Syllables and Phonotactics
Course Readings

The following readings have been posted to the Moodle course site:

- Contemporary Linguistics: Chapter 3 (pp. 77-84)
- “Syllables” by Kyle Johnson
A Review of Where We Are

The Fundamental Question (for Linguists):
What is the system of rules and mental representations that underlies our ability to speak and understand a human language?

▶ Last Unit: IPA
Notation that unambiguously represents the phones of all human languages.

▶ This Unit: Phonology
Rules that operate over those representations, and thereby affect how words are pronounced.
Some Quick IPA Practice

First, let’s practice reading some IPA:

[brejs jërsël fëntë iz këmiŋ]
First, let’s practice reading some IPA:

[brejs jirself wintir iz kwymi]  
(Brace yourself: Winter is coming!)
Some Quick IPA Practice

Here’s another one:

[aj downt want tu liv an ðis plænit ɛnimɔr]
Some Quick IPA Practice

Here’s another one:

[aj dəʊnt wɒnt tʌ lɪv ən ðɪs plænɪt ɛnɪmɔr]
(I don’t want to live on this planet anymore)
Towards ‘Phonology’

IPA transcription represents *some* of our knowledge of how a word is pronounced:

- Phones making up the word
- Sequence in which those phones are produced

However, there is more to a word’s pronunciation than just this...

- There are also **general rules** governing English pronunciation.
Introducing Syllables

Key Example
When we pronounce ‘understanding’, we don’t pronounce (or perceive) it as a simple string of sounds...

▶ Rather, the phones are grouped together into ‘beats’
▶ These ‘beats’ making up the word give it a rhythm
▶ These ‘beats’ and rhythm come out naturally when we speak words slowly

▶ [ʌn.dɪr.stæn.dɪŋ] ‘understanding’
▶ [pɛp.tow.bɪz.mɔl] ‘Pepto Bismol’
▶ [bʌ.lɔw.ni] ‘Bologna’
Introducing Syllables

Vocabulary:
These ‘beats’ making up the sound-structure of the word are called **syllables**.
Introducing Syllables

Vocabulary:
These ‘beats’ making up the sound-structure of the word are called syllables.

Key Fact:
For most English words, speakers only accept one way of breaking it up into syllables

- [ʌn . dɪr . stæn . diŋ] *[ʌ . ndɪrs . tænd . iŋ]
- [pɛp . tow . bɪz . mɔl] *[pɛpt . ow . bɪzm . ɔl]
- [bʌ . lɔw . ni] *[bʌl . own . i]
Introducing Syllables

Vocabulary:
These ‘beats’ making up the sound-structure of the word are called **syllables**.

Key Fact:
For most English words, speakers only accept one way of breaking it up into syllables

- [ʌn . dɪr . stæn . diŋ] *[^ʌ . ndɪrs . tænd . iŋ]*
- [pɛp . tow . bɪz . mæl] *[^pɛpt . ow . bɪzm . al]*
- [bʌ . low . ni] *[^bʌl . own . i]*

Conclusion:
Part of knowing English is knowing *how to divide words into syllables*

- So, this information is represented in our brains somehow.
Towards Syllabification

Question: How is this information represented in our brains?
Towards Syllabification

**Question:**
*How* is this information represented in our brains?

**Wrong Hypothesis:**
*Maybe we just memorize it on a word-by-word basis?*

▶ When we learn a word like ‘bologna’, we learn:
  ▶ The phones that compose it: [bʌlɔnɪ]
  ▶ The word’s **syllabification**: [bʌ . lɔw . ni]

**Vocabulary:**
The way that a word is broken down into syllables is called **syllabification**.
Towards Syllabification

Wrong Hypothesis:
The syllabification of word is memorized on a case-by-case basis.
Towards Syllabification

Wrong Hypothesis:
The syllabification of word is memorized on a case-by-case basis.

Problem for This Hypothesis:
English speakers know how to syllabify words they’ve never heard spoken before.

Example:
▶ Read the following word to yourself silently: “badartogly”
▶ Say the word to yourself slowly, breaking it into syllables...
Towards Syllabification

Wrong Hypothesis:
The syllabification of word is memorized on a case-by-case basis.

Problem for This Hypothesis:
English speakers know how to syllabify words they’ve never heard spoken before.

