varying conditions. For example, the high front vowel /i/ becomes lax [ɪ] before tautosyllabic liquids, as seen in (43).

43) /oφir/	[óφɪr]	‘type of snail’
/o-amir/	[wámɪr]	‘he copulates’
/titir/	[títɪr]	‘wall’
/i-sadir/	[isádɪr]	‘they discuss’
/o-oqir/	[wóqɪr]	‘heron’
/qaqir/	[qáqɪr]	‘palm heart’
/t-ehir/	[téhɪr]	‘I cut (cross grain)’
/φirφiri/	[φɪrφíri]	‘just now’
/t-adil/	[tádɪl]	‘my tongue’
/tidil/	[tídɪl]	‘outrigger peg’

This laxing process does not occur in open syllables, as seen in (44).

44) /írooe/	[írowe]	‘quiet’
/sírere/	[sírere]	‘type of shrimp’
/m-sirobo/	[ɲsiróbo]	‘she’s sleepy’
/isirián/	[isirján]	‘honeyeater (bird)’

/milié/	[miljé]	'rafter top'
/qahiliá/	[qahiljá]	'last'

Neither does /i/ become lax before non-liquids, as seen in (45). Recall that although non-liquids are restricted from coda position word-medially, they can function as codas word-finally:

45) /o-amin/	[wámin]	'he wraps it around'
/n-tadin/	[ɲtádin]	'you snore'
/bis/	[bis]	'type of tree'
/oelis/	[wélis]	'day after tomorrow'
/m-tidis/	[mætídis]	'it is stuck'
/m-φit/	[mφit]	'she stones it'
/danit/	[dánit]	'handle (tool)'
/qalit/	[qálit]	'tree house'
/toliq/	[tólik]	'three'
/m-diq/	[mædfk]	'she fills (container)'
/qariq/	[qárik]	'type of snail'

The above data are accounted for by the following rule:

- 46) Lax /i/: A high front vowel becomes lax before a tautosyllabic liquid.

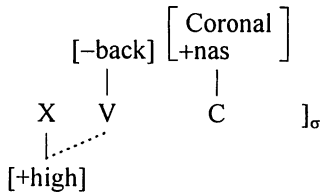
$$\begin{bmatrix} V \\ +\text{high} \\ -\text{back} \end{bmatrix} \rightarrow [-\text{ATR}] / \text{---} \begin{bmatrix} C \\ +\text{son} \\ +\text{cns} \\ -\text{nas} \end{bmatrix}]_{\sigma}$$

In addition to occurring in closed syllables with liquid codas /r/ and /l/, the lax high front vowel [ɪ] also occurs in closed syllables with coda /n/ provided it is preceded by a high front segment:

47) /qaién/	[qajín]	'rain'
/tiién/	[tijín]	'stick'
/φien/	[φjín]	'together'
/hrién/	[hərjín]	'things'
/dlién/	[dljín]	'ironwood'
/m-esién/	[mesjín]	'it is egg'
/n-sin/	[ɲsín]	'you plan'
/t-lin/	[təlín]	'I skin (animal)'
/m-looin/	[məlówin]	'it's shady'
/n-qomin/	[nəxómin]	'you're cold'

Here, the interpretation is not that the lax vowel is derived from /i/ in direct laxing, but rather from /e/ through two processes – laxing and raising. First /e/ is laxed to [ɛ] in the closed syllable. Then the vowel is raised to [ɪ] by assimilation to a preceding high front segment, as given by (48):

- 48) Front Vowel Raising: A front vowel is raised if it is preceded by a high segment and followed by tautosyllabic /n/.



The above raising rule necessarily follows laxing. If vowel raising came first, then laxing could not apply because the rule for laxing /i/ requires a liquid coda.

A2.3.3 Allophone [i]. It has already been shown that the front glide [j] is an allophone of /i/ in pre-vocalic or post-vocalic position. The central high glide [ɨ], also an allophone of /i/, only occurs in a branching or complex nucleus functioning as a glide between a labial onset and a back vowel, as seen in (49).

