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Integrating sound symbolism with core grammar: The case of expressive palatalization

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Sound symbolic patterns

Prevalent: most (all?) languages exhibit these kinds of patterns.

Overlap: shape canons, reduplication, consonant and vowel substitutions, e.g., palatalization

Phonesthemes

/gl/ 'light, vision', *gleam, glisten, glow*
/sn/ 'nose, mouth', *snore, snack, sniff*

Baby talk registers

/jani/ → ja[ɲ]i 'go'

/piɽaku/ → pi[ɻ]aku 'satiated' (Warlpiri, Laughren 1984)

Ideophones and sound symbolic vocabularies

tʃoko-tʃoko 'moving like a small child'

cf. *toko-toko* 'trotting' (Japanese, Hamano 1986/1998)

Context: Different in kind

Sound symbolism runs counter to many deeply held beliefs

- Contradicts arbitrariness of the sign: non-arbitrary sound-meaning mappings
- Challenges principle of compositionality: abstract semantic features difficult to isolate, combine in coherent semantic representations (Bolinger 1950, Kita 1993)

Sound symbolism doesn't seem to fit in known typologies
(Ferguson 1977, Kita 1997, Zwicky & Pullum 1987)

- Phonologically aberrant structure
- Special paradigms, morpho-syntactic requirements
- Interspeaker variation
- Imperfect control

➢ Sound symbolism may have a logic of its own, but should have a marginal status because it is different in kind from the rest of grammar.

Context: The surge in psycholinguistics

Phonesthemes: only a problem for compositional analysis, but fits within the view that mental lexical is a network of interconnected units

- Bybee 1988: lexical network linking phoneme sequences with semantic features
- Bergen 2004: phonesthemes display priming effects similar to compositional morphology

Word learning: iconic sound symbolism facilitates word learning with perceptuomotor analogies (Imai et al. 2008, Kelly et al. 2010)

Category learning: more abstract sound-meaning correspondences (meta-linguistic sound symbolism) aids in learning word classes (Cassidy & Kelly 1991, Fitneva et al. 2009, Monaghan et al. 2012)

➢ Sound symbolism is psychologically real, and provides important evidence in language acquisition; perhaps its marginal status in grammar should be reconsidered.

Context: Review of phonological analyses

SPE phonology: babytalk registers have always been formalized using SPE rule notation, showing the common ground they have with phonological processes (Ferguson 1977).

Autosegmental phonology and morphology: segmental processes involve featural morphemes subject to principles of autosegmental association and docking, parallel with sequential voicing in Japanese (Mester & Ito 1989)

Optimality Theory: segmental processes involve featural affixation, subject to alignment and anchoring constraints (Akinlabi 1996, Horwood 2002); realization of featural prosody governed by many of the same principles as 'regular phonology', e.g., conflicting directionality (Zoll 1997) and feature compatibility (Kurisu 2009)

- Theoretical insights can come from parallels between regular and expressive phonology.

Context: A middle ground

Claim 1: sound symbolism is different in kind from other phonological patterns, and phonological analysis of sound symbolic patterns must reflect this fact.

Claim 2: but sound symbolism can be integrated in traditional grammar, once proper motivation recognized (iconic mappings).

Claim 3: integrating expressive grammar with 'normal grammar' has two desirable consequences:

- Cleaner typologies: can distinguish expressive phonology from the rest of phonology
- Explains nature of generalization in expressive phonology

Focus and road map

Focus: expressive palatalization, sound symbolic use of palatal feature structure, its place in grammar

Japanese babytalk: se:ta: → [tʃ]e:ta: 'sweater'

Japanese ideophones: [tʃ]oko-[tʃ]oko

Typology: how does the typology of expressive palatalization compare with phonologically motivated palatalization

Theory: working constraint system for palatalization in general, propose Express(X) as the motivation for expressive palatalization

Optimality Theory: construct a factorial typology by letting the Express(X) constraints run loose on the rest of phonology

Generalization: factorial typology also endowed with structural relationships that enables generalization of expressive palatalization

Typology: Phonological palatalization

- A process in which consonants acquire a secondary palatal articulation or a shift to palatal place, triggered by front vowels and palatal glides.

Motivation: phonologization of gradient consonant-to-vowel co-articulation, misperception of these structures (Hyman 1976, Guion 1996)

Phonological palatalization in Japanese: non-coronals and *r* receive secondary palatalization, anterior coronals shift to post-alveolars before *i*.

a.	/job-itai/	jo[bʲ]itai	'call'
	/wak-itai/	wa[kʲ]itai	'boil'
	/kar-itai/	ka[rʲ]itai	'shear'
b.	/kat-itai/	ka[tʃ]itai	'win'
	/kas-itai/	ta[ʃ]itai	'lead'
	/ʃin-itai/	ʃi[ɲ]itai	'die'

Typology: Expressive palatalization

- A process observed in certain registers and lexical domains in which a set of consonants are replaced by alveolar-palatals or affricates; non-assimilatory.

Motivation: palatalization has an iconic function, relating palatal sound structure to ideas of smallness, childlike behavior, and affection.

Typical domains: baby talk registers, diminutive constructions, mimetic vocabularies, hypocoristics.

Expressive palatalization in Japanese: Japanese 'baby talk', coronal fricatives and *ts* replaced by corresponding affricates.

Source phrase	Baby talk form	Gloss
onaka suita	onaka [tʃ]uita	'(Are you) hungry'
tsumetai	[tʃ]umetai	'(Is it) cold?'
kutsuʃita o haku	ku[tʃ]u[tʃ]ita o haku	'Put on your socks, would you?'
se:ta: wa doko	[tʃ]e:ta: wa doko	'Where's the sweater?'

Typology: Collection methods

Kochetov & Alderete 2011, Patterns and scales of expressive palatalization: Typological and experimental evidence. *Canadian Journal of Linguistics* 56: 345-376.

Objective: examine expressive palatalization cross-linguistically and compare its typological properties with known facts of phonological palatalization.

Methods

- Collected 37 cases of expressive palatalization (baby talk registers, diminutive morphology, other sound symbolic systems)
- Genetic diversity: 37 languages from distinct 27 *genera* and 20 language families (based on WALS classification)
- All cases were analyzed for the natural classes of inputs and outputs and tabulated to look for cross-linguistic trends.
- Expressive palatalization systems compared with Bateman's (2007) survey of 58 systems of phonological palatalization.
- Today: builds on that dataset, total of 43 expressive systems.

Typology: Expressive palatalization patterns I

Key
k = noncoronal stops, t = coronal stop, n = sonorants, s = fricatives
BT = babytalk, DIM = diminutive, SS = sound symbolic register

Secondary palatalization (*n*=5)

	k	n	t	s	
a.	k^j	n^j	t^j	s^j	Estonian (Southern) BT, Saami (Kildin) DIM
b.	k	n^j	t^j	s^j	Russian DIM
c.	k	n	t^j	s^j	Greek BT
d.	k^j	ɲ	tʃ	ʃ	Japanese SS

Place shifts, coronals only (*n*=21)

	k	n	t	s	
a.	k	ɲ	c	ʃ	Arandic BT, Basque (Eastern) BT/SS, Huave DIM, Koryak DIM
b.	k	ɲ	tʃ	ʃ	Basque SS
c.	k	ɲ	t	ʃ	Cahuilla DIM, Cupeño DIM, Quechua (Santiago del Estero) SS, Quechua DIM
d.	k	ɲ	tʃ	tʃ	Latvian BT
e.	k	n	tʃ	ʃ	Cree BT, Cree (Mouse, E. Swampy) DIM, Ojibwa (Island Lake) DIM
f.	k	n	t	ʃ	Dakota BT, Nuuchahnulth DIM, Persian BT, Quechua (Wanca) BT
g.	k	n	c	s	Jaqaru DIM
h.	k	n	ts	ʃ	Wiyot DIM

