Syllabic Consonants and Syllabification in Imdlawn Tashlihiyt Berber

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1. PRELIMINARIES

This article deals with the Tashlihiyt dialect of Berber as spoken in the Imdlawn valley, seventy kilometers northeast of the city of Taroudant, in the Western High Atlas. One of us (ME) is a native speaker of that dialect, which will henceforth be referred to as ITB. A more detailed treatment of some of the points discussed here will be found in Emedlaoui (1985).

ITB has syllabic consonants (sonorants and obstruents), and the eligibility of a segment for being a syllabic peak depends on its position in the sonority hierarchy (sections 2 and 3). Before a pause two syllables may be fused into one (section 4). Long segments behave as asymmetrical sequences of two units (section 5).

The regularities discussed in this article are independent of grammatical categories or of the morphological make up of words. They are exceptionless, as far as we know.

ITB has three vowels ə, i and u, and the semivowels y and w. We shall call the segments i, y, u, and w high vocoids (henceforth HV). i and y are in complementary distribution in the phonetic representations, and so are u and w: if a HV is adjacent to a syllabic segment it must be a semivowel, otherwise it must be a vowel. For instance the 3m. sg. prefix shows up as y when the following segment is syllabic, and as i otherwise (cf. (1)), and the 2 pl. pronoun is pronounced ın when the preposition which governs it ends in a nonsyllabic segment, and wı if that preposition ends in a syllabic segment (cf. (2)):

(1) a. y-attray 'it is high'  b. i-skR 'he does'
(2) a. imı-mı-an 'your mouths'  b. i-kRz-a-wı 'he ploughed for you'

Consonantal sonorants can appear as syllabic peaks in ITB, and so can fricatives and stops. (3) presents syllability alternations in the initial consonant of verbs (3 m. sg. vs. 3 f. sg.) All verbs are in the perfective

* We thank Morris Halle and an anonymous reviewer for their comments.
aspect. Syllabic consonants are indicated by a capital or by an apostrophe (cf. fn. 1). On the phonetic properties of syllabic consonants, cf. section 3.

(3)  ik'di  tL'di  'pull'
     ir'ba  tR'ba  'carry on one's back'
     in'da  tN'da  'shake (milk)'
     in'da  tM'da  'be worn out'
     iz'di  tZ'di  'put together'
     iz'la  tZ'la  'get lost'
     fr'za  ty'za  'dig'
     if'da  th'da  'give (gift)'
     if'si  tSt'i  'select'
     is'si  tS'si  'untie'
     is'si  th'si  'go out (fire)'
     ir'ha  th'ha  'cover'

(4) presents syllabic alternations in the last consonant of verbs. On each line the form on the left is the 2 sg. perfective (the 2 sg. marker is /-t/) and that on the right is 3 f. sg. perfective (3 f. sg. is /-t/) with a dat. 3 m. sg. object (/-a-s/).

(4)  tRgL't  tRglas  'lock'
     tSkr't  tSkras  'do'
     tXzn't  txznas  'store'
     tZdmt  tZdnas  'gather wood'
     tLbZ't  tLbzas  'step onto'
     tLbZ't  tLbzas  'ideem'
     tRks't  tRkas  'hide'
     tNbf't  tNfas  'graze (skin)'
     tMxt  tMxas  'transform'

Aside from a well-defined class of problematic cases which all involve HV's (cf. the end of section 2), there is no reason to posit an underlying syllability contrast in ITB, as we shall see. i and y can be derived as two variants of the same underlying segment, and so can u and w, l and L, r and R and so on.

Following recent proposals, 3 we take the syllability of a segment to be a function of that segment's position in syllable structure, and not a specification of some distinctive feature such as [syllabic]. Every syllable is represented by a tree which has one and only one "head" (the syllable peak), and to say that a given segment is syllabic is the same thing as to say that that segment is associated with the head node of a syllable tree. Let I stand for the specifications [+son, -cons, +high, -back, -round], and U for conditions [syllable]

For convenience the parenthetical syllables in the parentheses will be separated by 1 line segments.

The representation of the syllable matrix, which develops some question of the interplay of the remarkable fact of the syllabic ordering of the segments. This fact is well established by the sequence of the last syllable in a sequence of the

In what follows I point out some approaches to this, but I will not develop the grammar of the syllable type in order to satisfy the substring each instance, in Tami possible syllable
and $U$ for [+son, –cons, +high, +back, +round]. The phonetic transcriptions [suy], [zwy] and [tMzimt] are simply shorthand notations for the following representations, where the syllabic peak is indicated by a star.

$$\begin{align*}
\text{S} & \quad z \quad U \quad I \\
\text{S} & \quad z \quad U \quad I \\
\text{S} & \quad t \quad m \quad z \quad i \quad m \quad t
\end{align*}$$

For convenience we will sometimes make use of $(sU'I)$, $(zUI')$ and $(t'm')(z'i'mt)$ as just another way of representing the objects in (5), with the parentheses standing for an associated $S$ node and with the apostrophe to indicate that the preceding element is a head. When we wish to make the syllabification more conspicuous in a phonetic transcription, syllables will be separated by dots: $tM \cdot zimt$. Following current practice, within a syllable, the sequence of segments preceding the peak will be called the onset, and the sequence of segments following it, the coda. The sequence of segments comprised of the peak and the coda (if there is one) is called the rime. In $zimt$ the onset, coda and rime are respectively $z$, $mt$, $imt$, and in $tM$ where there is no coda, the onset and rime are respectively $t$ and $M$.

The representations in (5) are comprised of two layers, a sequence of syllabic trees, which we will call the syllabic layer, and a distinctive feature matrix, which we will call the segmental layer. In all recent works which develop some form or other of the framework sketched above, a central question is that of characterizing the dependencies between the syllabic layer and the segmental layer. These are highly constrained, witness the remarkable fact that in most languages (ITB is no exception) the contents of the syllabic layer come close to being completely predictable from that of the segmental layer and from morphological and syntactic structure. This fact is what motivates various attempts to design syllabification procedures, that is, devices which mechanically assign a syllabic structure to a sequence of segments.

In what follows we endeavour to develop such a procedure for ITB and point out some problems that the facts of ITB present for various general approaches to syllabification that have been proposed recently.

It has been proposed in various recent studies on syllabification that the grammar of each language define a set of templates which characterize the syllable types possible in that language. According to these proposals, in order to syllabify a string of segments, one analyzes it as a sequence of substrings each of which must match one of the syllable templates. For instance, in Tamang, a Tibeto-Burman language spoken in Nepal, the only possible syllable types are (C)V(C) and CR(C), where $R$ is a non-nasal
sonorant (cf. Mazaudon 1973). The string /pinpa/ must be analyzed as
(pin) (pa), i.e. as CVC.CV. The syllabification (pi) (nna) is ill-formed
because nna can be analyzed neither as CV nor as CRV. How would such
an approach work for ITB?

(6) tagurt /t-ag-rur-t/ "stable"

(7) sawlX /sa-ul-x/ "I spoke"

(6) shows that ITB allows syllables of the form CV 'C (tag) and CV 'CC
(nur), and (7) that it allows syllables of the form CV ' (sa) and CC 'C
with a HV in onset position and a sonorant consonant as a peak (wLX). The
forms in (3) furthermore show that ITB allows syllables of the form
CC 'C. Let us assume for a moment that our grammar of ITB contains a
device that characterizes these syllable types as well formed. Consider now
the following.

