

An introduction to phonological representations

EGG 2017, Olomouc

Representing consonants

- General architectural differences
- Polish case allomorphy
- The Scottish Vowel Length Rule

Carr 1993: 65-66

(11) *Obstruents*

	p	t	ṭ	c	k	q	b	d	ḍ	ɟ	g	G	t̪	ɖ	č	ʝ	ɸ	f	θ	s	ʃ	ʂ	ç	x	χ	β	v	ð	z	ʒ	ʒ̣	j	y	ɥ			
cons	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
syll	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
voice	-	-	-	-	-	-	+	+	+	+	+	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	
obs	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
cont	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
del rel	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
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high	-	-	-	+	+	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	+	+	+
low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
back	-	-	-	+	+	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	+	+
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stri	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	+	-	+	+	+	-	-	+	-	+	-	+	+	+	-	-	+	-	+	

Carr 1993: 65-66

(12) *Sonorants*

	m	n	ɲ	ɳ	ŋ	N	β	w	ʋ	ø	ɪ	j	ɥ	ʁ	l	ʎ	ʌ	r	R	ɾ	ɽ	
cons	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	
syll	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
voice	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
obs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cont	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
del rel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
asp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
lat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-
nas	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ant	+	+	-	-	-	-	+	+	+	+	+	-	-	-	+	-	-	+	-	+	-	-
cor	-	+	+	-	-	-	-	-	-	+	+	-	-	-	+	+	-	+	-	+	+	+
high	-	-	-	+	+	-	-	+	-	-	-	+	+	-	-	-	+	-	-	-	-	-
low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
back	-	-	-	-	+	+	-	+	-	-	-	-	+	+	-	-	-	-	-	-	-	-
round	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-

Cyran (2010: 3)

(1)

	<i>Acoustic pattern</i>	<i>Articulatory execution</i>
A	<i>Mass</i> : central spectral energy mass (convergence of F1 and F2)	Maximal expansion of oral tube; maximal constriction of pharyngeal tube
I	<i>Dip</i> : low F1 coupled with high spectral peak (convergence of F2 and F3)	Maximal constriction of oral tube; maximal expansion of pharyngeal tube
U	<i>Rump</i> : low spectral peak (convergence of F1 and F2)	Trade-off between expansion of oral and pharyngeal tubes
ʔ	<i>Edge</i> : abrupt and sustained drop in overall amplitude	Occlusion in oral cavity
h	<i>Noise</i> : aperiodic energy	Narrowed stricture producing turbulent airflow
N	<i>Nasal</i> : low frequency of first resonance	Lowered velum; air flow through the nasal passage
H	<i>High tone</i> : raised pitch on vowels; VOT lag (aspiration) in obstruents	Stiff vocal cords
L	<i>Low tone</i> : lowered pitch on vowels; VOT lead (full voicing) in obstruents	Slack vocal cords

Representing consonants

- (I) = *palatal*, e.g. [j, ç, c]
palatalized, e.g. [p^j, k^j]
- (U) = *labial*, e.g. [p, b, v, f, w]
labialized, e.g. [k^w, g^w]
- (A) = *coronal*, e.g. [r, t, s]
retracted (uvular, pharyngeal), e.g. [R, q, G, ʕ]
- (◌) = *velar*, e.g. [k, g, x]
velarized, e.g. dark [ɪ] in English

Representing consonants

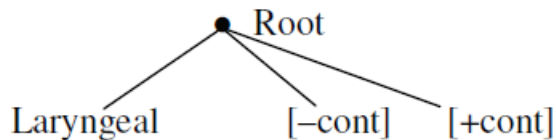
(9)

