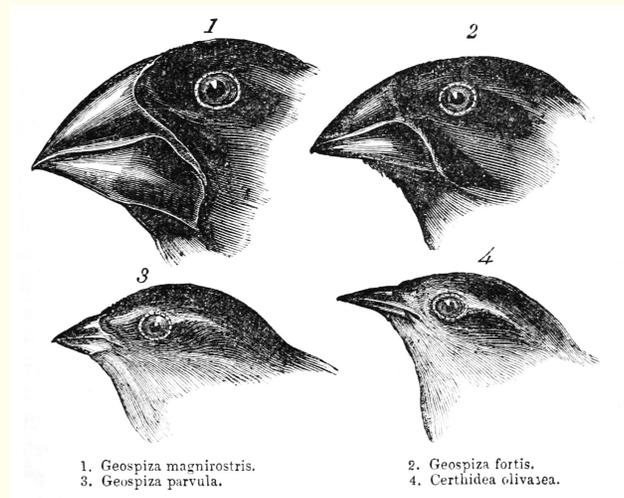


# The role of Synchrony: Structural conditions on sound change



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Evolutionary Phonology & Sound Change Typology

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# Explanation in Evolutionary Phonology

- Inheritance from shared mother tongue
- Phonetic factors, typically parallel evolution in the form of parallel phonetically motivated sound change
- Non-phonetic factors, including general cognitive mechanisms, potential phonological universals, **effects of feedback loops in the course of language acquisition**
- “Non-natural” external factors, including: contact, prescriptivism, literacy, 2<sup>nd</sup> language learning
- Chance

## Central Idea

In the course of language acquisition, **structural properties** of the phonological system being acquired may influence speech production and speech perception, **facilitating or inhibiting particular types of sound change**. We may discover these influences from two directions: investigations of sound change typology, and investigations of correlates of stable and unstable features in synchronic grammars.

# Structure Preserving Sound Change

## **Structural Analogy** BLEVINS 2004A:154

In the course of language acquisition, the existence of a (non-ambiguous) phonological contrast between A and B will result in more instances of sound change involving shifts of *ambiguous elements* to A or B than if no contrast between A and B existed.

This principle is simply. If two (or more) phonological segments or prosodic categories are learned quickly due to their unambiguous categorial status, then the existence of those categories in the evolving grammar will attract incoming ambiguous tokens to the pre-established categories. The overall consequence on historical grammars is 'structure-preserving sound change': the output of a sound change is a pre-established category or structure.

# Evidence for Structural Analogy: Compensatory Lengthening

Typological support for structure-preserving sound change is found in surveys of compensatory lengthening (de Chene & Anderson 1979, Kavitskaya 2002). Kavitskaya (2002) argues that compensatory lengthening sound changes result from phonologization of pre-existing differences in phonetic vowel duration. Phonetic factors leading to longer vowel durations include longer V-C transitions, longer vowels before particular consonants, and open-syllable lengthening. In her survey of 80 languages with historical compensatory lengthening sound changes, 72 or 90% occur in languages with pre-existing long/short vowel contrasts, while only 8 or 10% are found in languages without a pre-existing vowel length contrast. [Add Lakon, Olrat FRANÇOIS 2005]

# Evidence for Structural Analogy: Metathesis

Typological support for structure-preserving sound change is also found in surveys of metathesis (Blevins and Garrett 1998, 2004; Hume 2004). In metathesis, the inversion of segment order has a strong tendency to result in pre-existing phonotactics. For example, 23/24 cases of perceptual metathesis, where a long-domain feature is reinterpreted in a non-historical position, involve cases where the output of metathesis yields a pre-existing phonotactic (Blevins & Garrett 1998; 2004). A similar generalization appears to hold of regular CC metathesis; all 11 cases of regular sibilant-stop metathesis surveyed in Blevins and Garrett (2004) and Blevins (2004c), and all four regular cases of CC metathesis in Hume (2004), result in consonant clusters which occur in the pre-sound change stage of the language.

