24.961 Syllable-1

1. evidence for syllable:

- judgments of syllable count, role in metrics (Alexandrine);

  Alexandrine: 12 syllables with caesura
  Ni connu la beauté ll des yeux, beauté des pierres,

  iambic pentameter
  Shall I compare thee to a summer's day?

- simplifies statement of processes and constraints (recall North German rhotic vocalization in preconsonantal and word-final positions = syllable coda)

2. two competing views/properties of syllabification:

- waves of sonority or hierarchically structured constituents
- standard theory refers to both factors
- phonemes interface with the syllable through the timing tier: X slots or moras

3. internal structure: onset-rime (nucleus-coda)

- Prince & Smolensky (2004): Onset, No-Coda (Jakobsonian typology)

  Onset: penalize syllables beginning without a [+cons] onset
  No-Coda: penalize syllable terminating in a [+cons] segment
  Defines CV as most unmarked and VC as most marked

	CV	CVC	VC	V
Onset			*	*
No-Coda		*	*	

4. syllable parsing repairs: consonant deletion and epenthesis

Korean: CVC
kap 'price' kaps-i nom

Tangale: CVC
ɓagda 'pigeon' ɓagud Kai 'Kai's pigeon'

*Complex Onset/Coda, Parse-C/V
Dep-V, Max-C

/kaps/	Parse	*Complex-Coda	Dep-V	Max-C
☞kap				*
.kaps.		*!		
kapis			*!	
kap.s	s!			

/ ɓagda /	Parse	*Complex-Coda	Max-C	Dep-V
☞ ɓagud				*
.ɓagd.		*!		
ɓag			*!	
ɓag.d	d!			

5. Phonotactic constraints

- Recall discussion of coda/onset licensing vs. licensing by cue (class # 13)

6. sonority and nuclei

- sonority peak is a syllable peak with languages setting sonority threshold on nucleus

  Spanish: vowel
  Czech: vowel, liquid
  German: vowel, liquid, nasal
  ITB: vowel, liquid, nasal, obstruent

7. Sonority Sequencing Principle (SSP)

  sonority rises from onset to nucleus and falls from nucleus to coda

8. Case Study: English (Clements & Keyser 1982)

An.drew	Max-C, Dep-V, Parse > *Complex Onset
pro	Max-C, Dep-V, Parse > *Complex Onset
orb	Max-C, Dep-V, Parse > *Complex Coda

(6) a. English onsets: two consonants

	w	y	r	l	m	n	p	t	k
p	−	+	+	+	−	−	−	−	−
t	+	+	+	−	−	−	−	−	−
k	+	+	+	+	−	−	−	−	−
b	−	+	+	+	−	−	−	−	−
d	+	+	+	−	−	−	−	−	−
g	+	+	+	+	−	−	−	−	−
f	−	+	+	+	−	−	−	−	−
θ	+	+	+	−	−	−	−	−	−
ʃ	−	−	+	−	−	−	−	−	−
s	+	+	−	+	+	+	+	+	+

b.

	p[y]uke	priest	plate
twin	t[y]une*	trap	
quit	c[y]ute	crawl	clean
	beauty [byu]	brick	black
dwell	d[y]une*	drip	
Gwen	ambig[y]uity	grip	glad
	f[y]ume	free	flow
thwart	enth[y]use*	three	
		shrill	
sweet	s[y]uit*	slip	smell snow spa stem skip

- *[ju] loses its glide after a coronal in American English
- filters: avoid same place of articulation (recall Arabic OCP), perhaps motivated by syntagmatic contrast

*N'	*N"	*N"	*N"
/ \	/ \	/ \	/ \
lab lab	cor [+lateral]	−sonor X	cor
		+contin	−anter
		+voiced	
*pw, *bw	*tl, *dl	*vr, *zw	*tʃr, *ʃl

- special status of [s]

	N"		w	y	r	l	m	n
⟋	|	sp	−	+	+	+	−	−
s	C	st	−	+	+	−	−	−
		sk	+	+	+	+	−	−

- codas: 3-slot rime

[ɛ]	[e:]	[ɛ]	*[e:]
bell	bale	helm	[ejlm]

hem	aim	elf	[ejlf]
pep	tape	hemp	[ejmp]