Example:

► Read the following word to yourself silently: “badartogly”
► Say the word to yourself slowly, breaking it into syllables...
► I would bet that you syllabified it as follows:
  ► [ bæ . dɑː . tɑ . gli ]
► I would bet that you didn’t syllabify it this way:
  ► [ bæd . ɑːt . ɑɡ . li ]
Towards Syllabification

Conclusion:
Since you’d never heard “badartogly” before, your syllabification couldn’t have been memorized...
  ▶ So the ‘Wrong Hypothesis’ is wrong...
Towards Syllabification

Conclusion:
Since you’d never heard “badartogly” before, your syllabification couldn’t have been memorized...
  ▶ So the ‘Wrong Hypothesis’ is wrong...

Right Hypothesis:
English syllabification is based on a **general rule**.
  ▶ This rule tells you how to syllabify any imaginable word of English.

Vocabulary:
**Phonology** = the study of the general rules that govern how words are pronounced in a language.
The Burning Question: What *are* the rules for syllabifying a word of English?
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What *are* the rules for syllabifying a word of English?

Before we can state the rule, we need to talk a bit more about the internal structure of syllables...
The Structure of Syllables

- Every syllable is made up of (at most) three parts:
  - **Onset**: the consonants that begin the syllable
  - **Nucleus**: the sound in the middle of the syllable (usually a vowel)
  - **Coda**: the consonants the end the syllable

- Syllables can differ in size:
  - Some syllables do not have onsets (e.g. [it])
  - Some syllables do not have codas (e.g. [ti])
  - But, *every* syllable has a nucleus
The Structure of Syllables

Here are some syllables, broken down into their parts:

<table>
<thead>
<tr>
<th>Syllable</th>
<th>Onset</th>
<th>Nucleus</th>
<th>Coda</th>
</tr>
</thead>
<tbody>
<tr>
<td>[bæn]</td>
<td>[b]</td>
<td>[æ]</td>
<td>[n]</td>
</tr>
<tr>
<td>[bi]</td>
<td>[b]</td>
<td>[i]</td>
<td>NONE</td>
</tr>
<tr>
<td>[æn]</td>
<td>NONE</td>
<td>[æ]</td>
<td>[n]</td>
</tr>
<tr>
<td>[stænd]</td>
<td>[st]</td>
<td>[æ]</td>
<td>[nd]</td>
</tr>
<tr>
<td>[plæŋk]</td>
<td>[pl]</td>
<td>[æ]</td>
<td>[ŋk]</td>
</tr>
<tr>
<td>[bɔj]</td>
<td>[b]</td>
<td>[ɔj]</td>
<td>NONE</td>
</tr>
<tr>
<td>[spɾej]</td>
<td>[spɾ]</td>
<td>[ej]</td>
<td>NONE</td>
</tr>
<tr>
<td>[aj]</td>
<td>NONE</td>
<td>[aj]</td>
<td>NONE</td>
</tr>
</tbody>
</table>

Note:
Both parts of a diphthong count as being in the ‘nucleus’ of the syllable.
Towards ‘Phonotactics’

Key Fact: Not every sequence of phones is a possible onset or coda in English.

- Consider the following sequences of phones:
  - [mba . ka]
  - [ŋa . to]
  - [tsa]
  - [nuktʃ]
  - [tæg . nɪsp]

- Which one sounds *most* like an English word?
Towards ‘Phonotactics’

Key Fact:
Not every sequence of phones is a possible onset or coda in English.

- Consider the following sequences of phones:
  - [mba . ka]
  - [ŋa . to]
  - [tsa]
  - [nuktʃ]
  - [tæg . nɪsp]

- Which one sounds *most* like an English word?
- You probably said [tæg . nɪsp]
  - After all, *it’s the only one that English speakers can easily pronounce.*
Towards ‘Phonotactics’

But why don’t those other words sound like English?
Towards ‘Phonotactics’

But why don’t those other words sound like English?

- [mba . ka]
  - The first syllable starts with [mb]
  - *No English word or syllable can start with [mb]*
  - The sequence [mb] is not a possible onset
Towards ‘Phonotactics’

But why don’t those other words sound like English?

▶ [mba . ka]
  ▶ The first syllable starts with [mb]
  ▶ No English word or syllable can start with [mb]
  ▶ The sequence [mb] is not a possible onset

▶ [ŋa . to]
  ▶ The first syllable starts with [ŋ]
  ▶ No English word or syllable can start with [ŋ]
  ▶ The sequence [ŋ] is not a possible onset
Towards ‘Phonotactics’

But why don’t those other words sound like English?

