Sonority is epiphenomenal

Phonotactics in the Onset Prominence framework

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CUNY Phonology Forum conference on Sonority
January 14, 2016
Outline

• Preliminaries
  – “Who are your influences?”

• The OP representational environment
  – What is sonority and where does it come from?

• As many empirical patterns as we have time for
  – TR-type onsets and *tl restrictions, coda stop release
    (English and Polish), consonant syllabicity (Tashlhiyt Berber),
    trapped sonorants (Polish) . . . . .
Who are your influences?

• Those who focus on phonological representation
  – “If the representations are right . . . .” (McCarthy 1988)

• Anyone who has pursued the idea that manner of articulation is a prosodic feature
  – Steriade (1993); Golston & van der Hulst (1999); Pöchtrager (2006)

• Those who claim that ambiguities in the acoustic signal play a role in phonological evolution
Manner as a structural property

• Aperture Theory (Steriade 1993)
  – Separate root nodes for stop closure ($A_0$), frication ($A_f$), stop release ($A_{max}$)

• Golston & van der Hulst (1999)
  – ‘Stricture is structure’, sonority sequencing encoded in syllabic constituents

• Pöchtrager (2006)
  – No association lines between prosody and ‘segments’; manner is structure, structure is manner; ‘Melody’ is place (and perhaps laryngeal) specification
Listener-induced sound change (Ohala 1981)

- The acoustic signal is ambiguous with regard to phonological representation
  - Listeners parse these ambiguities in various ways to drive phonological evolution (Blevins 2004)
- The evolutionary approach may benefit by paying more attention to synchronic representation
  - If the signal is ambiguous, shouldn’t phonological representations be ambiguous as well?
  - Representational ambiguities create divergent parses to drive the evolution of phonotactic patterns
Preview of OP representations

• Both ‘syllables’ and ‘segments’ are emergent entities

• However, they both emerge from the same primitive representational hierarchy
  – They are built from the same materials
  – No need for any constraints on the segmental content of syllables; this is read directly off the representations

• Structures that diverge from the primitive motivate representational adjustments
  – Various types of phonological processes act as diagnostics for ‘adjusted’ structures
The OP hierarchy (Schwartz 2013)

• Abstracted away from stop-vowel CV sequence
• Each layer derived from identifiable acoustic landmarks (cf. Stevens 2002) in a CV unit
• One-to-one relationship between hierarchy and acoustic landmarks, but NOT between the hierarchy and a segmental string, which is derivative
Deriving segments and putting them together

- Individual segmental structures are extracted from the OP hierarchy, encode manner and sonority (left); segmental symbols are shorthand for place & (in most cases) laryngeal specifications.

- Most basic phonotactic mechanism is right-to-left absorption of lower-level vowels into higher-level consonants (right).
  - A single well-formedness condition, MINIMALCONSTITUENT (MC), motivates absorption
  - MC: A well-formed prosodic constituent contains active (binary) nodes containing medodic specification both above and below the VT level.

```plaintext
Closure Closure Closure Closure Closure Closure
/p/ Noise /m/ Noise Noise Noise Noise Noise
VO VO /f/ VO VO VO
VT VT VT /w/ VT VT

C C C
/t/ N N /t/
VO VO VO
VT VT VT
/a/
/u/
```
Ambiguities in the system

- Languages are forced into choices with regard to certain aspects of the OP representational system
  - The VO node may be present in the representation of consonants (left), or vowels (right)
  - Unary nodes create mismatches between ‘segments’ and structure; a stop-vowel sequence is structurally distinct from a liquid-vowel sequence
  - In other words, we can’t talk about a universal sonority scale; languages make their own
Rising sonority in onsets - Absorption

• Below we see English *cry*
  – /kr/ contained in one constituent
  – *ComplexOnset: maximum of one segment’s melody at VO level or above; violated in cry, but will be relevant later

• Not all ‘rising sonority’ onsets are absorbed
  – It will depend on the representation of the sonorant...

```
\[
\begin{array}{cccc}
\text{Closure} & C & C & \text{Closure} \\
& /k/ & N & \\
& & /r/ & \\
& VO & & VO \\
& & VT & \\
& & /ar/ & \\
\end{array}
\]
```
Sonority and sonorant consonants

• Sonorant consonants vary across languages, both in their phonetic properties and their phonological behavior

• OP structures let us represent this, with important implications for the representation of consonant clusters