- SSP

helm
elf triumph dam<n>
help hemp

- coronal edges:

depth, apse, adze, act, fifth, apt : violate SSP
wild, paint, fifths, sixths : violate length

- coronal edges are an outstanding problem; suggested solutions
  - add coronals by a special rule
  - adjoin to syllable or higher constituent
  - leave unparsed
  - posit empty syllable nucleus

9. special status of sC clusters

- recall sC clusters in Italian
- Broselow (1983) observes that in many languages, loanwords with initial clusters are adapted with anaptyxis (epenthesis) unless they are sC, where prosthesis is preferred

Farsi English (Karimi 1987)

p[e]lastic	f[i]loor	[e]smoke	[e]sp[i]ring
d[i]rink	th[i]ree	[e]slide	[e]ski

- suggests that [s] has different properties in onset vs. coda
- this asymmetry explored in detail in research of Suyeon Yun (2015)

10. Sonority Dispersion/Syllable Contact (Vennemann 1972)

- Penalize Coda-Onset sequences of rising sonority: i.gloo > ig.loo An.drew > And.rew
- Icelandic (Gouskova 2004)

- initial syllable stressed; vowel is lengthened before clusters of voiceless stop or [s] followed by [r,j,v,l] : sonority rise of degree X

vɪ:thja (7), vœ:kva (7), a:krar (6), thɪ:tra (6), skɔ:pra (6), tvɪ:svar (6), ɛ:sja (6) þ̥iðja (4), stœðva (4), þ̥laðra (3), visna (3), vɛlja (2), thɛvja (0), ɛvrɪ (−1), avlaɣa (−2), ð̥vɛrǧyr (−4)

analysis:

- Stress-to Weight: initial stressed syllable has complex rime: long vowel or coda consonant
- a markedness constraint against long vowels is interleaved with the sonority scale banning a certain sonority distance between the coda and following onset
- sonority scale: glide > r > l > nasal > voiced fric > voiced stop > voiceless fric > voiceless stop
- *Coda-Onset Rise evaluated from worst to best: *Coda-Onset Rise = 6 > *Coda-Onset Rise = 5 > *Coda-Onset Rise = 4, etc.
- so most clusters do not violate the contact threshold and hence will yield a closed stressed syllable
- but when the coda-onset sonority difference is 5 or greater then the markedness constraint against long vowels is violated

Ban on long vowels overrides constraints against moderate sonority rise

		NoLongV	*Dist+4	Ident[length]
a.	sɪg̊rɪ			
	☞ i. sɪg̊.rɪ		*	
	ii. sɪ:.g̊rɪ	*!		
b.	sɪ:g̊rɪ			
	☞ i. sɪg̊.rɪ		*	*
	ii. sɪ:.g̊rɪ	*!		

Long vowels are tolerated when sonority rises five points or more

		*Dist+6	*Dist+5	NoLongV
a.	eʰplɪ			
	☞ i. e.:ʰplɪ			*
	ii. ɛʰp.lɪ		*!	
b.	vɛaʰkrɪr			
	☞ i. vɛa:.ʰkrɪr			*
	ii. vɛaʰk.rɪr	*!		

Case Study 2 Imdlawn Tashilhiyt Berber (Dell & Elmedlaoui 1985 et seq., 2003)

ITB allows any consonant to be a syllabic nucleus but still optimizes the nucleus with higher sonority if possible. Since there are long strings of consonants in the input, there are many possible parses that would be valid syllabifications in isolation. But speakers converge on a unique parse. Syllable parses are based on speaker judgments, versification, and grammatical rules.

Presents a problem of global comparison and was used by Prince & Smolensky (1993, 2004) to motivate Optimality Theory: a small difference at one point in the string can have remote consequences--difficult to formalize with local rules that build up structure in ignorance of the final

product--but if optimization is over fully formed outputs that can be compared, then a rational attack on the problem is possible. However, there are also challenges for a completely parallel model and the ITB data have been used recently to motivate Serial OT (Pater 2012).

