

## Syllable structure: Overview / Describing syllabification options

### 1. Syllable structure and mental grammar

As we have seen, the way that segments are assigned to syllables can vary from language to language. But phonologists have found that within each language, the syllable structure assigned to any given word (or phrase) is **predictable**. This means that it must be **assigned by the phonological grammar** — syllable structure is not memorized and stored in URs.

As always, our goal is to develop a **model** of syllabification and syllable structure that is **general** enough to encompass the variation that we see between languages, while being **restrictive** enough to account for the aspects of syllable structure that do *not* vary between languages.

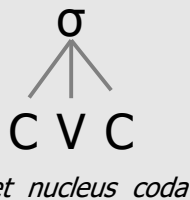
Crucially, while languages differ in the specific kinds of syllable structure that they allow, the variation between languages actually seems to involve only a very limited number of **possible options**. Our model also needs to take this restrictiveness into account.

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### 2. Basic terminology and notation for syllable structure

This diagram shows basic terminology for syllable structure. (See sections 3–5 for definitions.)

#### Syllable structure diagram



We can also define the following **notational conventions** for syllabification:

#### Notational conventions

- **σ** syllable
  - **X** any segment at all
  - **V** equivalent to feature “[+syll]”: any [-cons] segment that is not a glide, or any syllabic consonant
  - **C** equivalent to feature “[-syll]”: any [+cons] segment that is not syllabic, or any glide
- (The future handout “Representing glides and high vowels” has more to say about C, V, and glides.)

Some consequences for our phonological model:

- We propose that the **syllable (σ)** is an entity that is included in phonological representations and is manipulated and referred to by the mental grammar.
- We show which segments belong to which syllable by using **association lines**.
- We can let the grammar **refer to** syllables and syllable edges (thus, “syllable-initial” or “syllable-final”; see notation below) when we state the environments for phonological rules.
- We can also let the grammar refer to syllable positions such as *nucleus*, *onset*, and *coda*. For now, we can use these terms as elements in the **environment of a rule**.

**Examples: Some syllable-based rule environments**

- [σ\_\_ syllable-initial position (the σ label tells you that the bracket is a *syllable* edge or boundary)
- \_\_σ] syllable-final position

### 3. The parts of the syllable

#### A. The nucleus

One universal aspect of syllable structure is that every syllable has a **nucleus**, sometimes also called a **peak**. This is the core or main part of the syllable.

The set of things that can *be* syllable nuclei differs somewhat from language to language, however. All languages allow a single **vowel** to be a nucleus, but some languages are more permissive than that. Specifically, some languages allow two vowel segments in the same nucleus (=diphthongs). Other languages allow **consonants**, or particular *classes* of consonants, to be nuclei. (Some languages, like English, allow both diphthongs and consonant nuclei.)

So when we are investigating the syllable structure of a language, here are some questions we should consider concerning nuclei. Here (and below for onset and coda options), assume that **the answers to the questions are *no* unless there is phonological evidence to the contrary**. That's because these questions start from the structures that all languages allow, and "add on."

**Options to describe for nuclei in an individual language:**

- Nucleus is universally mandatory (no nucleus means no syllable)
- Vowel as nucleus is universally allowed
- Are diphthongs (sequence of two vowels as a single nucleus) allowed? (no/yes)
  - If yes, what are the relevant natural class(es)?
- Are other natural classes allowed as possible nuclei? (no/yes)
  - If yes, what are the relevant natural class(es)?

If we restrict our syllabification model to considering only these options for nuclei, it (correctly) prevents us from, for example, predicting a language where consonants are nuclei and vowels are not.

#### B. The onset

The syllable **onset** consists of all segments in the syllable that **precede the nucleus**.

Cross-linguistically, there is a **preference** for syllables to have onsets. In particular, a consonant between two vowels is **universally** syllabified as an onset to the second syllable ([a.tu]), not a coda to the first syllable (\*[at.u]). Also, every language includes at least some syllables with onsets; no language has a ban on syllables with onsets.

Here are the possible ways that languages can differ regarding onsets. Some languages **require** all syllables to have onsets, while other languages tolerate onsetless syllables when necessary. Some languages allow onsets to include more than one consonant, forming **clusters**, while other languages allow a maximum of one onset consonant. Furthermore, languages that allow

clusters usually place **restrictions** on what kinds of consonant combinations can be in a cluster. (When you need to state a cluster restriction, remember to state it in terms of **features** and **natural classes**, and/or **sonority**, a topic which we will address in an upcoming class.)

