

## 24.961 Phonotactics and Markedness

### 1. Phonotactics: systematic restrictions on possible sound sequences and word shape

no English word begins with velar nasal ŋ or tʃ; no word ends in h

Halle (1962)	brick	attested
	blick	possible but unattested
	bnick	impossible

### 2. Research by Albright (2007) and others shows that these judgments are often gradient:

bnick > blick > bdick > ldick > = “better than”

3. Research by Brendt (1993), Jusczyk (1997) and others demonstrates that infants are sensitive to phonotactic constraints before they acquire a lexicon; knowledge of phonotactics can help with parsing an utterance to find the word boundaries.

### 4. various questions one can ask about phonotactics

- What level are they stated at: lexical level, surface phonetic, or some intermediate level? Many languages have restrictions on roots that don't necessarily carry over to larger domains: e.g. Japanese idom-u, idon-de 'challenge' has two voiced obstruents (cf. Lyman's Law)
- are they positive or negative or both?
- Are they redundant? A rule of final devoicing entails that no word ends in [b,d,g]. Does it make any sense to say that there is a separate phonotactic constraint? If so, what is its relation to the rule, which is needed in any case, to account for alternations?
- On the other hand, one can turn this argument around: many alternations are motivated to maintain more general phonotactic constraints: in Seoul Korean long vowels only found in initial syllables; when word is placed in second position in a compound, length is lost
- How many such constraints can be reduced to constraints on syllable structure: e.g. \*[+voice] in obstruent codas, no complex onsets with tʃ, no syllable onsets with ŋ?
- How does one express the gradience of the judgments? Should one do so (i.e. is it a part of the grammar)?
- When subjects give ratings like bnick > blick > bdick > ldick in response to question “How good a word of English is X?” are they giving a judgment based on their knowledge of English or a more general intuition on how difficult it is to pronounce the cluster? Would speakers of a CV language like Japanese give similar gradient responses? Would we obtain similar gradience for judgments among existing clusters: e.g. German knV, klV, kV? See Berent et al. (2007).

## Markedness

[1] a term and intuition that derives from the Prague School of Trubetzkoy (1939) and Jakobson (1941)

Jakobson speculates that the order of acquisition of sounds by the child, the order of loss of sound in aphasia, and the implicational laws in the structure of phonemic inventories, all reflect the same underlying hierarchy; e.g. fricatives implies stops, velars imply coronals, nasal vowel implies corresponding oral vowel

[2] in the contemporary context, markedness means that one sound or structure is preferred to another in a given context: a > b; the dispreferred one is said to be “marked” with respect to the preferred or “unmarked” one: thus nasal vowels are marked with respect to oral vowels; voiced stops are marked with respect to voiceless stops; complex syllable onsets are marked with respect to simple onsets; contour tones are marked with respect to level tones, ....

[3] SPE Chapter 9 attempted to build this distinction into rules so that the change to an unmarked structure would be more highly valued by the evaluation metric; but the formalism was not worked out and this approach never got off the ground

[4] Stampe’s (1972) Theory of Natural Phonology

- another attempt to give markedness an explicit role in phonological grammars
- Stampe distinguishes Natural Processes like German Final Devoicing from more arbitrary rules like the Velar Softening in *critic* ≈ *critic-ism*

“A phonological process is a mental operation that applies in speech to substitute, for a class of sounds or sound sequences presenting a specific common difficulty to the speech capacity of the individual, an alternative class identical but lacking the difficult property”. p. 1

examples: vowel denasalization, obstruent devoicing, prenasalization ( b > <sup>m</sup>b )

- natural processes are innate
- child language substitutions reflect the application of these processes (cf. Jakobson 1941)

/lan/	‘lion’	Joan Velten
ĩãn	regressive nasalization of sonorants	
nãn	nasalized lateral becomes a nasal	
nan	nasal vowel becomes oral	

- the mature (adult) grammar arises by suppressing natural processes entirely or restricting their scope of application by narrowing their context or through ordering

to acquire Yoruba nasal vowels we must suppress V -> [-nasal]

to acquire Turkish /ü, ö/ we must suppress [+syll, -back] -> [-round]

to acquire Attic Gk /y/ we must narrow to [+syll, -back, -high] -> [-round]

English orders denasalization before the other process that nasalizes a vowel that precedes a nasal consonant: ta, \*tä; tad [æ] but tan [æ̃]

[5] Calabrese (1984, 1995, 2005)

- a derivational model that utilizes both ordered rules and markedness constraints
- like Stampe, Calabrese distinguishes between phonetically arbitrary rules like Velar Softening which are conventionalized products of history (cf. in the US we drive on the right side of the road and in Japan on the left) and phonetically motivated repairs that advance a rule output to a more natural state in the interests of ease of articulation and perception; but this force is counter-balanced by economy, which wants to shorten the input-output path, and which (following Bromberger-Halle 2000) Calabrese assumes to take place in real time<sup>1</sup>
- when a rule gives an output that violates a constraint then a limited set of repairs kicks in
- once the repair is made, the derivation proceeds to the next ordered rule

#### Metaphony in Italian dialects

- high vowel of suffix raises stressed vowel of root; when root vowel is [+ATR] close /e,o/, the rule uniformly applies across all dialects; but when root vowel is [-ATR] open /ɛ,ɔ/ then various responses: no change (Grado), diphthongization (Calvello), partial raising (Servigliano)

<u>f. sg.</u>	<u>m.sg.</u>	<u>m.pl.</u>		
sol-a	sul-u	sul-i	‘alone’	
ner-a	nir-u	nir-i	‘black’	
vekkj-a	vjekkj-u	vjekkj-i	‘old’	Calvello
vecc-a	vecc-u	vecc-i	‘old’	Servigliano
bɛl-a	bɛl-o	bɛl-i	‘beautiful’	Grado

- [+syll, -low, +stress] -> [+high] / \_\_\_ C<sub>0</sub> [+syll, +high]      rule
- \*[+syll, +high, -ATR]      constraint

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<sup>1</sup> “Phonology is about concrete mental events and states that occur in real time, real space, have causes, have effects, are finite in number” (Bromberger & Halle 2000:21).