• It all starts with how languages define the consonant-vowel distinction
Sonorants and the C-V distinction

- Languages have two options in their cutoff point between consonants and vowels (left)

- Liquids/Approximants are defined by the VO node
  - Depending on the C-V cutoff, they may be promoted to the Closure level to reinforce their status as consonants (right)
    - Promotion is a strengthening mechanism
    - Perhaps some sort of restriction against unary nodes at the Closure level
  - This may or may not be accompanied by phonetic obstruentization
  - Promoted sonorants are not absorbable (neither are nasals)
All TRs are not created equal

• When rising sonority clusters are absorbed, we should expect greater phonetic cohesion between the two consonants
• That is because they are contained in a single Closure constituent
• This is what we find in English stop-approximant clusters
  – devoicing in *clear* and *quite*; affrication in *try*; j-coalescence in *tune* (in British English)
  – Complex articulatory organization of onset clusters (e.g. Marin & Pouplier 2010)
All TRs are not created equal

• When rising sonority clusters are not absorbed, we should expect less phonetic cohesion between the two consonants
• That is because they are not contained in a single Closure constituent
• This is what we find in Polish TR clusters
  – Evidence for simplex articulatory organization of onset clusters
    • Intrusive vocoids, lack of devoicing
  – Clusters behave as if they were made up of two units
    • CV words in Polish are sub-minimal, CCV words are not
Polish /#gr/ vs. Eng. /#kr/
*tl onsets (amply vs. antler; Polish tle)

- /t/ and /l/ are both cued by a high F3 transition (e.g. Stevens 1998)
- An absorbed /tl/ presents challenges for the parse of the formant cue on VO
- In languages where /tl/ occurs, it is not due to absorption, and should be produced asynchronously

```
*tl/
  N
  VO
  t-[hiF3]; l-[HiF3]

Polish tle
  C
  VO (C)
  t
  N
  l
  N
  VO
  VO
  e
```
Interim summary

• So far we’ve seen two mechanisms
  – *Absorption* creates CVs and TR clusters, joining segments together
  – *Promotion* strengthens sonorants and prevents TR absorption

• What about consonants that are final or fall before obstruents?
Submersion

• Consider English *quick*
• the final /k/ cannot stand by itself, and may be *submerged* underneath the preceding vowel
• If a language does not allow submersion, the /k/ must be joined at higher level of structure (or just hangs there)
• The representational system allows for two types of ‘codas’
Two types of codas and stop release

- Polish *klik* ‘click’ vs. English *click*
- The Polish final /k/ is not submerged (left) and must be released; the English final /k/ is submerged and may be left unreleased
- Stop release may be suppressed in English, since the configuration produces more robust VC transitions
  - With submerged codas, sufficient discriminability (Lindblom 1990) does not require release bursts
A quick digression

• Submersion creates ‘ambisyllabic’ configuration (Kahn 1976): single OP constituent contains two ‘syllables’
  – Lenition possible in submerged structures (structures of *pity*)
  – May occur at boundaries in English

• The ‘syllable’ is epiphenomenal, deriving from an iteration of an active VT node
  – We’ve already seen a case in which a single syllable spans two constituents (Polish *gra* ‘game’ with non-absorbed cluster)
Submersion and consonant ‘syllabicity’

• Since ‘syllables’ and ‘consonants’ derive from the same hierarchy, explaining the origins of syllabic consonants is straightforward

• A ‘syllabic’ consonant has undergone submersion and lies under the VT level
  – There is no such thing as a ‘nucleus’
  – Any consonant may be syllabic, though we should expect obstruents, which are larger structures to be less susceptible to submersion
  – Tashlhiyt Berber (TB) shows us that there are two types of syllabic consonant
Submersion and consonant ‘syllabicity’

- Consider a TRV sequence (left), in which the vowel has been reduced, losing its place specification.
- The /r/ should be absorbed; to satisfy *ComplexOnset, the /r/ is submerged (right); syllabic as repair!

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/submersion diagram/
```

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<th>C</th>
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</tr>
</thead>
<tbody>
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<td>N</td>
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<td>N</td>
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</table>
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```plaintext
/submerged diagram/
```

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</tbody>
</table>
+---+ +---+ +---+ +---+ +---+
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Why is Tashlhiyt Berber unusual?

