



The limited role of the grammar in phonological change

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Introduction

- "Another theoretical question we are interested in is the role of grammar in linguistic change." (Conference announcement)
- Role of the grammar in sound change
 - de Lacy & Kingston 2011
 - Available at www.pauldelacy.net, to be published in NLLT
- Markedness within Generative phonology
 - de Lacy 2001, 2002a, b, 2004, 2006a, 2006b, 2007

Focus

- The phonological module (PM) from Generative theories
- Can the PM motivate change?
 - To what extent?
 - Can any extra-PM factors motivate change?
- Can the PM restrict change?
 - To what extent?
 - Can any extra-PM factors motivate change?

Aims

- Starting point: phonological changes are primarily motivated by extra-PM factors (misperception, articulatory modifications, etc)
- The PM's influence on sound change is *non-obvious* and *limited*, but *not nothing*
 - Indirectly motivates change
 - Directly restricts change
 - cf arguments that the PM's influence is obvious and extensive, or that the PM has no influence whatsoever
- Due to the PM's:
 - highly restricted Input->Output mappings
 - very unrestricted output states

Restrictive Strength and Output states

- PMs map inputs to outputs
- Three places where we can talk about restrictions/freedom: possible inputs, possible output states, and possible input→output mappings
 - No Generative Theory is committed a priori to any degree of strength at a particular level
- The 'restrictive strength' of inputs refers to the degree of limitations on input representations
 - Some theories allow input representations to be the same as output representations = low strength
 - Others put strong limits on input representations – no prosodic constituency, no non-contrastive features, etc. = high strength
 - Inputs aren't the focus today

I→O Restrictive Strength

- What is the extent of freedom of I→O mappings?
- Unrestricted I→O mappings for stops
 - /k p t ?/ can map to any other voiceless stop
- Quite restricted I→O mappings for stops
 - /k p t ?/ can map to themselves (identity), or to [?]

Output State Restrictive Strength

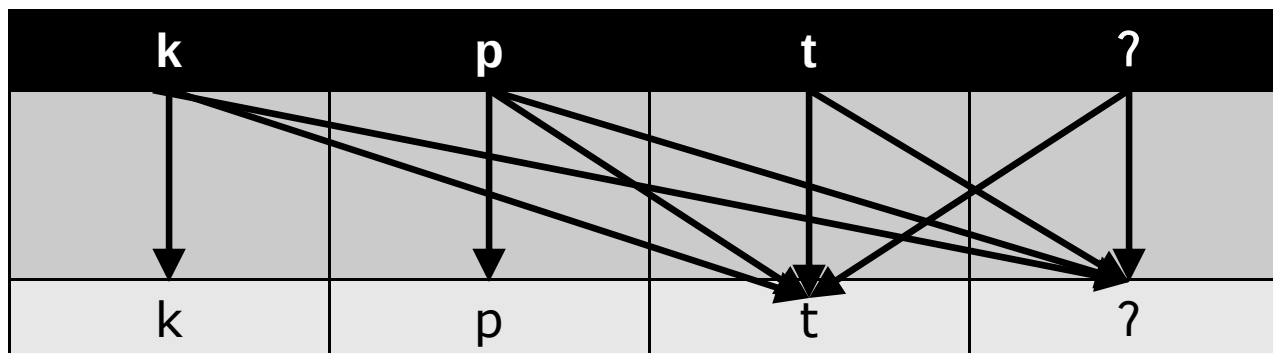
- PMs can generate a range of output states
- Unrestricted: any possible output state
 - e.g. for stop inventories, any combination of [k], [p], [t], [ʔ]
- Very restricted: few possible output states
 - e.g. inventories only from [k p t ʔ], [k p t], [p t]

So what is the PM like for Output States?

