ROOT PHONOTACTICS

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Roots IV

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Phonology-morphology

• Morphophonology
  • Phonological processes that reflect morphological structure
  • Often not fully regular
    • morpheme specific idiosyncracies
    • unrelated to general phonological system
    • arbitrary from the perspective of phonological theory
  • ‘Allomorphy’ usually doesn’t include patterns that
    • are derivable from general phonotactics
    • reflect language-wide allophony

• Phonological generalizations may be over morphological domains
  • Many phonotactic generalizations hold of roots or morphemes, not words
Phonological domains

- Phonological generalizations may be stated over roots
  - Quechua dorsal cooccurrence restriction
    - Root internally
      \[\text{k’anka} \text{ ‘rooster’ } \text{q’anqa} \text{ ‘ravine’ } \text{*k’anqa *q’anka}\]
    - Across morpheme boundaries, within a phonological word
      \[\text{mask’a-rqa} \text{ ‘he searched’ } \text{maqa-nki} \text{ ‘you fight’}\]
  - ‘Roots’ aren’t necessarily phonologically defined
    - Not always a standalone word, or a surface prosodic constituent
      \[
      /\text{k’anka}/ \text{ ‘rooster’ } \text{\textit{k’anka} k’ankan k’ankanwan} \\
      /\text{q’anqa}/ \text{ ‘ravine’ } \text{\textit{q’anqa q’anqa\textit{api q’anqa}man}} \\
      /\text{mask’a}/ \text{ ‘search’ } \text{\textit{mask’ani mask’a\textit{farqa mask’aq}} } \\
      /\text{maqa}/ \text{ ‘fight’ } \text{\textit{maqajta maqa\textit{\textit{antaq maqanqa}}} }
      \]
Questions about roots

• Part 1
  • Can we always distinguish root level generalizations from word level generalizations?
  • How does a learner figure out that a root is a relevant phonological domain?

• Part 2
  • Root templates
Roots vs. words

- Some restrictions are clear as to whether they are ‘root’ or ‘word’ level

- Canonical root level generalization: Quechua dorsal cooccurrence
  \[ \text{k’anka} \quad \text{‘rooster’} \quad \text{qhanqa} \quad \text{‘ravine’} \]
  \[ \text{*k’anqa} \quad \text{*qhanka} \]
  \[ \text{mask’a-rqa} \quad \text{‘he searched’} \quad \text{maqa-nki} \quad \text{‘you fight’} \]

- Canonical word level generalization: Quechua height allophony
  \[ \text{miña} \quad \text{‘wool’} \quad \text{perqa} \quad \text{‘wall’} \quad \text{*pirqa} \quad \text{*meña} \]
  \[ \text{hap’i-ni} \quad \text{‘I grab’} \quad \text{hap’e-rqa} \quad \text{‘he grabbed’} \]
  \[ \text{word is phonologically defined: stress assignment, prosodic organization} \]
  \[ \text{in Quechua, fixed penultimate stress} \]
Roots vs. words

- Other restrictions are ambiguous as to root vs. word level
  - Quechua laryngeal cooccurrence restrictions
    - No two ejectives within a root; \([p\ t\ t\ j\ k\ q]\) vs. \([p'\ t'\ t'\ j'\ k'\ q']\)
    - Ejectives only occur in roots, so holds of words as well
      - \(k'\)utu ‘to cut’ \(rit'i\) ‘snow’ *\(k'ut'u\)
      - \(k'\)utu-n\(k\)u ‘they chop’
      - \(rit'i-t'a\) ‘snow, acc’
    - No suffixes like *[-nk’u], *[-t’a]
      - *\(k'\)utu-n\(k\)’u
      - *\(rit'i-t'a\)
  - Ejectives do cooccur in compounds and phrases
    - \(mis\)k’i \(t’\)anta ‘tasty bread’
    - \(his\)q’on \(p’\)es\(q\)o ‘nine birds’
Roots vs. words

• Cooccurrence restriction on two ejectives could be stated over roots, or words
• Could also be stated over adjacent syllables
  • Roots in Quechua are almost all disyllabic $c_1v(C)c_2v$
    • language is strictly suffixing
  • 98% of ejectives are in the first two syllables
  • Forms like *[k’ap’u] are conspicuously absent
    • 0 attested, 44 expected (out of ~2000)
  • Forms like *[k’amip’u] less so
    • 0 attested, 1 expected (out of ~150)
Roots vs. words

- Cooccurrence restriction on two ejectives could be stated over roots, or words
- Could also be stated over adjacent syllables
  - Forms like [k’ap’u] are conspicuously absent
  - Forms like [k’amip’u] less so
- Compare speakers’ treatment of nonce words
  - Two ejectives: [k’ap’u], [k’amip’u]
  - Controls: [hap’u], [hamip’u]
  - Repetition task: ‘listen and repeat what you hear as precisely as possible’
  - 19 speakers, n=15 per type
Results - cooccurrence

control > cooccurrence: hap’u > *k’ap’u  hamip’u > *k’amip’u
Results - cooccurrence