(8) rathilt /ra-r-ul-t/ "you will be born"

The syllabification in agreement with the phonetic representation in (8)
is /ra 'r/ /U 'U/ /t/, indeed a licit one since, as we have just seen, CV 'C
and CV 'CC are possible syllable types in ITB. But the set of possible
syllable types of ITB also allows the syllabification CV 'C. CC 'C, i.e.
(ra 'r) (ti 'i) (U 'U/ /t/, which is equivalent to [rattUlLt]). There
is no general prohibition against words with the syllabic structure
CV 'C. CC 'C, witness [ratRgLt], i.e. (ra 'r) (tr 'r) (gl 'l)\(^4\) rather,
the string /ratUlLt/ simply does not belong to the set of those which can
take such a syllabic structure.

The situation, then, is this. The grammar of ITB must characterize the
object (9) as ill formed, although neither the syllabic structure (9)a nor the
segmental sequence (9)b is in itself ill formed. The source of the mismatch
between (9)a and (9)b cannot be located in any one of the three syllables
taken individually.

(9)

\[
\begin{align*}
a. & \quad \text{S} \quad \text{S} \quad \text{S} \\
\quad & \quad \text{S} \quad \text{S} \\
\text{b.} & \quad \text{r} \quad \text{a} \quad \text{t} \quad \text{l} \quad \text{U} \quad \text{t}
\end{align*}
\]

A definition of the set of possible syllable types is not enough to enable
one to syllabify any string of segments in ITB. Such a definition should be
supplemented with statements constraining the sequencing of well-formed
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syllables in words and utterances. When there is more than one way in
which some string of segments can be analyzed as a sequence of substrings
each of which is a possible syllable in the language, these statements could
be used as disambiguating devices. Problems of this sort are common in the
literature on syllabification. They most often have to do with the location
of syllable boundaries in intervocalic clusters: should \(extra\) be syllabified
\(ek \cdot stra\) or \(eks \cdot tra\) ?. In cases like these the location of syllable peaks
is the same in the two competing syllabifications. In ITB, on the other
hand, even the location of the syllabic peaks cannot be taken for granted,
due to the fact that any segment is able to occur as a syllabic peak. Before
we go any further let us introduce the prohibition of hiatus and the
sonority scale. By the prohibition of hiatus we mean the following em-

(10) \ Abutting syllabic peaks are never allowed to occur in the phonetic representations of ITB.

Here “abutting” means “not separated by a silence”, and (10) holds with-
out exception and regardless of morphological and syntactic structure.\(^9\)
The sonority scale is an ordered sequence of segment types specified by
Universal Grammar. For our purposes in this article, the following will be

(11) \ voiceless stop, voiced stop, voiceless fricative, voiced fricative,
nasal, liquid, HV, \(a\)

The more to the right of the scale a class of segments, the more sonorous
its members are said to be, or equivalently, the higher their degree of son-

Because of (10) a string containing two adjacent segments \(P\) and \(Q\) can
never be syllabified with both \(P\) and \(Q\) syllabic. The choice of (8) over (9)
is a particular case of the following empirical generalization.

(12) \ When a string ... \(PQ\) ... could conceivably be syllabified either as
... \(P'Q\) ... or as \(PQ'\) ... (i.e. when either syllabification
would involve only syllable types which, taken individually, are
possible in ITB), the only syllabification allowed by ITB is the
one that takes as a syllabic peak the more sonorous of the two

In /ra-\(t\)-\(\text{tU}-\(t\)/, \(\text{U}/\) is more sonorous than the preceding \(\text{/t/}\), and thus (8)
is selected against (9).

The prohibition of hiatus (10) overrides (12), as exemplified by the
fact that /t-IlUa-t/ (a place name) can only be pronounced [tIlwAt], i.e. (It') / (Ua')t/, whereas (12) leads one to expect [tuAt], i.e. (ItU') / (a')t/, which is in contradiction with (10). 11

The overriding effect of (10) over (12) can also be seen in the distribution of the GR syllables. Call GR syllables (G a mnemonic for “glide” and R for “resonant”) those syllables which, like wLx in (7), have a HV as their onset and a consonantal sonorant as their peak. In ITB words, GR syllables only occur immediately after a syllabic peak, 12 i.e., they occur only in contexts where a hiatus would ensue if, in conformity with (12), the HV were taken as a peak rather than the following sonorant. 12 Here are other forms containing GR syllables. 14

(13) ti. wN. t4  /t-IUn-t-a-s/   'you climbed on him'
ra. yMm. yi /ra-I-mrny/  'he will grow'
/ ra. yRz /ra-I-rz/  'it will be broken'
ha. wL. tN /haUl-tr/  'make them (m.) plentiful'

2. CORE SYLLABLES

Rather than have in our grammar two separate sets of statements, one to define the class of well-formed syllable types, and the other to constrain the sequencing of the syllable types in words and utterances, we will adopt what Steriade (1984) has dubbed a rule based approach to syllabification. As a testimony of our debt to Clements and Keyser (1983) and to Steriade (1982, 1984), we will borrow from them the expression “core syllabification”, but it should be clear that we use it in a different sense from them.

Let us assume that the lexical representations of ITB do not contain any syllabic trees but only strings of segments, and that syllabic trees are constructed over strings through the operation of phonological rules. The grammar of ITB contains in particular a set of rules which build core syllables. Core syllables are trees of the form (14)a of (14)b, where Y and Z each stand for a column of feature specifications.

(14) a. S
   /  /
   / Y
   /  *
   / Z
   b. S
      /  *
      / Y
      /  Z

We propose that the core syllable building rules are instantiations of the following rule schema.
pronounced [tʃwæt], i.e. 
[ʃwæt], i.e. (tU') (a 't),
also be seen in the distri-
a mnemonic for “glide” 
2 wLx in (7), have a HV 
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peak, i.e., they occur 
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climbed on him’
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(14a) of (14)b, where Y and
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\[
\begin{align*}
S & \\
* & \\
Z & 
\end{align*}
\]

as instantiations of the

(15) CS (Core syllabification): associate a core syllable with any se-
quence (YZ), where Y can be any segment and Z is a segment of 
type T, where T is a variable to be replaced by a certain set of 
feature specifications.

For instance, replacing T by the expression [-cons, +son. +low] in (15) 
yields a rule which builds a core syllable over any sequence (Y)a, where Y 
is any segment. We assume that the variable T in (15) takes on successively 
all the values given in the sonority scale in (11). We assume furthermore 
that the various rules of core syllable construction derived in that manner 
from (15) apply in the order specified by the sonority scale, starting from 
the a end of the scale. (15) will then yield in particular the following 
rules, which will apply in the order given:

(16) CS(a) associate a core syllable with any sequence (YZ), where 
Z is an a

(17) CS(HV) associate a core syllable with any sequence (YZ), where 
Z is a HV

(18) CS(L) associate a core syllable with any sequence (YZ), where 
Z is a liquid

(19) CS(N) associate a core syllable with any sequence (YZ), where 
Z is a nasal consonant

And so on.
The output of the syllabification rules must not violate various well-
formedness conditions on syllable structure, among which are the follow-
ing,

(20) every segment must be associated to an S node

(21) a segment can be associated to at most one S node

One way to enforce (21), i.e., to prohibit overlapping syllables, is to assume 
the following.

(22) CS can build core syllables only over (YZ) sequences where neither 
Y nor Z have yet been syllabified.

Consider for instance the sequence /t-!izUal-!In/ ‘those (f.) from 
Fitzwall’, which is pronounced [t'iz'Walit]. The construction of syllabic 
structure proceeds as follows:
During step (i) the string is scanned for sequences (Y)α: Uα is such a sequence, and U must be syllabified with α, in compliance with the standard conventions for the interpretation of parentheses in phonological rules. In step (ii), the string is scanned for sequences (Y)Z where Z is a HV, rU is such a sequence but according to (22) U is not available anymore for syllabification because it has already been associated with an S node in step (i); similarly in step (iii) l is not available anymore as a peak since it has been associated with an S node through the HV pass of CS.