	k	p	t	ʔ	
complete				✓	Nancowry and Tübatulabal reduplicants
			✓	✓	Harar Oromo (plain stops) (Owens 1985)
		✓	✓	✓	Tahitian (Coppenrath & Prévost 1974)
	✓	✓	✓	✓	Tongan (Churchward 1953)
			✓		Buriat native words (Poppe 1960)
		✓	✓		Vanimo (Ross 1980)
	✓	✓	✓		Māori (Bauer 1993)
gapped		✓		✓	Nganasan codas (Helimski 1998)
	✓			✓	Fuzhou (Yip 1982)
	✓	✓		✓	Hawaiian (Pukui & Elbert 1979), Luangiua (Salmond 1974), Yellowknife Chipewyan (Li 1946), Colloquial Samoan (Clark 1976), older speakers' (van den Heuvel 2004)
	✓		✓	✓	Ayutla Mixtec (Pankratz & Pike 1967), Egyptian Arabic (Broselow 1976, Gadalla 2000), Somali (Saeed 1999)
	✓		✓		Japanese (Yamato & Sino-Japanese strata) (Ito & Mester 1995)
other	✓	✓			-
	✓				-
		✓			-

$I \rightarrow O$ restrictiveness?

- If the output states can be (almost) anything, are $I \rightarrow O$ mappings necessarily unrestricted?
- No: *output diversity does not imply unrestricted generative power*



Unrestricted Output from Restricted I→O

	k	p	t	?	I→O Mappings
complete				✓	/p t k/ → [?]
			✓	✓	/p k/ → [t/?]
		✓	✓	✓	/k/ → [t/?]
	✓	✓	✓	✓	identity
			✓		/k p ?/ → [t]
		✓	✓		/k ?/ → [t]
	✓	✓	✓		/?/ → [t]
gapped		✓		✓	/k t/ → [?]
	✓			✓	/p t/ → [?]
	✓	✓		✓	/t/ → [?]
	✓		✓	✓	/p/ → [?/t]
	✓		✓		/p ?/ → [t]
other	✓	✓			! (/t/ must → [?], /?/ must → [t])
	✓				! (/t/ must → [?], /?/ must → [t])
		✓			! (/t/ must → [?], /?/ must → [t])

Even more unrestricted Output States

- Other I→O mappings exist
 - e.g. lenition: /t/→[r], /p/→[β], /k/→[χ], /ʔ/→[h]
 - also assimilation, dissimilation, etc.
- [k p] inventory?
 - /ʔ/→[h], /t/→[r]
 - NZ English basilect intervocalic singleton onsets:
 - [k p], no [t] (turns into [r]), no [ʔ] (no evidence for I→O mapping)
 - However, will *always* be in a restricted environment: i.e. in those environments where assimilation/dissimilation/lenition *can apply*

The difference?

- So what is the difference between a PM with
 - UU: unrestricted $I \rightarrow O$ & unrestricted output states
 - RU: and restricted $I \rightarrow O$ & restricted output states?
- UU: the output state $[k \ p \ ?]$ could be generated by many different $I \rightarrow O$ mappings
 - $/t/ \rightarrow [k]$ or $/t/ \rightarrow [p]$ or $/t/ \rightarrow [?]$
- RU: the output state $[k \ p \ ?]$ can only be generated by one mapping
 - $/t/ \rightarrow [?]$

Implications

- Recognition that output states are weakly restricted
- False leaps:
 - Therefore, $I \rightarrow O$ mappings are unrestricted
 - So the grammar has no role in motivating/constraining sound change
- If $I \rightarrow O$ mappings are strongly restricted, then the grammar can influence sound change ...
 - in situations where a sound change inadvertently requires an untenable $I \rightarrow O$ mapping
 - in the very few situations where the grammar cannot generate a particular output state (e.g. [k p] inventories in non-lenition, non-assimilation/dissimilation environments)

