Syllables and stress and Optimality Theory


Crosslinguistic variation in syllable types

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<th>V</th>
<th>CV</th>
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<th>VC</th>
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Vowel length possibilities:

<table>
<thead>
<tr>
<th></th>
<th>V</th>
<th>V:</th>
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<th>V:::</th>
<th>V₁V₂</th>
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‘it rains so hard that it is dark or hard to see’ (Passamaquoddy)
A scale of sonority… Syllables are built with sonority peaks, onsets, and codas.

(1)

<table>
<thead>
<tr>
<th>Segment</th>
<th>Complex Nucleus</th>
<th>Oblig. Onset</th>
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<th>Coda</th>
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Some parameters in a syllable theory:

So, a kid learning his/her language would need to set these parameters…
Syllabic segments allowed in a language.

<table>
<thead>
<tr>
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<tr>
<td></td>
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<tr>
<td>Imdlawn Tashlhiyt Berber</td>
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Grammar is a set of ordered constraints…

(2) **NO-EPENTHESIS**      *Faithfulness*
    **NO-DELETION**

(3) **ONSET**: *[.. V…*     *Markedness*
    **NO-CODA**: *…V]*

Underlying representation: /kæt/

“kæt” violates **NO-CODA**, satisfies **ONSET**, satisfies **NO-Ep** and **NO-DEL**.
“kæ” satisfies **NO-CODA**, **ONSET**, and **NO-Ep**, but **violates NO-DEL**.
“kætø” satisfies **NO-CODA**, **ONSET**, and **NO-DEL**, but **violates NO-Ep**.

The idea of Optimality Theory: Which one you say is a function of which constraints are more *important* in your language.

<table>
<thead>
<tr>
<th></th>
<th>NO-CODA</th>
<th>ONSET</th>
<th>NO-DEL</th>
<th>NO-Ep</th>
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<td>*</td>
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<tr>
<td>kætø</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>*</td>
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</table>
Re-ranking these constraints (24 possibilities) only yields 7 patterns:

CV languages:
- `ONSET, NO-CODA, NO-DEL >> NO-Ep` (better to add)
- `ONSET, NO-CODA, NO-Ep > NO-DEL` (better to delete)

(C)V languages:
- `NO-CODA, NO-DEL >> NO-Ep >> ONSET` (better to add for coda, not for onset)
- `NO-CODA, NO-Ep >> NO-DEL >> ONSET` (better to delete for coda, not onset)

CV(C) languages:
- `ONSET, NO-DEL >> NO-Ep >> NO-CODA` (better to add for onset, not coda)
- `ONSET, NO-Ep >> NO-DEL >> NO-CODA` (better to delete for onset, not coda)

(C)V(C) languages:
- `NO-DEL, NO-Ep >> NO-CODA, ONSET` (reproduce underlying form faithfully)

No re-ordering of the constraints would yield:
- V only
- V(C) only
- CVC only
- VC only

View of universals from the perspective of OT:

(4) Constraints are universal (all languages have them — this is “UG”)

Grammars differ only in the ranking of the constraints across languages.
The child’s task during acquisition is to acquire the rankings.

What’s the difference between an “onset” parameter and a high-ranked constraint? Why would we prefer one theory over another?
One argument for OT:
- Constraints are always active—never completely turned off.
- Parameters are either on or off—once off, we don’t expect them to exhibit any influence.

### Word stress and Optimality Theory


(5) **Alabama**
   (Ala)(bama)
   *

(6) x
   x x
   x x x x
   Alabama

(7) word
    w
    s
    s w s w
    A la bam a

Word stress—crosslinguistic preferences

(8) **Stressability**: Words have to be big enough to carry a stress.

*Minimal word requirement.*

(9) a. *i*kyʌs /k-ʌ-s/ ‘I put it’ *Mohawk*
b. *i*ktats /k-tat-s/ ‘I offer it’
c. *i*-keks /k-ek-s/ ‘I eat’
d. *i*kyَا ks /k-ya?k-s/ ‘I cut it’

(10) a. s?aal /s?al/ ‘ask (masc. sg.)’ *Levantine Arabic*
b. idrus /drus/ ‘study’ *Iraqi Arabic*
Demarcation: Words should have stress near the edge.