What kinds other kinds of sound change are facilitated/inhibited and why?

INVENTORY EVOLUTION

Context free  $t > k$  is rare. When does it occur?

PHONOTACTIC EVOLUTION

$C > \emptyset/V\_ \#$  is rare. When does it occur?

EVOLUTION OF ALTERNATION TYPES

Medial syncope is a common synchronic alternation type. When is syncopating sound change inhibited?

## Context free $t > k$

Context free  $t > k$  is rare cross-linguistically, as expected within the EP model of sound change. In this model, a context-free shift in major place of articulation is predicted only where sounds are perceptually similar and therefore likely to be confused with each other, as, for example, in a  $\theta > f$  change. By examining the rare cases where  $t > k$  does occur, we may be able to identify possible structural factors facilitating the change.

# Context free $t > k$ in Oceanic

Proto-Oceanic	*t	*k
Hawaiian	k	ʔ
Samoaan	t, k	ʔ
Luangiua	k	ʔ
Gomen	k	c
Dehu	k	∅
Iaai	k	∅
Doura	k	∅
Kuni	k	∅
Lala	k	∅

BLUST 1990:22, BLUST 2004

# Context free $t > k$ elsewhere

Language	Family	Sound change
Numfor/Biak	Austronesian	* $t > k$
Kisar	Austronesian	* $t > k$
Manipa	Austronesian	* $t > k$
Enggano	Austronesian	* $t > k$
Orokolo	Papuan/Gulf Prov.	* $t > k$
Chama	Tacana/Bolivia	* $t > k$

BLUST 1990:22, BLUST 2004; BLEVINS 2004:122-129

## A facilitating structural property

In Blust's (2004) compilation of 16 independent context-free  $t > k$  sound changes in Austronesian, the  $t > k$  sound change follows loss of  $*k$ . In other words, at the time the sound change occurs, there is no /k/ in the language. Blust (1990) characterizes this as a drag chain:  $t > k$  occurs to fill the /k/ gap.

Without invoking teleology, we can say that  $t > k$  appears to be facilitated when a language lacks /k/ as a phonological category. Why should this be?

# Understanding $t > k$

In the course of acquiring a language with a /k/ gap, the learner has many options in distinguishing the /p/ category from the /t/ category. If the central phonetic feature is strong stop burst of /t/ vs. weak stop burst of /p/, then [k] will be a better exemplar of /t/ than [t]. All one need assume is that there is variation in early speech between [t] and [k], a fact confirmed by most studies of early language acquisition.

		VOT	Burst
Category 1	[t] (and [k])	long	high amp
Category 2	[p]	short	low amp

DAVIES 1851, PLAUCHÉ 2001

## Understanding $t > k$

To the extent that we have discovered a potential facilitating factor in  $t > k$  sound change, the model of Evolutionary Phonology is strengthened. While there are similarities between [t] and [k] in contrast to [p], the evolution of a category based on these properties appears to evolve only when there is no pre-existing /t/ vs. /k/ contrast. The phonetic factor requires a structural factor to result in category evolution.

## Additional implications of $t > k$

A  $t > k$  sound change may result in a /t/-gap. Recall the discussion of Northwest Mekeo, a language without /t/, and without any coronal consonants. Languages like (/t/-less) Hawaiian and Samoan (common register) also lack /t/ as a contrastive phoneme. The analysis of  $t > k$  sheds further light on the rarity of these systems, since loss of /t/ due to  $t > k$  will only occur if a language has no /k/.

# Initial t1 clusters

A common view in modern phonological analyses is that T1 onset clusters are disfavored and highly marked. This view appears to be based on a small set of Indo-European languages, and within that, on weighting of standard languages over their non-standard counterparts. On the contrary, word-initial #T1 clusters are not uncommon in languages which allow onset clusters with laterals as second members, and there is little evidence that they are difficult to produce or perceive.