labials	/p/-{U.?.h}	/b/-{U.?.h.L}	/f/-{U.h.}	/v/-{U.h.L}	/m/-{U.?.L}
palato-labials	/p ^j /-{U. <u>I</u> .?.h}	/b ^j /-{U. <u>I</u> .?.h.L}	/f ^j /-{U. <u>I</u> .h.}	/v ^j /-{U. <u>I</u> .h.L}	/m ^j /-{U. <u>I</u> .?.L}
dentals	/t/-{A.?.h}	/d/-{A.?.h.L}	/s/-{A.h}	/z/-{A.h.L}	/n/-{A.?.L}
dental affricates	/tʃ/-{A. <u>I</u> .?.h}	/dʒ/-{A. <u>I</u> .?.h.L}			
alveolars/ retroflexes	/tʃ/-{A. <u>I</u> .?.h}	/dʒ/-{A. <u>I</u> .?.h.L}	/ʃ/-{A.I.h}	/ʒ/-{A.I.h.L}	/ŋ/-{A.I.?.L}
prepalatals	/tʃ/-{A. <u>I</u> .?.h}	/dʒ/-{A. <u>I</u> .?.h.L}	/ç/-{A. <u>I</u> .h}	/ʒ/-{A. <u>I</u> .h.L}	/ɲ/-{A. <u>I</u> .?.L}
velars	/k/-{Ø.?.h}	/g/-{Ø.?.h.L}	/x/-{Ø.h.}	/ŋ/-{Ø.?.L}	
palato-velars	/c/-{ <u>I</u> .?.h}	/ç/-{ <u>I</u> .?.h.L}	/ç/-{ <u>I</u> .h}		
coronal sonorants	/r/-{A}	/r ^j /-{A.I}	/l/-{A. <u>I</u> .?}	/w/-{ <u>U</u> .A.?}	/j/-{ <u>I</u> }

Representing consonants

- Backley and Nasukawa (2008):
- the order of /T+S/ in affricates is arbitrary and difficult to explain phonologically

(1) Linear ordering of [-cont] and [+cont] in affricates (Sagey (1986)):



- why should affricates be composed of 2 segments and not 3, 4 or more?
- affricates are stops with more complex place/resonance specification
- the place of articulation cues on plosives are much more difficult to recover for a speaker than place cues on fricatives
- affrication (delayed release) is a phonetic device that enhances place cues in non-continuant sounds (listener has more time to recover the cues)

What is the distribution of Polish Loc/Voc masculine endings?

Loc/Voc. in /e/	Loc/Voc. in /u/
chłó/p/+/e/ 'peasant'	gnó/j/+/u/ 'dung'
gró/b/+/e/ 'grave'	ro/k/+/u/ 'year'
sta/v/+/e/ 'pond'	bie/g/+/u/ 'run'
gra/f/+/e/ 'graph'	ry/ç/+/u/ 'lynx'
mi/t/+/e/ 'myth'	ko/ts/+/u/ 'blanket'
rzą/d/+/e/ 'government'	szop pra/tʃ/+/u/ 'raccoon'
cza/s/+/e/ 'time'	goś/tç/+/u/ 'guest'
be/z/+/e/ 'liliac'	go/l/+/u/ 'goal'
kra/n/+/e/ 'tap'	stra/x/+/u/ 'fear'
tłu/m/+/e/	
mu/r/+/e/	

Representing consonants

- apparently, for Element Theory the environment for the insertion of /e/ or /u/ is less natural than for the binary feature framework
- ET would have to resort to the notion of complexity = ‘a number of (a kind) of elements that a Phonological Expression(= segment) construction possesses’

Representing consonants

(9)

labials	/p/-{U.?.h}	/b/-{U.?.h.L}	/f/-{U.h.}	/v/-{U.h.L}	/m/-{U.?.L}
palato-labials	/p ^j /-{U. <u>I</u> .?.h}	/b ^j /-{U. <u>I</u> .?.h.L}	/f ^j /-{U. <u>I</u> .h.}	/v ^j /-{U. <u>I</u> .h.L}	/m ^j /-{U. <u>I</u> .?.L}
dentals	/t/-{A.?.h}	/d/-{A.?.h.L}	/s/-{A.h}	/z/-{A.h.L}	/n/-{A.?.L}
dental affricates	/tʃ/-{A. <u>I</u> .?.h}	/dʒ/-{A. <u>I</u> .?.h.L}			
alveolars/ retroflexes	/tʃ/-{A. <u>I</u> .?.h}	/dʒ/-{A. <u>I</u> .?.h.L}	/ʃ/-{A.I.h}	/ʒ/-{A.I.h.L}	/ŋ/-{A.I.?.L}
prepalatals	/tʃ/-{A. <u>I</u> .?.h}	/dʒ/-{A. <u>I</u> .?.h.L}	/ç/-{A. <u>I</u> .h}	/ʒ/-{A. <u>I</u> .h.L}	/ɲ/-{A. <u>I</u> .?.L}
velars	/k/-{Ø.?.h}	/g/-{Ø.?.h.L}	/x/-{Ø.h.}	/ŋ/-{Ø.?.L}	
palato-velars	/c/-{ <u>I</u> .?.h}	/ç/-{ <u>I</u> .?.h.L}	/ç/-{ <u>I</u> .h}		
coronal sonorants	/r/-{A}	/r ^j /-{A.I}	/l/-{A. <u>I</u> .?}	/w/-{ <u>U</u> .A.?}	/j/-{ <u>I</u> }

