Areal Sound Patterns in Evolutionary Phonology

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Sound Patterns

Phonology is the study of sound patterns and their cognitive basis. Sound patterns have complex origins defined by aspects of human cognition, pre-existing language states, sound change, language use, and language contact as illustrated and analyzed in lectures 1, 2 and 3.
Sound Patterns

Sound patterns include: properties of contrastive sound inventories, such as vowel, consonant, and tone inventories; patterned distribution of sounds or phonotactics; and the variable realization of sounds in different contexts, including phonological alternations.
Areal Sound Patterns

Areal sound patterns are sound patterns resulting from language contact when speakers of a language that lacks a particular sound pattern come to acquire a sound pattern in their speech from contact with a distinct language that has that sound pattern.
Identifying Areal Sound Patterns

An areal sound pattern is a sound pattern shared by two or more languages in a designated geographic region that: (i) does not result from shared inheritance for at least one pair of languages; (ii) is not a consequence of general linguistic tendencies for at least one language; and (iii) cannot be attributed to chance for at least one language.
Micro-Areas

A micro-area is defined by a small set of languages sharing an areal sound pattern.

Micro-areas may be geographically delimited, indicative of ancient contact and isolation, or they may reflect recent contact.
A Micro-Area in Central Taiwan

Three geographically contiguous Formosan languages, - Thao, Bunun, and Tsou -, show pre-glottalization of voiced stops /b/ and /d/ as [ʔb] and [ʔd] respectively.

Blust (2009: 641) suggests that the innovation occurred in Bunun, and spread to both Tsou and Thao.
Ruling out Common Descent

Proto-Austronesian *b, *d, …

/ | \ ….

Tsouic  Bunun  Western Plains

| ?b, ?d \

Tsou  Thao

?b, ?d  ?b, ?d

Pre-glottalization is not reconstructed for Proto-Austronesian.
Ruling out Phonetic Tendencies

Pre-glottalization is not a general phonetic tendency for voiced stops.

In hundreds of Austronesian languages, *b and *d are inherited as /b/ and /d/ without pre-glottalization.
Ruling out chance

The occurrence of pre-glottalized \( [\text{ʔ}b] \) and \( [\text{ʔ}d] \) in Bunun, Thao, and Tsou is unlikely to be due to chance. Less than 10% of the world’s languages have sounds of this kind without also having ejectives or glottalized sonorants (Maddieson 2013a). The probability of three randomly chosen languages having this pattern is .001.
Ruling out chance including ‘drift’

The occurrence of pre-glottalized [ʔb] and [ʔd] in Bunun, Thao, and Tsou is unlikely due to chance. Only 2% of Austronesian languages have preglottalized stops. The probability of three randomly chosen Austronesian languages having this pattern is .00008.
Map 1: Pre-glottalization in a micro-area of central Taiwan
Macro-Areas

A macro-area is defined by a large set of languages sharing an areal sound pattern.

Macro-areas may be geographically defined, indicative of ancient population dispersal, or nomadic existence.
Questioning a Macro-Area: The Australian Continent

Dixon (2002) argues that the entire continent of pre-contact Australia is a linguistic area, including more than 200 indigenous Aboriginal Languages.

However, sound patterns defining this area do not meet the criteria set out earlier for areal sound patterns because direct inheritance cannot be ruled out.
Contrastive Consonant Retroflexion

A contrast between retroflex and non-retroflex apical stops is found in more than two-thirds of Australian Aboriginal languages, while cross-linguistically it is found in only 5-7% of the world’s spoken languages.
Common Descent

A retroflex/non-retroflex contrast is reconstructed for Proto-Pama-Nyungan (Bowern & Koch 2004), mother of ~75% of Australian languages. The remaining languages fall into ~27 families. While detailed historical work is in its early stages, some, like Proto-Tangkic, are also reconstructed with contrastive retroflexion (Evans 1995).
Map 2: Areas on the Australian continent lacking contrastive retroflexion
Contrastive retroflexion is not an Areal Sound Pattern in Australia

The high frequency of contrastive retroflexion in Australian Aboriginal languages can be attributed to shared inheritance within recognized language families.

In contrast, “single apical” languages, where the retroflex contrast is neutralized, may constitute a linguistic area.
Ejectives in the American Northwest: An Areal Sound Pattern?