49) /qo ⁿ piɑ/	[qompɨɑ]	‘type of sago’
/qɒbiɑq/	[qəbɨɑq]	‘ashes’
/sɨbiɑr/	[sɨbɨɑr]	‘wasp’
/qɑrmiɑq/	[qɑrmiɑq]	‘very’
/sɑmiɑn/	[sɑmiɑn]	‘demon’
/m-miɑn/	[m̩miɑn]	‘it is dark’
/t-ɑoɨɑ/	[tɑwɨɑ]	‘my shadow’
/qɑoɨɑq/	[qɑwɨɑq]	‘until’
/biolo/	[biólo]	‘type of bamboo’
/qɑbios/	[qɑbiós]	‘type of lizard’
/tɒbio/	[təbɨó]	‘fire starter’
/m-φion/	[m̩φɨón]	‘its seed’
/m-sɑφion/	[məsɑφɨón]	‘its branch crotch’
/qɑmiolo/	[qɑmiólo]	‘long ago’

If, however, the glide is not preceded by a labial onset, the glide does not assimilate to the following vowel:

/n-oien/	[nəwʝín]	[nuwʝín]	'you get'
/t-oan/	[təwán]	[tuwán]	'I expel'
/n-oare/	[nəwáre]	[nuwáre]	'you wash'
/t-oaran/	[təwáran]	[tuwáran]	'my collar bone'
/t-oere/	[təwére]	[tuwére]	'I turn aside'
/m-toaq/	[mətəwáq]	[mətuwáq]	'it's broken'
/loa/	[ləwá]	[luwá]	'snake'
/o-loa/	[wələwá]	[wəluwá]	'he's good natured'
/soar/	[səwár]	[suwár]	'fruit bat'

Considering the data in (56), it is clear, however, that the phonemic vowel /o/ does not assimilate the qualities of a following [w] (non-nuclear /o/):

56) /qoóán/	[qowán]	*[quwán]	'friend'
/tooón/	[towón]	*[tuwón]	'star'
/irowé/	[irowé]	*[iruwé]	'quiet'
/qadooáq/	[qadowáq]	*[qaduwáq]	'tuber'
/φ-ooá/	[φowá]	*[φuwá]	'we (include.) cry'
/tooá/	[towá]	*[tuwá]	'bee'
/dooás/	[dowás]	*[duwás]	'cane grass'
/t-qooér/	[təxowér]	*[təxuwér]	'I move it aside'
/o-tooeit/	[wətowéjt]	*[wətuwéjt]	'it flashes'
/o-ooo/	[w-ówo]	*[wúwo]	'it's round'
/ioooq/	[jówoq]	*[júwoq]	'leech'
/qooon/	[qówon]	*[qúwon]	'bamboo strip'
/m-looin/	[məlówin]	*[məlúwin]	'it's shade'

The effects on schwa by a following front glide [j] or vowel is clearly seen in (57a-e). Schwa can optionally take on the quality of a following non-consonantal. It appears, however, that assimilation of the following vowel is not possible if an intervening consonant is not a continuant, as seen in (57f).

57) Optional Non-consonantal Assimilation by Schwa

a. /t-ian/	[təján]	[tiján]	'I rub'
/o-iaqa/	[wəjáɣa]	[wijáɣa]	'he's wicked'
b. /o-sirobo/	[wəsiróbo]	[wisiróbo]	'he's sleepy'
/o-sitolo/	[wəsitólo]	[wisitólo]	'he's thirsty'
c. /φ-heit/	[φəhéjt]	[fəhéjt]	'we (incl.) wait'
/t-heq/	[təhéəq]	[təhéəq]	'my tooth'

d.	/m-φaleq/	[məφáleq]	[maφáleq]	'its bark'
	/m-saq/	[məsáq]	[masáq]	'it is lost'
	/n-qaφe/	[nəkáφe]	[nakáφe]	'you carry'
	/n-qani/	[nəkájni]	[nakájni]	'you're sick'
	/i-qaq/	[jəkáq]	[jakáq]	'they dig up'
e.	/t-hano/	[təháno]	[taháno]	'my younger sister'
	/t-qodois/	[təkodójs]	[tokodójs]	'my bone'
	/n-qoró/	[nəkoró]	[nokoró]	'stand!'
	/m-hoq/	[məhóq]	[mohóq]	'we (excl.) arrive'
	/t-hot/	[təhót]	[tohót]	'I see'
f.	/t-bait/	[təbájt]	*[tabájt]	'I play'
	/m-rana/	[mərəna]	*[marána]	'she tells'
	/m-to/	[mətó]	*[motó]	'she says'
	/t-noq/	[tənoq]	*[tonóq]	'I know'
	/t-bere/	[təbére]	*[tebére]	'I order'
	/m-leli/	[məléli]	*[meléli]	'she sits'
	/t-di/	[tədi]	*[tidí]	'I fall'
	/o-lis/	[wəlís]	*[wilís]	'he's tall'

The above vowel assimilation data are accounted for by the following rule, assuming that only vowel features can spread to the degenerate syllable nucleus (V linked to \emptyset):

- 58) Optional Degenerate Vowel Assimilation: A degenerate syllable nucleus may optionally assimilate to the following non-consonantal if an intervening consonant is continuant.