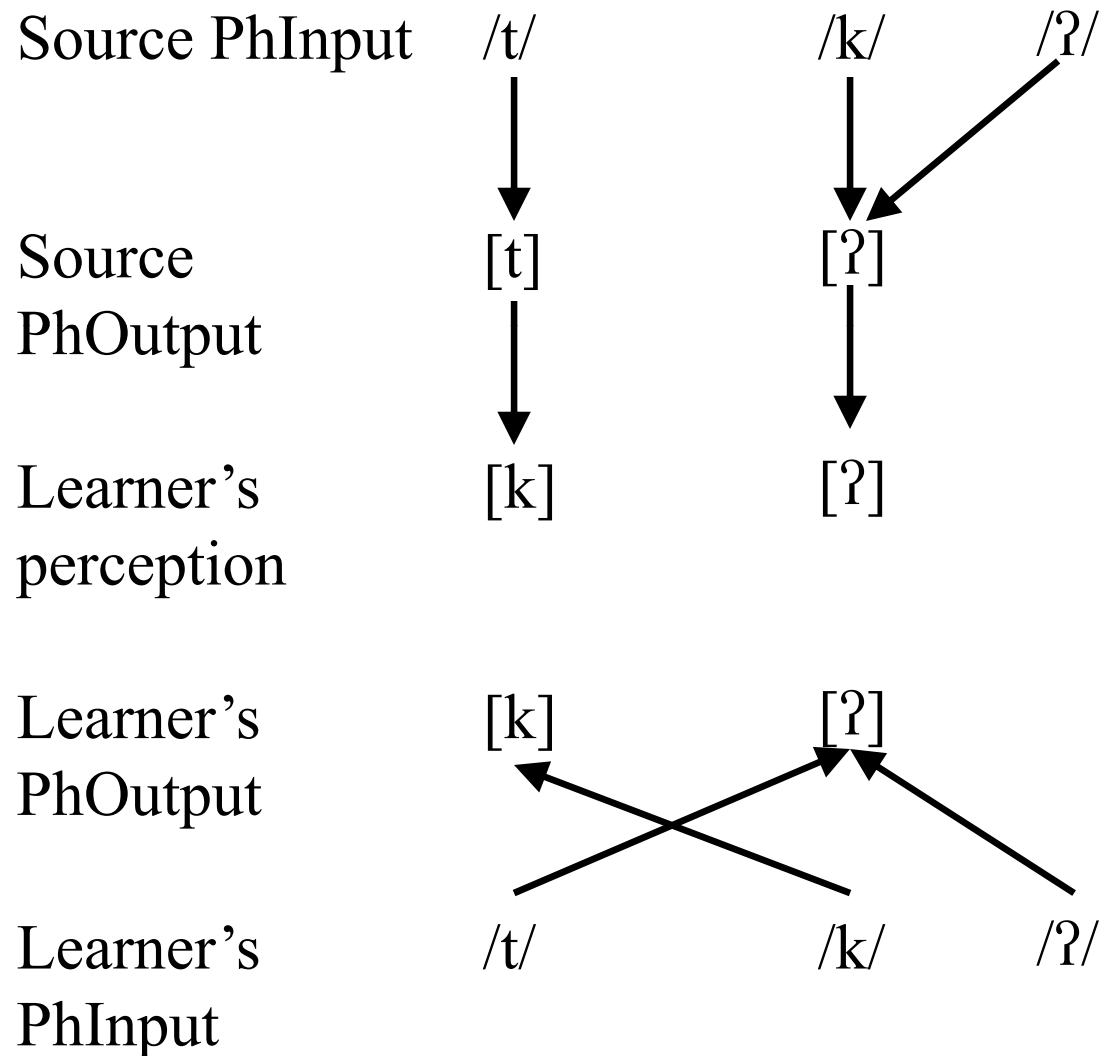
Practical implications

- The influence of the grammar will be primarily seen in $I \rightarrow O$ mappings, not output states
- Most attention in markedness, typology, sound change, etc. has focused on output states, not $I \rightarrow O$ mappings
- Studying $I \rightarrow O$ mappings is *difficult*

Extra-phonological motivations

- The task of a learner is to construct an $I \rightarrow O$ mapping that produces an output state that is the same as the *perceived* output state
- Learner does not know
 - the source's $I \rightarrow O$ mapping
 - the source's output state
- Misperception, misarticulation motivate sound change
- The learner may have a radically different $I \rightarrow O$ mapping from the source
 - $I \rightarrow O$ mappings are only accessible through alternations

Example



Case Study: Stop inventories

- Are there any inventories in which [k] and/or [p] exist but [t] and [ʔ] do not in a non-lenition, non-assimilative, non-dissimilative environment?
- None detected so far
 - Some cases have been proposed, but don't hold up under close inspection (de Lacy 2006, de Lacy & Kingston 2011)
- In leniting/assimilative/dissimilative contexts = no problem
 - Beyond stops: Chickasaw has [m] and no [n] in codas
 - Alternations show that /n/ coalesces with preceding vowels; /m/ does not
- But is the lack of [k p] inventories just an accident?