Crosslinguistically popular: Initial, Penultimate, Final. (Primary stress)

(12) a. pũliŋkalatsu ‘we (sat) on the hill’ Pintupi
    b. yapurukitanēhāse ‘verily to climb’ Warao
    c. akonetepāl ‘times’ Weri

Rhythm: Bounded. Avoiding lapses and clashes (alternating stress)

(14) tiḷirijulampatu ‘the fire for our benefit flared up.’ Pintupi
    (tiḷ).i.(riŋ.ju).tamu.tu

(15) a. yapurukitanēhase Warao
    (yà.pu).(rù.ki).(tâ.ne).(há.se) ‘verily to climb’
    b. enahoroahakutai ‘the one who caused him to eat’
    e.(nà.ho).(rò.a).( hà.ku).(tá.i)

Hungarian: main stress initial, secondary stress on odd-numbered syllables.

(16) a. bόldog ‘happy’
    b. bόldogsà:ɡ ‘happiness’
    c. bόldogtālan ‘unhappy’
    d. bόldogtālansà:ɡ ‘unhappiness’
    e. légešlēgmegēn genteštēltenēbkeknē ‘to the most irreconcilable ones’

(17) a. õ σ
d. õ σ õ σ
e. õ õ σ õ σ õ σ õ σ õ σ õ σ õ σ õ σ

Pintupi: like Hungarian, except no stress on the final syllable

(18) a. pāŋa ‘earth’
    b. tjūta ‘many’
    c. mālawāna ‘through from behind’
    d. pũliŋkālatju ‘we (sat) on the hill’
    e. tāmulimpatůŋku ‘our relation’
    f. tiḷirijulampatu ‘the fire for our benefit flared up’
    g. kūranjūlulimpatůŋa ‘the first one (who is) our relation’
(19) a. \( \ddot{\text{o}} \sigma \)
b. \( \ddot{\text{o}} \sigma \sigma \)
c. \( \ddot{\text{o}} \sigma \ddot{\text{o}} \sigma \)
d. \( \ddot{\text{o}} \sigma \ddot{\text{o}} \sigma \sigma \)
e. \( \ddot{\text{o}} \sigma \ddot{\text{o}} \sigma \ddot{\text{o}} \sigma \)
f. \( \ddot{\text{o}} \sigma \ddot{\text{o}} \sigma \ddot{\text{o}} \sigma \sigma \)
g. \( \ddot{\text{o}} \sigma \ddot{\text{o}} \sigma \ddot{\text{o}} \sigma \ddot{\text{o}} \sigma \)

(20) **Foot dominance:** The side of the foot where the *head* is (the strong element). Left-dominant feet are *trochees* (X.), bounded right-headed feet are *iambs* (\( . \) X).

A way to think about this is as building *trochees* or *iambs* from one side or the other. So, for Hungarian,

(21) légešlègmegêngestèlhetèlennèbbknèk ‘to the most irreconcilable ones’
    \( (\ddot{\text{o}} \sigma) \)
    \( (\ddot{\text{o}} \sigma) (\ddot{\text{o}} \sigma) \)
    \( (\ddot{\text{o}} \sigma) (\ddot{\text{o}} \sigma) (\ddot{\text{o}} \sigma) \)
    \( \ldots \)
    \( (\ddot{\text{o}} \sigma) (\ddot{\text{o}} \sigma) (\ddot{\text{o}} \sigma) (\ddot{\text{o}} \sigma)(\ddot{\text{o}} \sigma) (\ddot{\text{o}} \sigma) \)
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When we get to the last syllable, we can’t build a trochee, so we just make a one-syllable foot. But in Pintupi, we can’t build a trochee, so we leave the syllable out.