Representing consonants

The Scottish Vowel Length Rule (Aitken's Law)

1. Distribution of length in SSE vowels:²

a) invariably short: *pit* /pɛt/, *putt* /pʌt/, *lout* /ʌʌt/

b) invariably long: *pet* /pɛ:t/, *wait* /we:t/, *pat* /pa:t/, *cot* /kɔ:t/, *boat* /bo:t/, *choice* /tʃɔ:is/, *lout* /ʌa:t/

c) of variable length: *meat* /mit/ vs. *steer* /sti:r/, *brood* /brʊd/ vs. *brewed* /brʊ:d/, *side* /saɪd/ vs. *nitro* /na:ɪtro:/

Representing consonants

2. Length of /i/ and /ʌ/ in short and long environments (in milliseconds):

	<i>meat</i>	<i>bead</i>	<i>steer</i>	<i>Soot</i>	<i>brood</i>	<i>moore</i>
<i>syadm1</i>	76	86	185	88	101	176
<i>syah1</i>	110	125	266	93	112	268
<i>syajg1</i>	93	113	229	75	129	229
<i>syalt1</i>	86	136	252	70	118	234
<i>syadel</i>	151	162	281	164	154	349
<i>syae1</i>	113	102	285	80	126	292
<i>syae1</i>	77	109	230	80	104	251
<i>syamg1</i>	95	159	248	120	126	263
<i>syalf1</i>	126	122	306	131	144	269
<i>syalc1</i>	113	176	256	106	205	292
<i>sybac1</i>	105	150	244	106	171	272
<i>syarm1</i>	103	100	179	94	123	181
MEAN	104	128.3	246.75	100.5	134.4	256.3
INCREASE		+23%	+92%		+33%	+90%

Representing consonants

3. Length of /a/ and /ɛ/ in short and long environments:

	<i>pat</i>	<i>bad</i>	<i>far</i>	<i>Pet</i>	<i>bed</i>	<i>err</i>
<i>syadm1</i>	212	196	235	205	172	266
<i>syæh1</i>	180	290	277	188	263	239
<i>syajg1</i>	194	275	265	203	262	292
<i>syalt1</i>	184	233	209	202	219	282
<i>syadel</i>	248	345	361	241	312	338
<i>syæf1</i>	240	285	321	194	289	280
<i>syæw1</i>	154	251	301	165	222	256
<i>syamg1</i>	208	256	254	169	258	243
<i>syalf1</i>	181	270	291	159	233	266
<i>syalc1</i>	198	291	298	203	279	301
<i>sybacl</i>	162	295	352	147	253	293
<i>syarm1</i>	128	210	238	164	180	221
MEAN	190.75	266.4	283.5	186.7	245.1	273
INCREASE		+39%	+6%		+31%	+11%

Representing consonants

4. SVLR increase of the four vowels before /r/:

	/i/	/ɨ/	/a/	/ɛ/
<i>syadm1</i>	115%	74%	19%	54%
<i>syafh1</i>	112%	139%	-4%	-9%
<i>syajg1</i>	102%	77%	-3%	11%
<i>syalt1</i>	85%	98%	-10%	28%
<i>syade1</i>	73%	133%	4%	8%
<i>syaeft1</i>	179%	131%	12%	-3%
<i>syaeuw1</i>	111%	141%	19%	15%
<i>syamg1</i>	55%	108%	0%	-5%
<i>syalf1</i>	150%	86%	7%	14%
<i>syalc1</i>	45%	42%	2%	7%
<i>sybac1</i>	62%	59%	19%	15%
<i>syarm1</i>	79%	47%	13%	22%

Representing consonants

3. The Scottish Vowel Length Rule (McMahon 1991, 2000):

$$\begin{array}{c} \text{X} \rightarrow \text{X X} / \\ | \quad \backslash / \\ [+ \text{ tense}] [+ \text{ tense}] \end{array} \quad \left. \begin{array}{l} + \text{ voiced} \\ + \text{ continuant} \\] \end{array} \right\}$$