BLEVINS & GRAWUNDER 2009

# Initial Tl clusters from Kl > Tl

<u>E. Vogtland</u>	<u>Std. German</u>	<u>gloss</u>
[tl]ag	klag	'charge (1SG IND)'
[tl]amm	klamm	'damp'
[tl]ammern	Klammern	'clothpins'
[tl]ang	Klang	'sound'
[tl]appert	klappert	'worn out'
[tl]ein	klein	'small'
be[t]lag	beklag	'complain (1SG IND)'

BLEVINS & GRAWUNDER 2009

## Initial Tl clusters from Kl > Tl

<u>E. Vogtland</u>	<u>Std. German</u>	<u>gloss</u>
[tl]ag	klag	'charge (1SG IND)'
[dl]as	Glas	'glass'
[d]latt	glatt	'slippery'
[d]laube	glaube	'believe (1SG IND)'
[d]laubst	glaubst	'believe (2SG IND)'
[d]leich	gleich	'straight away'
[d]locke	Glocke	'bell'
ge[d]laubt	geglaubt	'believed'

# Initial Tl clusters from Kl > Tl

<u>Windhill</u>	<u>Lorton</u>	<u>Penrith</u>	<u>OE,ME/gloss</u>
tlap	tlap	--	klappjan/ 'clap'
tlɪm	tlɪm	tlɪm	klimban/ 'climb'
tlɪŋ	tlɪŋ	tlɪŋ	kliŋgan/ 'cling'
tlɪəz	tlɪəz	tlɪaz	kla:ðas/ 'clothes'
tlɑ:d	tləwd	tlu:d	klu:d/ 'cloud'
tlɑ:t	tləwt	--	klu:t/ 'clout'

# Other languages with K1 > T1

Language	Family	change
German dialects	IE, Germanic	K1 > T1
English dialects	IE, Germanic	K1 > T1
Mong Njua	Hmong-Mien	K1 > T1
Katu	Austroasiatic, Mon-Khmer	K1 > T1

BLEVINS & GRAWUNDER 2009

## A facilitating structural property

In Blevins & Grawunder's (2009) compilation of four distinct languages with initial #Kl > #Tl, including multiple dialects of German and English, all languages showing this sound change have a /Tl/ gap. Given this, we can say that kl > tl is facilitated when a language lacks /tl/. This appears to be the opposite of structure-preserving sound change: a new cluster type occurs only when it fails to contrast with its source. Why should this be?

# Additional implications of #k1 > #t1

- #T1 clusters are not disfavored and are not rare.
- They can be stable for long periods:
  - PIE \*T1 is maintained as /T1/ in:
    - Proto-Albanian
    - Proto-Celtic
- They have different sources, in addition to \*K1 > T1:
  - Ancient Greek vowel loss: \*TV1 > T1
  - Slavic metathesis: \*CV1. > CIV.
  - Mexican Spanish T1 in loans

## Understanding #kl > #tl

In the course of acquiring a language with a /tl/ gap, there is evidence that: (i) #kl may be heavily co-articulated, yielding dorso-coronal or wholly coronal initial stops; and (ii) there is phonotactic perceptual assimilation, in that speakers of a language lacking Tl-clusters perceive these as legal Kl-clusters (Hallé et al. 1998; Hallé and Best 2007). A true sound change occurs when phonetic [tl], [dl] are reanalyzed as /tl/, /dl/ respectively.

# Word-final consonant loss

Any regular sound change that does not have a clear phonetic explanation poses a challenge to Evolutionary Phonology. One of these is final-consonant loss, a sound change that appears to have occurred at least 14 times independently in the Austronesian language family.

WORD-FINAL C-LOSS  $C > \emptyset / \_ \#$

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$C > \emptyset / \_ \#$

Since there is no evidence of lenition, and all Cs, including {p, t, k, m, n, s, l, r} were lost, this sound change suggests structural conditioning.