Stop I→O mappings

- Prediction: /t/→[?], never →[k], →[p]
- Is /t/→[p] learnable?
 - Yes, through alternations: [hap] ~ [hat-i]
 - Proposing that /t/ → [p] in codas
- Is [t] in codas misperceivable as [p]?
 - Less likely than other stops (both visual and acoustic cues)
- We might expect a lack of coda /t/→[p]

/t/→[k]

- Much more likely
- *t →k: found in Hawai'ian, Luangiua, colloquial Samoan, Fort Chipewyan Chipewyan
- Loanword adaptation in Peruvian Spanish
 - Pre-consonantal stops are realized as [k]: [peksi] 'pepsi', [xikler] 'Hitler'
- Does /t/→[k] ever occur?
 - No cases in de Lacy (2006)
 - Method: /t/→output mappings determined by alternations

/t/→[ʔ] common

- Yamphu (Rutgers 1998)
 - /t d t:/ →[ʔ] in codas
- /næm:it/ → [næm:iʔ] 'daughter-in-law'
 - [næm:ida] {instrumental}
- [k^hap] 'language'
- [æʔlik] 'bendy'
- /asiʔ/ → [asiʔ] 'previously'
 - [asiʔemba] 'before' (*[asidemba])

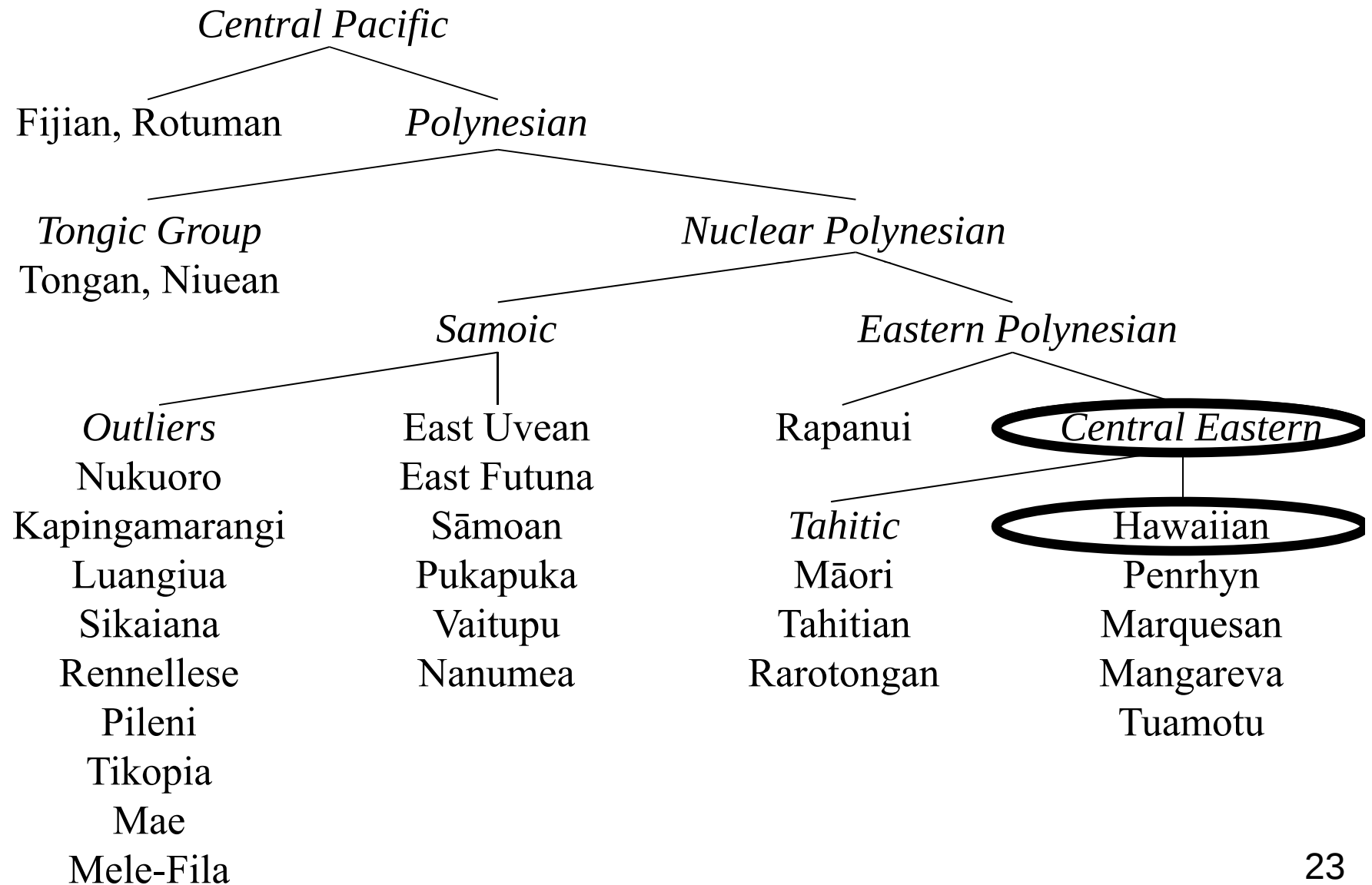
Problems with stop inventories

- Blevins (2004) suggests that the absence of [k] is crucial for misperception of [t] as [k]
 - None of the cited languages with coda alternations have this situation