When we are examining the syllable structure of a language, we want to look for phonological evidence concerning the following options for onsets.

**Options to describe for onsets in an individual language:**

- Are onsetless syllables allowed? (no/yes)
- Are onset clusters allowed? (no/yes)
  - If yes, are there any restrictions on possible onset clusters?

Some languages also have restrictions on possible onset consonants, but this is relatively rare.

### C. The coda

The syllable **coda** consists of all segments in the syllable that **follow the nucleus**.

Every language has syllables with nuclei and onsets, but not every language has syllables with codas. Thus, some languages **ban** codas. There may also be restrictions on which consonants are **allowable codas** in the language; it is often the case that not all of the consonants found in a language can appear in coda position. Finally, as with onsets, languages can vary as to whether they allow coda **clusters**, and if so, whether there are **restrictions** on which consonants can combine to form a cluster. (Again, any coda or cluster restrictions must be stated in terms of **features** and **natural classes**, and/or **sonority**.)

**Options to describe for codas in an individual language:**

- Are codas allowed? (no/yes)
  - If yes, are there any restrictions on possible coda segments?
- Are coda clusters allowed? (no/yes)
  - If yes, are there any restrictions on possible coda clusters?

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## 4. Phonological rules dependent on syllable structure

### A. Segmental rules with syllable-related environments

As noted in section 1 above, now that we have introduced the **syllable** and its subparts the **onset**, the **nucleus**, and the **coda** into our model, phonological rules can refer to these elements. In fact, this kind of phenomenon is one of the main sources of **evidence** for how segments are syllabified: If we can identify a phonological process that applies to, or is determined by, segments that clearly belong to position P but not segments that clearly belong to position Q, we can then use those facts to make an **argument** that a segment whose syllable position is not immediately obvious must actually be in position P or position Q, depending on whether the process applies to the segment in question.

### B. Rules that apply when syllabification fails

As we have seen in many examples from class, there is another kind of situation where phonological rules are dependent on syllable structure. Sometimes, a word (or phrase) will

contain segments that cannot be included in syllable structure, given the language's syllable structure options. For example, maybe clusters are not allowed, but a word's underlying representation has three consonants between vowels. In this case, only two of the three consonants can be legitimately syllabified.

Segments that are not (yet) included in syllable structure are said to be **unsyllabified**. We add a prime ( ' ) to the segment-type symbol to indicate unsyllabified status:

#### **Unsyllabified elements**

- **C'** any unsyllabified [-syll] segment
- **X'** any unsyllabified segment

(We do not generally need to refer to 'unsyllabified vowels' because vowels are universally allowed to be a syllable nucleus and therefore will always be assigned a syllable node.)

Many languages react to unsyllabified consonants with rules of epenthesis, inserting a vowel either before or after the C', or deletion, deleting the C' (or perhaps a neighboring C whose syllable position the original C' can then fill). Therefore, processes of **epenthesis** and **deletion** can be a good source of evidence about the allowable syllable structures of a language.

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## **5. Summary: Syllabification options**

Here is a summary of what to try to determine when investigating the syllable structure of a language. (Remember: the default answer to the questions is "no" without evidence for "yes".)

Answering these questions is part of **describing** the facts about the world (syllable structure in a given language). The next step will be to give our model a way to apply **phonological processes** so that it can **predict** syllable structure that matches the relevant description.

#### **Options to describe for nuclei:**

- Nucleus is mandatory (no nucleus means no syllable)
- Vowel as nucleus is universally allowed
- Are diphthongs (sequence of two vowels as a single nucleus) allowed? (no/yes)
  - If yes, what are the relevant natural class(es)?
- Are other natural classes allowed as possible nuclei? (no/yes)
  - If yes, what are the relevant natural class(es)?

#### **Options to describe for onsets:**

- Are onsetless syllables allowed? (no/yes)
- Are onset clusters allowed? (no/yes)
  - If yes, are there any restrictions on possible onset clusters?

#### **Options to describe for codas:**

- Are codas allowed? (no/yes)
  - If yes, are there any restrictions on possible coda segments?
- Are coda clusters allowed? (no/yes)
  - If yes, are there any restrictions on possible coda clusters?