► [mba . ka]
  ▶ The first syllable starts with [mb]
  ▶ *No English word or syllable can start with [mb]*
  ▶ The sequence [mb] is not a possible onset

► [ŋa . to]
  ▶ The first syllable starts with [ŋ]
  ▶ *No English word or syllable can start with [ŋ]*
  ▶ The sequence [ŋ] is not a possible onset

► [tsa]
  ▶ The first syllable starts with [ts]
  ▶ *No English word or syllable can start with [ts]*
  ▶ The sequence [ts] is not a possible onset
Towards ‘Phonotactics’

But why don’t those other words sound like English?

▶ [mba . ka]
  ▶ The first syllable starts with [mb]
  ▶ No English word or syllable can start with [mb]
  ▶ The sequence [mb] is not a possible onset

▶ [ŋa . to]
  ▶ The first syllable starts with [ŋ]
  ▶ No English word or syllable can start with [ŋ]
  ▶ The sequence [ŋ] is not a possible onset

▶ [tsa]
  ▶ The first syllable starts with [ts]
  ▶ No English word or syllable can start with [ts]
  ▶ The sequence [ts] is not a possible onset

▶ [nuktf]
  ▶ The first syllable ends with [ktʃ]
  ▶ No English word or syllable can end with [ktʃ]
  ▶ The sequence [ktʃ] is not a possible coda
Phonotactic Constraints

Vocabulary:
The rules that determine the possible onsets or codas are called **phonotactics constraints** (a.k.a phonotactics).

- ‘phono’ = sounds; ‘tactic’ = arrangement
  (how the sounds can be arranged)
Phonotactic Constraints

Vocabulary:
The rules that determine the possible onsets or codas are called **phonotactics constraints** (a.k.a. **phonotactics**).

▶ ‘phono’ = sounds; ‘tactic’ = arrangement (how the sounds can be arranged)

Key Fact:
Different languages have different phonotactic constraints.

▶ In Dholuo, [mb] and [ŋ] are possible onsets:
  ▶ [mba . ka] = story
  ▶ [ŋa . to] = person

▶ In Tlingit, [ts] is a possible onset, and [ktf] a possible coda:
  ▶ [tsa] = seal
  ▶ [nuktf] = to do
Phonotactics and Syllabification

Fun Fact:
Phonotactic constraints play a major role in syllabification.

- What’s wrong with: *[ʌ . ndɪɾs . tænd . iŋ]*
  - [nd] is not a possible onset of English (No word of English begins with [nd])

- Why not this: *[pɛpt . ow . bɪzm . əl]*
  - [zm] is not a possible coda of English (No word of English ends in [zm])
Toward the Syllabification Rule

But, phonotactic constraints don’t explain *everything*...

- Why don’t we syllabify like this: *[abl . own . i]*
  - This syllabification is totally consistent with English phonotactics.
    - *[abl]* is a possible English syllable
    - *[own]* is a possible English syllable
    - *[i]* is a possible English syllable

- The answer will come from a concrete rule (algorithm) for syllabifying an English word...
The Syllabification Algorithm

- There are four main steps to the ‘syllabification rule’ (‘syllabification procedure’, ‘syllabification algorithm’)

- We will illustrate each step with our made-up words \([\text{bædɒtægli}]\) and \([\text{tægnɪsp}]\).
Step 1: Label the Nuclei

▶ Every syllable has a nucleus.
▶ **Key Fact:** *All vowels serve as syllabic nuclei.*
▶ So, Step One of our syllabification procedure is:
  ▶ Identify all the vowels in the word, and...
  ▶ Label those vowels as ‘nuclei’ (N)

\[ b \text{Æ} d \text{Æ} g l i t \text{Æ} g n i s p \]
Step 1: Label the Nuclei

- Every syllable has a nucleus.
- **Key Fact:** *All vowels serve as syllabic nuclei.*
- So, Step One of our syllabification procedure is:
  - Identify all the vowels in the word, and...
  - Label those vowels as ‘nuclei’ (N)

```
N  N  N  N  N
|   |   |   |
b æ d ʌ t a ɡ l i

N  N
|   |
t æ g n ɪ s p
```
Step 2: Label the Onsets

Step 2: Label the Onsets

To the extent allowed by the phonotactics, gather up all the phones preceding a nucleus, and label them as an onset.