Given a sequence like /hurint/, the HV pass of CS will first yield /tU/ 'r/ /int/, the pass for the nasals will yield /tU/ ' / /m/ ' /r/ /int/ ' /t/, and we are now left with a string where CS cannot anymore apply. We assume that at that point various attachment rules apply, whose role is to syllabify the segments not yet syllabified by CS. These rules make codas and complex onsets from the leftovers of CS, as it were. They are responsible for the final syllabification /tU/ ' / /m/ ' /r/ /int/ ' /t/, where every segment is associated to an S node, as required by (20).

Since the rules in (16)-(19) are ordered in such a way that more sonorous segments are eligible as syllabic peaks earlier than less sonorous ones, in a sequence YZ syllabified by CS the level of sonority of Y is in most cases\(^2\) lower than or equal to that of Z.

The organization ascribed here to the syllabification mechanisms makes the prediction that no rime in ITB should contain a sequence of segments where the first has a lesser degree of sonority than the second; for instance there should not exist a syllable like kmr with m as its syllabic peak, for such a sequence would have been syllabified as k/mr/ by the pass for the liquids, which precedes the pass during which the nasal m becomes available for grouping with the preceding k. This prediction is in accord with the data. The apparent counterexamples to it are all found in syllables with complex codas, which arise through the operation of annexation rules such as the one discussed in section 4. Here are forms illustrating the operation of CS.

(24) a. iy. ml  /i/-yml/  "it (m.) went mouldy"
b. i. slm  /i/-slm/  "it (f.) went numb"
c. tzMl  /i/-zml/  "it (f.) is stifling"
d. tMzfl  /i/-mzf/  "she jested"

One can partition all those segments that occur as peaks, at times do not. In [high] segments, it consists of all the very small or alto most strings belong proposed recently.\(\) follows: first, scan of these as a syllabics or codas. It expects but they all syllabic peaks can be at a time and check class 1. ITB poses a the segments belon determine whether examining its feet rounding segments.

ITB allows arise after a pause. Post voice ingress, i.e. w the absence of an syllabic immediately which is pronounced hiatus was presente more appropriate to individual syllables:

(25) All syllables
One can partition the segment inventory of a language into three classes:
1. those segments which only occur as syllabic peaks;
2. those which never occur as peaks, and
3. those which sometimes occur as peaks and sometimes do not.

In French, for instance, class 1 consists of all the [-cons, -high] segments, class 2 consists of all the [+cons] segments, and class 3 consists of all the [-coa, +high] segments. In most languages class 3 is very small or altogether empty, and consequently most syllabic peaks in most strings belong to class 1. Various syllabification algorithms have been proposed recently which crucially rely on that fact. They operate as follows: first, scan the string for all segments of class 1 and mark each of these as a syllabic peak, and then syllabify the remaining segments as onsets or codas. These algorithms differ from one another in various respects but they all share the assumption that in a string of segments most syllabic peaks can be located by a procedure which examines one segment at a time and checks its feature content to determine whether it belongs to class 1. ITB poses a problem for all such algorithms, for in that language all the segments belong to class 3, and consequently one cannot in general determine whether a given segment in a string is a syllabic peak simply by examining its feature specifications independently of those of the surrounding segments.

ITB allows onsetless syllables, but these can occur only immediately after a pause. Postpausally, /\textipa{tə}n/ 'kid' may be pronounced with smooth voice ingress, i.e. with what is usually taken to be the phonetic reflex of the absence of an onset, or of a void onset. Not only vowels can be syllabic immediately after a pause, but also consonants, cf. e.g. /\textipa{rəl}/ 'lock', which is pronounced [\textipa{Rəl}] after a pause. In (10) the prohibition of hiatus was presented as a constraint on pairs of adjacent syllables. It is more appropriate to incorporate it into our grammar as a constraint on individual syllables:

(25) All syllables in ITB must have an onset.

This constraint does not apply to postpausal syllables. To see how (25) interacts with CS, consider /\textipa{l-\textipa{hə}ul-tn}/ 'he made them (m.) plentiful', which is pronounced /\textipa{i\textipa{θə} . w\textipa{l} . t\textipa{n}/ in isolation. CS(a) yields /\textipa{i\textipa{θə} } /\textipa{Utl}/ (we leave out the morpheme boundaries, which are irrelevant here).
CS(HV) then scans the string for sequences (Y)Z with Z a HV, I and U are such sequences, with Y empty. The application of CS(HV) should thus yield (I'/ha'/U'/m), a string which would result in a phonetic representation where, short of making a pause after a, the onsetsless syllable (U') would violate (25). Whenever an application of CS at a particular point of the string would result in a violation of (25), we assume that that application is omitted. In the present case CS(HV) will only apply to I, hence (I'/ha'/U'tn). CS(L) will then apply, yielding (I'/ha'/U'/m), and finally CS(N), hence (I'/ha'/U'/m).

A sequence such as /kiIt/ contains two adjacent segments which are eligible for syllabicity during the same pass of CS. A priori (17) can take (Y)Z to be /kiI/, hence the final output [kiwr], or it can take (Y)Z to be /IU/, hence [kyut]. We will assume that it takes the first analysis, and more generally, that

(26) during each pass corresponding to a step of the sonority scale, CS operates iteratively from left to right.

The following forms all contain a sequence ABC where B and C belong to the same step of the sonority scale. In each line the form on the left is the attested one, where the syllabification is (AB')C, in conformity with (26), and the unacceptable form on the right has instead the syllabification A(BC').

(27) /rks-ə/  R. kSX  * Rk. SX  'I hid'
    /baIn-n/  ba. yNn  * hay. nN  'they (m.) appear'
    /I-sUfU-Iht/  isafyyit  * isafyiyit  'let him illuminate'23
    /idI-Ill/  Lidyiyi  * Lidyiyi  'pull me!'24

(26) cannot be the complete story, however. Counterexamples such as the following suggest that some other rule or principle is at play. For /Ugm-n/ 'they (m.) drew (water)' (26) predicts u. gMn as the only correct syllabification; however ugm. Mn is also possible. For /I-t-bdi-n/ 'for the cockroaches' (26) predicts i. tBd rin, whereas the only possible syllabification is ut. bD. rin (lt. ob/a)D. rin in a narrower transcription, cf. section 3. We leave these for further research. On (26) and the geminates, cf. section 5.

Finally, we must mention the existence of a class of morphemes which behave exceptionally with respect to CS. All of these contain a HV that does not show up as a peak in certain contexts where CS predicts it should. One finds pairs such as

(28) sya  bar  t-urti

The lexical rule must induce these forms.

3. SYLLABIC

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/t-lngd-t/ 'yo.

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with Z a HV, I and U are 1 of CS(HV) should thus result in a phonetic representation of CS at a particular of (25), we assume that a CS(HV) will only apply if /i/ or /u/ are adjacent segments which are CS. A priori (17) can take [j], or it can take (Y) [i] to skip the first analysis, and of the sonority scale, CS

C where B and C belong to the form on the left is B'C', in conformity with the alternation in the syllabification of the example.