BLEVINS 2004B

# Word-final consonant loss

## **Western Malayo-Polynesian**

1. Nias
2. Bungku-Tolaki and Muna-Buton (southeast Sulawesi)
3. Bima
4. Ngadha, Enda and other languages of Flores
5. Savu (Hawu) of the Lesser Sundas

## **South Halmahera-West New Guinea**

6. Wadapi-Laut (and possibly other languages of Yapen Is.)

## **Oceanic**

7. Proto-Admiralty
8. Tabar (and possibly other languages of New Ireland)
9. Lakalai/Nakanai (and possibly other languages of New Britain)
10. Motu and other Central Papuan languages
11. North/Central Vanuatu languages
12. Iaaï (New Caledonia)
13. Nuclear Micronesian
14. Central Pacific

## Structural conditioning of word-final C-loss

The central factor uniting all cases of final C-loss is that, once the final C is lost, all syllables are open. In other words, the structural conditioning for final C-loss is a phonotactic where all but final syllables are open syllables. This structural condition is surprising. It suggests that the overwhelming CV syllable structure of the language plays a role in potential disregard, or failure to attend to final consonants.

## Additional implications of word-final C-loss

That final C-loss is unnatural, or not phonetically motivated, is strengthened by the absence of parallel sound changes outside of Austronesian. While there are cases that are superficially similar, none have the same basic properties of: (i) eliminating all final Cs without evidence of lenition; (ii) resulting in across-the-board CV syllable-structure; (iii) targeting oral stops, fricatives and sonorants alike.

## Potential parallels of word-final consonant loss

French shows latent consonants which appear to reflect historical word-final C-loss.

However, at the earliest stages, up to the beginning of the 16<sup>th</sup> century, the pattern described for French was one in which final consonants were pronounced (with possible devoicing) in pre-pausal position, lost before following consonant-initial words, and pronounced (with possible voicing) in pre-vocalic position (Nyrop, 1967:324-28.)

## Potential parallels of word-final consonant loss

In French then, the regular sound change was a general rule of cluster simplification within the phonological word or phrase ( $*C_1C_2 > C_2$ ), not an instance of word-final C-loss. A parallel to this cluster simplification in the history of Austronesian is the development in Proto Central Eastern-Malayo-Polynesian, where PMP  $*CVCCVC$  are simplified to  $CVCVC$ , with final consonants intact.

## Potential parallels of word-final consonant loss

Another case of latent consonants associated with C-loss are those in Lardil nouns (Hale 1973, Kenstowicz 1994). When an absolutive noun loses its final vowel, labial and velar consonants are lost as well. However, coronal sonorants and obstruents are free to occur word-finally in Lardil, making the sound changes in uninflected nouns interpretable as strict adherence to pre-existing word-final phonotactics.

## Potential parallels of word-final consonant loss

In the history of Slavic, final consonants have been lost as part of the ‘open syllable conspiracy’. However, as detailed by Nowak (2002), this happened via a sequence of independent sound changes over hundreds of years, not by one general sound change like the recurrent loss of final-consonants in Austronesian discussed here.

## Investigating correlates of stable features in synchronic grammars

Many languages with VCVCV strings reduce the medial vowel in running speech, but fail to show diachronic syncope of this vowel for centuries. The question asked in Evolutionary Phonology is why this vowel is stable in some languages, and unstable in others? If the vowel is phonetically unstable in both language types, a structural feature may be involved.

# Predicting Syncope in Austronesian

VC<sup>v</sup>CV > VC.CV

Language	syncope	PAN final *C maintained
2.Amis	*baqəRuh ‘new’ > faʔloh	*baRaq ‘lung’ > falaʔ
3.Puyuma	*paleCuk ‘shoot’ > palTuk	*biRbiR ‘lips’ > birbir
4.Kavalan	*baŋeliS ‘tusk’ > baŋris	*biraŋ ‘to count’ > bilaŋ
6.Tsou	*qatiməla ‘flea’ > timro	*enem ‘six’ > nomə
7.Bunun	*baqəRuh ‘new’ > baqlu	*baRaq ‘lung’ > bahaq
8.Thao	*baqəRuh ‘new’ > faqlu	*aN-aNak ‘child’ > al-alak
9.Saisiyat	*binəSiq ‘seed rice’ > binSiʔ	*SimaR ‘grease’ > Simar