- Look at the consonants preceding each ‘N’
- Find the *largest* continuous sequence that English phonotactics allows to be an onset.
- Write an ‘O’ above that sequence and connect each phone to that ‘O’ with a line.

```
N  N  N  N  N
|   |   |   |
b  æ  d  a  t    a  g  l  i

N  N
|   |
t  æ  g  n  i  s  p
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\[
\begin{array}{ccccccc}
O & N & N & N & N & N & N \\
& & & & & & \\
b & æ & d & æ & t & æ & g & l & i \\
& & & & & & t & æ & g & n & ɪ & s & p
\end{array}
\]
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```
O N O N N N
| | | | | |
b æ d α t α g l i
```

```
N N
| |
t æ g n i s p
```
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```
<table>
<thead>
<tr>
<th>O</th>
<th>N</th>
<th>O</th>
<th>N</th>
<th>O</th>
<th>N</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>æ</td>
<td>d</td>
<td>a</td>
<td>ɹ</td>
<td>t</td>
<td>æ</td>
</tr>
</tbody>
</table>
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```
O N O N O N N
| | | | | | |
b æ d a r t a g l i
```

- [t] is not a possible onset of English (no word starts with [t])
Step 2: Label the Onsets

Step 2:
To the extent allowed by the phonotactics, gather up all the phones preceding a nucleus, and label them as an onset.

- Look at the consonants preceding each ‘N’
- Find the largest continuous sequence that English phonotactics allows to be an onset.
- Write an ‘O’ above that sequence and connect each phone to that ‘O’ with a line.

[\text{ONONONON}] \quad [\text{NN}]

b æ d æ r t æ g l i t æ g n i s p

- [\text{t}] is not a possible onset of English (no word starts with [\text{t}])
Step 2: Label the Onsets

Step 2:
To the extent allowed by the phonotactics, gather up all the phones preceding a nucleus, and label them as an onset.

- Look at the consonants preceding each ‘N’
- Find the largest continuous sequence that English phonotactics allows to be an onset.
- Write an ‘O’ above that sequence and connect each phone to that ‘O’ with a line.

O N O N  O N  O N
\[ \text{b æ d a ŋ t æ g l i} \]

- [ŋt] is not a possible onset of English (no word starts with [ŋt])
- [gI] is a possible onset of English (e.g. [glow])
Step 2: Label the Onsets

Step 2:
To the extent allowed by the phonotactics, gather up all the phones preceding a nucleus, and label them as an onset.

- Look at the consonants preceding each ‘N’
- Find the largest continuous sequence that English phonotactics allows to be an onset.
- Write an ‘O’ above that sequence and connect each phone to that ‘O’ with a line.

\[ \text{ONONONONON} \]
\[ \text{bædætægli} \]
\[ \text{ONON} \]
\[ \text{tægnisp} \]

- [\text{ut}] is not a possible onset of English (no word starts with [\text{ut}])
- [\text{gl}] is a possible onset of English (e.g. [\text{glow}])
Step 2: Label the Onsets

To the extent allowed by the phonotactics, gather up all the phones preceding a nucleus, and label them as an onset.

- Look at the consonants preceding each ‘N’
- Find the largest continuous sequence that English phonotactics allows to be an onset.
- Write an ‘O’ above that sequence and connect each phone to that ‘O’ with a line.

[Diagram showing steps for labeling onsets]

- [\texttt{[\textipa{ot}]}] is not a possible onset of English (no word starts with [\textipa{ot}])
- [\texttt{[\textipa{gl}]}] is a possible onset of English (e.g. [\textipa{glow}])
Step 2: Label the Onsets

Step 2:
To the extent allowed by the phonotactics, gather up all the phones preceding a nucleus, and label them as an onset.

- Look at the consonants preceding each ‘N’
- Find the *largest* continuous sequence that English phonotactics allows to be an onset.
- Write an ‘O’ above that sequence and connect each phone to that ‘O’ with a line.

[$\text{ONONONONON}$]

[$\text{ONON}$]

[$\text{ONTÃAnglisp}$]

- [$\text{[ut]}$] is not a possible onset of English (no word starts with [$\text{[ut]}$])
- [$\text{[gl]}$] is a possible onset of English (e.g. [$\text{[glow]}$])
- [$\text{[gn]}$] is not a possible onset of English (no word starts with [$\text{[gn]}$])
Finding the Onsets

- A major part of ‘Step 2’ is figuring out “Can this sequence of phones be an onset in English?”

- To answer this, either:
  - Use your own ‘intuitions’ as a native speaker (if you are one)
  - Team up with a friend who is a native speaker (if you aren’t one)

- Either way, you ask “can a word of English start with this sequence of phones?”
Step 3: Label the Codas

Step 3:  
To the extent allowed by the phonotactics, gather up the remaining unlabeled phones following a nucleus, and label them as a coda.

- Look at the consonants following each ‘N’ (that aren’t already labeled as ‘O’s)
- Find the largest continuous sequence that English phonotactics allows to be a coda.
- Write a ‘C’ above that sequence and connect each phone to that ‘C’ with a line.
Step 3: Label the Codas

Step 3:
To the extent allowed by the phonotactics, gather up the remaining unlabeled phones following a nucleus, and label them as a coda.

- Look at the consonants following each ‘N’ (that aren’t already labeled as ‘O’s)
- Find the largest continuous sequence that English phonotactics allows to be a coda.
- Write a ‘C’ above that sequence and connect each phone to that ‘C’ with a line.

