

Evolutionary Phonology and Sound Change Typology

Lecture 2: Natural and unnatural sound patterns

I. Common sound patterns tend to be natural sound patterns.

But what are natural sound patterns? (Blevins 2008a, 2008b) *Natural sound patterns are sound patterns grounded in articulatory, aerodynamic and perceptual properties of speech.* Typically, this means that the sound pattern can be explained with reference to articulatory and perceptual properties of speech; not predicted, but understood with reference to concrete aspects of speech production and perception. Naturalness, in this sense, can be applied to synchronic contrasts, phonotactics, and alternations, as well as to sound change. This definition is the most common one found in the phonology literature.

A. A sampler of natural sound patterns.

P	=	Primary perceptual basis	C = consonant
A	=	Primary articulatory basis	V = vowel
S	=	Synchronic	C _{vd} = plain voiced obstruent
D	=	Diachronic	C _v = plain voiced obstruents & implosives
Cf	=	Context-free	C _{-vd} = voiceless obstruent
Cs	=	Context-sensitive	N = nasal consonant
inc.	=	includes	

A.1 Alternations with a primary perceptual basis.

a. fricative > fricative, inc. θ > f, s > ʃ/_l	P, D, Cf, Cs	Ohala (1974), Blevins (2004a, 134-35)
b. t > k kl > tl	P, D, Cf, Cs P, A, D, Cs	Blust (1990, 2004), Blevins (2004a, 122-25) Blevins & Grawunder (2009)
c. flat > flat inc. pharyngealized, labialized, retroflex, velarized	P, D, Cf	Ohala (1974), Blevins (2004a, 136-37)
d. aspiration <> nasalization, aka rhinoglottophilia	P, D, Cf	Blevins (2004a, 135-36)
e. velar palatalization	P/A, S, D	Guion (1998)
f. l > w	P/A, S, D	Ohala (1974)
g. tonogenesis	P/A, D	Hombert et al. (1979)
h. coronal R <> uvular R	P, D	Engstrand, Frid & Lindblom (2007)
i. final vowel shortening	P, D, S	Myers and Hansen (2007)
j. pre-vocoid vowel length neutralization	P, D, S	Myers and Hansen (2005)
k. perceptual metathesis	P, D, S	Blevins and Garrett (1998, 2004)
l. dissimilation	P, D, S	Blevins (2004a, 148-49)
m. neutralization of release features when consonant is unreleased (inc. laryngeal and place features)	P, S, D	Steriade (1999), Blevins (2004a, Ch4 & Ch5)
n. regressive assimilation of release features in CC clusters (inc. laryngeal and place features)	P, S, D	Ohala (1990), Steriade (2001) Blevins (2004a, Ch4 & Ch5)
o. progressive assimilation of retroflexion in CC	P, S, D	Steriade (2001)

A.2 Alternations with a primary articulatory (or mixed) basis.

q. local CV, VC, CC, VV assimilations	A, D, S	Hardcastle and Hewlett (1999), Recasens & Palares (2001)
r. vowel harmony	A, D, S	Majors (1998), Harrison et al. (2002), Przedziecki (2005)
s. consonant harmony	A, D, S	Hansson (2001, 2004)
t. tonal downdrift	A, D, S	Hombert (1974)
u. tone sandhi	A, D, S	Shih (2005)
v. compensatory lengthening	A, D, S	Kavitskaya (2002)
w. positional neutralization	A, D, S	Barnes (2006)
x. final obstruent devoicing	A, D, S	Blevins (2006a)
y. consonant lenition	A, D, S	Kirchner (2004)
z. consonant fortition	A, D, S	Kavitskaya (2005)

II. Uncommon sound patterns tend to be unnatural sound patterns.

But what are unnatural sound patterns? On first thought, one might view unnatural sound patterns as any sound patterns that are not classified as natural in the sense defined above. However, the term 'unnatural' is used by many to express an opposition that is stronger than this, with a cline of naturalness, from the truly 'natural' at one extreme, to the truly 'unnatural' at the other. The most unnatural sound patterns are those that have all the distributional hallmarks of naturalness, being regular and exceptionless, *but lack phonetic grounding*. A less extreme definition is adopted here: *Unnatural sound patterns are those with no plausible single phonetic source, origin, or explanation*. As with naturalness, unnaturalness, in this sense, can be applied to synchronic contrasts, phonotactics, and alternations, as well as to sound change. In the realm of alternations, another term for unnatural sound patterns is 'crazy rules' (Bach and Harms 1972). In the domain of regular sound change, 'unusual' or 'bizarre' changes are highlighted in Blust (2005), where the basis of this classification is, again, the lack of clear phonetic grounding.