• Individual segmental representations extracted from entire CV hierarchy, including the VT level
• Left, a stop structure in most languages; Right: a stop structure in Tashlhiyt, which can be a light syllable on its own
Two types of syllabic consonant

• *ts.ti* (Ridouane 2008): ‘complex onset’ submersion in absorbed sequences
  – ‘nucleus’ housed under left branch of VT node
Two types of syllabic consonant

- *if.kd* (Ridouane 2008): coda-type submersion makes falling sonority syllables
  - ‘nucleus’ housed under right branch of VT node
Polish trapped sonorants

• The Common Slavic word for ‘larynx’ = grũ.ta.ɲǐ
• The short (yer) vowels were lost . . .
• In Czech, the /r/ became syllabic, hr.tan
• In Polish, we get krtan, a one-syllable word with an onset /krt/
• Interestingly, this type of cluster in Polish has been analysed as a ‘double onset’ (Kuryłłowicz 1952), each of which obeys sonority sequencing
Evolution of the trapped sonorant

• The /r/ from the CS form had been absorbed into the stop
• Then the yer vowels dropped
• Later, sonorants were promoted in Polish
• In words like *krtan* the /r/ was trapped inside the /k/, and couldn’t be promoted
Representing *krtan* 

- ‘Sonority sequencing’ observed within individual C constituents
- Polish has no formal restrictions on the number of consecutive C constituents containing consonants
- Gaps in cluster inventories are merely the result of the evolution of the Polish lexicon
Interim conclusions

• OP captures some sonority-based generalizations, without giving it formal phonological status
  – Derived from independently motivated manner-based specification

• Greater empirical insight than the traditional sonority scale
  – Phonetic realization of TR-type clusters
  – Prohibitions on *tl onsets
  – Coda stop release
  – Consonant syllabicilty and Polish trapped sonorants

• The patterns shown so far have been described in published work, so you can check them out . . . (links on handout)

• Next on the agenda are . . .
  – Coda restrictions and syllable contact
Coda restrictions

- Many authors have claimed that there is a preference for codas of high sonority.
- Since OP allows for both submerged and non-submerged codas, this claim must be considered with regard to both types.
- We must determine the coda type before talking about restrictions.
- Diagnostics include lenition, weight effects.
Coda restrictions

• In languages with submerged codas, restrictions on the size or melodic content of the submerged structure
  – Smaller structures should be more conducive to submersion
  – Submerged structure without melodic features be preferred

• Obstruents usually have larger structures, but this depends on the status of the VO node

• When consonants lack VO . . .
  – An unreleased stop is just a single Closure node
  – A fricative is just a single Noise node
  – All sonorants are just a single node (Closure or VO)

• Coronals or dorsals may be unspecified, but this depends on the language

• If a language does not allow submersion, we shouldn’t expect any restrictions on the type of segments that may appear as codas
Syllable contact

• Syllable contact law: requirement that codas be more sonorous than the following onset

• Syllable ‘contact’ is the wrong label; we should be talking about syllable ‘separation’
  – The real focus is what makes a good boundary

• The goodness of a boundary may be read directly off of OP structures
  – A good boundary is when the second segment is higher in the hierarchy than the first
  – Again this depends on the status of the coda
SC case studies (see e.g. Gouskova 2004)

• Onset strengthening when coda is not ‘sonorous’ enough (Kazakh/Kyrgyz)
  – But in Kyrgyz (Zhu, up next): /n/ strengthens but /m/ does not; /n/ strengthens after /j/ but /l/ does not
  – If laterality is a ‘place’ feature in Kyrgyz, /l/ (as well as /m/) can be stronger than unspecified /n/

\[
\begin{array}{ccc}
  \text{C /m/} & \text{C /l/} & \text{C /n/} \\
  \text{[lab]} & \text{[lat]} & \\
\end{array}
\]

• What makes a ‘place’ feature?
  – Spectral modulations to formant structure (Traunmüller 1994)
  – Laterals have more consistent spectral effects than /n/ (raised F3)
SC case studies (see e.g. Gouskova 2004)

• Medial cluster syllabification depending on sonority differences (Faroese/Icelandic)
  – Fortis TR clusters are onsets, lenis DR clusters are hetero-syllabic
  – Lenis unspecified for laryngeal features, better candidate for submersion

```
       C
     /   \
    N     N
   /     /
  VO    VT
 /     /
VT      VT
      /     /
     C /d/  C /t/
      /     /
     *[sg]
```
Thanks for listening 😊

See handout for conclusions and key references