(22) źĩiriŋju لماضی ‘the fire for our benefit flared up’
    \( (\ddott\sigma) \)
    \( (\ddott\sigma)(\ddott\sigma) \)
    \( (\ddott\sigma)(\ddott\sigma)(\ddott\sigma) \)
    \( (\ddott\sigma)(\ddott\sigma)(\ddott\sigma)\ddott\sigma \)

In both cases, the *primary* stress is the leftmost stress.

Left-dominant, right-to left…

*Warao:* main stress penultimate, secondary on even syllables counting from end

(23) a. yà.pu.rù.ki.tà.ne.hà.se ‘verily to climb’
b. e.nà.ho.rò.a.hà.ku.tá.i ‘one who caused him to eat’

Right-dominant, left-to-right.

*Araucanian:* main stress on the second syllable, secondary on following even
(24)  
a.  e.lú.a.è.new
   ‘he will give me’

b.  ki.mú.fa.lù.wu.lày
   ‘he pretended not to know’

Right-dominant, right-to-left…

Werí:  
main stress on final syllable, secondary on preceding odd

(25)  
a.  ulùamít
   ‘mist’

b.  àkunètepál
   ‘times’

Unbounded. One stress per word, allow long lapses (more rare)

(26)  
Quantity sensitivity: “Heavy” syllables attract stress.

Some languages care about heavy syllables, some don’t.

Seminole/Creek

(27)  
a.  cokó
   ‘house’

b.  osána
   ‘otter’

c.  pomosaná
   ‘our otter’

d.  anokicíta
   ‘to love’

e.  amanokicitá
   ‘to love mine’

f.  amanokikácíta
   ‘to love mine (pl.subj.)’

(28)  
a.  σ ó

b.  σ ó σ

c.  σ σ σ σ

d.  σ σ σ ó σ

e.  σ σ σ σ σ ó

f.  σ σ σ σ σ ó σ

Only the primary stress realized, but still counts from the left in iambs.

If there is a heavy syllable, the counting starts over

(29)  
a.  ta:skitá
   ‘to jump (sg. subj.)’

b.  ta:shokítá
   ‘to jump (dual subj.)’

c.  tokohokítá
   ‘to run (dual subj.)’

d.  nihá:
   ‘lard’

e.  hitotí:
   ‘snow’
(30)  a. $\sigma \sigma \hat{\sigma}$  
b. $\sigma \sigma \hat{\sigma} \sigma$  
c. $\sigma \sigma \sigma \hat{\sigma} \sigma$  
d. $\sigma \hat{\sigma}$  
e. $\sigma \sigma \hat{\sigma}$  

(31) IAM: Form $(\sigma \hat{\sigma})$ if possible, otherwise form $(\hat{\sigma})$. Constructing a system to predict and account for stress.

(32) word

\[
\begin{array}{c}
w \\
\downarrow \\
\text{s} \\
\downarrow \\
A \text{ la} \\
\downarrow \\
\text{a}
\end{array}
\quad \begin{array}{c}
\text{s} \\
\downarrow \\
\text{w} \\
\downarrow \\
\text{b} \\
\downarrow \\
\text{am} \\
\downarrow \\
\text{a}
\end{array}
\]

(33) a. word b. word

\[
\begin{array}{c}
\text{F}_S \\
\sigma \\
\downarrow \\
\text{cón}
\end{array} \quad \begin{array}{c}
\text{F}_W \\
\sigma \\
\downarrow \\
\text{tèst}
\end{array} \quad \begin{array}{c}
\text{F} \\
\sigma \\
\downarrow \\
\text{tém}
\end{array} \quad \begin{array}{c}
\sigma \\
\downarrow \\
\text{pest}
\end{array}
\]

So, there are (prosodic) words, feet, and syllables (so far).

Distinctions in syllable weight which are encoded by moras.