The most widely-studied source of unnatural sound patterns is likely analogy, as this term was used and understood in the 19th century and contrasted with natural 'mechanical' sound change (e.g. Paul 1880). Under analogy, a sound pattern may emerge from word-level changes based on form/meaning similarity relations between other sets of words (e.g. Aka-Bea final voicing). However, unnatural sound patterns have a variety of other sources. These include: 'rule inversion' where a historical sound change taking A > B in some environment is reinterpreted as a generalization on the distribution of A in the complement environment (Vennemann 1972); rule telescoping, where a sequence of historical sound changes A>B, B>C, etc. has a condensed form A>C in the grammar, with no evidence for intermediate stages (Hyman 1975, Chapter 5); accidental convergence of diachronic processes that result in regular sound patterns (Blevins 2004a, 69-70; 162-64); analogical morphophonology, where morphophonological alternations are reinterpreted as phonological ones (Garrett and Blevins 2009); conscious or deliberate manipulation of linguistic symbols that result in regular sound change (Blust 2005:264); and language contact (Blevins 2006a).

Providing empirical support for the classification of a sound pattern as 'unnatural' is more difficult than evidence for naturalness, since no amount of positive evidence will show that, for example, under certain conditions, [t]s *cannot be* perceived regularly as [k]s. In fact, though a regular context-free sound change *t > k might at first glance seem unnatural, there is now evidence that it may be natural after all (Blevins 2004a, 122-25; Blust 2004). With instances of rule inversion, the unnatural status of the rule is established by evidence from historical linguistics, typology and phonetics. What all potentially unnatural sound patterns have in common is a starting point where the sound pattern in question is one that is *not known to follow from any natural phonetic principle*.

A. A sampler of unnatural sound patterns: alternations

a. w/j > -p	Drehet, Levei	D, Cs	Blust (2005)
b. w/b > c-, -nc-	Sundanese	D, Cs	Blust (2005)
c. dr > k ^h	Drehet	D, Cf	Blust (2005)
d. b > -k-	Berawan	D, Cs	Blust (2005)
f. Ø > j / [_ a	Oceanic	D, Cs	Blust (1990)
g. C > Ø / [_	Pama-Nyungan	D, Cs	Blevins (2001)
h. C > Ø / [_]	Oceanic	D, Cs	Blevins (2004b)
i. C > Ø / [_]	Cajun English	D, Cs	Blevins (2006b)
j. t, t ^h , d > s / _ m	Ancient Greek	S, Cs	Paul (1880) Garrett and Blevins (2009)
k. p > s / _ i	Bantu	S, Cs	Hyman (1975, 174-75)
l. i > u / d _	Kashaya	S, Cs	Buckley (2000)
m. n > / _ i, j	E. Ojibwe	S, Cs	Buckley (2000)
n. M > L / _ C _{vd}	Zina Kotoko	S, Cs	Odden (2005)
o. M > L / C _v _	Zina Kotoko	S, Cs	Odden (2005)
p. Ø > dz / V _ i	Chamorro	S, Cs	Blevins (2008b)
q. Ø > ŋ / V _ V	Uradhi	S, Cs	Blevins (2008b)
r. h > l / {V _{+bk} , C} _ V	Wiyot	S, Cs	Blevins & Garrett (2007)
s. C _{-vd} > C _{vd} / [_]	Lezgian	S, Cs	Yu (2004)
t. antigemination	Tonkawa, Tunisian Arabic, etc.	S, Cs	Blevins (2005)
u. /t, k, s, ʃ, h/ but not /p/	Japanese, target of voicing	S, Cs	Mielke (2008:156-57)
v. /v s g/, but not /b/, /d/, /x/, etc.,	Evenki, target of post-nasal nasalization	S, Cs	Mielke (2008:165-66)
x. / _ {ʃ s ^w n}, but not other Cs	Thompson, /t/-deletion	S, Cs	Mielke (2008:168-69)
y. {n n' ? h} _ , but not other Cs	Thompson, /t/-deletion	S, Cs	Mielke (2008:168-69)

III. Case study of consonant epenthesis: natural and unnatural sound patterns

(1) A common phonological description of consonant-epenthesis

There is a recurrent sound pattern V > C_iV

(2) Why the general pattern V > C_iV ? Universal syllabic markedness

ONSET: Syllables need/require onsets (Syllable[V...])*

(3) In V > C_iV, why is C_i inserted instead of C_j ? Universal segmental markedness

C_i is less marked than C_j.