Typology: Expressive palatalization patterns II

Observation: many patterns have a single output segment, i.e., the affricates *tʃ* or *ts.*

Affrication I: tʃ (*n*=13)

	k	n	t	s	
a.	tʃ	tʃ	tʃ	tʃ	Basque (Western) DIM
b.	tʃ	tʃ	tʃ	s	Georgian DIM
c.	k	n	tʃ	s	Osage DIM, Yurok DIM
d.	k	n	t	tʃ	Chukchi DIM, Chumash (Ventureño) DIM, Japanese BT, Kannada (Haryaka) BT, Karok DIM*, Korean BT, Miwok (S. Sierra) DIM, Spanish BT, Thai BT

Affrication II: ts (*n*=4)

	k	n	t	s	
a.	k	n	ts	ts	Greek SS
b.	k	n	ts	s	Cree (Plains, W. Swampy) DIM
c.	k	n	t	ts	Nez Perce DIM, Paiute (Northern) DIM

Typology: Affrication is different

Phonological palatalization: affricates often arise via structure preservation; *tʃ* is the closest stop-like consonant to a palatal stop.

Expressive palatalization: affrication seems to have a distinct motivation:

- Single segment output systems: 17 of 43 systems have either *tʃ* or *ts*
- Rampant affrication: Georgian diminutives virtually all consonants map to post-alveolar affricates (coronal and velar stops, coronal sonorants)
- Affrication of fricatives, even palatal fricatives, which is unattested in phonological palatalization (Bhat 1978).

➢ Affrication functions different in expressive palatalization, producing affrication patterns that are unattested in phonological palatalization.

Typology: Place asymmetry

'Coronals only' palatalization is the most common pattern in both expressive and phonological palatalization, but it is much more common (88.4%) in expressive palatalization.

'Dorsals only' palatalization is well-attested in phonological palatalization (Luganda, Roviana, Dakota, Somali), but it is completely unattested in expressive palatalization.

Place of articulation targets: phonological vs. expressive palatalization

	cor	dor	cor+dor	lab+cor+dor
Phonological (n=50)	30	10	8	2
Expressive (n=43)	38	0	1	4

- **Expressive palatalization**: noncoronal palatalization implies coronal palatalization. (Not true of phonological palatalization.)

Typology: Manner asymmetry

Expressive palatalization:
•25 cases palatalize only obstruents
•18 cases palatalize both obstruents and sonorants
•*No cases only palatalize sonorants.*

Phonological palatalization:
Bateman (2011) difficult to tabulate relevant cases, but:
•Palatalization of only obstruents also most common
•Palatalization of both obstruents and sonorants is attested.
•*Palatalization of only sonorants*: Basque, Tohono O'odham, Eastern Mari, Greek, Lahu

- **Expressive palatalization**: palatalization of sonorants implies palatalization of obstruents. (Not true of phonological palatalization.)

- **Expressive palatalization**: sonorants can be mapped to palatal-alveolar affricates (Western Basque, Georgian); such an aggressive change is unattested in phonological palatalization.

Theory: Overview of assumptions

Need *some theory* of palatalization …
-palatalization is context-sensitive and assimilatory

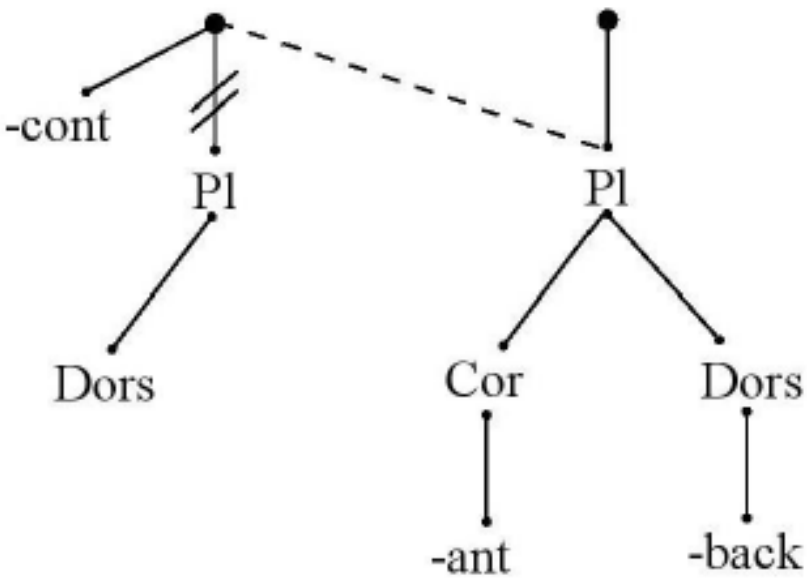
Palatals as complex place (Jacobs 1989, Jacobs and van de Weijer 1992)
•Palatals and palatal-alveolar affricates have complex place specifications: Cor + Dors/[-back]
Alternatives: Bateman 2007, Hume 1994, Lahiri & Evers 1991)

Affricates as complex manner (Hume 1994, Lombardi 1990, Sagey 1986)
•Specified [-cont] + [+cont]

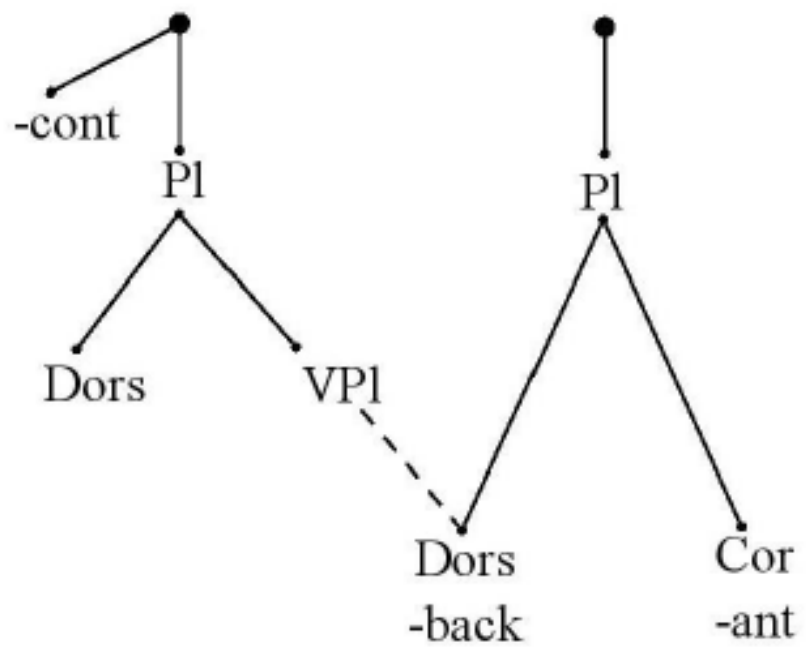
Optimality Theoretic implementation: phonological palatalization is the result of ranking context-specific markedness constraints above faithfulness.

Theory: Phonological palatalization

$k \rightarrow c/tʃ \ / \_\_ \ i$



$k \rightarrow k^j \ / \_\_ \ i$



Theory: Markedness and faithfulness

Markedness (Chen 1996, Hall & Hamann 2003, Maddieson 1984, Telfer 2006)

*KI	No sequence of noncoronal stop followed by a high front vowel.
*NI	No sequence of a sonorant coronal followed by a high front vowel.
*TI	No sequence of a coronal stop followed by a high front vowel.
*SI	No sequence of a coronal fricative following by a high front vowel.
*C^j	No consonants with secondary palatalization.
*Ts	No *ts*.
*Pal	No palatal consonants.
PalStridency	Palatals must be strident (effectively bans *cɟ* and *ɲ*, but not *ʃʒ*).
*PalStop	No palatal stops (bans *cɟ*).