1. background

- vocoids: a, i, u, y, w; high vowels and glides largely in complementary distribution[1]
- syllables: CV, CVC, V (initially); #CCV and VCC# clusters permitted where edge consonant is coronal; also CVCC possible if coda is geminate (ignored here)
- consonant strings: in the context of voiced nuclei, transitional schwas are heard; D&E treat them as phonetic not phonological; they are analogous to the releases in the French clusters *admirer*, *abdiquer*. "ME is normally unaware of the existence of the VTV's in his speech, and …he finds it quite difficult to perceive".

/t-ntl-t = tnt/	tn̩.tl̩t.tn̩t	'you f. hid them'
/kks = t t-ʃʃ-t = t/	k̩.ks̩t.tš̩.št̩t	'remove it m. and eat it'
/t-!bttn/	!tb̩t.tn̩	'she put a lining'

2. loans from Moroccan Arabic drop schwas; “Ashlhiy speakers are well-known for being unable to handle MA schwas (subject of comic ridicule)”.

MA		ITB		
verb	noun	verb	noun	
Hbəs	Həbs	Hbs	l-Hbs	'prison'
sbət	səbt	sbt	s-sbt	'keep the Sabbath'
rzəq	rəzq	rzq	r-rzq	'may God grant'

3. ITB syllabic nuclei span the entire gamut of the sonority scale

3sg. i-	2sg. t-	
il.di	**tl.di**	'pull'
ir.ba	**tr.ba**	'carry on back'
in.da	**tn.da**	'shake'
im.da	**tm.da**	'be worn out'
iz.di	**tz.di**	'put together'
iZ.la	**tZ.la**	'put together'
ig.za	**tg.za**	'dig'
iH.da	**tH.da**	'give gifts'

[1] Dell & Elmedlaoui (2002) show that some glides are stable and never vocalize, requiring a lexical specification.

is.ti	**ts.ti**	'select'
if.si	**tf.si**	'untie'
ix.si	**tx.si**	'go out , be extinguished'
ik.ti	**tk.ti**	'remember'

Harmonic nucleus: *t, > > *s, > > *n, > > *l, > > *i,u > > *a

[4] Instead of resorting to epenthesis or deletion, a simple CVC/CC,C syllable structure is obtained by allowing any consonant to form a nucleus: MAX C, DEP (V), *CCC onset/coda > > HNuc (all members of the form *Nuc(C))

/txsi/	*CCC onset	HNuc (*Nuc (S))
+**tx`.si**	√	*
txsi	*!	√

/tsti/	MAX C	HNuc (*Nuc (S))
+**ts`.ti**	√	*
sti	*!	√

4. Prevocalic segments are non-syllabic:

t-CCC-t	*t-CCC-as*	
tr.glt	**trg.las**	'lock'
ts.krt	**tsk.ras**	'do'
tx.znt	**txz.nas**	'store'
tz.dmt	**tzd.mas**	'gather wood'
tl.bzt	**tlb.zas**	'step onto'
tr.kst	**trk.sas**	'hide'
tn.Sft	**tnS.fas**	'graze'
tm.sxt	**tms.xas**	'transform'

5. Optimizing for sonorant nucleus

monosyllable		disyllables	
krm	'dry out '	g^w.mr	'hunt'
smd	'add'	z.dm	'gather firewood'
krz	'plough'	r.ks	'hide'
xng	'choke'	n.gd	'drown'

/smd/	HNuc-*t	HNuc-*s	HNuc-*n
> smd			*
s.md	*!	*	
/zdm/			
zdm	*!		
> z.dm		*	*

/ra-t-lwl-t/ -> rat.lult disyllabic /ra-t-lql-t/ -> ra.tl.qlt trisyllabic

/ra-t-lwl-t/	HNuc-*t	HNuc-*s	HNuc-*n	HNuc-*l	HNuc-*i,u
>rat.lult					*
ra.tl.wlt				*!*	
/ra-t-lql-t/					
>ra.tl.qlt				**	
rat.lq.lt	*!*				

9. Imperfective gemination

perf	imperf	perf	imperf
krz	kkrz	rks	rkks
ħlb	ħħlb	lbʒ	lbbʒ
zlm	zzlm	ɣml	ɣmml
mrz	mmrz	rʃk	rʃʃk
xng	xxng	ʒbd	ʒbbd
frn	ffrn	xsi	xssi

6. Hiatus is avoided; onsetless syllables are only found word-initially. The onset requirement can lead to a violation of Harmonic Nucleus in which a less optimal, lower sonority nucleus is chosen in order to avoid two successive syllabic nuclei.