But what counts as heavy differs a little bit from language to language:

(34) CV light
    CVC light or heavy
    CVV heavy
    VV heavy

The idea is that heavy syllables have two of something that light syllables only have one of. The unit of weight is the mora, and it is represented in the prosodic structures. All vowels have a distinct mora, onsets do not (the presence of onsets never seems to contribute to a syllable’s weight class), codas do sometimes:

(35) \[
\begin{array}{c}
\sigma \\
\downarrow \\
C \\
\downarrow \\
t \\
\downarrow \\
a
\end{array} \quad \begin{array}{c}
\sigma \\
\downarrow \\
C \\
\downarrow \\
t \\
\downarrow \\
a
\end{array}
\]
The intuition about stress in words is that it indicates groupings of syllables (the feet), each group having a prominent syllable (a head).

Prosodic structure:

```
PrWd

Foot

\sigma

\mu

\nu
```

'It rains so hard that it is dark or hard to see' (Passamaquoddy)

Hixkaryana

(37) a. to.ró:.no ‘small bird’
    b. ne.mó:.ko.tó:.no ‘it fell’

IAMBIC A foot is like this: \(\text{LH}\) or \(\text{H}\) if it has to be.
PARSE-SYLL Syllables are contained in feet.
WSP Heavy syllables are stressed, stressed syllables should be heavy.
ALL-FEET-L Every foot is at the left edge of the PrWd.

We can tell: IAMBIC >> PARSE-SYLL
It’s more important to have feet of \(\text{LH}\) shape than to foot all syllables.

(38) a.tfó:.wo.wo ‘wind’
What’s wrong here? Why didn’t it come out as *a.tfó:.wo.wó:?  

NONFINALITY No foot is final in PrWd.

So, it seems:  NONFINALITY >> PARSE-SYLL

What’s wrong with *a.tfó:.wó:.wo? This is getting hard to keep track of...

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<td></td>
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<tr>
<td>(a.tfó:).(wó:).wo</td>
<td>*!</td>
<td></td>
<td>*</td>
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<tr>
<td>(a.tfó:).wo.wo</td>
<td></td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>(a.tfó:).(wo.wó:)</td>
<td>*!</td>
<td></td>
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</table>

(39) kwa:ja ‘red and green macaw’

<table>
<thead>
<tr>
<th></th>
<th>NONFINALITY</th>
<th>IAMBIC</th>
<th>PARSE-SYLL</th>
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<tr>
<td>(kwa:).ja</td>
<td></td>
<td></td>
<td>*</td>
</tr>
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NONFINALITY >> IAMBIC >> PARSE-SYLL

(40) a. ák.ma.tá:.rí ‘branch’
    b. tóh.ku.ré:.ho.na ‘to Tohkurye’
    c. tóh.ku.ré:.ho.ná:.ha.fá:ha ‘finally to Tohkurye’

These seem to be stressing odd syllables… why? Oh, and the vowels aren’t lengthening.

(41) a. nák.ŋóh.yátʃ.ke.ná:.no ‘they were burning it.’
    b. kʰa.ná:.nʰ.no ‘I taught it’
    c. mi.há:.na.nʰ.no ‘You taught him’

Stage I: Core syllables: CV
Stage II: Minimal words/binary feet
   a. Core syllables: CVCV
   b. Closed syllables: CVC
   c. Vowel length distinction: CVV
Stage III: Prosodic words (larger than a binary foot)
Stage IV: Prosodic words (target)

(Demuth does this with three constraints. NO-CODA, ALIGN-PrWd, NO-DEL).

/o:li:fant/ [fa] I
   [ho:ta] IIA
   [faut] IIb
   [o:fa 'fan] III
   [o:li: 'fant] IV

(43) Stage I Stage IIa Stage IIb,c Stage III

    Ft/PrWd Ft/PrWd Ft
    σ σ σ μ μ

Stage I: NO-CODA >> ALIGN-PrWd … >> … NO-DEL
Stage IIA: NO-CODA, ALIGN-PrWd … >> … NO-DEL
Stage IIb: ALIGN-PrWd … >> … NO-DEL … >> … NO-CODA
Stage III *COMPLEX … >> … NO-DEL, ALIGN-PrWd … >> … NO-CODA
Stage IV NO-DEL, ALIGN-PrWd … >> … NO-CODA, *COMPLEX