Glottalized consonants in Yurok, an Algic language of Northwestern California, may constitute part of an areal sound pattern in Northwestern California (Haas 1976), or part of a larger identifiable areal pattern of high frequency glottalized consonants on the Northwest Coast of North America (Maddieson 2013a).
Languages of the Pacific Northwest coast with glottalized consonants.

Circles indicate languages without ejectives.

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<td>Twana</td>
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<td>27</td>
<td>Lower Chehalis</td>
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<td>Lower Chirook, Clatsop</td>
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<td>Clatskanie</td>
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<td>Kiks</td>
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Ruling out inheritance

Glottalized consonants are found in Yurok, and in neighboring Hupa and Tolowa, two Athabaskan languages, in Chimariko, an isolate, in Shasta, another isolate, and in Wintu, a Wintuan language. Since Yurok is unrelated to these languages, and Proto-Algic lacked ejectives, the glottalized consonants in Yurok are not due to inheritance or shared inheritance.
But can we rule out chance?

Ejective-like consonants, are found in 92/566 or 16.3% of languages in WALS (Maddieson 2013a). Since Yurok is one of approximately 32 Algic languages, and the only one with ejectives, how can we rule this out as a chance event within Algic?
But can we rule out chance?

If a particular sound pattern is common or attested in some significant percentage of the world’s languages, how can we determine whether its occurrence in what could be a linguistic area is independent, or due to contact?
Map 4: Final obstruent devoicing in Europe
1 Northwest
2 Northeast
3 North Coast
4 Sacramento Valley
5 South Coast
6 San Joaquin Valley
7 Southern Coast
8 Southeast

Key to Tribal Territories
California’s Cultural Areas

Ejectives in Yurok: Not from lexical borrowing

Though a shared culture area exists, lexical borrowing is rare in Northwestern California (Conathan 2004).

In the few borrowings in Yurok, there are no cases of /p’/ or /k’/, and only a few possible instances of /t’/ or /tʃ’/ (Blevins 2002).
Ejectives in Yurok: Regular sound change

Yurok ejectives appear to be triggered by ejectives in neighboring languages. But they are due to regular sound change:

*Ct > *Cʔt > *Cʔ > C'
Areal sound pattern paradox

Areal sound patterns are paradoxical: their primary catalyst is external, and yet, they often take the form of regular internally motivated sound change.

How can this be? STONE SOUP!
Areal sound pattern hypothesis

Most areal sound patterns are due to perceptual magnet effects within one language, where the perceptual magnets themselves are sounds from another language.
Perceptual Magnet Effect

Language experience alters perception. More specifically, sounds close to a prototypical category are less easily discriminated than those that are farther away. Prototypes “draw” perceptually similar sounds towards them.
The perceptual magnet effect
(Kuhl et al. 1992; Kuhl 2000)
Areal Sound Patterns
as Perceptual Magnet Effects

Areal sound patterns can be viewed as long-term consequences of a special case of the perceptual magnet effect. An external phonetic proto-type is internalized by a speaker on the basis of data external to the language being acquired. If bilingualism is the norm, as has been claimed, for example, in many contact situations, then the phonetic proto-type established for one language must be seen as having a magnet effect in another. In the mind of the speaker, the two languages are distinct, however, *phonetic proto-types in one can act as magnets in the other.*
Areal Sound Pattern Hypothesis

Areal sound patterns are due to perceptual magnet effects within one language, where the perceptual magnets themselves are sounds from another language. As a consequence, their evolution may mimic that of internal phonetically-based sound change.
Areal Sound Pattern Hypothesis
Condition 1: Perceptual Saliency

Establishment of a phonetic proto-type requires *perceptual saliency*: the more salient the phonetic pattern, the more likely it will spread via contact.
Ejectives are perceptually salient sounds, and therefore are expected to show areal sound patterns more often than their non-ejective counterparts.
Areal Sound Pattern Hypothesis
Condition 2: Significant Exposure

Establishment of a phonetic proto-type requires *significant exposure*: the more intense the language contact, the more likely it will result in diffusion of a sound pattern. The perceptual magnet effect works on phonetic proto-types, and may take several generations to yield sound patterns that are recognizable instances of sound change. For this reason, exposure must not only be significant, but span several generations of language learners.
1 Northwest
2 Northeast
3 North Coast
4 Sacramento Valley
5 South Coast
6 San Joaquin Valley
7 Southern Coast
8 Southeast