Faithfulness (Fukazawa 1999, Lombardi 2001, McCarthy & Prince 1995)

Ident[son]	Corresponding segments agree in [sonorant].
Ident[back]	Corresponding segments agree in [back].
Max[cont]	No deletion of [continuant].
Dep[+cont/-cont]	No insertion of [+cont], No insertion of [-cont].
Dep[Place]	No insertion of place features.
Max[Place]	No inertion of place features.

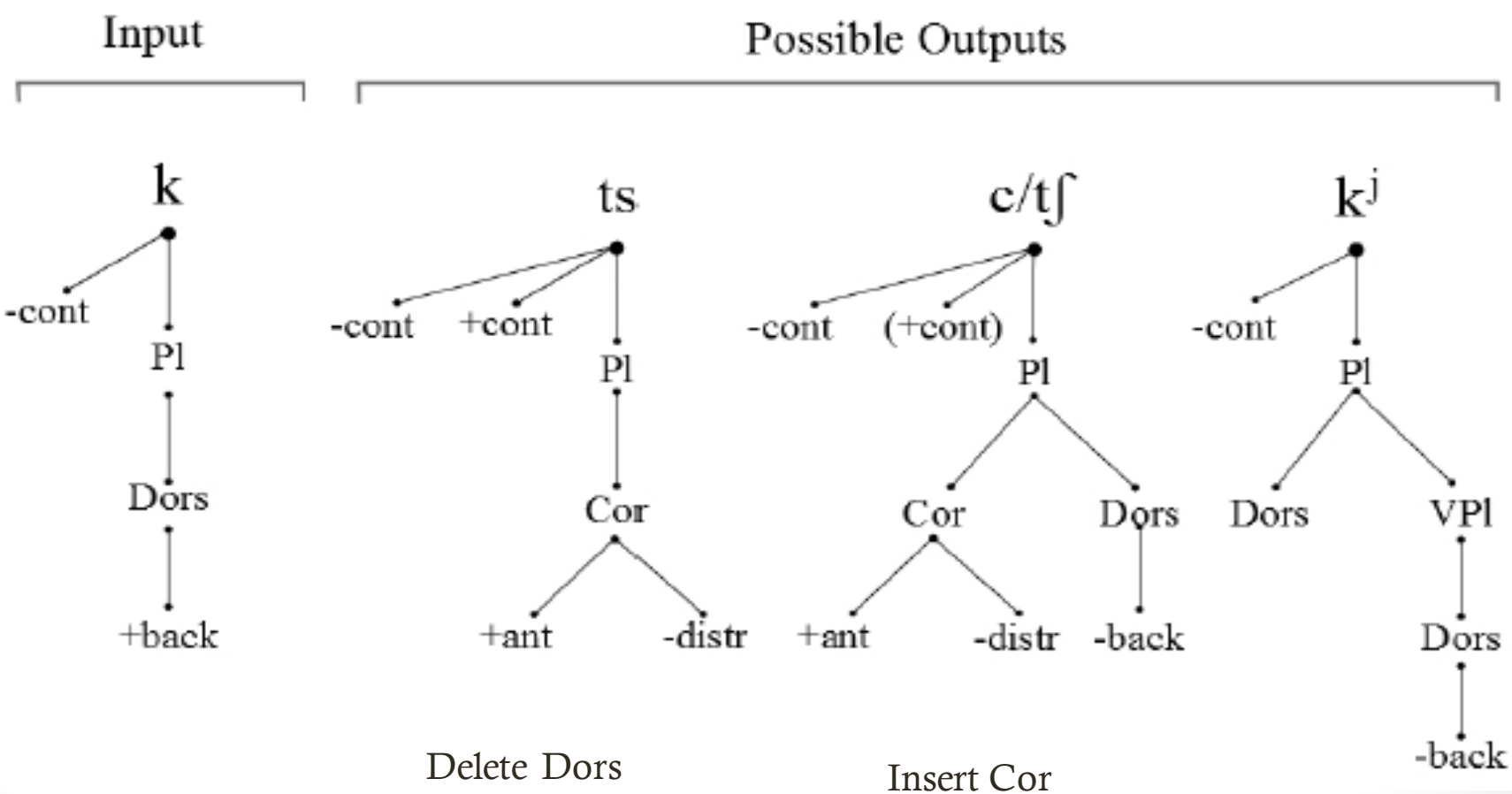
Theory: Illustration of velar palatalization

/ki/	*KI	*Cʲ	*PALSTRID	DEPPLACE	MAXPLACE	*DEP(+CONT)
ki	*!					
ci			*!		*	
→ tʃi					*	*
kʲi		*!				

- Context-sensitive *KI motivates the unfaithful mapping.
- Context-free markedness *Cj and *PalStridency prevent marked alternatives.
- Winner [tʃ] violates MaxPlace (lost a Dors) and Dep(+cont), but is best on markedness.

Theory: Expressive phonology

- Motivation for mappings cannot be CV assimilation, because expressive palatalization is not context-sensitive.



Delete Dors
Insert Cor

Insert Cor
Flip [back]

Insert VPl/Dors

Theory: Express(X) constraints

Proposal: a set of constraints posit output targets that instantiate iconic sound-meaning mappings.

EXPRESS[PAL]: All segments must be palatal (Dorsal/[-back] specification).

EXPRESS[AFFRIC]: All segments must be affricates (both [-cont] and [+cont]).

How it works:

•Applies to all segments but interleaved with markedness/faithfulness, morpheme-specific constraint tied to particular morphemes.

Background

•Functional motivation: part of a larger theory of magnitude sound symbolism. Express(X) implements the frequency code of Ohala 1994, palatalization serves an iconic function, palatals and affricates high spectral frequency, associated with speech of small children.

•See Nichols 1971 on "higher tonality", i.e., acute consonants (anterior coronals) and sharp consonants (palatals), and "increased harshness" (affricates).

•See also Yip (1998) on Repeat(X), a constraint used to motivate reduplication (also iconic in nature).

Theory: Express(X) constraints, minutiae

What kind of constraint is Express(X)?

•Probably a markedness constraint, because it applies to derived phonological structures.
•It could be a constraint defined on correspondence relations, like transderivational antifaithfulness constraints, but the derived phonological structures makes that analysis more complex.

Lexical idiosyncracy

Expressive palatalization often applies only in lexically circumscribed domains (e.g., diminutives) or in a subset of the members of a word class. To account for lexically idiosyntactic nature, could be specified as a co-phonology (Inkelas 1998) or morpheme-specific constraints (Pater 2009).

Isn't this just MorphReal for a palatal morpheme?

No. There is substance to the constraints (no substance to lexically specified material). And MorphReal has difficulty accounting for multiple applications of expressive palatalization and the lack of directionality effects.

Theory: Illustration of expressive palatalization

/ko/	EXPR(PAL)	EXPR(AFF)	*Cʲ	*PALSTRID	ID[BACK]	DEPPL	MAXPL	*DEP[+CONT]
ko	*!	*						
co		*!		*	*	*		
→ tʃo					*	*		*
tso	*!					*	*	*
kʲo		*!	*			*		

Express(X) >> Faithfulness

- Express(Pal) removes non-palatals from the candidate set.
- Express(Affric) removes non-affricates.

➢ Expressive palatalization is not context-sensitive, it is a fact of register or a lexical domain tagged for these constraints.

OT: Factorial typology

- **Objective**: integrate the Express(X) constraints with an existing theory of palatalization, understand the typological predictions it makes.