(i) 'hid'
(ii) 'they (m.) appear'
(iii) 'let him illuminate' 23
(iv) 'pull me!' 24

Counterexamples such as the example are at play. For /U glamorous/ as the only correct pronunciation, For /e/ 'for' whereas the only possible is a narrower transcription. On (26) and the greatest class of morphemes which contain a HV that texts where CS predicts it

(28) say 'let pass!
bur 'give back'
turtt 'garden', f.

zwi 'beat down'
lwR 'run away'
lwRw 'kind of feline', f. 25

The lexical representation of the root in the second member of each pair must induce the back HV to behave exceptionally with respect to CS. These forms are dealt with in Elmedlaoui (1985).

3. SYLLABIC CONSONANTS

Since well-documented studies of languages with a rich array of syllabic consonants, especially obstruents, are not a common occurrence in the phonological literature, 26 we will pause to give a few phonetic details about the syllabic consonants of ITB.

In our phonetic transcriptions, the indications pertaining to syllabicity were gathered from the judgments of one of us (ME) qua native speaker. For each form transcribed, two questions were asked: 1) how many syllables are there? and 2) where is the peak of each syllable located? When asked such questions regarding French, the native speakers of French seem to have intuitions of a more or less uniform degree of immediacy and sharpness for all forms, provided the exact nature of the judgments sought from them has been made clear to them. 27 For ITB on the other hand, ME's intuitions vary in immediacy and sharpness depending on the phonological make-up of the forms subjected to his judgment. Elsewhere in this article, unless stated otherwise, we have used as our data only forms which are representative of sequence types about which ME's intuitions are clear-cut and consistent over time. But here are a few examples where they are not.

Although ME has a clear intuition that /n®f-at/ 'skin! (pl.)' and /l®z-m-at/ 'open! (pl.)' must count as two syllables when pronounced after a pause, in that environment he cannot decide where the peak of the first syllable is located, i.e. he is unable to chose between N® and n® between l®z and l®z. He has no doubts that /s®-rks-x-t/ 'hid him' 28 contains two syllables and that the peak of the first is on s, but he is unsure where to locate the peak of the second. He is positive that in l®-l®gd-t/ 'you drowned', which is pronounced l®N®s®gatt, n is a syllable peak, but he cannot tell whether gatt counts as a second syllable.

Cases such as the above constitute a few well circumscribed areas of uncertainty. It is however noteworthy that there exist such areas in ITB whereas there are none in French. 29

Judgments about the location of syllable boundaries were not examined. Whenever we represent a form as a sequence of syllables, the location
of the syllabic peaks in that form reflects an empirical observation, whereas the allocation of the nonsyllabic segments between the onset and coda positions of the various syllables reflects the predictions made by our analysis.

Besides the vowels a, i, u, descriptions of other Berber dialects record the existence of reduced vowels. The reader may wonder whether our transcribing certain consonants as syllabic is not just another way of recording the existence of a short vowel next to those consonants, i.e., whether, when we are transcribing, e.g., /t-sti/ 'she selected' as tSti, a more precise rendition should not be [tasti] or [tastti].

There do indeed occur at the phonetic level ultra-short transitional vowels, and these are not indicated in our transcriptions. The first thing to notice about them is that they occur only adjacent to voiced consonants. No voiced vocoid, however short, can be heard in the first syllable of tS·t or in the second syllable of u·tk 'I struck you' (from /Ut-x-k/), and pronouncing one there is grossly incorrect. Some utterances must be voiceless throughout, cf. e.g., tf·tkt, 'you suffered a sprain'. In syllables with only voiceless consonants, there is nothing in what one hears which could suggest the existence, adjacent to the syllabic consonant but not to the others, of a voiceless vowel. There is no audible difference, at least in the way articulation moves from one consonant to the next, when one compares tSt in ITB tS·t and in English cut sticks, or kSt in ITB :Rks: 'you hid' (/t-rks-t/) and in English next.

Except in certain homorganic sequences, as when r is followed by n, ITB stops have a very clearly marked oral release, before a pause as well as before another consonant. Between the release of a consonant and the onset of the closure of another which immediately follows, there occurs a very short transitional vocoid which sounds like a slight aspiration if the glottis is not vibrating, and as a vowel if it is. Although ME is to some extent able to consciously manipulate other superficial aspects of his pronunciation, such as emphatic articulation or voicing in consonant clusters, he has no control over these ultra-short transitional vowels. As a matter of fact, in most cases he finds it quite difficult to perceive them, and so does the coauthor in many cases. There is no doubt in our minds that the occurrence of these vowels is predictable in all environments at a very late stage in the derivations, but a systematic study has yet to be made. From the restricted data we have gathered it is already clear that three factors play an important role: voicing, point of articulation, and syllabic structure as predicted by CS.

Voicing has already been mentioned above; transitional vowels are always adjacent to a voiced consonant. We have found transitional vowels only between consonants which differ in point of articulation. One may sometimes hear one between s and b in tS. bγ? 'you painted' (/t-sγ-t/).
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Berber dialects record er may wonder whether our is not just another way of
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level ultra-short transitional transcriptions. The first thing adjacent to voiced conso-
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point of articulation. One may
r ‘you painted’ (/t-shy-t/),

but never between s and t in /ts, dRt ‘you let fall’ (/t-s-(dR-t/).
Other examples of transitional vowels are found in R gLx ‘I locked’
(/gl-x/) and ixNg ‘he strangled’ (/l-xng/), for which more precise
transcriptions would be [RgLx], [ixNg]. When [RgLx], for instance,
is pronounced at the end of an utterance with a high rising intonation (cf.
section 4) the high rising tone is heard as much on the [l] as on the fol-
lowing vowel. /l-xng-l/ ‘he strangled him’, is pronounced l.xNg.t, or
more precisely [ixNgcur]. This form illustrates the fact that not every
transitional vowel corresponds to a different syllabic peak. So does the
monosyllabic form lSkd ‘stub, sg.’ (from /lSkd/), more precisely [lSkd].

As for the relevance of syllabic structure for predicting the distribution
of transitional vowels, it is illustrated by /l-xng-a-s/ ‘he strangled for
him’, which is ixNgas, with no transitional vowel on either side of n.
In the n-llu:, ixNg and ixNgrr mentioned above, where a transitional vowel
occurs between n and g, these consonants belong to the same syllable.
In ixNgas on the other hand they belong to different syllables and no
transitional vowel occurs. This is not to say that transitional vowels never
occur between heterosyllabic consonants, however, witness tSby’t (cf.
above) or i.xNn, ngs ‘he wrong (someone’s) neck for him’
(/l-sunq-a-s/), where a transitional vowel occurs between n and a.

Between a HV onset and a syllabic sonant consonant, as in the forms
in (13), one hears a short, lax, somewhat centralized, homorganic analogue
of the HV, i.e. [I] after [y] and [o] after [w]. For instance the following
examples illustrate the contrast between yIl and yL ([yl]) and that
between wUI and wL ([wOl]).32

(29) a. aristayIlqaayd /ar-I-staI=qalqId/
b. aristayLqaayd /ar-I-staI=qalqId/
c. innawumis /I-nna=U-UmnIs/
d. innolmas /I-nanUl=ma-s/

Recent discussions dealing with other Berber dialects (cf. fn. 7) assume
that in these dialects all syllabic peaks are full vowels or shwas. The full
vowels are the reflexes of segments already present in the phonological
representations, while the shwas are inserted in order to break consonant
clusters which would otherwise remain unsyllabified. Could syllabification
in ITB not be accounted for along similar lines, with a late rule deleting
the epenthetic shwas and transferring their syllabicity to a neighbouring
consonant? We leave it to the interested readers to see for themselves how
unpromising the prospects are in that direction. We will simply show that at
least one phonological process treats consonantal peaks on a par with nonconsonantal ones.