```
O N O N C O N O N
| | | | | | | | | | |
b æ d ð ð t ð g l i
```

```
O N O N
| | | |
t æ g n i s p
```
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To the extent allowed by the phonotactics, gather up the remaining unlabeled phones following a nucleus, and label them as a coda.

- Look at the consonants following each ‘N’ (that aren’t already labeled as ‘O’s)
- Find the largest continuous sequence that English phonotactics allows to be a coda.
- Write a ‘C’ above that sequence and connect each phone to that ‘C’ with a line.

```
O N O N C O N O N
| | | | | | | | |
|
O N C O N
| | | | | | |
t æ g n i s p
b ð d æ t æ g l i
```
Step 3: Label the Codas

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\[
\begin{align*}
\text{ONOONCONON} & \quad \text{ONOCONC} \\
\text{bædætæg} & \quad \text{tægnisp}
\end{align*}
\]
Step 3: Label the Codas

Step 3:
To the extent allowed by the phonotactics, gather up the remaining unlabeled phones following a nucleus, and label them as a coda.

- Look at the consonants following each ‘N’ (that aren’t already labeled as ‘O’s)
- Find the largest continuous sequence that English phonotactics allows to be a coda.
- Write a ‘C’ above that sequence and connect each phone to that ‘C’ with a line.

[sp] is a possible coda of English (e.g. [kɔsp])
Finding the Codas

- As with Step 2, a major part of ‘Step 3’ is the question “Can this sequence of phones be a coda in English?”

- To answer this question, either:
  - Use your own intuitions as a native speaker (if you are one)
  - Team up with a friend who is a native speaker (if you aren’t one)

- Either way, you ask “can a word of English end with this sequence of phones?”
Step 4: Add the Syllable Labels

Step 4:
Group together the ‘O’s, ‘N’s and ‘C’s into syllables.

- Above each N, write a ‘σ’ (for syllable), and draw a line connecting them.
- If there is an O preceding an N, connect that O to the σ that N is connected to.
- If there is a C following an N, connect that C to the σ that the N is connected to.

O N O N C O N O N

b æ d a r t a g l i

ON CON CON

t æ g n i s p
Step 4: Add the Syllable Lablels

Step 4:
Group together the ‘O’s, ‘N’s and ‘C’s into syllables.

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- If there is an O preceding an N, connect that O to the σ that N is connected to.
- If there is a C following an N, connect that C to the σ that the N is connected to.