Constraint set:

Seven faithfulness constraints:

Ident[son], Ident[back], Max[cont], Dep[+cont/-cont], Dep[Place], Max[Place]

Five markedness constraints:

*C^j, *Ts, *Pal, PalStridency, *PalStop

Two Express(X) constraints: Express[Pal], Express[Affric]

Factorial typology:

•14! over 87 billion orderings, but only 69 distinct patterns

Goodness of fit:

•Predicts 14 of the 19 attested systems

•Predicts affrication patterns and place and manner asymmetries

OT: Affrication patterns

Phonological palatalization	**Expressive palatalization**
t → c ts tʃ	t → c ts tʃ
s → ʃ *ts *tʃ	s → ʃ ts tʃ
*ʃ → tʃ	ʃ → tʃ
*n → tʃ	n → tʃ

Task at hand: how produce the affrication patterns in expressive palatalization only.

OT: Expressive palatalization in fricatives

Thai baby talk: /k n t s/ → k n t ʧ

Input: /sŭaj$_{expr}$/	Outputs	EXPR[AFFR]	EXPR[PAL]	PALSTRID	*PALATAL	*CJ	*SI	DEP[-CONT]	DEP[PLACE]
a.	sŭaj$_{expr}$	*!	*				*		
b.	ʃŭaj$_{expr}$	*!			*				*
c.	→ tʃŭaj$_{expr}$							*	*
d.	sʲŭaj$_{expr}$	*!				*			*

Affrication of fricative motivated by Express(Affric), cf. Express(Pal).

OT: Expressive palatalization in fricatives, cont'd

Japanese baby talk: /k n t s/ → k n t ʧ

Input: /oiʃi:$_{expr}$/	Outputs	EXPR[AFFR]	EXPR[PAL]	*PALATAL	*CJ	*SI	DEP[-CONT]	MAX[PLACE]	DEP[PLACE]
a.	oisi:	*!	*			*		*	
b.	oiʃi:	*!		*					
c.	oitʃi:						*		
d.	oisʲi:	*!			*			*	*

- Need Express(Affric) separate from Express(Pal).

OT: No phonological palatalization of fricatives

- Absence of fricative to affricate mappings in phonological palatalization naturally predicted by the simple constraint system.
- Palatalization is sufficient to avoid a *SI violation; affrication is overkill.
- Candidate (c) is harmonically bound by (b); no ranking of constraints will predict it.

Input: /si/	Outputs	EXPR[AFFR]	PALSTRID	*SI	*CJ	*PALATAL	MAX[CONT]	DEP[-CONT]	MAX[PLACE]	DEP[PLACE]
a.	si			*!						
b.	→ ʃi					*				*
c.	tʃi					*		*!		*
d.	sʲi				*!					*

OT: Affrication and ranking effects

Affrication to ʧ: Korean, Japanese, Chukchi, Kannada
Express(Affric) *TS >> DepPlace

Affrication to ts: Greek, Cree, Nez Perce
Express(Affric) >> Dep[-cont/+cont], *TS

Palatalization, no affrication: Arandic, Cahuilla, Dakota
Express(Pal) >> DepPlace

Rampant affrication: Western Basque, Georgian
Express(Affric) >> DepPlace, Ident[son] …

OT: Importance of ambient phonology

Cree babytalk: /k n t s/ → k n ʧ s

Inputs	Outputs	DEP[-CONT]	PALSTRID	IDENT[BACK]	IDENT[SON]	MAX[CONT]	EXPR[AFFR]	EXPR[PAL]	DEP[+CONT]	DEP[PLACE]
a. /k/	→ k						*	*		
	ʧ			*!					*	*
	c		*!	*!			*			*
b. /n/	→ n						*	*		
	ʧ				*!				*	*
	ɲ		*!				*			*
c. /t/	t						*!	*		
	→ ʧ								*	*
	ʃ					*!	*		*	*
	c		*!				*			*

- Express(X) constraints must be integrated with the rest of the phonology to work properly.

OT: Place asymmetry, sketch of argument

Expressive palatalization: non-coronal palatalization implies coronal palatalization. (Not true of phonological palatalization.)

Velar palatalization is trivial for phonological palatalization:

*KI >> faithfulness >> *SI, *TI, *NI

Expressive palatalization:

- Faithfulness violations more egregious because no vowel to share complex place with.
- Express(X) constraints set specific output targets: palatals, affricates
- Faithfulness costs to achieving the output targets less for coronals than non-coronals

OT: Faithfulness costs to non-coronals

Inputs	Outputs	PALSTRID	*CJ	*TS	EXPR[AFFR]	EXPR[PAL]	DEP[+CONT]	DEP[PLACE]	MAX[PLACE]	IDENT[BACK]
a. /k/	k				*!	*				
	kʲ		*!		*			*		
	c	*!			*			*		*
	→ tʃ						*	*		*
	ts			*!		*	*	*	*	
b. /t/	t				*!	*				
	tʲ		*!		*			*		
	c	*!			*			*		
	→ tʃ						*	*		
	ts			*!		*	*			

OT: Impossible expressive palatalization

- Comparative tableau: L means above constraint must be dominated by a constraint with a W in the same row.
- No ranking of constraints can account for both (a) and (e).

Inputs		Winner ~ Loser	PALSTRID	*CJ	*TS	EXPR[AFFR]	EXPR[PAL]	DEP[PLACE]	MAX[PLACE]	ID[BACK]	DEP[+CONT]
a.	k	tʃ ~ k				W	W	L		L	L
b.	k	tʃ ~ kʲ		W		W				L	L
c.	k	tʃ ~ c	W			W					L
d.	k	tʃ ~ ts			W		W		W	L	
e.	t	t ~ tʃ				L	L	W			W
f.	t	t ~ tʲ		W			L	W			
g.	t	t ~ c	W				L	W			
h	t	t ~ ts			W	L					W

OT: Possible expressive palatalization

- Palatalization of coronals, but not noncoronals, has different faithfulness violations.
- W mark under Ident[back] allows for consistent system.

	Inputs	Winner ~ Loser	PALSTRID	*CJ	*TS	EXPR[AFFR]	EXPR[PAL]	DEP[PLACE]	MAX[PLACE]	ID[BACK]	DEP[+CONT]
a.	k	k ~ tʃ				L	L	W		W	W
b.	k	k ~ kʲ		W			L	W			
c.	k	k ~ c	W				L	W		W	
d.	k	k ~ ts			W	L		W			W
e.	t	tʃ ~ t				W	W	L			L
f.	t	tʃ ~ tʲ		W		W					L
g.	t	tʃ ~ c	W			W					L
h	t	tʃ ~ ts			W		W	L			

OT: What is behind the place asymmetry?

- The place asymmetry is not due to a special domain or staging for expressive phonology.
- Garden variety faithfulness is at the heart of the difference, supporting grammar integration.

Inputs		Winner ~ Loser	PALSTRID	*CJ	*TS	EXPR[AFFR]	EXPR[PAL]	DEP[PLACE]	MAX[PLACE]	ID[BACK]	DEP[+CONT]
a.	k	tʃ ~ k				W	W	L		L	L
b.	k	tʃ ~ kʲ		W		W				L	L
c.	k	tʃ ~ c	W			W					L
d.	k	tʃ ~ ts			W		W		W	L	
e.	t	t ~ tʃ				L	L	W			W
f.	t	t ~ tʲ		W			L	W			
g.	t	t ~ c	W				L	W			
h	t	t ~ ts			W	L					W

			P			EX	E	DI	MA	ID[BACK]	DEP[+CONT]
a.	k	k ~ tʃ				L	L	W		W	W
b.	k	k ~ kʲ		W			L	W			
c.	k	k ~ c	W				L	W		W	
d.	k	k ~ ts			W	L		W			W
e.	t	tʃ ~ t				W	W	L			L
f.	t	tʃ ~ tʲ		W		W					L
g.	t	tʃ ~ c	W			W					L
h	t	tʃ ~ ts			W		W	L			

Faithfulness

OT: Manner asymmetry

- Expressive palatalization: sonorant palatalization implies obstruent palatalization. (Not true of phonological palatalization.)
- 'Sonorant only' expressive palatalization is impossible.