- Typological scope: only a few place neutralizations have been examined in depth
- Only a few cases of /t/ neutralization are known
 - "No language has /t/→[k] is premature
- Summary: typological studies are currently unlikely to shed much light on the issue of the PM's involvement in sound change

A different approach

- The approach predicts that a sound change that involves an impossible I→O mapping for the learner will be avoided
- Epenthesis (de Lacy 2006)
- Restricted I→O mappings:
 - $/\emptyset/ \rightarrow [ʔ]$
 - $/\emptyset/ \rightarrow [t]$
- No epenthetic [k] or [p]

PEP

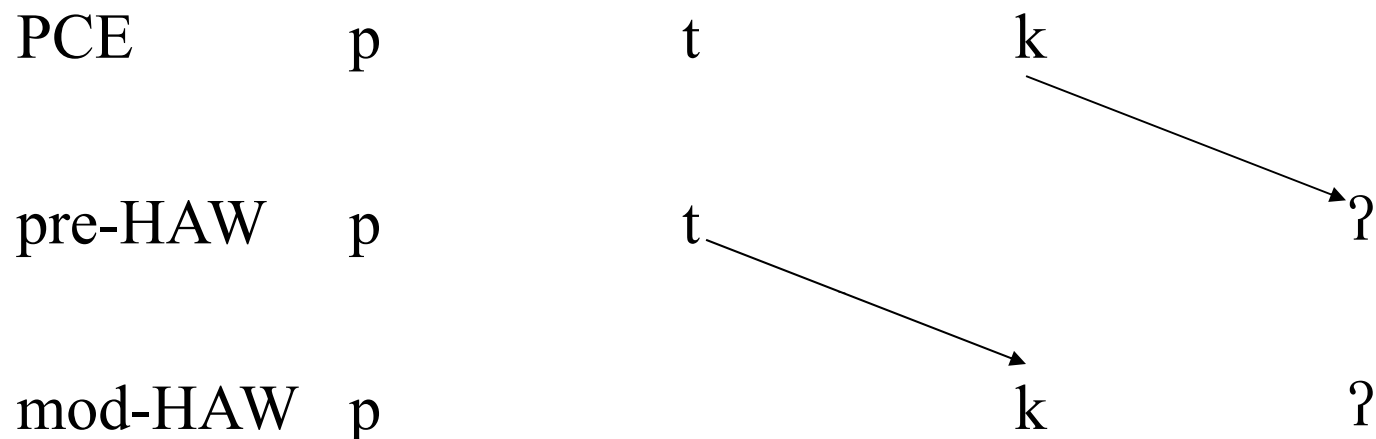


Segments of PCE

- Stops [p t k], no [ʔ]
 - PEP *ʔ → PCE ∅
- Epenthesis
 - All (almost all?) CE daughter languages have a reflex of the passive and gerund morphemes
 - They show consonant epenthesis
- Māori (diachronically very conservative)
 - (a) /mahue-ia/ → [mahuetia] ‘put off+passive’
 - (b) /manue-aŋa/ → [mahuetaŋa] ‘abandonment’
 - (c) /aroha-ia/ → [arohatia] ‘love+passive’

Environment: at the beginning of PrWds

PCE → Hawai'ian (HAW)