(4) Recurrent general patterns of consonant-epenthesis

- i. Intervocalic: $VV > VC_iV$
- ii. a. Prosodic domain-initial: $Pr[V > [C_jV$
 b. Prosodic domain-final: $V]_{Pr} > VC_j]$

A. Natural epenthesis sound patterns

(9) Glide Insertion as sound change

<u>Language/source</u>	<u>Sound change</u>	<u>Examples</u>	<u>gloss</u>
i. Pre-Hindi	*ia > ija	*kia- > kijaa	'done'
ii. Pre-Chamorro	*ua > uwa	*buaq > *puwa > pugwa?	'betel nut'
	*ia > ija	*liaŋ > *lijaŋ > lidzaŋ	'cave'
	*au > awu	*zauq > *tʃawuq > tʃago?	'far, distant'
iii. Pre-Tauya	*ie > ije	*nie > nije	'I/you (sg.) eat'
	*ia > ija	*nia > nija	'they eat'
	*oe > owe	*oe > owe	'I/you (sg.) say'
	*ue > uwe	*-tue > -tuwe	'I/you give to'

(11) Lou intervocalic glide-insertion \neq ONSET

i. Not all vowel sequences give rise to intervocalic glides (only sequences of rising sonority do)

/tia-n/	[tijan]	'his/her abdomen'
/kea/	[keja]	'swim'
/moloa-n/	[molowan]	'his/her shadow/spirit'
/suep/	[suwep]	'digging stick'
But: /wei-n golom/	[weɪŋgolom]	'your saliva'
/mween/	[mween]	'man, male'
/kapeun/	[kaβeun]	'bitter'

ii. Vowel-initial words are typically unaffected phrase-initially

/okok/	[okok]	'to float'
/ara-mu ŋata-n/	[arəmŋaran]	'your head is bald'
/i lip nɔt/	[ilɪpnɔt]	'pregnant (lit. 'she is carrying a child)'

iii. New vowel-initial words may arise via initial C-loss or borrowing

- a. *p > Ø / _V (Pre-Lou) *paŋan > aŋ 'feed'; *pia > ia-n 'good', *puka > uk 'open, uncover', *apaRat > aa 'south wind', *sa-ŋapuluq > saŋaul 'ten'.
- b. *k > Ø / _V (Pre-Lou) *ka > a 'and', *keri > er 'scrape out', *konso > os 'husk coconuts'.
- c. aipika 'an edible plant: *Hibiscus manihot* (loan: NG Pidgin aipika)

(12) Homorganic glide/vowel evolution in non-onset position (Hock 1991:119-20)

<u>Language</u>	<u>Sound change</u>	<u>Examples</u>	<u>gloss</u>	<u>Output of sound change</u>
a. American English	ʃ > jʃ	mæʃ > mæjʃ	'mash'	coda, complex coda
b. Old French	ɲ > jɲ > in	*plajit > <i>plaint</i> *poɲu- > <i>poing</i>	'complains' 'fist'	complex nucleus
c. Lithuanian	pʲ > pj	*pʲauti > pyauti	'cut'	complex onset

(13) Significant differences between *j/w* and *ʔ/h* epenthesis-as-sound-change

	<u><i>j/w</i></u>	<u><i>ʔ/h</i></u>	<u>Languages with prosodic epenthesis:</u>
Position of origin	V_V	p[_V V_]p	English (?), French(?), Rennellese (?), Ritwan (h), Nhanda (h/?), Muna (?), Anejom (?), Chintang (?), Yurok (h), Atayal, etc. (?); Aklanon, etc. (h) [see (15)]
Typically contrastive	Yes	No	
Input phonetic ambiguity	Yes	not necessarily	

(14) Non-contrastive phrase-initial [ʔ] in Muna, Anejom and Rennellese

	i. prosodic laryngeal; phrase-initial	ii. no prosodic laryngeal; V-initial syllables	gloss
a. Muna	[ʔina] [ʔo.e] [ʔurE]	[i.na] [o.e] [u.rE] [a.i.ni] [wa.e.a]	'mother' 'water' 'high tide' 'this' 'bat'
b. Anejom	[ʔa.ek] 'you (sg.)'	[ʔa.ba.ma.ek]	'you (sg.) come!'
c. Rennellese	[ʔe uʔu e te hokai] [ʔuʔu mai]		'the lizard bites' 'Bite!'