Key to Tribal Territories
California’s Cultural Areas

Areal Sound Pattern Hypothesis
Condition 3: Perceptual similarity

The perceptual magnet effect requires *perceptual similarity or phonetic proximity* between the proto-type and language-internal tokens, and draws phonetically similar tokens closer to the phonetic prototype. If there are such tokens, sound change will appear to be natural and phonetically motivated. If perceptually similar tokens are absent, there may be no effect, and no new category will evolve.
Karuk Consonants

\[
\begin{array}{cccccc}
  p & t & tʃ & k & (ʔ) \\
  m & n \\
  β, f & s, θ & x & h \\
  r & j
\end{array}
\]

Pre-Karuk syllables *CV(C)

*** No source for ejectives ***
Perceptual Magnet Effects yield Phonetically-based regular sound change

Glottalization in Pre-Yurok

\[ *Ct > *C^2t > *C? > C' \]

Ingredients: two common sound changes

a. \( t > ^2t > ? \) (English, Fuzhou, Ilokano, etc.)

b. \( C? > C' \) (Caddo, Yapese, etc.)
Indic Retroflexion

Hamp (1996) is extremely precise about the mechanisms giving rise to Sanskrit retroflexion, justifying the level of detail in terms of providing a clear explanation of “the development and spread of an important trait of the South Asian Sprachbund...[and] one of the clearest, most fully documented, and most internally complex cases known to us of what appears as areally induced phonological diffusion.”
Indic Retroflexion
as a Perceptual Magnet Effect

a. Ruki Rule: *s > ʃ / {r,u,k,i} _
b. ʃ-split: *ʃ > ʒ / _ D

c. *ʃ, *ʒ > ʂ, ʐ
d. {*t,*d,*n,*l} > {t, d, n, l} / ... {ʂ, ʐ}
Tibetan Retroflexion as a Perceptual Magnet Effect

pT  Ladhaki

*tr > t  e.g.  truk > ṭuk ‘six’

*dr > ɖ e.g.  dre > ɖe ‘devil’
Front rounded vowels:  
A rare contrast

Only 37/562 or 6.6 % of languages in the WALS survey have front round vowels. Of these, 29/37 or 78% are spoken in the north-central area of the Eurasian continent. Outside of this region very few languages with front rounded vowels are found, and they are widely scattered. (Maddieson 2013c).
Map 7: Front rounded vowels in Central and Western Europe, including "edge" languages Breton (NW), Souletin Basque (SW), Albanian (SE), Finnish (NE)
Front rounded vowels as a Perceptual Magnet Effect

a. $^*u > y / _ C_0 i$ (Germanic, Albanian)
b. $u: > y$ (Gallo-Romance)
c. $u > y$ (Souletin Basque)

“It seems likely that the hearing of sounds of this sort in some languages of the area may have given further support to phonetically natural processes in other languages.” (Maddieson 2013c)
Pre-aspiration: A rare phonetic feature

Pre-aspiration is rare, occurring in only 4/451 languages of UPSID, and is typically an allophonic variant of post-aspiration in voiceless stops. It is even rarer as a contrastive feature of oral stops, with Ojibwe being the only UPSID language with this property.
Pre-aspiration as an areal feature

Pre-aspiration is an areal feature of medial tense voiceless stops in Northern Europe, especially Scandinavia and areas where Old Norse was once spoken (Hansson 1999; Helgason 2002).
Map 8: Principal locations of pre- and post-aspiration in Scandinavia and the North-Atlantic (Helgason 2002:3)
Pre-aspiration and Perceptual Saliency

Bladon (1986) suggests that the rarity of pre-aspiration is due to its low perceptual saliency. If this is the case, then, under the perceptual magnet model, pre-aspiration should be less likely to diffuse than other more salient phonetic properties. In fact, strength of pre-aspiration appears to correlate with diffusion.
Weak pre-aspiration is a poor magnet

Weak pre-aspiration appears to result in spotty diffusion, cross-speaker variability, and non-normative phonetics as found in Saami dialects and Tyneside English.
Strong pre-aspiration is a good magnet

Strong pre-aspiration appears to result in more widespread diffusion and less variability, as in Scots-Gaelic dialects where Common Gaelic /p, t, k/ are realized as pre-aspirated stops. In areas where pronunciation is most normative, preaspirates are strengthened to velar fricatives, resulting in pronunciations like [xp], [xt], and [xk].
Radical Areal Spread