	PCE	mod-HAW
Initial stressed	[tá:] ‘strike’	[ká:]
	[táfa] ‘side’	[káha] ‘place’
	[tía] ‘stake, post’	[kía]
Initial unstressed	[tafíti] ‘foreign country’	[kahíki]
Medial stressed	[matála] ‘untied’	[makála]
Final stressed	[matáu] ‘fishhook’	[makáu]
Final unstressed	[míti] ‘suck’	[míki] ‘suck in’

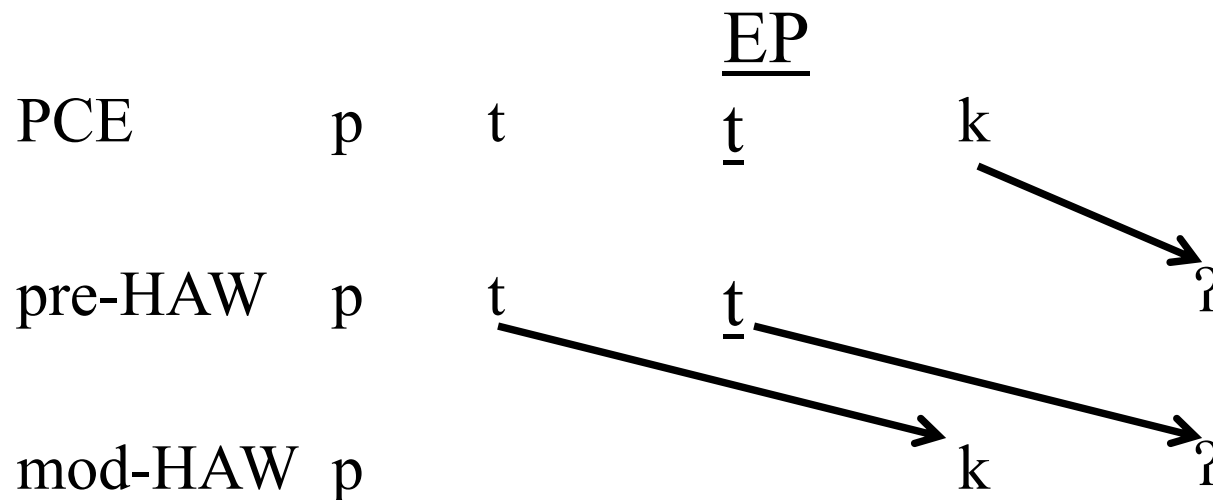
Modern persistence

- The same misperception that motivated /t/→[k] still exist
- Loanword adaptation (Adler 2006)

tinker		
tinker	[¹ tɪŋkə]	[ki ¹ nikə]
trap	[¹ tʃɹæp]	[kəlá:pə]

Epenthesis?

- If lexical *t → HAW [k], then we would expect PCE epenthetic *t to become HAW [k]
- PCE /arofa-ia/ → [arofatia]
- HAW /aloha-ia/ → [aloha?ia]



Regular vs Lexical Allomorphs

- The passive has a regular allomorph /ia/
 - /ia/ shows epenthesis when it appears PrWd-initially
- It also has irregular (suppletive) allomorphs
 - e.g. [lia], [mia], [nia], [na], [hia]
 - [haʔi-na] 'tell+pass.'
- PCE had *suppletive* [tia] allomorphs
 - Hawai'ian: [kia]
 - *holotia → HAW [holokia]
- *t in other affixes surfaced as [k]
 - HAW [ku:], [ka:]

Was the passive special?

- Nominalizer: -ɽana, (suppletive -hana, -kana, -lana)
- Imperative: -ɽia (supp. {h,k,l,m}ia, na)
- Transitivity: -ɽi (supp {h,k}i)
- Phonetically special?
 - Impossible to tell
 - No studies on modern CE languages about whether epenthetic [t] is realized differently from lexical [t]