(15) Final laryngeal epenthesis in Austronesian (Blust 2009)

- i. $\emptyset \rightarrow ʔ / V_]_{PrWd}$ in Atayal, Saisiyat, Pazeh, Bunun, Kavalan, Paiwan, Puyuma, Amis; Yami, Itbayaten, Ivatan, Casiguran Dumagat; Brunei Malay, Sarawak Malay, Taboyan, Lawangan, Kapuas, Ba'aman, Katingan, Dohoi, Murung, Tunjung; Lou; Sundanese.
- ii. $\emptyset \rightarrow h / V_]_{PrWd}$ in Aklanon (and other Bisayan dialects of C. Philippines), Tagabili, Taosug; many northern and central Sarawak lgs., including: Miri, Narum, Kiput, Berawan, Western Penan, Long Wat Kenya, Sebop, Kelabit, Dalat, Matu, and Serike Malanau.

(16) Final [h]-epenthesis in Aceh (Durie, 1985)

$$\emptyset \rightarrow h / V_]_{Cl-Pr}$$

B. Unnatural epenthesis sound patterns

(23) Chamorro obstruent/zero alternations from glide-epenthesis + strengthening

Sound change i. $V_i > V_j i, V_u > V_w u$

Sound change ii. $j > dz, w > gw$ (context-free strengthening; articulatory)

- | | | | |
|----|------------|-----------------|----------------------|
| a. | a.mo.ti | 'take away for' | cf. amot 'take away' |
| b. | ha.tsa.dzi | 'lift for' | cf. ha.tsa 'lift' |
| c. | ha.na.gwi | 'go for' | cf. ha.naw 'go' |

(24) Singhi obstruent/zero developments from laryngeal epenthesis + strengthening (Blust, 1994)

Sound change i. $\emptyset > h / V_]_{Pr}$

Sound change ii. $h > x / u _ _$
 $s / i _ _$

- | | | | |
|----|---------------------------------|----|-------------------------|
| a. | PMP *Raja > ajux 'great, large' | c. | PMP *qubi > bis 'yam' |
| b. | PMP *batu > batux 'stone' | d. | PMP *kali > karis 'dig' |

(25) Velar/palatal stops from high-vowel devoicing + phonologization (Mortensen 2012)

Sound change i. Vowel is devoiced phrase/word-finally

Sound change ii. Devoiced portion of vowel is reinterpreted as voiceless fricative

Sound change iii. Voiceless fricative is reinterpreted as voiceless stop

Singhi, Lom (Austronesian)
 Huishu, Maru (Tibeto-Burman),
 Momo, Fomopea (Grassfields Bantu)

(26) Significant differences between synchronic epenthesis with natural and unnatural histories

	<u>natural history</u>	<u>unnatural history-1</u>	<u>unnatural history-2</u>
Position	V_V p[_V , V_]P	V_V p[_V , V_]P	complement of C > $\emptyset / V_i _ \dots$
Segment quality	w/j, h/?	obstruents	w/j, h/?, nasal, liquids

(27) Rule inversion resulting in C-epenthesis, where W = weak consonant

i. Sound change: $W > \emptyset / V_i _ \{ \#, C \}$

ii. Resulting surface patterns $V_i \{ \#, C \} \sim V_i W V$

iii. Synchronic reanalysis: $\emptyset \rightarrow W / V_i _ V$

(28) Examples of inverted C-loss giving rise to C-epenthesis

<u>Language</u>	<u>Consonant</u>	<u>epenthesis context</u>	<u>Reference</u>
Uradhi	ŋ	V#_V	Hale 1976
English, RP, Boston, etc.	ɹ	V _i #_V (V _i = lax)	refs. in Blevins 1997,
Bristol, Mid.At. etc.	l	V _i #_V (V _i =lax; V _i = O)	Gick 1999
Yupik	ʁ	V _i _#V (V _i ≠ ə)	Jacobson, 1984
Anejom	r	V_## V	Lynch 2000:29

(29) Final C-loss in Oceanic (Ross 1998)

Proto-Oceanic *C > Ø / _]Wd in, e.g.: Central Pacific (Fijian, Rotuman, Polynesian)
 Western Oceanic (Manam, etc.)
 South-East Solomonic (Toqabaqita, etc.)

