Today's objectives:
- **Diagnosing syllable structure**
- **Describing syllable "options"**
- **Rules to build syllables**

Background preparation:

- *PP: Tibetan*

0. Today's plan

- Analysis of Tibetan

  - Morpheme URs (review!)
  - Non-syllable-based analysis (mostly review)
  - Syllable-based analysis / comparison

- Syllable structure in our phonological model

  - Predictability and building syllables
  - Describing syllable-structure options
  - Proposing syllable-building rules

- Example: Cairene Arabic

1. Morpheme alternations in Tibetan

- Data set: [Tibetan](#)

  - Prep question #1: *What is the UR for the Tibetan morpheme that means 'nine'?*

  - Reminder — What is the recommended approach to a prep question like this?
  (Are you answering this single question in isolation?)

Group discussion

- Data set: Tibetan

    - What is the best UR proposal for 'nine' (and the other morphemes in the data set)? Why?

1. Morpheme alternations in Tibetan

Group discussion

- Data set: [Tibetan](#)

  - What is the best UR proposal for 'nine' (and the other morphemes in the data set)? Why?

Debriefing

  - What complication do you find when you try to segment **all** the morphemes in this data set?
  - What are the logically possible approaches?
  - Which approach is best, and why?

2. A segmental-rule analysis for Tibetan

Group discussion

- Data set: <u>Tibetan</u>

    - Prep question #2: *Write a rule for this alternation using our model before we introduced syllables*

2. A segmental-rule analysis for Tibetan

Group discussion

- Data set: Tibetan

  - Prep question #2: *Write a rule for this alternation using our model before we introduced syllables*

Debriefing

  - Try stating the rule in words before formalizing
  - Remember: Apply your rule to the data set to make sure its **predictions** match the data

3. A syllable-based analysis of Tibetan

Group discussion

- Data set: Tibetan

  - Prep question #3: *How could we approach this alternation using syllable structure? Which approach is preferable here?*

  - *Hint:* There are some similarities to epenthesis in Cairene Arabic

3. A syllable-based analysis of Tibetan

Group discussion

- Data set: [Tibetan](#)

  - Prep question #3: *How could we approach this alternation using syllable structure? Which approach is preferable here?*

Debriefing

  - How could we decide whether the segmental approach or the syllable approach is better?

- Syllable structure is **phonological** (not phonetic); we have to discover its properties based on **evidence**

- Two **languages may differ** in how they assign segments to syllables (example?)

But phonologists have also found:

- The way a **particular language** assigns segments to syllables is fully **predictable** (consistent)

- Should syllable structure be **stored in URs**, or assigned by the **phonological grammar**? Why?

- Our model of the phonological mental grammar currently includes…

  - A set of **features**

  - The concept of a **segment**, made up of features

  - Word boundary (#)

  - Phonological rules that manipulate features (called "**segmental rules**"): A → B / C __ D

  - The concept of a **syllable (σ)**, made up of segments

  - The syllable positions **nucleus**, **onset**, **coda**

  - We also need to add:
    A way of assigning segments to syllables

5. Rules for building syllable structure, part 1

Group discussion

- Improve our model:
  Propose a step-by-step process that creates syllables and assigns segments to them in Tibetan

  - Every nucleus gets a syllable / every syllable has a nucleus

  - Every syllable has at most one segment in the onset and at most one segment in the coda (extra consonants are "left over")

Debriefing

- Show how your proposed process would assign syllable structure to:

  / rgu+bd͡ʒu /   'ninety'

- How is a **…VCV…** sequence syllabified in…
    - English?

        [əp**ʰ**il]   'appeal'

    - Cairene Arabic?

        / Raːgil / → [**RAː**gil]   'man'

- How can our model account for this? What guarantees that we get the right structure here?

6. Syllable-structure options

- How is a **...VCCV...** sequence syllabified in...

  - English?

    [əpʰlɔd]   'applaud'

    [kʰəmpʰɛɹ]   'compare'

    [əspajɹ]   'aspire'

  - Cairene Arabic?

    / faSlu / →[**FAS**lu]   'his term'

  - Tibetan?

    / rgu+bd͡ʒu / → [gu**b**d͡ʒu]   'ninety'

6. Syllable-structure options

- Many aspects of syllable structure are either:

  - the same in all languages

  - chosen from a very small range of possibilities

- Examples of this that we have just seen:

  - **All languages:** A consonant right before a nucleus is syllabified as an *onset*

  - **Some languages:** *Onset clusters* are allowed (but not in all languages)

- How can our model account for this?