In the lexical representations of ITB emphatic articulation is demonstrably a property of individual segments. (cf. Elmedlaoui 1985). But at the phonetic level it spans strings of segments: If the underlying representation of a word contains an emphatic segment all the segments in that word have a uniform degree of emphatic articulation at the phonetic level. At the phonetic level, one may simply classify words as non-emphatic and emphatic. The influence of an emphatic word on the surrounding words in the utterance is independent of the location of the emphatic consonant(s) in the underlying representation of that word. Furthermore, at the phonetic level, an onset and the following peak always agree in emphasis. Both are emphatic, or else neither one is. This is true of all syllables, in particular of those whose onset and peak belong to different words. For instance, when an emphatic word ending in a consonant is followed by a non-emphatic one beginning with a vowel, that vowel becomes emphatic.93

\[(30) \text{yazdislu} /\text{i-} \text{z-d-slu/} \quad \text{'he came near and leaned on (something)'}\]

The same spread of emphasis to the right occurs no matter what the initial segment of the second word is, as long as that segment is syllabified as a peak together with the last segment of the first word. In (31) the s is syllabic and becomes emphatic:

\[(31) \text{yiwitit} \text{Sadaru} /\text{i-} \text{fUf} \text{-} \text{t-} \text{t-s} \text{-} \text{dar} \text{-} \text{Un/} \quad \text{he feels like going to your place}\]

Notice now that in (30) the s is not pronounced emphatic. The difference between the non-emphatic s in (30) and the emphatic one in (32) is a clearly perceptible one.

\[(32) \text{haydislum} /\text{ha} \text{-} \text{sid} \text{-} \text{iUm-n/} \quad \text{'there are six that last}\]

The non-emphatic pronunciation of s in (30) is a particular case of the following generalization: when three segments A, B, C occur in a configuration A=BC, where A belongs to an emphatic word and where A and B are syllabified together as onset and peak, emphasis spreads to B but not to C, even in cases such as (30) where C presumably belongs to the same syllable as A and B. However that generalization may be accounted for, the point about it is that its formulation implies that at the stage of the phonological derivations where the mechanism responsible for emphatic
ntal peaks on a par with phonetic articulation is demon-
strated in most languages. If the underlying segment is syllabified not as a non-emphatic word on the su-
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sentation of that word. If the following peak always either one is. This is true of et and peak belong to dif-
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s) no matter what the initial segment is syllabified at a first word. In (31) the s is

ar-Um/.

rd emphatic. The difference emphatic one in (32) is a

ere are six that last.35

is a particular case of the

ts A, B, C occur in a con-
natic word and where A and emphasis spreads to B but presumably belongs to the alization may be accounted

implies that at the stage of nism responsible for empha-

sis spread operates, s in (31) must fill the same structural position as i in (30), i.e. it must be a peak. If at that stage of the derivations the ante-
penultimate syllable in (31) were represented as r̃as with a peak vowel to be deleted later on, then the mechanisms responsible for emphasis spread would have to be designed in such a way as to make s emphatic in r̃as but not in dis in (30), i.e. their operation in such cases should be made sensitive not only to structural positions such as onset and peak, but also to the feature specifications of the peak when the peak is a vo-
coid.

4. PREPAUSAL ANNEXATION

(33) a. i̱gi̱dr b. i̱gi̱dr /i̱gi̱dr/ ‘eagle’
y̱um M y̱um r̃ /I̱Ur̃/ ‘he tasted’
R̃g̃l̃ R̃g̃l̃ /r̃g̃l̃/ ‘lock!’
u̱gl̃x̃k̃M u̱gl̃x̃k̃m /U̱g̃l̃-x̃-k̃m/ ‘I hung you (fem.)’
̃d̃u̱ñ N u̱d̃m̃N /d̃u̱m̃-ñ/ ‘they (m.) last’

In all the forms in (33)a the peak of the last syllable is a consonantal sonorant. The pronunciations recorded in (33)a are as predicted by CS. They are the only possible ones before another word whose first segment is not syllabic.36 Before a pause, however, there is free variation with the pronunciations in (33)b, where the final sonorant is not syllabic. ME's syllabicity judgments correlate with audible differences. ITB has an intonation which is used in questions to convey a nuance of puzzlement, and which ends in a high rising tone (HR) preceded by a low tone. The HR is always assigned to the last tone-bearing unit of the utterance. The last tone-bearing unit of an utterance is the last syllable with a voiced peak, i.e. the last syllable in the forms above. At the end of an utterance, when /i̱gi̱dr/, for instance, is pronounced as in (33)a, the two vowels carry a low tone and the HR is heard on the final consonant. If it is pronounced as in (33)b, only the first i carries a low tone, and the HR is heard on the second i. Also, dr sounds longer than gi in (33)a whereas the opposite is true in (33)b. Similar observations can be made with other intonations.

Let us posit a rule of Prepausal Annexation, which applies after CS and changes a final core syllable into a coda to the preceding syllable.

(34) S S

X A B

[cons] 

before a pause
Words ending in a vocoid are not subject to prepausal annexation. (34) requires the prepausal syllable to be an open one. Closed syllables always retain their syllabic identity, in front of a pause or elsewhere. Compare (33) and the following, which retain the same number of syllabic peaks no matter what follows.

(35)  
\[
\begin{align*}
\text{i . ga . } dRn & \quad /\text{igadr~n/} & \text{"cagles"} \\
\text{tu . } Rm & \quad /\text{tr~umr/} & \text{"you tasted"} \\
\text{R . glx} & \quad /\text{rgl~x/} & \text{"I locked"} \\
\text{u . glx . } tNt & \quad /\text{ugl~t~mnt/} & \text{"I hurt them (f)"}
\end{align*}
\]

In words where CS predicts a final open syllable with an obstruent as a peak, that prediction is borne out when another word follows. This is illustrated below.

(36)  
\[
\begin{align*}
\text{is . bu . kD . ba . } b & \quad /\text{i~b~uba~b\text{a}~s/} & \text{"he poked his father\, eye out"} \\
\text{tr . kS . } b & \quad /\text{tr~ks~baba~s/} & \text{"his father hit"} \\
\text{if . kK . } b & \quad /\text{it~kk~baba~s/} & \text{"his father suffered a sprain"} \\
\text{is . } t\gamma & \quad /\text{it~t\gamma~l~f/} & \text{"he cracked the door"}
\end{align*}
\]

Before a pause, however, the two final consonants never count as a syllable. Prepausally, /isuba/ can only have two syllables, and /trks, itkk, tstr/ can only have one. The application of rule (34) is obligatory when the last segment is an obstruent, and it is optional when that segment is a sonorant.

As formulated in (34) the rule should operate no matter what the syllable preceding the prepausal syllable. There are however restrictions on that syllable, witness the fact that the final /\text{m/ cannot lose its syllabic index in /ra~t~km/}"she will enter", where the output of CS is /\text{rk . sm/. We leave this question for further research.

5. GEMINATE SEGMENTS

ITB has a length contrast for both consonants and vowels. There are two sources for long segments. Some are the phonetic reflexes of underlying long segments, while others arise when identical segments happen to occur on both sides of a morphological boundary. Both types are often (but not always – cf. fn. 46) indistinguishable at the phonetic level. For instance /\text{gr~a~nn/} "that field" and /\text{gran~n/} "lofts" are homophonous. As far as syllabification is concerned, all occurrences of a long segment

must be regarded as perfective and i perfective has a long /\text{r/ an /\text{grU/} and /\text{gnU/} /\text{grrU/} as /\text{gR . ru/.}

(37)  
\[
\begin{align*}
\text{gnu} & \quad /\text{g\nu/} \\
\text{gz} & \quad /\text{gz/} \\
\text{gdz} & \quad /\text{gdz/}
\end{align*}
\]

Another reason is that two units are the first geminate are not in prepausal post /\text{mL/} or monos /\text{nt/. Whereas /\text{yu . kK/ or yuKk, yu . kKr/. Whereas /\text{skam, skar~mn/\text{end of prepausal steady state syllab}} that the first half second as a coda, a.