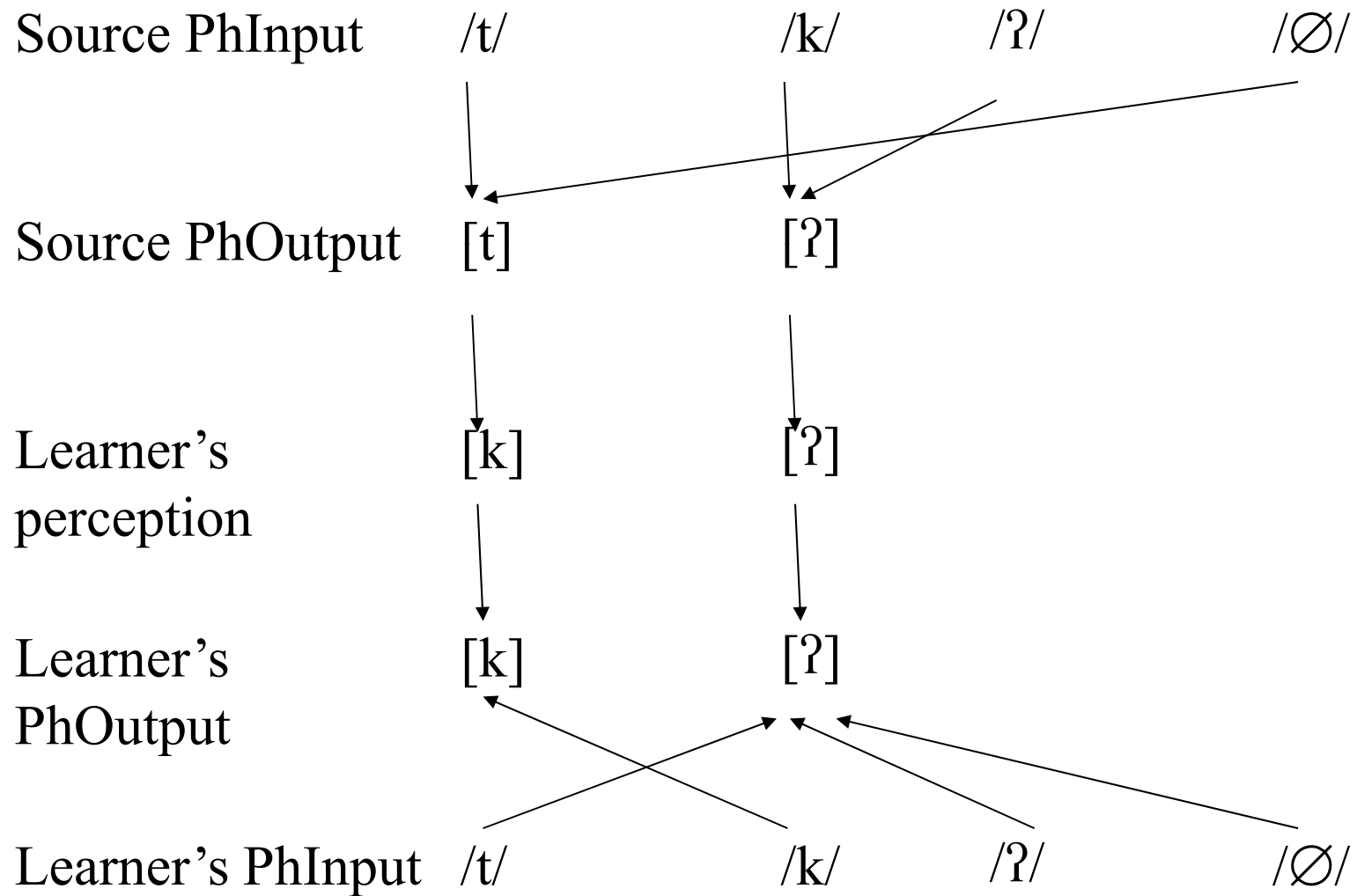
Grammar as the motivation

- The problem with epenthetic [k] is that it involves an impossible PM I→O mapping: $/\emptyset/ \rightarrow [k]$
- As soon as lexical [t] was eliminated, there was only one choice for the epenthetic consonant: [ʔ]

How does this work?

- The source's outputs include [p t ?], no [k]
- The learner misperceives [t]
 - Likely to be [k]
 - But [?] also possible
- The grammar guides the misperception
 - The lexical inventory [p k ?] *can* be generated
 - The epenthetic output [k] *cannot* be generated, so the learner selects [?] as the misperceived output
- The learner's task is to create an $I \rightarrow O$ system with lexical [p k ?] and epenthetic [?]