	Inputs	Winner ~ Loser	PALSTRID	*CJ	*TS	EXPR[AFFR]	EXPR[PAL]	DEP[PLACE]	IDENT[SON]	DEP[+CONT]
a.	n	tʃ ~ n				W	W	L	L	L
b.	n	tʃ ~ nʲ		W		W			L	L
c.	n	tʃ ~ ɲ	W			W			L	L
d.	n	tʃ ~ ts			W		W	L		
e.	t	t ~ tʃ				L	L	W		W
f.	t	t ~ tʲ		W			L	W		
g.	t	t ~ c	W				L	W		
h	t	t ~ ts			W	L				W

OT: Manner asymmetry, cont'd

- 'Obstruents only' palatalization is possible, because of role of faithfulness.
- Like place asymmetry, manner asymmetry derives from integration of Express(X) constraints with 'normal phonology'.

	Inputs	Winner ~ Loser	PALSTRID	*CJ	*TS	EXPR[AFFR]	EXPR[PAL]	DEP[PLACE]	IDENT[SON]	DEP[+CONT]
a.	n	n ~ tʃ				L	L	W	W	W
b.	n	n ~ nʲ		W			L	W		
c.	n	n ~ ɲ	W				L	W		
d.	n	n ~ ts			W	L			W	W
e.	t	tʃ ~ t				W	W	L		L
f.	t	tʃ ~ tʲ		W		W				L
g.	t	tʃ ~ c	W			W				L
h	t	tʃ ~ ts			W		W	L		

OT: Residual issues

Secondary palatalization

Problematic, because apparent coronal bias effects not predicted. Likely requires a role for stringency relations among the *Cj constraints.

Wiyot diminutives /k n t s/ → k n ts ʃ

Seems to require a markedness constraint for *tʃ, which makes sense theoretically (bans complex place + complex manner)

Jaqaru diminutives /k n t s/ → k n c s

Seems to require a constraint banning palatal nasals and fricatives (also in a stringency relation).

Factorial typology

With four new constraints,18! yields 315 patterns.

Accounts for all the 19 attested patterns, without sacrificing analysis of affrication and the place and manner asymmetries.

Interim summary

Typology: expressive palatalization is different in kind from phonological palatalization.

- Affrication patterns in expressive palatalization only
- Place and manner asymmetry in expressive palatalization only

Theory: expressive palatalization is motivated by the non-assimilatory constraints, Express(Affric), Express(Pal); captures their iconic nature.

OT: Express(X) constraints, when let loose on the rest of phonology, account the typological differences between expressive and phonological palatalization.

- Theoretical results only work if Express(X) constraints integrated with normal phonology; not sequestered to some circumscribed domain of grammar.

Generalization: Sketch of argument

Linguistic generalizations

Don't always start out as broad generalizations in the minds of speakers.
Usually built up over a series of ever-widening generalizations.

Emergent grammar

•Development of verb meanings (Goldberg 1999)
•Syntactic constructions (Tomasello 2003)
•Phonological alternations in the lexicon (Bybee 1998, Archangeli, Mielke and Pulleyblank 2012)

Joseph 1997 'On the centrality of marginal grammar' CLS 33.

•Argues for a more central role in linguistic analysis of "marginal" phenomena
•Illustrates how "marginal" patterns, like phonesthemes, ideophones, registers of marginalized groups, can gain a foothold in synchronic grammar, lead to broader generalization.

Expressive palatalizations

•More concrete forms like babytalk registers seem to be extended in more abstract lexical domains, requiring analysis of generalization.
•Structural relationships in our factorial typology embody the kind of typological space need for phonological generalization of expressive patterns.

Generalization: Language-internal relationships

Concrete: baby talk registers

- Imitative, direct mimicry for accommodation/endearment.

Abstract: diminutives, sound symbolic inventories

- Conventional sound symbolism, involves abstraction over more concrete sound symbolism.

	concrete	abstract
a. Japanese	k n t tʃ	kʲ ɲ tʃ ʃ
b. Quechua (Wanca)	k n t ʃ	k ɲ t ʃ
c. Basque (Eastern)	k ɲ c ʃ	k ɲ tʃ ʃ
d. Greek	k n tʲ sʲ	k n ts ts

- Abstract palatalization can be seen as an extension of concrete palatalization. 'Incubators' for lexicalized versions.
- Japanese: Hamano (1986) claims meanings of many mimetic nouns derive from the 'Palatalization/childlike behavior' sign of babytalk

Generalization: A parallel with reduplication

Reduplication: also involves non-arbitrary sound-meaning correspondences, 'plural' for nouns, 'repeated action' for verbs.

Reduplication often found in babytalk registers (Ferguson 1964, Haynes & Cooper 1986), and child language (Fee & Ingram 1982, Ferguson 1983), relevant to expressive grammar.

Regier 1998: cross-linguistic survey of reduplicative meaning

•Substrate with iconic meanings: 'baby', 'repetition', 'plural'

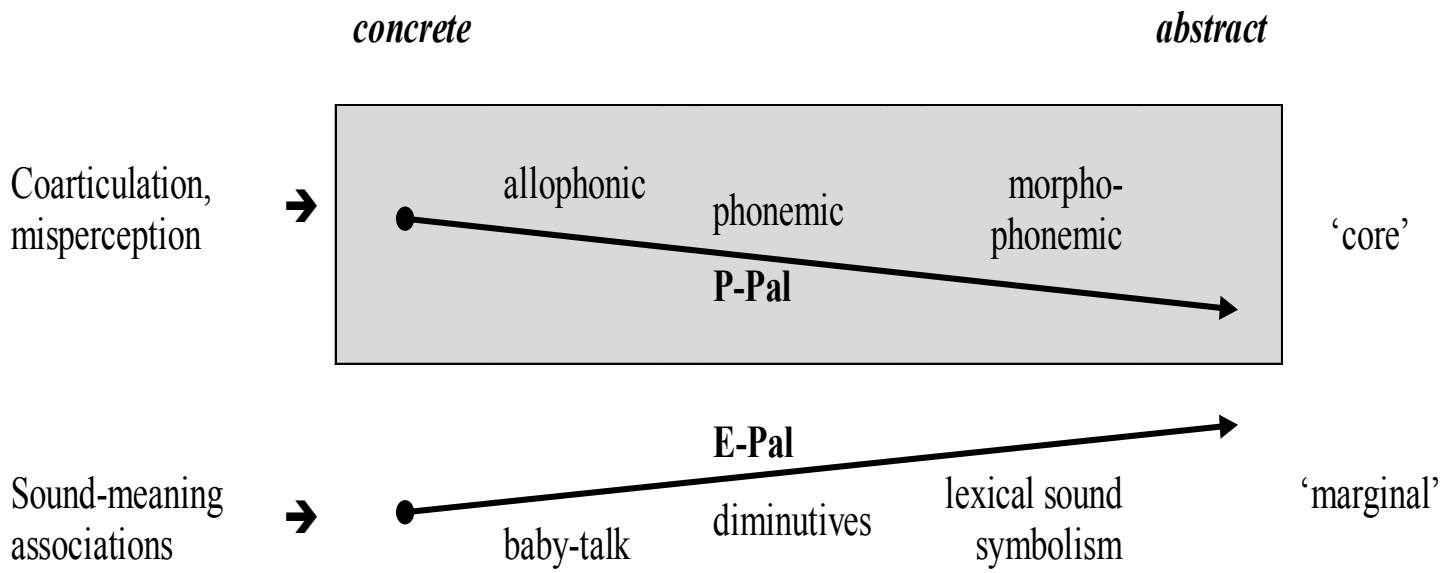
•Also many more abstract meanings: affection, diminution, completion of action, imperfects

•Showed that all arbitrary meanings could arise from more basic iconic meanings through regular processes of semantic extension.

