13 Syllables

13.1 Syllables in Phonological Theory

Among phonological entities, syllables are unusual in the degree to which they stand out to the native speaker at the conscious level. It is relatively easy for people to count the syllables of a word — much easier than counting the segments. People also find it intuitive to count out syllables and arrange them in time whenever they use them in verse, chant, and song.

Looking within phonology itself, we find that syllables frequently appear in environments of phonological rules, both for deriving allophones and in morphophonemic alternation. Syllables also are the units that bear stress (chapter 14) and serve as the “anchor points” for tones in total systems and in intonation (chapter 15). It is hardly surprising that phonologists have often made use of syllables in phonological theory.

13.2 Representation

Various means are used to depict syllables formally. In the International Phonetic Alphabet, syllables are shown by separating them with a boundary symbol, specifically a period; thus, connective is represented with its syllabification as [kʌ.nɛkt]. Another approach, followed here, eschews boundary symbols and assumes instead that syllables are phonological constituents. For representing such constituency, the clearest notation is tree structure. In the representation for connective below, the syllable constituents are labeled with $\sigma$ (Greek sigma, for “syllable”):

A more concise notation uses brackets, annotated with $\sigma$: [kʌ.nɛkt]. The full tree notation will be used here for phonological derivations in which segments get added to or removed from syllables, or for cases where brackets must be reserved for morphological or syntactic structure.

In discussing syllables, it is useful to be able to refer to certain substrings of them. The onset of a syllable is defined as the consonant or sequence of consonants at the beginning of a syllable. The coda is the consonant or sequence of consonants at the end of a syllable. The nucleus of a syllable is the vowel or diphthong found at the syllable’s core and functioning as its sonority peak (sometimes peak is used instead of nucleus). It is obligatory for a syllable to have a nucleus, very common for a syllable to lack a coda, and less common for it to lack an onset.

In some theories, the onset, nucleus, and coda are described as constituents (they are daughters of the syllable node $\sigma$, and dominate segments). This book will use “onset,” “nucleus,” and “coda” merely as useful descriptive terminology. The representations used will be the simple structures shown above in which $\sigma$ dominates segments directly.

13.3 Syllabification

In principle, syllabification could be part of the phonemic representation of forms. Where this is so, we would be able to detect it in the form of minimal pairs (chapter 2) that differ only in syllabification. Thus, we could imagine a language in which there is a word judged by native speakers to be syllabified [kat]o[tra], which means (say) ‘sheep’, and a different word judged to be syllabified [aka][tra], which means ‘goat’. This would be a minimal pair for syllabification.

Such distinctions have in fact been suggested, but only for a very few languages (see Further reading). In most languages, however, syllabification is predictable: starting out from the string of segments, one can predict the syllabification (or multiple syllabifications, in cases of free variation). Just as a complete phonological description seeks to derive all of the predictable allophones of the language by rule, it should also derive the syllabification.

The basis on which syllabification is derived must be (partly) language-specific: every language has its own principles of syllabification. We can see this by looking at very similar segmental strings that get syllabified differently in different languages. The word for ‘four’ in Spanish is syllabified [kwau][tw],. But in Ilokano, where the same word occurs as a borrowing, it is syllabified [kwat][w].

The question arises of how we know this. First, native speakers of both languages intuit these syllabifications. Second, the distribution of allophones supports it: for instance, the /t/ of Ilokano [kwat][w] is the preglottalized [t̚] allophone that we generally find in syllable-final position, not the plain [t] found syllable-initially. In addition, vowels are typically shorter when they are followed by a consonant in their syllable, and the Ilokano [a] vowel is noticeably shorter than the Spanish.
13.3.1 General principles of syllabification

Such interlinguistic differences, however, are usually modest; it is the cross-
linguistic resemblances that are perhaps more striking. It is possible to state a set
of "garden-variety" principles of syllabification that give at least an approxima-
tion to syllabification in most languages; and this task is addressed in the following
sections.

13.3.1.1 Finding the syllable nucleus

The nucleus of the syllable is normally a vowel or diphthong, though in some
languages other segments with lower sonority (liquids and nasals) can be syllabically
and form syllable nuclei; this is discussed in §4.4.3.

Definitional (see §4.4.3), there is a one-to-one correspondence between
[+syllabic] sounds and syllables; every [+syllabic] sound is the nucleus of its
own syllable. However, the questions of what sounds count as [+syllabic] is an
analytic one and cannot be determined by merely listening to the data. Cases that
often need to be addressed are whether a particular sequence should count as [aa]
two [+syllabic, −long] segments) or [a:] (one [+syllabic, +long] segment, §3.4.1);
or whether the [l] of a word-final sequence like [abl] has a [+syllabic] [l] or a
[−syllabic] [l]; the syllabification will depend on this decision.

13.3.1.2 Syllabic affiliations of consonants

Assuming that the choice of [+syllabic] segments has been correctly made, the main
task in syllabification is determining to which syllable the consonants belong.