No interaction: effect size is the same for disyllables and trisyllables
error rate on *k’ap’u = *k’amip’u
Roots vs. words

- Cooccurrence restriction isn’t stated over adjacent syllables
- Stated over a larger domain, either the root or word
  - Option 1: *k’amip’a interpreted as a root, –p’a not a possible suffix
    - Still compatible with word level generalization
  - Option 2: *k’ami-p’a is interpreted as bimorphemic
    - Restriction holds of the stress domain, i.e., the phonological word
- Distinguish root v. word: force bimorphemic interpretation
  - teach novel suffix, [-p’a]
  - compare k’amip’a to k’ami-p’a
Questions about roots

• Part 1
  • Can we always distinguish root level generalizations from word level generalizations?
    • No, data is not deterministic
    • probe speakers’ interpretations
  • How does a learner figure out that a root is a relevant phonological domain?

• Part 2
  • Root templates
Questions about roots

• Part 1
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Roots/words or syllables

• ‘Initial 2 syllables’ is largely sufficient domain for describing laryngeal phonotactics
  • Yet, cooccurrence restriction seems to be at the root/word level
    • Not all phonotactics show this pattern

• Ordering restriction
  • No ejectives in plain stop initial roots
    *rit’i ‘snow’ *kit’i
    *misk’i ‘sweet’ *pisk’i
    *hutʃ’uj ‘small’ *tutʃ’uj
  • Repetition task: *[kap’u] vs. *[kamip’u]
Results - ordering

control > ordering: hap’u > *kap’u  hamip’u > *kamip’u
Results - ordering

Interaction: effect size is larger disyllables than trisyllables error rate on *kap’u > *kamip’u
Roots/words or syllables

- Ordering restriction is sensitive to phonetic distance between interacting segments
  - Not obviously a root or word level restriction
  - Different from cooccurrence restriction

- Learners have a choice
  - State restrictions over linear string of phonological/phonetic units
    - ordering restriction: distance between k...p’ matters
  - State restrictions over higher level domain
    - cooccurrence restriction: distance between k’...p’ doesn't matter
Roots/words or syllables

- Cooccurrence (*k’-p’) vs. ordering (*k-p’)
  - Typological differences
    - Obligatory Contour Principle (OCP) – cross-linguistically common
      - Semitic: restriction on pairs of homorganic labials and dorsals, identical consonants
      - Muna: no pairs of prenasals
      - Mayan, Aymara, Hausa, Old Georgian: no pairs of ejectives
    - Ordering restriction – typologically rare
Roots/words or syllables

- Cooccurrence (*k’-p’) vs. ordering (*k-p’)
  - Typological differences
  - Formal differences
    - Cooccurrence restriction is ‘algebraic’ (Berent et al. 2012; Marcus 2001)
      - *[+ejective][+ejective] = *[αF][αF] or *[αF][X],
    - Less obvious how to state the ordering restriction
      - Align [+ejective] to leftmost stop
      - *[plain stop][ejective]
      - single direction harmony
Roots/words or syllables

• Cooccurrence (*k’-p’) vs. ordering (*k-p’)
  • Typological differences
  • Formal differences
  • Other behavioral differences
    • Cooccurrence restriction is generally stronger than ordering restriction
      • Perception tasks: ordering violations (*kap’i) don’t always differ from controls

• Cooccurrence restriction is
  • learned over a higher level domain
  • more typologically common
  • formally simpler(?)
  • observable on a wider range of tasks
    → What’s the link?
Questions about roots

• Part 1
  • Can we always distinguish root level generalizations from word level generalizations?
    • No, data is not deterministic
    • probe speakers’ interpretations
  • How does a learner figure out that a root is a relevant phonological domain?
    • Phonological interpretation is also possible

• Part 2
  • Root templates
Questions about roots

• Part 1
  • Can we always distinguish root level generalizations from word level generalizations?
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• Part 2
  • Root templates
Semitic root templates

• Roots are typically CCC
• Root consonants associate to a template
  • The template itself (the pattern) and the vowels carry semantic information: they are morphemes

  - bijel ‘he cooked’ CiCeC
  - hivfil ‘it ripened’ hi-CCiC
  - bufal ‘he was cooked’ CuCaC
  - jevafel ‘he will cook’ je-CaCeC

• Clearest case for templates
  • Templates are needed (for linguists and babies) to analyze the morphology/phonology of the language
Quechua root templates

• Roots in Quechua have a fixed shape
  • Almost all disyllabic: CVCV or CVCCV
    wasi ‘house’ riku ‘to see’
    waʎpa ‘chicken’ mask’a ‘to search’

• No morphological status for templates
  • no templatic alternations
  • no meaning associated with being disyllabic