➢Normal processes of language change resulted in wider set of environments.

Generalization: The continuum model

Kochetov & Alderete 2011, Patterns and scales of expressive palatalization: Typological and experimental evidence. *Canadian Journal of Linguistics* 56: 345-376.



- Phonological extension along concrete and abstract dimensions can be placed on a continuum, relating both the emergence of both "marginal" and core phonology.

Generalization: Cross-linguistic patterns

Phonological extensions in our corpus:

- Percentage of faithful mappings goes down from concrete to abstract categories, showing extension to new phonological contexts. (Fricatives are an outlier.)
- Abstract domains exhibit new sound types (marked with *), showing extension to new sound patterns.

	k			n				t					s				
	k	kʲ	tʃ	n	ɲ	nʲ	tʃ	t	c	tʲ	tʃ	ts	s	sʲ	tʃ	ʃ	ts
BT	14	1	0	10	4	1	0	8	3	2	2	0	0	2	6	5	0
%	*93.3*	*7.7*		*66.6*	*33.4*			*53.3*	*49.7*				*0*	*100*			
DIM/SS	24	2	2*	15	9	2	2*	11	4	2	8	3*	7	2	3	13	3*
%	*85.7*	*14.3*		*53.6*	*46.4*			*39.3*	*60.7*				*24.1*	*75.9*			

What is the mechanism that accounts for phonological extension, or emergence of a new sound type?

Generalization: The mechanism

What is the explicit mechanism that relates the language internal patterns?

- Answer: ranking permutation within our typology.

Factorial typologies are rich in structure relationships that can be defined through ranking permutations (Alber et al. 2015). But requires grammar integration.

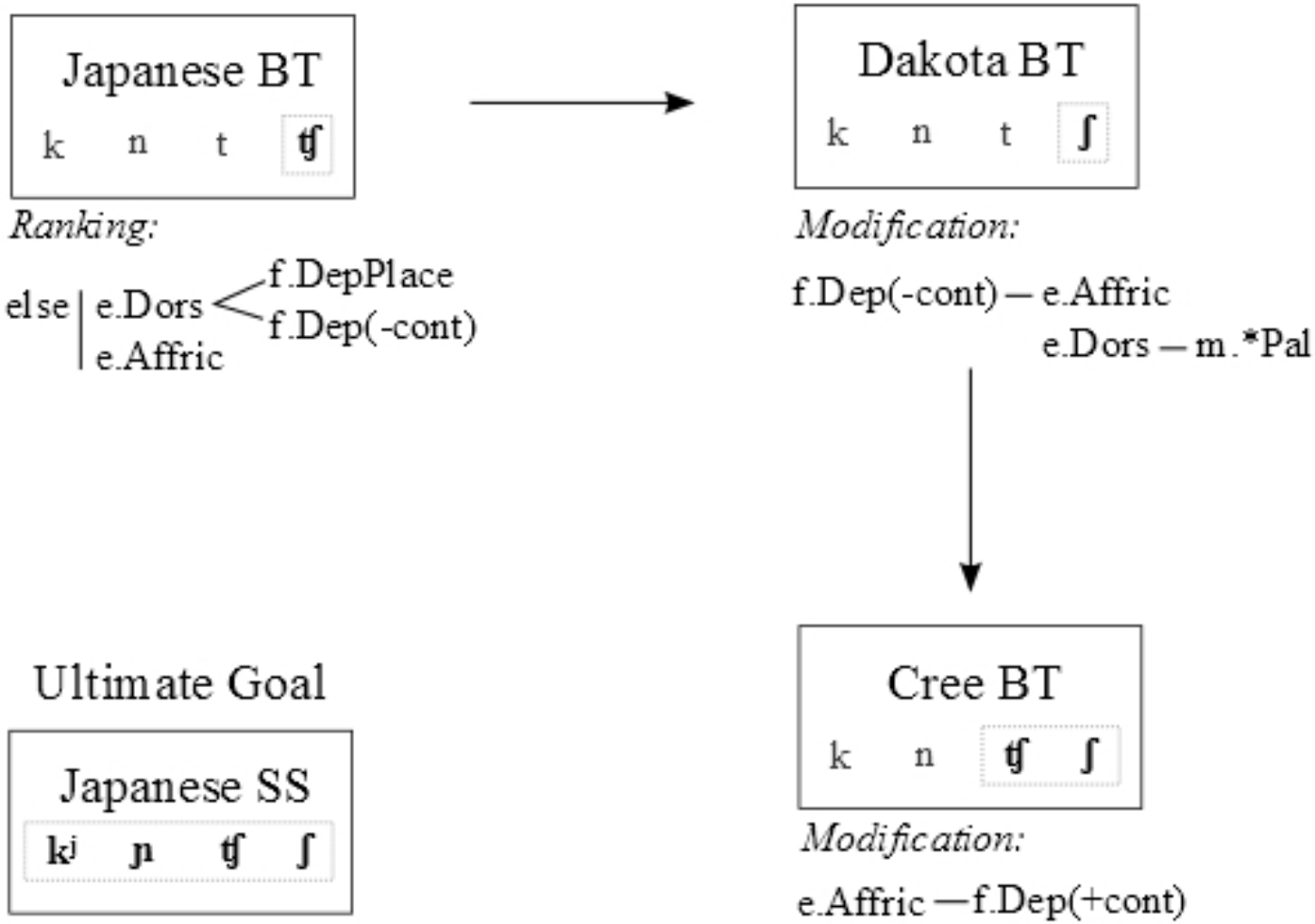
Eastern Basque babytalk [k ɲ c ʃ]

Top stratum	Middle Stratum	Bottom Stratum
IDENT[SON], IDENT[BACK] MAX[CONT], MAX[PLACE] DEP[-CONT], ***DEP[+CONT]*** *Cʲ, *Ts	EXPRESS[AFFRIC] EXPRESS[PAL]	*PAL, PALSTRID, DEP[PLACE]