6. Syllable-structure options

- Many aspects of syllable structure are either:
  - the same in all languages
  - chosen from a very small range of possibilities

- This is unlike segmental rules, which seem to differ widely from language to language

- Therefore, our approach to modeling syllable-building rules will look a little different from our approach to modeling segmental rules:

  - **Universal** <u>rules</u> that **build** syllable structure
  - **Language-specific** <u>limits</u> on rule **application**

6. Syllable-structure options

- Our first step in analyzing syllable structure: **Observe** and **describe** what syllable-structure patterns are possible out there in the world

  - Handout - "[Syllable structure: Overview / Describing syllabification options](#)"

- **In practical terms**, when working with a data set:

  a) Use the available phonological **evidence** to determine how segments are assigned to syllables in the language

  b) Make **generalizations** about **legal** **nuclei**, **onsets**, or **codas** in the language

7. Rules for building syllable structure, part 2

- Our next step in analyzing syllable structure:

  What kind of **syllable-building rules** can we propose to enforce both universal patterns and options in individual languages?

  - Handout - "[Syllable-building rules](#)"

- **In practical terms**, when working with a data set:

  c) **Apply** the universal syllable-building **rules**, as restricted by the **limits** on legal onsets, nuclei, and codas in the specific language in question

- Data set - <u>Cairene Arabic</u>

  a) Use the available phonological **evidence** to determine how segments are assigned to syllables in the language
  - We did this in previous class discussions, using evidence from pharyngealization spread and vowel epenthesis (insertion)

  /faSlu/ → [**FAS**.lu]   /ʔul-t-l-u/ → [ʔul.t**i**.lu]

  'his term'   'I said to him'

  (*not* *[fa.SLU])   (*not* *[ʔult.lu], *[ʔul.tlu])

8. Example: Cairene Arabic

- Data set - Cairene Arabic

    b) Make **generalizations** about **legal nuclei**, **onsets**, or **codas** in the language

    - Use the **summary question list** at the end of the handout "Syllables: Overview / Describing syllabification options" and see how many questions you can answer

- Data set - <u>Cairene Arabic</u>

   b) Make **generalizations** about **legal** **nuclei**, **onsets**, or **codas** in the language

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Nuclei:

- Nucleus is universally mandatory
- Vowel as nucleus is universally allowed
- Are diphthongs allowed?
- Other natural classes/possible nuclei?

- Data set - <u>Cairene Arabic</u>

  b) Make **generalizations** about **legal nuclei**, **onsets**, or **codas** in the language

  > ***Onsets:***
  >
  > - Are onsetless syllables allowed?
  > - Are onset clusters allowed?
  >   - If yes, any restrictions?

- Data set - <u>Cairene Arabic</u>

    b) Make **generalizations** about **legal nuclei**, **onsets**, or **codas** in the language

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Codas:

- Are codas allowed?

    - If yes, any restrictions?

- Are coda clusters allowed?

    - If yes, any restrictions?

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8. Example: Cairene Arabic

- Data set - <u>Cairene Arabic</u>

  c) **Apply** the universal syllable-building **rules**, as restricted by the **limits** on legal onsets, nuclei, and codas in the specific language in question

    - Handout: "<u>Syllable-building rules</u>"
      - Nucleus Rule
      - Onset Rule
      - Coda Rule

- Proposal: Syllable-building rules tell the grammar how to **associate** segments with syllables

8. Example: Cairene Arabic

- Data set - <u>Cairene Arabic</u>

  c) **Apply** the universal syllable-building **rules**, as restricted by the **limits** on legal onsets, nuclei, and codas in the specific language in question

  - **Nucleus Rule**

    Every unsyllabified segment that is a legal nucleus (V') projects (=creates and associates to) a syllable

    $$\sigma$$
    $$\vdots$$
    $$V'$$

    - *Limit: Only vowels are legal nuclei*

- Data set - <u>Cairene Arabic</u>

  c) **Apply** the universal syllable-building **rules**, as restricted by the **limits** on legal onsets, nuclei, and codas in the specific language in question

  - **Nucleus Rule**
    Limit: Only vowels are legal nuclei

    /faSlu/   /ʔul-t-l-u/
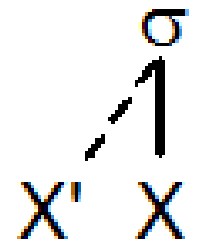

    [f a S l u]   [ʔ u l t l u]