It is generally true that when a consonant immediately precedes a vowel, it must
belong to the same syllable as the vowel. As a consequence, VCV is normally
syllabified as [V][C][V], not *[V][C][V]. Moreover, while VCCV is sometimes
syllabified as [V][C][C][V], it is very unlikely for it to be syllabified as *[V][C][C][V].

This leaves two choices ([V][C][C][V], and [V][C][C][V]) for biconsonantal
clusters and three ([V][C][C][V], [V][C][C][V], and [V][C][C][V]) for tricon-
sonantal clusters. To choose among these, we will assume that languages have
ordered rules that affiliate consonants either to the following or to the preceding
syllable. Such rules can be complex, and we will only give some outline analyses
here. Before proceeding, however, it is useful to consider a heuristic principle that
guides many analyses.

This heuristic, the Maximal Onset Principle, states that we can often predict
the syllabification of intervocalic clusters by observing the set of consonant
clusters that may begin a word: VC1C2V will be syllabified as [V], if a word can begin C1C2V (and similarly, VC1C2V will be syllabified as [V], if a word can begin C1C2C3V, and so on).

Here is an example: in English, approve is syllabified as [a][p][r][v], because
English words can begin with /p/; but Wheatley is syllabified [w][e][t][l], because
no word can begin with /tl/. In Persian, the maximal consonant sequence at the
beginning of a word is just one, so a word like /æbru/ 'eyebrow' must be syllabified
[æ][b][r][u], not *[æ][b][ru].

The Maximal Onset Principle often can predict syllabification in languages, but
is not infallible. For example, in Ilokano, kwatro is syllabified [kwat],[lo], even
though there are words that can begin with /tlo/, for example tres 'three'. The
principle also produces incorrect results when applied with certain English onsets. /kw/ is a possible (though rare) onset in English (dwell), but Edwardian seems to
be syllabified [ed][w][a][t],[lo], not *[e][d][w][a][t],[lo]. [We can tell this from allophone evidence: [d] shows up in Edwardian with the coda allophone heard in Ed [ed], not the slightly affricated [d] onset allophone heard in dwell.]

The Maximal Onset Principle, though useful, is only a heuristic; it is not really
specific enough to be part of a phonological analysis. The reason is that a full
grammar of a language should say what the word-initial onsets are; for example
that /bl/ is a possible onset of English and that *[bn] is not. *[bmn] is an impossible
word of English, because it begins with an impossible onset. For a language with a
syllable onset inventory as complex as that of English, the establishment of a set of rules that can derive all and only the possible onsets involves fairly
extensive analysis, which will not be attempted here. The usefulness of the
Maximal Onset Principle is that it predicts, correctly in most cases, that if there
is a choice between syllabifying a consonant as an onset or as a coda, it will be
syllabified as an onset.

13.3.1.3 An outline scheme for syllabification

With this background in place, we can set up an outline version of how syllabifica-
tion works, sufficiently detailed to serve in the discussion that follows. There are
three rules, which apply in the order shown.

σ Assignment
Assign syllable nodes (σ) to be in one-to-one correspondence with [+syllabic]
sounds.

Onset Formation
Join consonants to the following syllable, provided the resulting cluster can
occur at the beginning of a word (Maximal Onset Principle).

Coda Formation
Join any consonants not yet syllabified to the preceding syllable.

These rules can be used with the English word contract /kɔntrəkkt/. First,
to enforce the one-to-one correspondence of [+syllabic] sounds and syllables, σ
Assignment must affiliate a syllable node with the vowels /ə/ and /æ/.
In Tonkawa, an extinct American Indian language once spoken in Texas, there is a Syncope rule that deletes the second vowel of a word when it is not adjacent to a consonant cluster or final consonant:

Tonkawa Syncope

The underlying representation /notoxo-n-o-o/ ‘he hoes it’ (‘hoe-progressive-declarative-3 person present’), would be initially syllabified as shown below:

The remaining consonants are syllabified by Coda Formation:

This analysis implements the Maximal Onset Principle through rule ordering: Coda Formation follows Onset Formation and applies only to unsyllabified consonants; hence it syllabifies only the consonants that were not already syllabified by Onset Formation. Where the Maximal Onset Principle does not hold true, as in cases like Edwardian, it would be necessary to limit certain cases of Onset Formation to word-initial position.

13.4 Syllables and Phonological Derivations

Syllabification is complicated by the fact that the rules of the phonology often rearrange the sequence of consonants and vowels, through deletion, insertion, and other processes. How does syllabification respond to such changes? More generally, what is the place of syllabification in the phonological derivation? One widely held view, adopted here, is that the rules of syllabification are persistent. This means that underlying phonological representations are syllabified by the syllabification rules at the outset of the derivation, and that whenever a phonological rule applies, the syllabification rules reapply if applicable. We will see evidence that bears on this claim later on; for now, I will simply give an example to illustrate the concept of persistence.