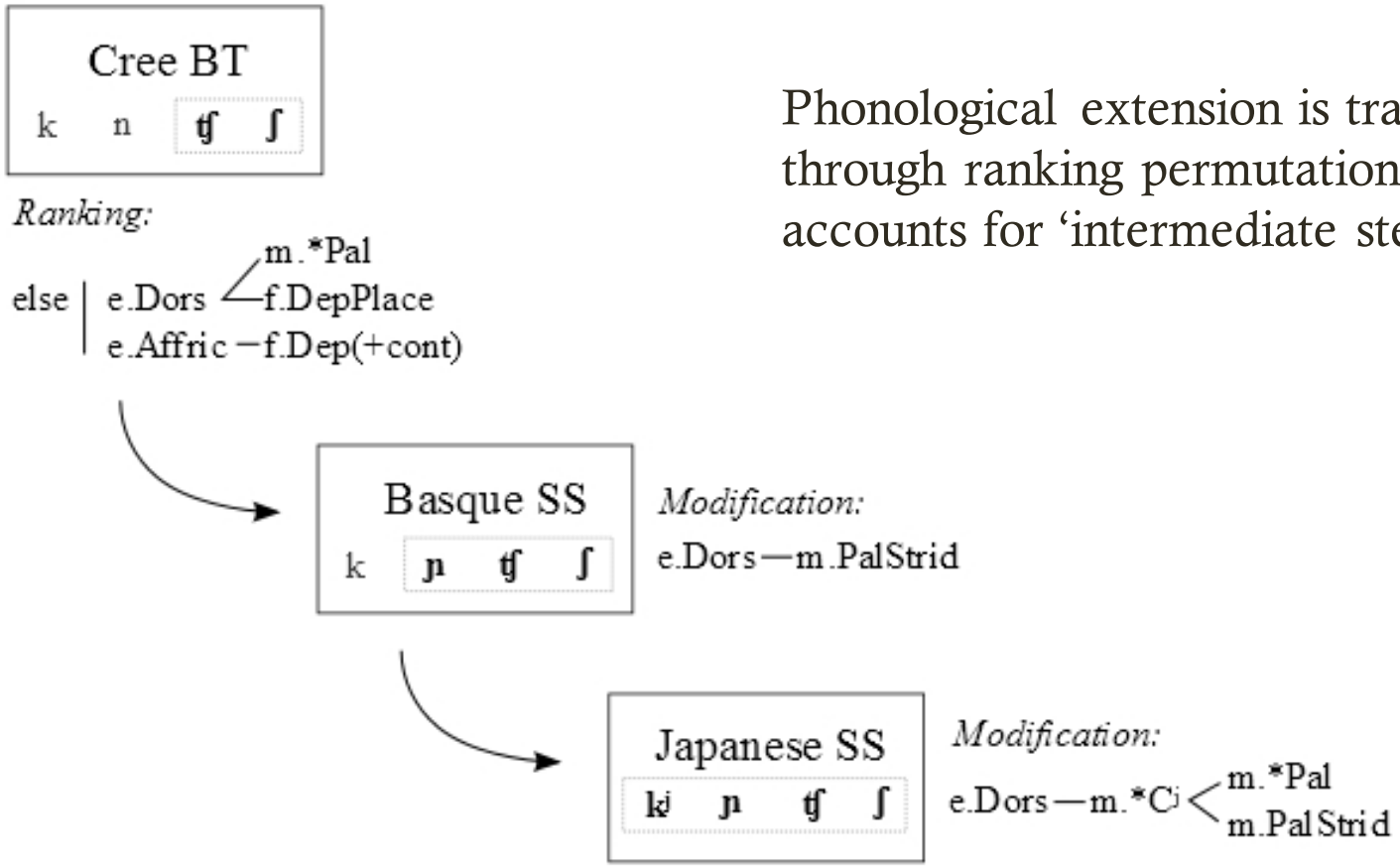
Eastern Basque sound symbolic vocabulary [k ɲ tʃ ʃ]

Top stratum	Middle Stratum	Bottom Stratum
IDENT[SON], IDENT[BACK] MAX[CONT], MAX[PLACE] DEP[-CONT] *Cʲ, *Ts	EXPRESS[AFFRIC] EXPRESS[PAL]	*PAL, PALSTRID, DEP[PLACE] ***DEP[+CONT]***

Generalization: From BT to SS in Japanese



Generalization: From BT to SS in Japanese, cont'd



Phonological extension is tractable through ranking permutation, and accounts for 'intermediate steps'.

- This kind of phonological extension only possible if Express(X) constraints are fully embraced by the rest of the grammar.

Take homes

- Typology: expressive palatalization is different in kind of phonologically motivated palatalization
- Theory: Express(X) is a theory of magnitude sound symbolism (the frequency code), capturing iconic nature of palatalizaiton
- Grammar integration: embedding the Express(X) constraints in 'normal phonology' is necessary to account for the typological differences.
- Generalization: grammar integration also naturally accounts for the conjectured generalization of expressive phonology.

Thoughts: Other types of expressive phonology

Other patterns of expressive phonology

Expressive palatalization is one of many patterns of magnitude sound symbolism, and other sound-meaning associations also exist.

- More frequency code findings: stopping, glottalization, fronting of velars, high front vowels.
- Reduplication: repetition, distributivity
- Temporal duration: vowel length for long durations
- Light/heavy: voiceless/voiced

- More on babytalk: fronting of velars, rhotic substitutions, nasal assimilation, cluster simplification
- Shape canons: babytalk and ideophones, e.g., CV-C:V in Berber babytalk

Natural extensions of the Express(X) format:

- Express(constr.glottis), Express(-cont), etc.
- Repeat(Pcat/Mcat) (à la Yip 1998)

Limits to approach: cluster resolution, minimal word canons will likely duplicate the effects of other motivated constraints

Thoughts: Where do Express(X) constraints come from?

Our implementation. Express(X) constraints are universal, derive typological results through usual ranking permutation.

Question. Are the forces that underlie expressive palatalization universal (possibly innate) constraints, or do cross-linguistic trends emerge as the result of experience in language development? Absolute or statistical universals?

In support of a statistical universal, driven by experience:

Holy Grail of research on sound symbolism: universal substrate for size symbolism. Strong trends, but no absolute patterns.

- Experimental research (Sapir, Newman): greater-than-chance correlation between articulatory position and pitch and size categories
- Typological research (Jesperson, Nichols, Ultan): strong associations between smallness and palatals, affricates and high front vowels
- Exceptions (Diffloth 1994): Bahnar (Austroasiatic): high vowels correlated with big size.
- Developmental research: perceived associations between high pitch and small size develops much later (age 11) than might be expected if it was an innate instinct.

Thoughts: Variability, should we be worried?

Observation: in some contexts, speakers have 'imperfect control' of expressive palatalization, and variation is observed.

Kochetov & Alderete (2011): fricative palatalization in Japanese babytalk

ts	22/27 observations	81.4%
z	16/37 observations	43.2%
s	27/27 observations	100%
ʃ	21/27 observations	77.8%

Palatalization is 'semi-regular', but pretty regular, and speakers are consciously aware of its significances.

Tools for variable phonology

- Variable rules format
- Probabilities assigned to rank orders (e.g., Boersma and Hayes 2001)
- MaxEnt, Harmonic grammars
- Connectionist grammars

Express(X) constraints assigned motivation for expressive phonology, which greatly simplifies the correct characterization of variable outcomes.

Thoughts: The featural affixation alternative

Featural affixation (Akinlabi 1997, Firthian idea of feature prosody)

•Subset of features can constitute a defective morpheme, realization of which is crucial for marking morphological distinctions.

•Works in tandem with alignment constraints and MorphReal to ensure correct realization of feature prosody.

Some common ground

Express(X) constraints can bring about aberrant phonology because they can require phonotactically illegal structure; MorphReal does the same thing.

Some clear differences

•Express(X) is functionally motivated by the frequency code; featural affixation is really a theory of morphology, not sound symbolism.

•Express(X) accounts for multiple palatalizations in the same domain as a natural outcome of its wide scope. Featural affixation, supported by MorphReal, doesn't predict multiple palatalization.

•In general, expressive palatalization is not directional (see Alderete & Kochetov 2009, Kochetov & Alderete 2011), though directionality is central to featural affixation

•It's difficult to see how featural affixation could be generalized, as natural predicted in the Express(X) theory.

Red herring: 'conflicing directionality'

Objection. Examination is limited to black and white cases (baby talk vs. phonological palatalization). Perhaps some cases, like mimetic words, can be treated with standard tools of phonological analysis

Japanese mimetic palatalization in CVCV roots (Hamano, 1986/1998)

a. Coronal + noncoronal, palatalize coronal: *šaka-šaka, *sak^{y}a-sak^{y}a*

b. Leftmost of two noncoronals: *p^{y}oko-p^{y}oko, *pok^{y}o-pok^{y}o*

c. Rightmost of two coronals: *doša-doša, * ǰosa-ǰosa*

d. Avoid /r^y/: *ɲoro-ɲoro, *nor^{y}o-nor^{y}o*

Potential insights from theoretical phonology

•Palatalization involves realization of floating features (Itô Mester, Akinlabi)

•Alignment of floaters have different edge orientations, the 'conflicting directionality' pattern of (b-c), like stress (Zoll)

Japanese mimetics: corpus study

Alderete & Kochetov 2009. Japanese mimetic palatalization revisited: implications for conflicting directionality. Phonology 26: 369-388.