Representing consonants

2. Voicing and continuance hierarchy (Harris 1985):

voiceless
stops

voiceless
fricatives

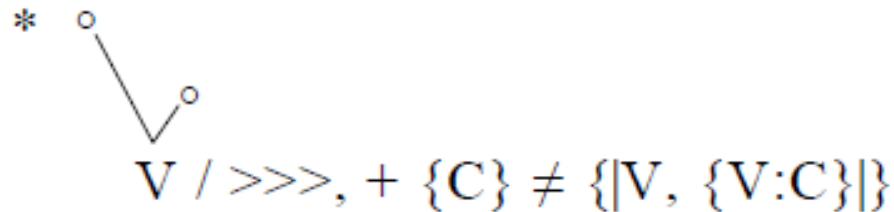
voiced stops
nasals, /l/

voiced fricatives
/r/



Representing consonants

4. The Scottish Vowel Length Rule (Anderson 1993: 423)



- complex metrical structure (long vowel) is erected UNLESS
- the following consonant is in the dependent position ('>>>')
- and this consonant is not composed of **component** V and mutually dependent {V:C}
- PREDICTION: in open syllables all vowels may be long

Representing consonants

- Pukli (2006), Sundkvist (2010)
- Long vowels found also before: /g/ and /dʒ/
- /v, ð, z, ʒ, r, g, dʒ/ and at the end of words
- *league, huge, legion, beagle, eagle, bugle* have longer vowels
- *needle, leader, kitch, people, sepia, ruby* have short vowels

Representing consonants

3. The Scottish Vowel Length Rule (McMahon 1991, 2000):

$$\begin{array}{c} X \rightarrow X X / \\ | \quad \backslash / \\ [+ \text{ tense}] [+ \text{ tense}] \end{array} \quad \left. \begin{array}{l} + \text{ voiced} \\ + \text{ continuant} \\] \end{array} \right\}$$

Representing consonants

2. Voicing and continuance hierarchy (Harris 1985):

voiceless
stops

voiceless
fricatives

voiced stops
nasals, /l/

voiced fricatives
/r/

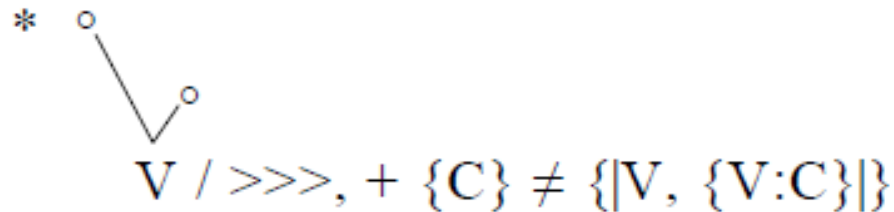


Representing consonants

- no reason why /t/, /n/, /m/ should be preceded by short vowels
- while /g/ and /dʒ/
- the ‘end of the word’ and [+voice, +continuant] do not form a natural class anyway

Representing consonants

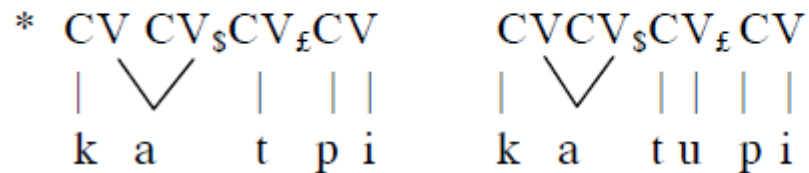
4. The Scottish Vowel Length Rule (Anderson 1993: 423)



- PREDICTION: in open syllables all vowels may be long
- this is not true about Standard Scottish English

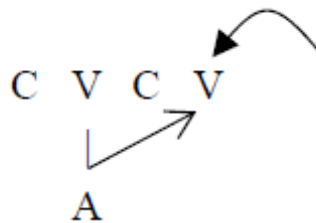
Representing consonants

6. The representations of **ka:tpi* and *ka:tupi* (Lowenstamm 1996: 431)



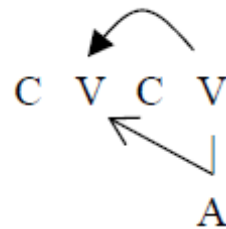
7. Two types of long vowels (Scheer 2004: 267)

a)



a head-initial vowel

b)



a head-final vowel

Where:

— Licensing

— spreading

Representing consonants

5. Onset Licensing Principle (Cyran 2010: 82):

Each nucleus must license its onset.

Licensing Absorption

The licensing potential affecting a V is inversely proportional to the substantive complexity of a following C.