• Simple syllable structure: CV or CVC

• Phonotactic generalizations about ‘roots’
  • disyllabic, not smaller or larger
  • C final roots are rare, *waʎpan
Chol root templates

• Roots in Chol (Mayan) are predominately CVC
  • no general preference for CVC syllable structure

/mek/ ‘hug’ amek’ejoŋ kmek’ejetj amek’e
/tʃoj/ ‘sell’ ktʃojə no itʃojə
/waŋ/ ‘tortilla’ wah awaŋ iwaŋ
/wiŋ/ ‘sleep’ wiŋjoŋ wiŋjetŋ

• CVC is a good candidate for a generalization about URs
Chol root templates

• Roots in Chol (Mayan) are predominately CVC
  • no general preference for CVC syllable structure

/mek’/ ‘hug’ a-mek’-e-j-ơŋ k-mek’-e-j-etj a-mek’-e
/tʃoŋ/ ‘sell’ k-tʃoŋ-o i-tʃoŋ-o
/wah/ ‘tortilla’ wah a-wah i-wah
/wɨj/ ‘sleep’ wɨj-i-j-ơŋ wɨj-i-j-etɨ

• CVC is typically analyzed as a generalization about URs
• But it’s also a generalization about surface roots
• Question: is the ‘template’ phonological? or morphosyntactic?
Chol root templates

- Exceptions to CVC UR template: /VC/ roots (Coon 2015)
- /VC/ roots appear on the surface as VC or ?VC
  - VC if preceded by a consonant final prefix
  - ?VC if word initial
    - [ʔab] ‘hammock’ [kab] ‘my hammock’
- Distribution of glottal stop not derivable from word level phonology
  - Cʔ is a licit cluster: [ʃʔiʃik] ‘woman’
    - no motivation for deletion in [k-ʔab] *[k-ʔab]
  - #V is a licit structure: [a-mek’-e] *[ʔa-mek’-e] ‘you hugged him’
    - no motivation for insertion in [ʔab] *[ab]
  → alternation is something about the root (template)
Chol root templates

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  • ?VC if word initial
    [ʔab] ‘hammock’  [kab] ‘my hammock’
• Distribution of glottal stop not derivable from word level phonology
• CVC is a phonological generalization – but over what?
  • Epenthetic glottal stop doesn’t belong to a morpheme
  • Prefix is a distinct morpheme
  • The root in [ʔ-ab] and [k-ab] is VC
Chol root templates

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    - [ʔab] ‘hammock’  [kab] ‘my hammock’
  - Distribution of glottal stop not derivable from word level phonology
- CVC is a phonological generalization – but over what?
  - ‘the syllable that contains the root must have an onset’
    - [jilijetɨ]  [j-il-i-j-etɨ]  [ji.li.jetɨ] ‘she saw you’
    - [ʔak’ɛntɨjoŋ]  [ʔ-ak’-ɛn-ˈti]-j-oŋ]  [ʔa.k’ɛn.ˈti.joŋ] ‘it was given’
  - not ‘the syllable that contains the root must be CVC’
**Chol root templates**

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    - [ʔab] ‘hammock’ [kab] ‘my hammock’
- Distribution of glottal stop not derivable from word level phonology

- CVC is a phonological generalization – but over what?
  - ‘the syllable that contains the root must have an onset’
  - What’s the connection to the CVC template?
    - Maybe none?
Chol root templates

- **Morphosyntactic analysis** (Coon 2015)
  - CVC template is a morpheme
  - First phase of spellout includes root, template, agreement prefixes
    - Template is filled from the root out
    - Prefixes may fill template if the root can’t, e.g., [kab]
    - Epenthetic material may fill template if the root can’t, e.g., [ʔab]

\[
\begin{align*}
  [\text{kab}] & \quad \text{‘my hammock’} \quad \{k, \text{ab, CVC}\} \quad \rightarrow \quad [\text{k}] \quad \text{C V C} \\
  [\text{ʔab}] & \quad \text{‘hammock’} \quad \{\text{ab, CVC}\} \quad \rightarrow \quad [\text{ʔ}] \quad \text{C V C}
\end{align*}
\]
Chol root templates

- Phonotactic generalizations
  - roots are CVC or VC
  - syllables that contain the root have an onset
    - accounts for distribution of glottal stop
- Morphology: CVC is a morpheme
  - Does this subsume phonological generalizations? or is it orthogonal?
    - can account for distribution of glottal stop
    - why are roots so consistent in shape? (also a question for Semitic)
- How is Morpheme $\leftrightarrow$ CVC learned?
  - Coon (2015): it’s Voice
    - active-passive alternation: CVC - CV$^h$C
      - [mek’] ‘hug’
      - [me$^h$k’] ‘be hugged’
      - [tʃ’il] ‘fry’
      - [tʃ’i$^h$l] ‘be fried’