Focusing on rare phonological features allows one to rule out chance or parallel evolution in identifying areal sound patterns. Another way of eliminating these factors is to show that a group of features is shared between neighboring languages, and that this group of features cannot be the consequence of shared inheritance. In cases where multiple aspects of sound patterns spread, radical changes to the typological profile of a language are possible.
Phonological Feature Complexes: The Case of Chamic

Chamic, and its sister Malayic, are subgroups of Western Malayo-Polynesian, within the expansive Austronesian language family. The history of Chamic-speaking people over the last 2,000 years involves movement from insular Asia to the Southeast Asian mainland as early as 500 B.C.
Radical areal spread in Chamic

Chamic migrations gave rise to initial and sustained contact with speakers of Mon-Khmer languages. Subsequent movements of Chamic-speaking peoples resulted in intense contact with Vietnamese, and with Min speakers on the island of Hainan. Through this period of sustained contact, Chamic underwent radical contact-induced phonological restructuring (Thurgood 1999).
Map 9a: The Modern Distribution of Chamic languages (Thurgood 1999)

Map 9b The Modern Distribution of Cham and Mon-Khmer (Thurgood 1999)
Radical areal sound patterns in Chamic

1. disyllabic > sesquisyllabic > monosyllabic

2. Restructuring of V and C inventory

3. Syllabic modification
   merger and loss of final consonants
   neutralization of voicing and vowel-quality in
   pre-syllable

4. Tonogenesis: neutral > register complex > tone
<table>
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<tr>
<th>MOSTLY DISYLLABIC</th>
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<th>MOSTLY MONOSYLLABIC</th>
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<td>no tone no register</td>
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<td>no tone no register</td>
<td>tone</td>
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<tr>
<td>mamah</td>
<td>məmah</td>
<td>ma₃₃</td>
<td>‘chew’</td>
</tr>
<tr>
<td>huma</td>
<td>həmah</td>
<td>ma₃₃</td>
<td>‘dry field’</td>
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<td>tanan</td>
<td>kənan</td>
<td>ŋaŋ₃₃</td>
<td>‘hand; arm’</td>
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<tr>
<td>panah</td>
<td>mənah</td>
<td>na₃₃</td>
<td>‘shoot (bow)’</td>
</tr>
<tr>
<td>baseq</td>
<td>məsah</td>
<td>sa₃₃</td>
<td>‘wet; damp’</td>
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<tr>
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<td>məda</td>
<td>thə₁¹</td>
<td>‘young, tender’</td>
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<td>daRaq</td>
<td>ərah</td>
<td>sia₃₅</td>
<td>‘blood’</td>
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<tr>
<td>bulan</td>
<td>mlan</td>
<td>-phian¹¹</td>
<td>‘moon’</td>
</tr>
<tr>
<td>qabu</td>
<td>libao</td>
<td>phə_REQUIRED_TRUE</td>
<td>‘ashes’ (p.183)</td>
</tr>
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</table>

Table 1. Radical phonological change in two Chamic languages: Rade of South Vietnam, and Tsat of Hainan Island (based on Thurgood 1999)
The Distribution of Contrastive Tone

Most languages are tone languages, and most tone languages are spoken in three large zones: South-East Asia, New Guinea, and equatorial Africa (Maddieson 2013d). Within Africa, most of the tonal languages are found within the Niger-Congo family, and tone is assumed to be an inherited feature there.
Tone as an Areal Feature

However, the situation in South-East Asia is different. Though tone and register are pervasive, the largest language families in the area, Austro-Asiatic and Sino-Tibetan, are reconstructed as non-tonal languages. It could be that tone has evolved through contact more than any other phonological feature, both within South-East Asia, and within the New Guinea area.
Tonogenesis in Austronesian

Austronesian (1,000+ languages, < 2% tonal)

Contact-induced

Tsat << Min
Moken, Pattani Malay << southern Thai
Raja Empat << Papuan
Jabem, Bukuwa << Papuan
Kara << Papuan

Independent development
New Caledonian group only, 5/28
Summary

Areal sound patterns are easy to define but not always easy to identify, as they mimic internal developments. This mimicry is explained by the Areal Sound Pattern Hypothesis: sound patterns in one language effect those in another through perceptual magnet effects. Perceptual magnet effects are most robust when sound patterns are of high perceptual saliency and when contact is intense and prolonged. However, they also require perceptual similarity. A sound pattern will not spread if perceptually similar sounds to not occur in a neighboring language.
Thank you very much!

Merci Beaucoup!
Selected References

Emeneau, Murray B. 1956. India as a linguistic area. Language 32: 3-16.
Selected References