Geminative HV's, consonants, are mization when they the perfective form is phonetically /\text{tu/} than resulting from /\text{tu: r/}, which we more conspicuous, and iy represent l and /\text{i/.}

The forms below morphemic gemin

ITB verbs whose p

POQaR/ as their imp

(38)  
\[
\begin{align*}
\text{I} & \quad /\text{i/} \\
\text{\text{xxi/} /\text{bd/}
\end{align*}
\]}
must be regarded as a sequence of two units. [gru] and [gr::u] are the
perfective and imperfective form of a verb meaning 'to pick up'. The
perfective has a regular r and is monosyllabic, whereas the imperfective
has a long r and is disyllabic. Positioning an underlying contrast between
[grU] and [gr::u] accounts for both differences at once. CS syllabifies
[grU] as gR. ru. Here are other similar pairs.

(37)  gnu  gNnu  'sew'
      zlu  zLlu  'lose'
      gzi  gZzi  'vaccinate'

Another reason to consider homomorphic geminates as sequences of
two units is the fact that words which end in a syllabic homomorphemic
geminate are not subject to prepausal annexation. For instance, whereas
in prepausal position /I-m'l/ 'show, 3 sg. aorist', can be either disyllabic
(i. mL) or monosyllabic (imu), /Iml/ (a place name) can only be disyllabic
(i. m.L). Whereas in the same context /I-Ukr/ 'he stole' can be either
ju. kR or yukr, /I-Ukrr/ 'he drags' must be pronounced disyllabic:
yu. kRr. Whereas /skar-n/ 'they (m.) are doing' can be either ska. rN
or skarn, /skar-nn/ 'do over there!' must be disyllabic: ska. rNn. At the
end of prepausal /Iml/, /I-Ukrr/ and /skar-nn/ one simply hears a long
steady-state syllabic consonant. However our syllabification rules tell us
that the first half in the geminate functions as a syllabic peak and the
second as a coda, and we have made our transcriptions accordingly.

Geminates HV's, whose behavior in syllabification is similar to that of
consonants, are manifested as long vowels with no discernible diphthong-
ization when they function as a peak followed by a coda. For instance,
the perfective form of the verb meaning 'to wait', which is /SUr/, is
phonetically /Su: r/, as predicted by CS. The alternate pronunciation
resulting from the operation of the rule of prepausal annexation is
/[Su: r]/, which we transcribe as /[Su: r]/ so as to make its syllabic structure
more conspicuous. In all our transcriptions in this article, whenever
and r represent homosyllabic sequences they must be read as [u:] and
[r:].

The forms below illustrate the pervasive parallelism between homo-
phonemic geminate HV's and homonomorphic geminate consonants.
HV verbs whose perfective stem is /PQoR/ (column I, II) have /tto-
PQoR/ as their imperfective stem (column III).

(38)   I       II    III
      /!xlis/  /xLis  /txsL . las  'pay'
      /sxxr/  sx X xN  ttxsX . xan  'dip (in sauce)'
      /bddl/  bD . dL  ttrbD . dalt  'exchange'
Geminates can also appear in complex codas:

(39) a. /az·munnk/ [a·zmn·nn-k] 'your meadow'
     b. ill·mas /l·lm·a·s/ 'he spun (e.g. wool) for him'
     c. tawy·dar /t·a·ddar-t/ (a woman’s first name)
     d. /dût·bar/ [d·t·bar] 'barricade'

Combining the length contrast in the vowel with that in the following coda yields a four-way contrast which is illustrated below. All four utterances are disyllabic.

(40) imans /I·In·ns/ 'he said: spend the night!'
     tiumans /tim·ns-s/ 'near him'
     buţmaans /buţmaa·ns/ 'spend the night, Boujema'
     buţmaans /buţmaa·ns-s/ 'his Boujema'

Geminates occurring in complex codas are in contradiction with the predictions made by (26). In (39)a, for instance, (26) predicts /az·mu·nnVk/, since in the input to the nasal pass of CS the sequence /nn/ meets the conditions for being analyzed as a sequence YZ by subrule (19). There is no general prohibition in ITB against making a core syllable out of two identical segments, witness the third syllable in is·mu·nNi ‘did they (F.) get together?’, from /Is·mu·nnI/. The prohibition concerns only sequences where the two identical segments belong to the same morpheme:

(41) In ITB, a geminate is never realized as a sequence onset plus peak when both halves belong to the same morpheme.

Here are other examples where the application of (26) would yield a representation which runs counter to the empirical generalization (41). The correct pronunciation is on the left and that predicted by (26) is on the right.

(42) /i·扎ura·III/ 'let him search' (cf. fn. 23)  *itarayli  iтарайли
    /I·UIN/ 'he flew away'  yuyyl  *yuyyl
    /I·ddar/ (a man’s first name)  iydar  *iydar
    /ai11/ 'horse'  iyvis  *iyvis
    /I·mla·III/ 'he showed to me' (cf. fn. 24)  imlayyli  *imlayly

Until now we have been concerned with the syllabic structure of words in modern Berber, following various metrical units, the utterances X’s is one to X’s. Here are the examples:

(43) X
     I
     Here are the contexts:

(44) S  X  I
     The phonological context:

(45) a. X  I
     la  z
     In (45a) the geminates linked to X do not belong to the same morpheme.

(46) No ITB
yad 'be bad luck'
zar 'tighten'
wat 'spend'
wál 'to worry'

your meadow′⁴¹
a spun (e.g. wool) for him′⁴²
woman's first name′⁴³
arricade′

with that in the following
rated below. All four utter-

: spend the night!′⁴⁴
h′⁴⁵
he night, Boujama′
jeuna′

contradiction with the pre-
26 predicts /az . mu . nNk/,
sequence /mt/ meets the con-
y subrule (19). There is no
more syllable out of two iden-
is . mu . nNk 'did they (f.)
hibition concerns only se-
go to the same morpheme:

a sequence onset plus peak
orpheme.

m of (26) would yield a re-
pirical generalization (41).
that predicted by (26) is on

) *zarayit
yuyit
yudar
ayis
24) inlayiti

/t−aUUUrl/ 'work'
/afaUUu/ 'blanket'
tawwuri *tawwuri
afawwu *afawwu

Until now we have assumed that the units associated with S nodes by
the syllabification rules are the segments themselves. Suppose instead,
following various recent proposals,⁴⁷ that those units are rather empty
linguistic units, call them X, which constitute a kind of timing skeleton for
the utterances. In most cases the association between the segments and the
X's is one to one; but geminates are segments which correspond to two
X's. Here are for instance the lexical representation of *ini 'mouth', *imni
'mummy' and afawwu 'blanket'.

(43)  
\[
\begin{array}{cccc}
X & X & X & X \\
I & m & I \\
\end{array}
\quad \begin{array}{cccc}
X & X & X & X \\
I & m & I \\
\end{array}
\quad \begin{array}{cccc}
X & X & X & X & X \\
a & f & a & U & U \\
\end{array}
\]

Here are the corresponding phonetic representations.