Representing consonants

9.

a) $\{A\} > \{A.X\} > \{X\}$

b) $\{\underline{A}.X\} > \{A.X\} > \{A.\underline{X}\}$

- an expression containing only element |A| is easier to license than the representation containing |A| and another element, which is easier to license than an expression not containing |A| at all
- an expression in which |A| is the head is easier to license than the expression in which it is an operator etc.
- **the more |A| you have the easier you are to license as a long vowel**

Representing consonants (but for the time being Scottish vowels)

/i(:)/ = {I} (MEAT, STEER)

/e:/ = {I.A} (WAIT, THERE)

/ɛ:/ = {I.A} (PET, ERR)

/ɛ/ = {I.A} (PIT, STIR)

/a:/ = {A} (PAT, FAR)

/ʊ(:)/ = {U.I} (ROOM, PUT, MOORE)

/o:/ = {U.A} (LOAD, MORE)

/ɔ:/ = {U.A} (WAR, POT)

/ʌ~ə/ = { } (PUTT, CARTER)

/ʌi/ = { } {I} (SIDE)

/a:i/ = {A} {I} (SIGH)

/a:u/~ʌu/ = {A} {U}~{ } {U} (LOUT, NOW)

/ɔ:i/ = {A.U} {I} (BOY, CHOICE)

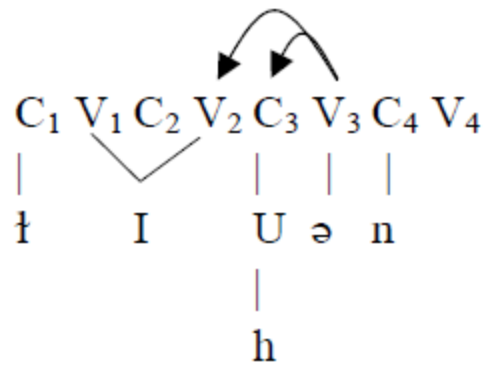
/iʊ(:)/ = {I} {I.U} (TUNE, DURING)

Representing consonants

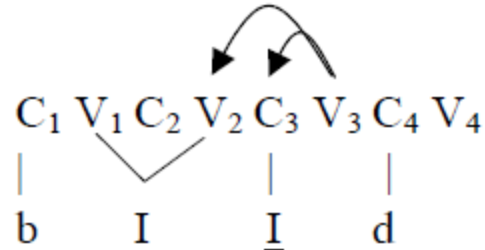
21. The elemental make-up of SSE consonants:

/j/ = {I}	/ɸ/ = {I.h}	/θ/ = {I.h.H}	/d/ = {I.h.?	/t/ = {I.h.?.H}	/n/ = {I.?.L}
/w/ = {U}	/z/ = {I.h}	/s/ = {I.h.H}	/b/ = {U.h.?	/p/ = {U.h.?.H}	/m/ = {U.?.L}
/r/ = {I}	/v/ = {U.h}	/f/ = {U.h.H}	/g/ = {_.h.?	/k/ = {_.h.?.H}	/t/ = {U.I.?
/ɹ/ = {A}	/ʒ/ = {I.h}	/ʃ/ = {I.h.H}	/dʒ/ = {I.?.} {I.h}	/tʃ/ = {I.?.} {I.h.H}	/ŋ/ = {_.?.L}
/ɻ/ = {A}		/x~h/ = {U.h.H}		/ʌ/ = {U.h.H} {U}	