- Data set - <u>Cairene Arabic</u>

  c) **Apply** the universal syllable-building **rules**, as restricted by the **limits** on legal onsets, nuclei, and codas in the specific language in question

  - **Nucleus Rule**

    Limit: Only vowels are legal nuclei

    /faSlu/   /ʔul-t-l-u/

    σ   σ   σ   σ
    | | | |
    [f **a** S l **u**]   [ʔ **u** l t l **u**]

- Data set - Cairene Arabic

  c) **Apply** the universal syllable-building **rules**, as restricted by the **limits** on legal onsets, nuclei, and codas in the specific language in question

    - **Onset Rule**

      Every unsyllabified segment (X') that immediately precedes a syllabified segment is added to that syllable, as long as a legal onset is produced

      • *Limit: Applies only once; no clusters*

- Data set - <u>Cairene Arabic</u>

    c) **Apply** the universal syllable-building **rules**, as restricted by the **limits** on legal onsets, nuclei, and codas in the specific language in question

    - **Onset Rule**

    Limit: Applies only once; no clusters

    /faSlu/   /ʔul-t-l-u/

    σ   σ   σ   σ

    [**f** a S **l** u]   [**ʔ** u l t **l** u]

- Data set - <u>Cairene Arabic</u>

  c) **Apply** the universal syllable-building **rules**, as restricted by the **limits** on legal onsets, nuclei, and codas in the specific language in question

  - **Coda Rule**

    Every unsyllabified segment (X') that immediately follows a syllabfied segment is added to that syllable, as long as a legal coda is produced

    σ

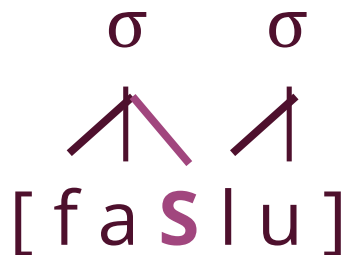   X X'

    - *Limit: Applies, but only once; no legal clusters*

- Data set - Cairene Arabic

    c) **Apply** the universal syllable-building **rules**, as restricted by the **limits** on legal onsets, nuclei, and codas in the specific language in question
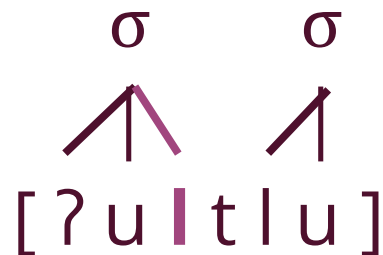
    - **Coda Rule**

        Limit: Applies, but only once; no legal clusters
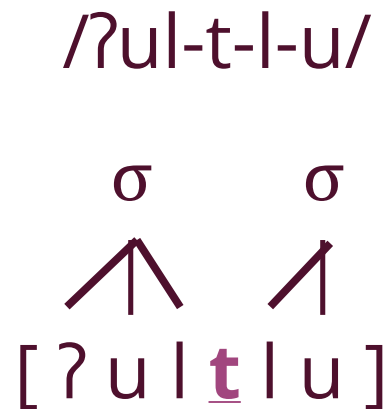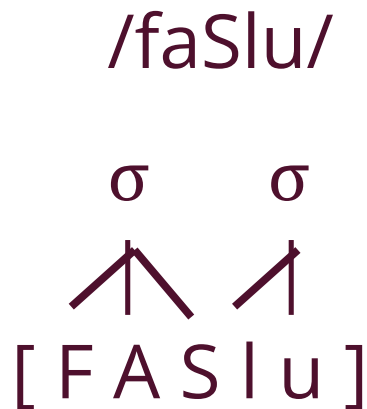
        /faSlu/ /ʔul-t-l-u/

        σ   σ   σ   σ

        [f a **S** l u]   [ʔ u **l** t l u]

8. Example: Cairene Arabic

- Data set - <u>Cairene Arabic</u>

  Results of applying syllable-building rules:

  - Pharyngealization in [**FAS**.lu] correctly predicted

  - Remaining unsyllabified consonant in [ʔul.**{t}**.lu] correctly predicts epenthesis

/faSlu/   /ʔul-t-l-u/

σ   σ   σ   σ

[F A S l u]   [ʔ u l **t** l u]

9. Next time

- Prep questions:
  Practice identifying syllable-structure options

- In class:
  Data set - Korean loanwords