/sawl-x/ -> sa.wlx /kinsta/ -> ki.ns.ta

/sawl-x/	Onset	*HNuc-l	*HNuc-i,u
sa.ulx	*!		*
☞sa.wlx		*	
/kinsta/	Onset	*HNuc-s	*HNuc-n
☞ki.nṣ.ta		*	
ki.ṇs.ta	*!		*

- Dell & Elmedlaoui surmount this problem by building the onset into the first step of their algorithm, which parses a "core" CV syllable: "associate a core CV syllable with any sequence (Y)Z, where Z is /a/; where Z is a high vowel, where Z is a liquid, where Z is a nasal, …"

7. In case of a tie, a leftmost effect is found for the syllable nucleus

/kywt/	*HNuc-i,u	Leftmost
☞ki.wt	*	#k
kyut	*	#ky!
/rks-x/	*HNuc-s	Leftmost
☞ r.kṣx	*	rk
rk.sx̣	*	#r, rks
/tftkt/	Hnuc-stop	
☞ tf̣.tk̟t	*	#tft
tf̣t.kṭ	*	#tftk

8. No rising rimes (Clements 1997)

/ugdbda/	ug.dḅ.da	*u.gḍb.da	avoid sonority plateau in rhyme when obstruent is nucleus
/txznas/	ṭ.xẓ.nas	*tx̣z.nas	"
/kšm/	ḳ.šṃ	*kšṃ	
/ršq/	ṛ.šḳ	*rṣ̌q	

- The latter two cases follow from the original Dell & Elmedlaoui algorithm that descends the sonority hierarchy; they challenge the parallel OT analysis based on "worst to best" H-Nuc.

/ugdbda/	*Huc-stop	Leftmost
ug.dḅ.da	*	ugd
u.gḍb.da	*	ug

/kšm/	*t	*s	*m
k.šm	*!		*
kšm		*	

- some remedies considered include stating the constraint in positive terms going from "best to worst" or invoking a parallel set of margin (onset coda) constraints penalizing high sonority onsets and codas that can be interleaved with the peak constraint: *M/a > *M/i,u > *M/liq > *M/nas > *M/fric > *M/stop

/kšm/	*M/nas	*HNuc-stop	*HNuc-fric
> kšm		*	
kšm	*!		*

- Pater (2012) argues that these data support a Harmonic Serial model of OT where just a single syllable nucleus is inserted per gen cycle

first step

/kšm/	*hiatus	*syll.stop	*syll.fric	*syll.nasal
> kšm				*
kšm			*!	
kšm		*!		

second step

/ kšm/	*hiatus	*syll.stop	*syll.fric	*syll.nasal
> kšm		*		*
kšm	*!		*	*

9. geminates: the second half of a geminate cannot be a nucleus

ill.mas 'he spun (wool) for him' *i.ll.mas ay.yis 'horse' *a.yi.ys a.faw.wu *a.fa.wuw

- thus, a true (tautomorphemic) geminate can form coda-onset (ay.yis), nucleus coda (xlls 'pay' perf), and complex coda (ill.mas), but not onset-nucleus distributing the consonant across the bisegmental sequence with the largest acoustic disparity
- if the first half of a geminate is more sonorous than the second, then onset-coda parse would be a mismatch in prominence (see Morita 2014 for further examples)

10. avoid (initial) onsetless syllables

/i-ukr/ yu.kr *iw.kr 'he stole

/bddl/ bd.dl *bd.dl 'exchange'

/urti/ ur.ti *wr.ti 'garden'

/u-urti/ wur.ti 'garden' construct state

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