BLEVINS 2009B

# Regular syncope

Synchronic syncope in Taba, a SHWNG language

<u>verb</u>	<u>applicative verb</u>	
lékat	lékto	‘be bad’
bálinj	bálnik	‘wrap up’
búlaj	búljak	‘twist’
téden	tédnek	‘stack’

BLEVINS 2009B

# No syncope

The loss of final consonants in the history of Oceanic has given rise to subgroups which, historically, lacked closed syllables altogether. This is the case for Central Pacific, which includes Rotuman, the Fijian languages, and the Polynesian languages. An interesting aspect of the sound patterns of these languages is not only that none appear to have synchronic syncope alternations, but also that in the several thousand years of independent development, none has innovated a regular (medial) syncopating sound change. BLEVINS 2009B

## No syncope

The absence of historical syncope cannot be attributed to the failure of unstressed vowels to reduce. Phonetic studies of Fijian fast speech show significant reduction of unstressed vowels, and Rotuman final unstressed vowels have arguably become voiceless, with subsequent loss giving rise to the so-called ‘incomplete phase’, yielding synchronic closed syllables. An explanation for the failure of syncope as sound change then cannot be found in the phonetics of the language. The Austronesian languages that have undergone syncope, as well as those that have not, all show V.C<sup>V</sup>.CV sequences, but syncopating sound change is common where closed syllables pre-exist, and rare where they do not. BLEVINS 2009B

# Predicting Syncope in Austronesian

Within the Austronesian language family of over 1000 languages, medial syncope in VCVCV strings is predictable to a great extent. It occurs in languages that have pre-existing closed syllables, and does not occur in languages with only open syllables. In effect, it is structure preserving. BLEVINS 2009B

# Predicting Syncope in Austronesian

The overall sound patterns suggest that “perceptual illusions” in the sense of Dupoux et al. (1999) play a role, not only in loanword phonology, and experimental contexts, but also in the acquisition of native sound patterns. A general ...VCVCV... pattern yields perceptual illusions when medial syncope applies, and inhibits syncope as a regular sound change.

# Conclusions

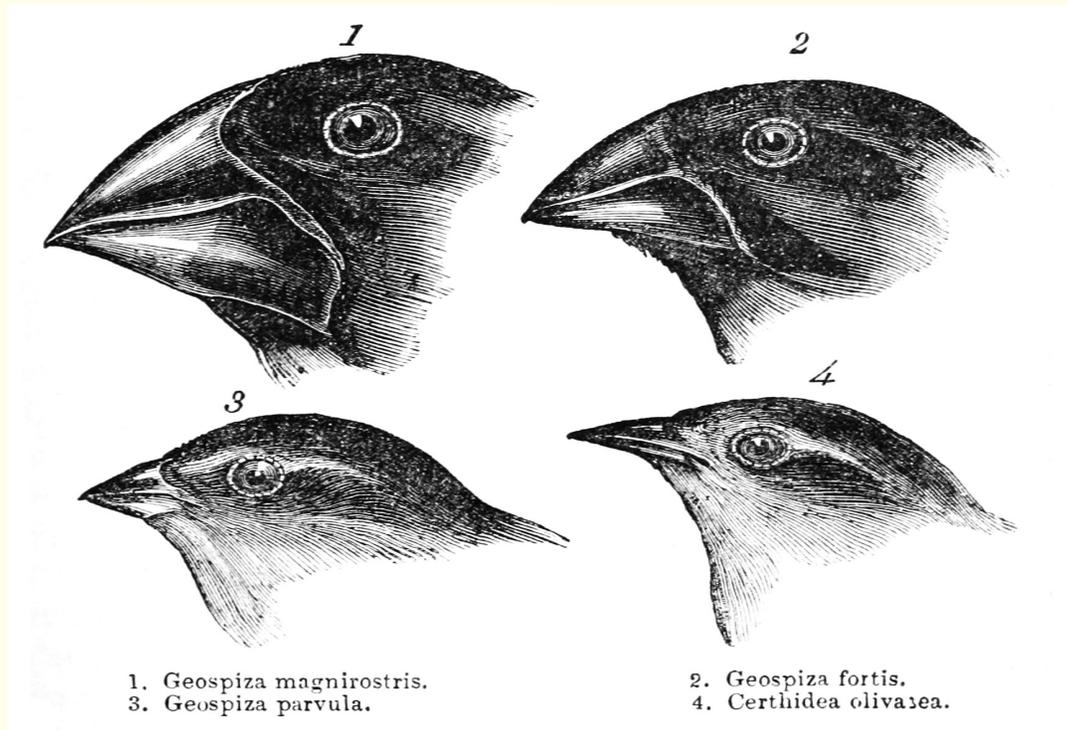
Sound changes that appear unnatural like  $*t > k$  may be the result of structural gaps, in this case a /k/-gap, that facilitates grouping of [t] and [k] into a single phonetically-defined category.