/ner-u/	/vɛkkj-u/	
nir-u	vɪkkj-u	metaphony ( i = [+high, -ATR]
-----	violation!	*[+high, -ATR]
	vjekkj-u	repair: fission of features Calvello
	vekkj-u	repair: feature reversal (lowering) Servigliano
-----	vecc-u	palatalization

- it's not clear how one would extend this system to treat the “duplication” problem where the same constraint governs the lexicon; perhaps one can deny that they are the same phenomenon

[6] review of Rice (2005), who distinguishes “grammar-internal” from “grammar-external” expressions of markedness

#### [7] Grammar-external

- frequency within and across lgs: unmarked sound is more frequent

coronals: all languages have some coronal consonants; almost all have t and n  
 English inflectional affixes are drawn from coronal obstruents: eat-s, want-ed,  
 slep-t, ten-th, auto-[z]  
 most frequent letter in English is t (16%); first consonant in Morse code

- perceptual salience; marked sound is more salient

ejective vs plain stop; long vs. short vowel; stressed vs. unstressed vowel;  
 high vs. low tone

- precedence in language acquisition and loss (Jakobson 1941):

- unmarked phoneme acquired before marked:

glide > lateral; s > ʃ  
 coronal > velar; cf. Duten Ta Herr Dotta;  
 oral vowel > nasal vowel; Fr non > [na] (Joan Velten)

- marked phoneme or structure disappears before unmarked one in aphasia (Romani & Calabrese 1998)

gridare > kritare [voice]  
 tyepido > tepido; treno > teno; complex onset  
 sfort<sup>o</sup> > sfo<sup>t</sup>o coda  
 avviato > aviato [+long]

[8] Grammar-internal

- unmarked is preferred segment in phonemic inventory

Fijian:	p	t	k	English	p	t	k
					<b>b</b>	<b>d</b>	<b>g</b>
Arabic	i	u	a	Japanese	i	u	e o a
Korean	i	ɨ	u				
	e	ə	o				
		a					

- Gaps in phoneme table are typically marked segments

Russian obstruents

p	t	k	ts	tʃ	f	s	ʃ	x
b	d	g			v	z	ʒ	
	stops		affricates		fricatives			

ATR contrasts in African languages

i	u	ɪ	ʊ
e	o	ɛ	ɔ
	ə		a
[+ATR]		[-ATR]	

Casali (2003) 108 languages surveyed

- 60 fully cross ATR with other vowels
- if contrast is restricted, then absent for low vowels
- Kinande has suspended contrast in nonhigh vowels: /i, u, ɪ, ʊ, ε, ɔ, a/
- Yoruba suspends contrast for high vowels: /i, u, e, o, ε, ɔ, a/

- unmarked is product of non-assimilatory neutralization: (> = 'better than')

b > p / \_\_\_ # not p > b / \_\_\_# Russian, German, ..... [-voice] > [+voice]

s,t,th,c,ch > t / \_\_\_ # (Korean) [-contin] > [+contin]; [+anterior] > [-anterior]

[-spread gl] > [+spread gl] ( > = is preferred to)

Seoul Korean: long vowels restricted to word-initial syllable: [+long] > [-long]

Egyptian Arabic: long mid vowels become high when shortened

be:t 'house' bit-na 'our house' [-high] > [+high]

➤ unmarked is preferred as epenthetic (dummy) element: t > p,k; ə > a, o

Fr blabla blablat-er 'to say blabla'

➤ marked feature survives coalescence

Lithuanian: ʃ-s and s-ʃ → ʃ [-anterior] < [+anterior]

Tigrinya (Buckley 1991)

The following examples of coalescence are attested:<sup>15</sup>

(36) i + u → u  
i + i → i  
ʌ + u → o  
ʌ + o → o  
ʌ + i → e  
ʌ + e → e  
ʌ + a → a

Modern Greek: Chatzidakis' Rule (Newton 1972)

Proclitic = base: [+back, +round] < [-back, -round];

[+low] < [-low];

[-high] < [+high]

su = <i>pa, to = <e>ksera, mu = <e>ðose,

t<u> = aðerifu, t<u> = orfanu, t<o> = allo

Telegu (Wilkinson 1974) retroflexion preserved

/le:ɖi-lu/ > le:[u] 'deer pl.'

/panɖu-lu/ > pa[[u] 'fruit pl.'

➤ marked feature is not copied in reduplication (TETU)

Sanskrit reduplication

root            perfect  
pat            pa-pat-a        'fly'

prath	pa-prath-a	'spread'
mna:	ma-mna:-u	'note'

reduplicant has simple CV shape and does not copy vowel length: CV > CCV, a > a:

➤ unmarked found in hypocoristic (nicknames)

Elizabeth	Beth ≈ Bess	θ -> s
Mathew	Mat	θ -> t
William	Will ≈ Bill	sonorant > obstruent, continuant > stop
Richard	Dick	r > d
Sarah	Sadie	r > d
Jacob	Jack	V: -> V
Michael	Mick	V: -> V
Margaret	Peg	m > p

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