```
<table>
<thead>
<tr>
<th>σ</th>
<th>σ</th>
<th>σ</th>
<th>σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>N</td>
<td>O</td>
<td>N</td>
</tr>
</tbody>
</table>
```

```
<table>
<thead>
<tr>
<th>σ</th>
<th>σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>N</td>
</tr>
</tbody>
</table>
```

```
| b | æ | d | æ | ŏ | t | æ | g | l | i |
```

```
| t | æ | g | n | s | p |
```
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\[
\begin{array}{cccccc}
\text{σ} & \text{σ} & \text{σ} & \text{σ} \\
\text{O} & \text{N} & \text{O} & \text{N} & \text{C} & \text{O} & \text{N} & \text{O} & \text{N} \\
\hline
\text{b} & \text{æ} & \text{d} & \text{a} & \text{r} & \text{t} & \text{æ} & \text{g} & \text{l} & \text{i} \\
\end{array}
\]
Step 4: Add the Syllable Labels

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Group together the ‘O’s, ‘N’s and ‘C’s into syllables.

▶ Above each N, write a ‘σ’ (for syllable), and draw a line connecting them.
▶ If there is an O preceding an N, connect that O to the σ that N is connected to.
▶ If there is a C following an N, connect that C to the σ that the N is connected to.
Study Exercise:

- At home, try running this procedure on the following words:
  - [ʌndɪrˈstændɪŋ] ("understanding")
  - [pɛptəw bɪzmɔl] ("Pepto Bismol")
  - [bʌˈloʊni] ("Bologna")

- Confirm that our rule will predict the correct syllabification for these words.
Summing Up

What We’ve Done So Far:

► We’ve laid out a rule that will correctly syllabify English words.

► This rule, then, is one (very small) part of an answer to our ‘fundamental question’.

The Fundamental Question (for Linguists):
What is the system of rules and mental representations that underlies our ability to speak and understand a human language?
Problem: Syllabic Consonants

But, there’s a problem for our syllabification rule...

▶ If we follow this rule, the only possible nuclei we will get will be vowels

▶ However, although every vowel *is* a nucleus...

▶ ...some nuclei are **not** vowels.
Syllabic Consonants in English

Key Fact:
The consonants [l], [n], and [ɹ], can be nuclei in English.

Words With Consonants as Syllabic Nuclei:

▶ “kitten”   [kɪ . tn]
▶ “cuddle”   [kʌ . dl]
▶ “banner”   [bæ . ðə]

Question: Why do we say they are the nucleus of a syllable?
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- “kitten” [kɪ . tn]
- “cuddle” [kʌ . dl]
- “banner” [bæ . nɹ]

Question: Why do we say they are the nucleus of a syllable?

Answer: We hear these words as having two syllables, but there is no ‘second vowel’ before the final consonant.

  - “kitten” and “cuddle”: tongue never leaves alveolar ridge after [t]/[d].
  - “banner”: you go immediately from [n] to [ɹ], with no intervening vowel
Syllabic Consonants in English

Vocabulary:
When a consonant serves as a syllabic nucleus, it is said to be a **syllabic consonant**

IPA Representation:
In IPA, syllabic consonants are indicated by putting a little vertical line beneath them:

- “kitten” [kɪ . tɪ]
- “cuddle” [kʌ . dɪ]
- “banner” [bæ . nɪ]
Syllabic Consonants in English

It seems, then, that the *real* syllabification rule for English outputs representations like these:

\[
\begin{align*}
\sigma & \quad \sigma \\
\AA & \quad \AA \\
O & \quad N & \quad O & \quad N \\
\mid & \quad \mid & \quad \mid & \quad \mid \\
k & \quad i & \quad t & \quad ð
dd & \quad \mid
\end{align*}
\]

\[
\begin{align*}
\sigma & \quad \sigma \\
\AA & \quad \AA \\
O & \quad N & \quad O & \quad N \\
\mid & \quad \mid & \quad \mid & \quad \mid \\
k & \quad æ & \quad n & \quad ã
\end{align*}
\]

The Problem:

- Our current rule won’t make representations like this
- *so, we have to fix our rule*…
- ... but it goes beyond ‘201’ to explain how.
One Last Mystery

Question:
Why don’t we syllabify “bologna” like this: *[bʌlənə]?
   ▶ This syllabification is totally consistent with English phonotactics.
      ▶ [bʌl] is a possible English syllable
      ▶ [own] is a possible English syllable
      ▶ [i] is a possible English syllable

The answer comes from an important feature of our rule...
Onsets Over Codas

A Prediction of Our Rule:
If phonotactics allow a consonant to be either an onset or a coda, then it will be an onset.

- \([b\lambda . l ow . ni], \ not \ *[b\lambda l . o w n . i]\)

Question: How, exactly, does our rule predict this?
Onsets Over Codas

A Prediction of Our Rule:
If phonotactics allow a consonant to be either an onset or a coda, then it will be an onset.

▶ \([b\text{ la} \ . \ l\text{o}w \ . \ ni], \ not \ *[b\text{ la} \ . \ o\text{wn} \ . \ i]\

Question: How, exactly, does our rule predict this?

Answer: Because our rule determines the onsets first.

▶ Step 2:
Gather up all the consonants that can form an onset, and label them as such.

▶ Step 3:
Of the remaining consonants, gather up all those that can form a coda, and label them as such.

Since our algorithm creates the onsets first...
...the codas are made out of only those consonants that couldn’t form onsets...
Illustrative Derivation

Let’s see in detail how this works, by using our algorithm to syllabify “bologna”
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Step 1:
Label every vowel as a nucleus.
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b l o w n i
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Step 1:
Label every vowel as a nucleus.

\[
\begin{align*}
N & \quad N & \quad N \\
\mid & \quad \mid & \quad \mid \\
b & \land & l & ow & n & i
\end{align*}
\]
Illustrative Derivation

Let’s see in detail how this works, by using our algorithm to syllabify “bologna”

Step 2:
To the extent allowed by the phonotactics, gather up all the phones preceding a nucleus, and label them as an onset.