(44)  
\[
\begin{array}{cccc}
S & S & S & S \\
* & * & * & * \\
\end{array}
\quad \begin{array}{cccc}
S & S & S & S \\
I & m & I \\
\end{array}
\quad \begin{array}{cccc}
S & S & S & S \\
a & f & a & U & U \\
\end{array}
\]

The phonological representations which we gave above as /aamU−nn−k/
and /is=mUn−nt/ are now to be represented as below.

(45)  
\[
\begin{array}{cccc}
a. & X & X & X & X \\
l a & z & m & U & n & n & k \\
\end{array}
\quad \begin{array}{cccc}
b. & X & X & X & X & X \\
l s & m & U & n & n & t \\
\end{array}
\]

In (45)a the geminate in the suffix is a single column of feature specifi-
cations linked to two X positions, since both halves of the geminate belong
to the same morpheme. We assume that all geminates both halves of which
belong to the same morpheme must be so represented:

(46)  
No ITB morpheme may contain
\[
\begin{array}{cc}
X & X \\
F & F \\
\end{array}
\]

(where F is a set of feature specifications)⁴⁸
In (45)b, since the lexical representation of the root /mUn/ and that of the suffix /nt/ must be specified independently of one another in the grammar, the representation contains two occurrences of the set of feature specifications characteristic of /nt/, the first of which belongs to the lexical representation of the root mUn, and the second, to the lexical representation of the 3 f. pl. suffix -nt. Generalization (41) can now be taken as a consequence of the conjunction of (46) and the following.

\[
\text{(47) is ill formed}
\]

The last four examples in (42) contain sequences of three successive positions with identical feature specifications. These must be analyzed as a geminate followed by a non-geminate, as in the lexical representation of afawwu in (43). If they were analyzed instead as a non-geminate followed by a geminate the realization of that geminate as a sequence onset-peak would constitute a violation of (47). More generally, configuration (48)a is allowed in lexical representations, but not (48)b. (45) is repeated here as (48)c for the sake of comparison.

\[
\begin{align*}
&\text{(48) a. (OK)} \\
&\quad \text{X} \quad \text{X} \\
&\quad \text{F} \\
&\text{b. (*)} \\
&\quad \text{X} \quad \text{X} \\
&\quad \text{F} \\
&\text{c. (*)} \\
&\quad \text{X} \quad \text{X} \\
&\quad \text{F} \\
&\text{F}
\end{align*}
\]

(47) and (48) suggest some fundamental asymmetry in the nature of lexical geminates in ITB. It is as though their right half was in some sense subordinated to their left half.

One way to develop this idea is the following. Suppose that the lexical representations of imi, immi and afawwu are those below instead of those in (43).

\[
\begin{align*}
&\text{(49) X X X} \\
&\quad \text{X} \quad \text{X} \quad \text{X} \\
&\quad \text{F} \quad \text{F} \quad \text{F}
\end{align*}
\]

In order to be able to derive the phonetic representations in (44) our grammar must contain a rule which links any unassociated X to the melodic segment on its left.
out /mʌn/ and that of one another in the cases of the set of feature h belongs to the lexical to the lexical representa-
l) can now be taken as allowing.

Assume that (50) applies only after all the subrules of CS have applied. Consider for instance what will happen in the derivation of //azmU–nn–k/, whose underlying representation is now

\[\begin{align*}
&X X X X X X X \\
&\text{la } z \quad m \quad U-n \quad -k
\end{align*}\]

For an X to be made into a peak by one of the subrules of CS, that X must be linked with the set of feature specifications required by the subrule in question. For instance, in order for an X to be made into a peak through the operation of CS(N), that X must be linked to a segment containing the specification [+nasal]. Since (50) applies only after CS, throughout the operation of CS, the penultimate X in (51) is not linked to any column of feature specifications, and hence it cannot be made into a peak by any subrule of CS. This accounts for (47). On the other hand, the absence of any feature specifications attached to an X does not prevent that X from being made into an onset by CS, since the only thing that is required of an X for that X to be eligible as an onset, is that it immediately precede a peak. Nothing will prevent the penultimate X in immi and afawwe in (49) from becoming onsets during the HV pass of CS.

With this new mode of representation for lexical geminates, (48) becomes

\[\begin{align*}
&\text{a.(OK)} \quad \text{b.(*)} \quad \text{c.(*)} \\
&X X X X X X X X X X X X X X X X X \\
&F \quad F \quad F \quad F \quad F \quad F \quad F \quad F
\end{align*}\]

(52) b is now simply a subcase of (52)c and does not need any special mention.
NOTES

1. These vowels have variants conditioned by neighbouring consonants, but since these are not relevant here we will not represent them in our phonetic transcriptions. In this article “consonant” is always equivalent to [consonantal] in the sense of Chomsky and Halle (1968). The consonants of ITB are: b, m, f, t, d, n, s, z, ñ, t, k, k', s, s', x, k', r, γ, γ', q, h, š, ʃ, l, r, γ and γ' represent voiced uvular fricatives. Syllabic consonants are represented by capitals (e.g. N stands for a syllabic n) except for γ, h, š and ʃ, where syllability is represented by an apostrophe. The voiceless consonants are unaspirated; the voiced consonants have glottal vibration throughout the closure period and sound like those of French. There exist lexical geminates corresponding to a, i, u and to all the consonants except γ and γ'. When prefixed to the transcription of a word the exclamation point indicates that at the phonetic level all the segments of that word have emphatic articulation; when prefixed to the phonological representation of a morpheme it indicates that one or more segments in that representation are emphatic. We will use the following abbreviations: sg., singular; pl., plural; m., masculine; f., feminine; gen., genitive; dat., dative.

2. m– gen.–, – dat.


4. Although this fact is usually taken for granted, one may wonder why things could not be otherwise.


8. From /re–r/ you will look: re future, t–...– 2 sg.


10. On the universal sonority scale, cf. Hooper (1976), Bell and Hooper (1978), Kiparsky (1979), Selkirk (1984), Steriade (1982). Steriade argues that sonority scales may vary across languages and proposes that they are derived from a fixed hierarchy of binary distinctive features.

11. The ungrammaticality of that cannot be explained by a general prohibition against words beginning in /f/, for there is no such prohibition in ITB, witness that... you were born’, from /th.../.

12. Except in words containing an exceptional morpheme of the type exemplified in (28), e.g. il, wr ‘he ran away’. Like all the others in ITB, these forms always comply with (10).

13. Such syllables are exceptions to the often noted tendency for the peak of a syllable to coincide with its sonority maximum (cf., e.g. Bell and Hooper 1978). On the other hand, ITB has no syllables where the coda is more sonorous than the peak. This asymmetry may be taken as evidence suggesting that the peak is more closely related to the coda than to the onset, as proposed, e.g., in Halle and Vergnaud (1980) or Selkirk (1982). For different views on the internal structure of syllables, cf. Clements and Keyser (1983).

14. /l–...–r/ 2 sg.; /r–s/ 3 m. sg. dat.; /re–/ future; /l–/ 3 m. sg.; /–m/ 3 pl. object.

15. Pronounced durti, from /durti/ ‘she gave them (f.) back’; t– 3 f. sg–...
-m-|t| 3 f. pl. object. The morpheme boundaries, which are irrelevant here, are left out from the main text for the sake of simplicity.

16. Onsetless syllables with an oral stop as a peak must be excluded from the phonetic representations of ITB. On how this should be done, cf. Elmedlaoui (1985). Making the final /t/ the peak of an onsetless syllable would furthermore result in a violation of (25) below.