Other sound changes like medial vowel syncope that appear highly natural may be inhibited by structural factors that are known to give rise to “phantom vowels”, in this case, languages where all consonants are released into following vowels.

# Conclusions

Though the majority of common sound changes in the world's languages reflect phonetically natural processes associated with articulatory, aerodynamic, and perceptual properties of human speech, not all aspects of sound change typology follow from phonetics. Structural properties of a language influence the way in which contrasts, phonotactics and alternations are acquired, and appear to play a significant role, as a consequence in sound change typology.

Merci beaucoup!



Thank you very much!

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# Phonetic and phonological learning

Three aspects of spoken language make phonological learning complex and distinct from sign-language learning: (i) the majority of sound-meaning correspondences are arbitrary; (ii) the critical period for phonetic learning occurs prior to the end of the first year of life; and (iii) indelible phonological category learning stems from a linkage between sensory and motor experience where “sensory experience with a specific language establishes **auditory patterns stored in memory that are unique to that language**, and these representations guide infants’ successive motor approximations until a match is achieved”

KUHL 2010

# Phonetic structure and neural commitment

Native language neural commitment is a term for the implicit learning process that begins before birth and commits the brain's neural circuitry to the properties of native-language speech. That neural commitment has bi-directional effects: it improves learning for sound patterns that are compatible with the learned phonetic structure, and decreases perception of nonnative patterns or categories that do not match the learned pattern.

KUHL 2004, 2010

# Learning phonology without phonetics

The acquisition of sign language does not require storage of phonetically detailed auditory representations in the brain, nor the analysis of these within the first year which results in learning of language-specific phonological categories and sound patterns. Similarity of phonological categories across signed languages and the gross visual skills necessary to discern them may result in faster phonological learning past the critical age for spoken language phonology. Mimesis and iconicity in sign language may also speed lexical and grammatical acquisition.

# How fast can phonology be learned?

International Sign language is used by the Deaf for communication at international events. It is structurally more complex than spoken pidgins, and has iconic and non-iconic signs, an extremely complex grammatical system, and a limited lexicon (Rosenstock 2004, Quinto-Pozos & Adam 2012). The phonology of this language is mobile, making use of handshapes from the signers' dominant language, contact languages, and conventional International Sign. Fast learning is legend, with training as short as 2-3 days. Could this fast learning reflect the liberation of phonology from auditory native-language neural commitment?

# How is Evolutionary Phonology different?

- Attempts to explain recurrent sound patterns
- Attempts to explain sound pattern frequency
- Attempts to identify structural features that trigger or inhibit sound change
- Attempts to identify stable sound patterns
- Proposes testable hypotheses
- Makes no reference to phonological markedness
- Makes predictions in diachronic and synchronic domains, e.g. sub-theory of final devoicing