```
N N N
|   |
|   |
  b l ow n i
```
Illustrative Derivation

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Step 2:
To the extent allowed by the phonotactics, gather up all the phones preceding a nucleus, and label them as an onset.

```
O N O N O N
\-----\-----\-----
b ʌ ow n i
```
Illustrative Derivation

Let’s see in detail how this works, by using our algorithm to syllabify “bologna”

Step 2:
To the extent allowed by the phonotactics, gather up all the phones preceding a nucleus, and label them as an onset.

```
O N O N O N
\___\___\___\___\___\___\___
b \land \ ow \ n \ i
```

- Notice that on this step, we are *forced* to group [l] and [n] as onsets
- The rule won’t let us “wait” to Step 3 to group them as codas
Illustrative Derivation

Let’s see in detail how this works, by using our algorithm to syllabify “bologna”

Step 3:
To the extent allowed by the phonotactics, gather up the remaining unlabeled phones following a nucleus, and label them as a coda.

```
O N O N
| | | | |
b l o w n i
```
Illustrative Derivation

Let’s see in detail how this works, by using our algorithm to syllabify “bologna”

Step 3:
To the extent allowed by the phonotactics, gather up the remaining unlabeled phones following a nucleus, and label them as a coda.

O N O N O N

| | | | | |

bʌlanɔni

▶ Nothing happens at this step, since there are no ‘remaining unlabeled phones’.
Illustrative Derivation

Let’s see in detail how this works, by using our algorithm to syllabify “bologna”

Step 4:
Group together the ‘O’s, ‘N’s and ‘C’s into syllables.

O N O N O N
|   |   |   |

b o w n i
Illustrative Derivation

Let’s see in detail how this works, by using our algorithm to syllabify “bologna”

Step 4:
Group together the ‘O’s, ‘N’s and ‘C’s into syllables.

\[
\begin{array}{cccc}
\sigma & \sigma & \sigma \\
O & N & O & N \\
\sigma & \sigma & \sigma & \sigma \\
\text{b} & \text{l} & \text{o} & \text{w} & \text{n} & \text{i}
\end{array}
\]
Illustrative Derivation

Let’s see in detail how this works, by using our algorithm to syllabify “bologna”

Step 4:  
Group together the ‘O’s, ‘N’s and ‘C’s into syllables.

\[ \begin{align*}
\sigma & \sigma & \sigma \\
\text{\underline{O}} & \text{\underline{N}} & \text{\underline{N}} & \text{\underline{O}} & \text{\underline{N}} \\
\text{\underline{b \ \underline{low \ n \ i}}} \\
\end{align*} \]
Summing Up:

- There is a general ‘preference’ for consonants to be onsets, rather than codas.

- That is, if the phonotactics allow a particular consonant to be either an onset or a coda, then it will be an onset.
  - \([b\lambda \ . \ low \ . \ ni], \text{ not } *[b\lambda I \ . \ own \ . \ i]\)

- Our syllabification algorithm captures this fact, by ordering the labeling of onsets before the codas.
  - The codas will only be made out of those consonants that couldn’t be onsets.