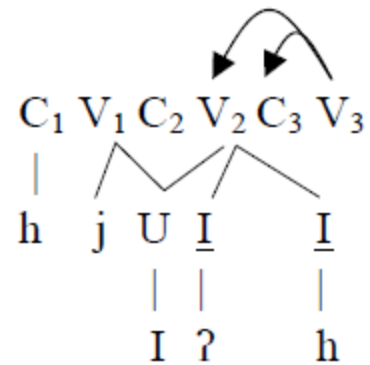
a) *leaven* /'li:vən/



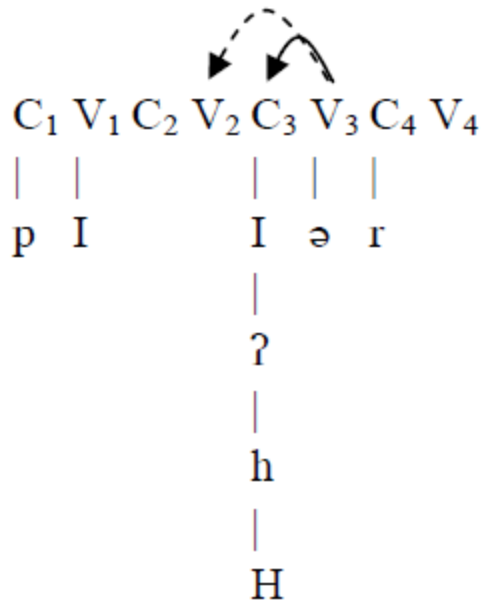
b) *beard* /bi:rd/



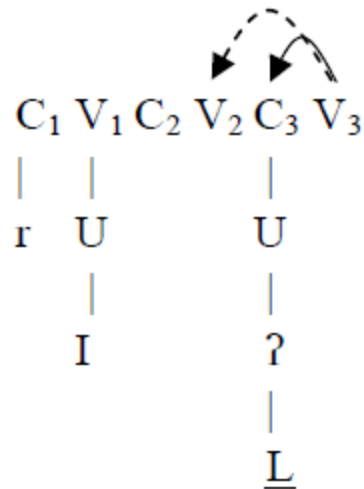
c) *huge* /hju:dʒ/



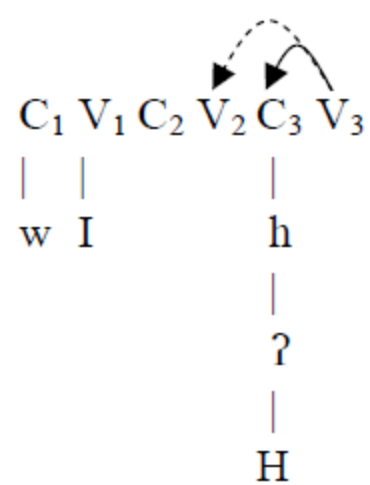
d) *Peter* /pitər/



e) *room* /rʊm/



f) *week* /wik/



Representing consonants

- it is not being a voiced fricative but being a Phonological Expression not bigger than 2 elements that counts

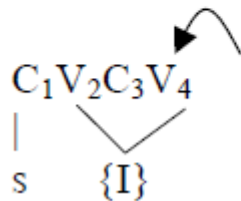
12. Final Nuclei (FN) licensing parameter:

License FN [ON]/OFF

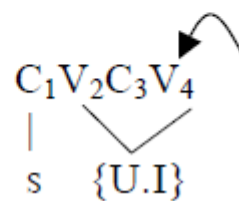
- it is the LICENSING that counts ultimately

13. Parametrically licensed Final Nuclei in SSE:

a) *see* /si:/



b) *Sue* /sue:/



Representing consonants

- is there any independent evidence for the relevant representations
- why should velarity be ‘emptyness’

22. Potential combinations of initial (two member) clusters in SSE

	/p/	/b/	/f/	/t/	/d/	/θ/	/s/	/ʃ/	/k/	/g/	/x~h/	/n/	/m/
/w/	*	*	*	ok	ok	ok	*	*	ok	ok	*	*	*
/t/	ok	ok	ok	*	*	*	*	*	ok	ok	*	*	*
/ɹ/ or /r/	ok	ok	ok	ok	ok	ok	*	*	ok	ok	*	*	*

Representing consonants

23. Conditions on Infrasegmental Government domains in SSE:

A segment A may govern segment B iff:

- a) A has a positive sonority index and B has a negative sonority index and
- b) no element in the make-up of B is a head and
- c) A and B do not share a resonance element of the same headedness status.

- $\text{Sonority} = \text{Number of Resonance Elements} - \text{Number of Manner Elements}$
- complexity related effects have empirical basis iff there is independent evidence for the representation of the consonants

Representing consonants

21. The elemental make-up of SSE consonants:

/j/ = {I}	/ð/ = {I.h}	/θ/ = {I.h.H}	/d/ = {I.h.?	/t/ = {I.h.?.H}	/n/ = {I.?.L}
/w/ = {U}	/z/ = {I.h}	/s/ = {I.h.H}	/b/ = {U.h.?	/p/ = {U.h.?.H}	/m/ = {U.?.L}
/r/ = {I}	/v/ = {U.h}	/f/ = {U.h.H}	/g/ = {_.h.?	/k/ = {_.h.?.H}	/t/ = {U.I.?
/ɹ/ = {A}	/ʒ/ = {I.h}	/ʃ/ = {I.h.H}	/dʒ/ = {I.?.} {I.h}	/tʃ/ = {I.?.} {I.h.H}	/ŋ/ = {_.?.L}
/ɻ/ = {A}		/x~h/ = {U.h.H}		/ʌ/ = {U.h.H} {U}	

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