17. On core syllables where Y is more sonorous than Z, cf. (13) and fn. 13.
18. /l/ 3 m. sg.; /l/ 3 f. sg.; /lkl/ 'all, even'; /x/ 1 sg.; /k/ 2 m. sg. object; /na/ 'what?'; /a/ future; /t− /2 /t/ 2 sg. /s/ 'to be': in a narrower transcription where ultrashort transitional vowels are noted (cf. section 3) these forms are: /lMl/, /slom/, /sMs/, /ts/ /l/ /lkl/ /x/ /k/. /ut/, /m/, /n/, /t/ /lkl/, /n/ /a/ /lkl/, /it/ /t/ /lkl/.
20. Postpausal syllables which are phonologically onsetless can (but need not) be pronounced with an initial glottal stop: [Pikru], [PRoL].
21. It is not uncommon for languages to be more liberal with regard to the syllable types that they allow at the two ends of the domain over which syllabification is defined. For another instance of this in ITB, cf. section 4.
22. In Steriade 1984 the "CV rule", which builds CV syllables over the C and V slots of a CV skeleton à la Halle and Vergnaud (1980), operates from left to right. Although (26) constrains the operation of CS in terms of left and right, we believe that (26) is not concerned with left to right ordering per se, but rather with favoring applications of CS that maximize the sonority differences between the terms Y and Z in (15).
23. /iɪ/, injunctive. Compare with /ləstɪ/ 'let him shea'/ (I-/lari-/it)/.
24. /iɪ/, 1 sg. object. Compare with /ləstɪ/ 'crop my hair'/ (I-/lari-/iɪ)/.
25. This is a bound state form. The corresponding free state form is [tovRut].
26. For a general survey, cf. Bell 1978. On Pacific Northwest Indian languages cf. Heard 1978. There are on record languages with syllabic consonants that must already appear as such at the most abstract level of representation where syllabic structure is present. One of these is Bái, a "monosyllabic" language of Southern China whose syllables are all of the form CVG (C for glide). Besides a, o, u, etc., the voiced labiodental fricative can appear in the V position behind most consonants, hence syllables such as /tv/ /k/ /f/ /n/ /m/ /v/ /v/.

These syllables are tone-bearing units like any others in the language. A similar situation is also found in neighboring dialects of Chinese. Cf. Dell (1981) and references therein.
27. i.e. once they have been made aware of the difference between counting syllables in written words and in spoken ones, of the differences between the pronunciation in use in everyday speech and those used in singing and in reading poetry, and last but not least, once they have been made to realize that, even within the bounds of one style of speech, many forms can be pronounced in more than one way.
28. /s/ causative, /s/ 1 sg.; /l/ 3 m. sg. object.
29. Most of these involve syllabic consonants (especially obstruents), i.e. configurations which have no analogues in French about which one could examine the judgments of the native speakers of French (French does not allow syllabic consonants, even at the most superficial level, pecc Bell 1978). One may speculate whether one would not find similar areas of uncertainty in the judgments of the native speakers of any language with syllabic consonants.
30. Cf. e.g. Applegate (1958), Destaing (1920).
31. The sounds perhaps longer in the ITB sequences than in the English ones.
32. a) ‘he selects for the chief’: /ar/modal, /i/ 3 m. sg.; /i/ dative; b) ‘the chief’ selects; c) ‘the untidy one said’: /ui/ bound state prefix; d) he took care of his mother /i/ 3 m. sg. possessive.
33. A dot under a segment indicates emphatic articulation. /i/ 3 m. sg., /i/ in direction of the speaker.
34. Literally ‘he brought the eye to your place’; /|U| ‘bring, take away’; /i-|H| |eye’; /i/ ‘toward’, /|der-|Un/ ‘your house’. This form is homophonous with /i-|U| |r=|der-|Un/ ‘he fell asleep in your house’ (lit. ‘sleep took him away in your house’).
35. /ke/ ‘here is...’; /sd/ ‘six’, /dUn/ ‘to last’, /n/ 3 m. pl.
36. As in igida /idan ‘the eagle that they (m.) saw’ (/|H|dO=|a=| |ra-n/), /de/ ‘that’, /n/ 3 m. pl. If the first segment in the next word is syllabic the final consonant becomes an onset, as in yur. ma. man ‘he tasted the water’ (/r=|U|m=a=n/).
37. And when furthermore that word begins with a nonsyllabic segment. When that segment is syllabic, cf. the preceding footnote.
38. /-a-|nu/ ‘that’; /loft, sg. ’is /a/n/.
39. Its imperfective is /|t=a|n/ (cf. (38)).
40. With one exception: After /|H/ i is lowered to [e]. When /|H/ occurs after /i/ only the first HV is lowered, and the sequence is realized as [e] /y/ as for instance in nHl ‘wash’ (‘|H|l=a=n’). /H|y/ ‘step back’ (|H|l=a=n).
41. /n/ genitive; /k/ 2 sg. object.
42. Cf. il /|H|l/ ‘spur’ which is distinct phonetically from i /|H|l/ (prepausally also /|H|l/ ‘skin’, from /|H|n/.
43. Contrast this with say. dRi ‘ear (wheat)’ (/r=|H|dR/), with a non-geminate cod in the first syllable.
44. /m/ ‘to say’; /n/ ‘to spend the night’.
45. /t/ ‘side’; /n/ genitive; /a/ 3 m. sg.
46. Is interrogative; /nt/ 3 f. pl. Contrast trisyllabic is /mu. n/It with disyllabic /la. m/unnk in (39). Setting aside the differences in the last consonant and in emphatic articulation, /mu. n/It (two syllables) and /m/unnk (only one) sound very much alike to an untrained ear. In particular, both contain a long steady-state n. However, intonational facts go hand in hand with ME’s syllable count. In matter of fact requests for information, ITB speakers commonly use a tone which ends in a mid tone (M) followed by a high falling tone (HF). When is /mu. n/It occurs at the end of an utterance carrying that tone, /mu/ carries an M and the following long n carries a HF, in the same way as in is. sa. ‘are they (m.)’ through? (/H|ess=|a-n/) sa carries an M and has a HF. When /la. m/unnk occurs in the same context, on the other hand, /la/ carries the M, and the HF is carried by the sequence /m/unnk taken as a whole.
49. Angoujard (1984:193) also suggests that long consonants be represented as above.

REFERENCES


than in the English ones. 

- g., /i/ dative; b) 'the chief 

section. /i/ 3 m. sg., /d/ in 

/ 'bring, take away'; /l/ /l-t/ 

homophonic with /l/ /l-t/ 

took him away in your house'. 

*3 m pl.

w* (/f[w] ŭ-d=ae= [x<a-n]/, /ad/ 
is syllactic the final consonant 

*ter* (/l-um=ranh/), 
a nonsyllabic segment. When 

When /l/ occurs after iI, only 

ized as [ry], as for instance 

(/HId/).

/ 'he span' which is distinct 

on /l/ll/). 

dr-t/), with a non-geminate 

is, mu. nNt with disyllabic 

the last consonant and in 

-munk (only one) sound very 

contain a long steady-state n. 

's syllable count. In matter of 

use a tune which ends in a mid 

is, mu. nNt occurs at the end 

ad the following long n carries 

through? (/f[x=al-a-n]/) so 

in the same context, on the 

y the sequence /munk taken 


r Principle", about which cf. 

consonants be represented as


Descriptive literature is spotty. Dizi is the language spoken by the Dizinoth of the Kutia Province, sometimes known as Dizinoid, though this is also used by the Balbanis and the Zhuang as well.

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According to Allan (1975), the dizi is a member of the Dizi subgroup, which is characterized by the presence of a distinctive prosodic structure consisting of a sequence of syllables. In this paper we are especially interested in the prosodic structure and its interaction with the phonological system.