The process



Summary

- Limitations on the PM's I→O mappings helped guide a learner's misperception
 - In a sense, the grammar *motivated* the change from epenthetic /t/→[?]
 - But this is an indirect sense of 'motivated': the misperception was *possible*; the grammar helped push the misperception in a particular direction

Voiced stops and sound changes

- g b d Nhanda (Blevins 2001), Catalan (Wheeler 2005)
- g b Tigak (Beaumont 1979)
- g d Wapishana (Tracy 1972), Ayutla Mixtec (Pankratz and Pike 1967)
- b d Sioux Valley (Santee) (Shaw 1980: 17), Xavanté Macro-Je (Rodrigues 1999a)
- g Makurap (Rodrigues 1999b:112ff)
- b Koasati (Kimball 1991)
- d Diyari (Austin 1981), Nambiquara (Kroeker 1972)

Possible mappings

- Lenition: /g/ → [ɣ,w], /b/ → [β,w], /d/ → [ɾ,l]
- What about selective devoicing?
 - /+voice/ → [-voice]
 - But *individual* /g/ → [k], /b/ → [p], /d/ → [t] are not possible
 - No 'selective' devoicing
- So, an output system like [b d] must have come about by /g/ → [ɣ/w], *not* /g/ → [k]

Counter-examples?

- Blevins (2006): Tonkawa, Frisian c. 1900, Haisla
- Tonkawa: no voiced stops
 - The *b*, *g*, *gw* in Hoijer (1993) stood for voiceless stops (corrected in Hoijer 1946, Mithun 1999)

Frisian c.1900

- Frisian c.1900
 - No words end in [g]
 - /b/ and /d/ are partially or entirely devoiced word-finally
 - But: No evidence that /g/ → [k] – no alternations
- Modern Frisian: /g/ spirantizes:

UR		Spirantize		Devoice
/b/			→	p
/d/			→	t
/g/	→	y	→	x

Kitlope Haisla

- The stops / $\widehat{d\bar{z}}$ $\widehat{d\bar{l}}$ g^j G / “usually” devoice finally
 - there are no alternations showing / b g^w G^w /
 - there are “not many” examples.
- / d / exhibits “free variation between variants with and without voicing”, and “occurs very frequently”.
- The fact that final / d / devoices *more often* than other voiced stops does not mean that there must be a ranking in which / d / devoices finally while underlying voiced dorsals do not
- Not possible to conclude much

Dakota (Shaw 1980)

- Output coda inventory of [g] *alone* – no [d] or [b]
- /wãjak/ → [wãjag] ‘to see’ cf. [wãjak-a]
- /ʃok/ → [ʃog] ‘thick, solid’ cf. [ʃo.k-a]
- /tʃek/ → [tʃeg] ‘to stagger’ cf. [tʃe.k-a]
- /xap/ → [xam] ‘to be stripped’ cf. [xa.p-a]
- /sɔt-ja/ → [sɔn.ja] ‘to know’
- /wa-nitʃ/ → [wa.nin] ‘be without, lack’ cf. [wa-ni.tʃ-a]

Conclusions

- What is the PM like?
 - Fairly restricted $I \rightarrow O$ mappings
 - Almost unrestricted output states
- Implications for sound change
 - Almost all output states can be learned
 - But each output state is restricted in how it is implemented in terms of $I \rightarrow O$ mapping

Detection of the grammar's influence

- A sound change can result in an output state that can only be brought about by a particular I→O mapping
 - But that mapping forces some other part of the phonology to change
- Hawai'ian: misperception of [t] as [k] required epenthetic [k]
 - The inability to map $/\emptyset/ \rightarrow [k]$ 'indirectly motivated' the change of epenthetic [t] to [ʔ]
- Devoicing systems: the misperception of some voiced stop as a voiceless stop indirectly motivates across-the-board devoicing

Is the grammar's role obvious?

- No
- The permissiveness of output states mean that looking at the typology of output states alone will rarely show any certainty
- In contrast, the typology of $I \rightarrow O$ mappings should show significant asymmetries
- So, the PM plays a role in sound change, but a subtle one

Online Resources

Clark, Ross (2010). Polynesian Lexicon Project Online.
<http://pollex.org.nz/> [Retrieved 6 December 2011]

de Lacy's articles & book: www.pauldelacy.net
- and sources for the devoicing cases