(30) C/Ø alternations in some Austronesian languages (Hale 1973, Lichtenberk 2001; Pawley 2001)

<u>Language</u>	<u>thematic Cs</u>	<u>extension of thematic C?</u>
Toqabaqita	t, f, s, m, n, ŋ, l, r, w, ?	no
Manam	t, m, n, ŋ, l, r, w, ?	yes, semantic (see 31iii)
Maori	t, k, m, n, ŋ, r, wh, h	default (see 31ii)
Samoan	t, s, f, m, n, ŋ, l, ?	no
Tongan	t(s), k, f, m, n, ŋ, h, ?	no
Niuean	t, k, m, n, h	no
Hawaiian	k, m, n, l, h, ?	yes, -ʔia

(31) Some observations regarding C/Ø alternations in Oceanic

- i. /f/, /m/ are maintained in many Oceanic languages in this context
- ii. Maori default passives are sensitive to prosodic structure of the base, and there are different ‘default’ consonants in different dialects (Hale 1973; Blevins 1994)

- a. -ia, -a when base is bimoraic
- b. elsewhere, -Cia

dialect I:	-tia
dialect II:	-hia
dialect III:	-ɲia

- iii. Where leveling does occur within subparadigms, it is inconsistent with phonological markedness predictions.

Manam (Lichtenberk 2001), tr vbs based on kinship take -m-, where this pattern is arguably an innovation:

tama-m-i ‘regard s.o. as one’s father’	natu-m-i ‘adopt s.o. as one’s child’
tina-m-i ‘regard s.o. as one’s mother’	taua-m-i ‘have s.o. as one’s trading partner’
toqa-m-i ‘regard s.o. as one’s older ss sibling’	ruaŋa-m-i ‘have s.o. as one’s friend’
tari-m-i ‘regard s.o. as one’s younger ss sibling’	

- iv. V-initial allomorphs are maintained without change/ In Maori, 41.09 % of passives take -a (Biggs 1966)

(32) DeLacy (2006) on markedness and epenthesis

- (i) Markedness constraints are aspects of phonological grammars
- (ii) Markedness constraints constrain grammars in arbitrary (non-phonetic) ways
- (iii) Consonant epenthesis reflects a markedness hierarchy for Place of Articulation where:
 |dorsal >> labial >> coronal >> glottal|

The PoA hierarchy... favours glottals over all other PoAs, so accounting for why epenthetic consonants can be glottal. However, glottals are highly sonorous, so when constraints against high sonority segments dominate, glottals are eliminated as possible epenthetic segments. (op cit. p.79)

(iv) Markedness hierarchy predicts no epenthetic [p] or [k], or does it?

Of course, assimilation and dissimilation are factored out of the preceding discussion. A labial like [p] may be epenthesized in order to agree with an adjacent segment's PoA.

(33) Counter-examples to DeLacy's (2006) predictions, keeping in mind that:

- a. The only relevant data are synchronic C/zero alternations
- b. Loan word phonology can not be used as (primary) evidence
- c. Potential assimilatory or dissimilatory contexts don't count
- d. The consonant in question must be one that DeLacy does not analyse as a 'morpheme'

i. Maori , dialect III (see above)

a. *-ia* , *-a* when base is bimoraic

b. elsewhere, *-Cia* dialect I: *-tia* dialect II: *-hia* dialect III: *-nia*

ii. Panyjima (& Western Desert) phonotactic fixing with /-pa/

Panyjima share a general constraint against word-final consonants with a number of languages of Western Australia (including Western Desert dialects...). A syllable /pa/ is suffixed to stems which would otherwise close with a consonant. In Panyjima, this constraint has generalised such that nominal suffixes and clitics may not be attached to consonant-final stems; the /pa/ syllable is employed to produce vowel-final stems. (Dench 1991: 133)

Cf. a. karlinyjayi-ku 'return' (Vintr)

f. pirtulpa 'petrol' (Eng.)

b. karlinyma-lku 'bring back'

g. winmilpa 'windmill' (Eng.)

c. karlinypa 'returning' (N)

d. kunyanngu 'sleepy fellow'

h. yapan-tu-lku 'put hot cooking stones into

e. kunyanpa 'asleep' (N)

i. yapanpa 'hot cooking stone'

Western Desert: "... traditionally, many Yankuntjatjara words end in a consonant, where in Pitjantjatjara they would have the extra syllable *-pa* added" (Goddard 1992:ix).

V. Selected References (not in EP; not in Lecture 1 References; not in Blevins 2008a,b)

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