No lexico-graphic evidence for conflicting directionality

Examination of the actual forms from prior research and two mimetic dictionaries shows that there is no basis for 'leftmost noncoronal, rightmost coronal' generalization.

•Coronal + coronal: 1 form leftmost ***šana-šana***, 1 form rightmost ***doša-doša***

•Noncoronal + noncoronal: only two forms: ***pʸoko-pʸoko, hʸoko-hʸoko***

Exhaustive search for conflicting directionality: no evidence

Asked native speakers to supply mimetic palatalization in 1098 logically possible CVCV mimetic words. Still no empirical evidence.

- Coronal + coronal: 1 leftmost, 4 rightmost
- Noncoronal + noncoronal: 6 leftmost, 7 rightmost

Psycholinguistic study: no directionality effects

Objection. While there may be little or no evidence from actual words, perhaps native speakers none the less have intuitions consistent with phonologically motivated conflicting directionality.

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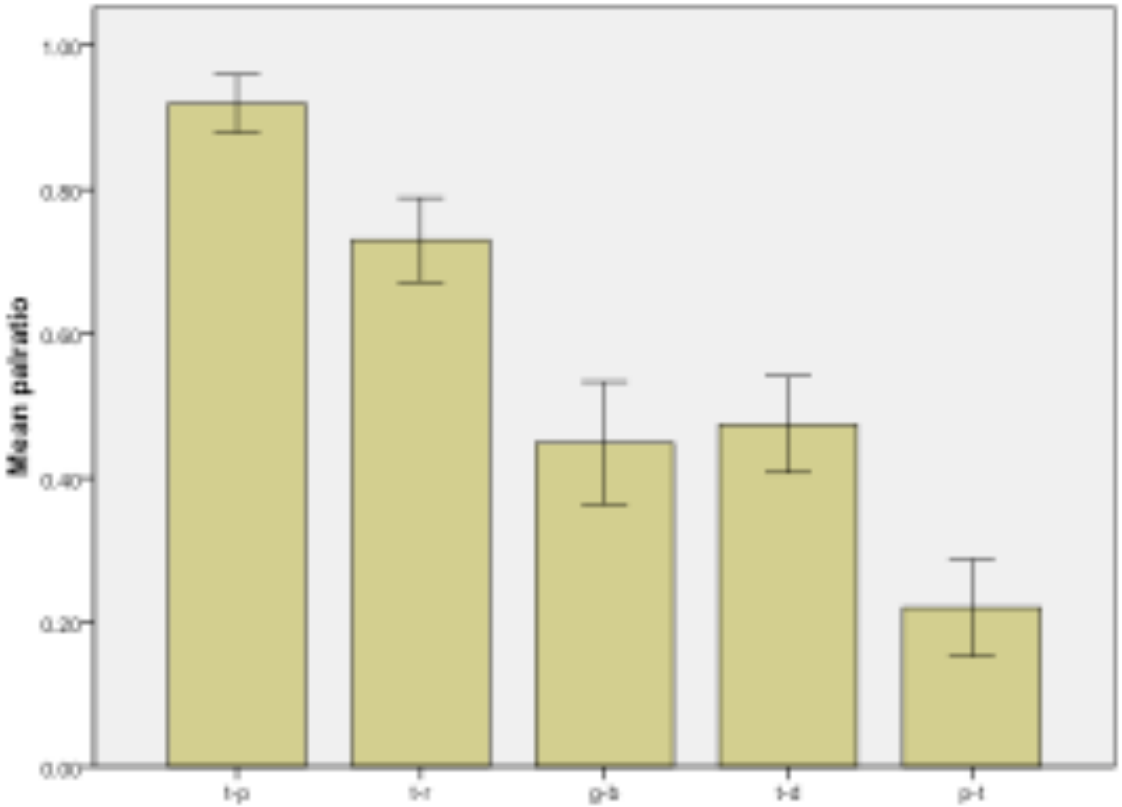


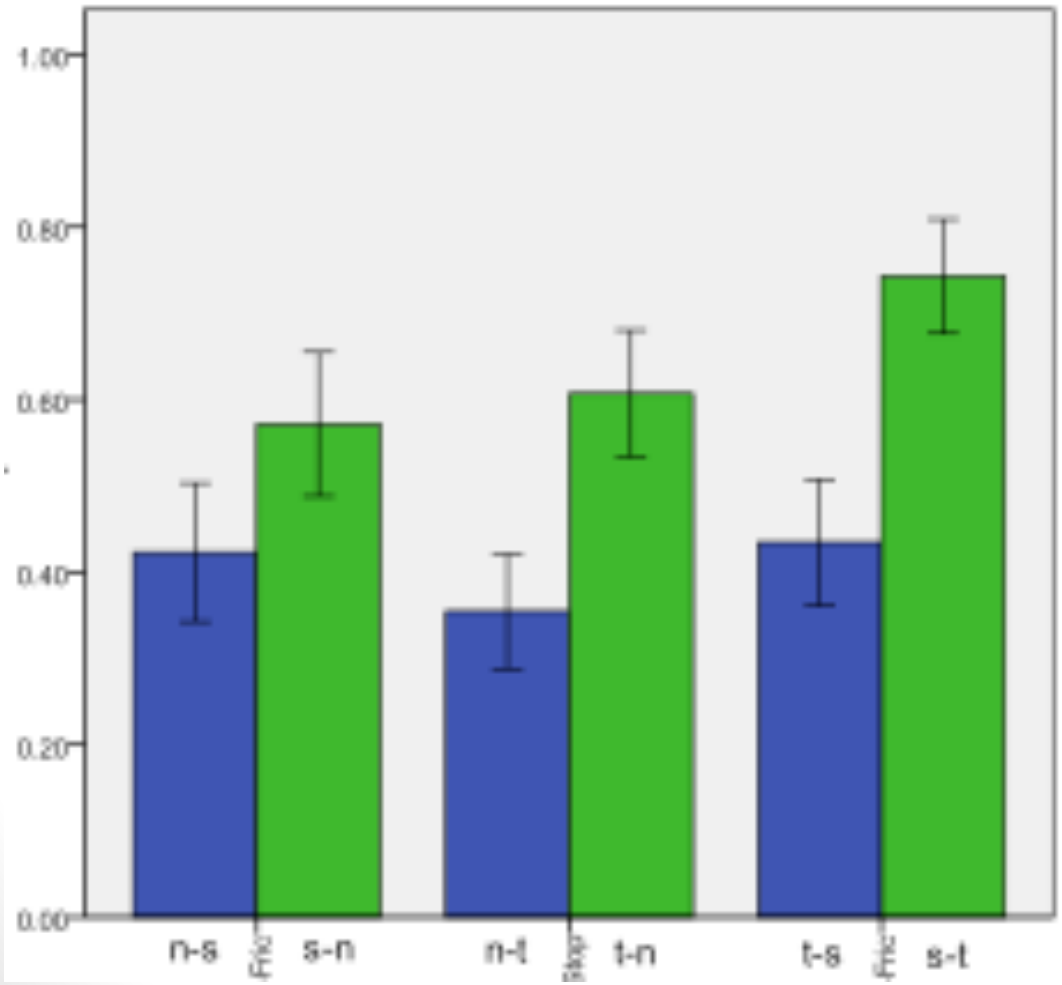
Percentages of C1 (high) or C2 (low) palatalizations.

Significant coronal bias, and also rhotic avoidance.

But noncoronal-noncoronal (g-b) and coronal-coronal (t-d) CVCV words are at chance

More evidence: manner asymmetry

Tally so far: no evidence for phonological palatalization, but significant evidence for expressive palatalization, given coronal bias.



Manner biases:

Obstruents significantly more likely to be palatalized than sonorants

Sibilant fricatives also significantly more likely to receive palatalization that other coronals.

➢Manner biases thus further confirm expressive palatalization analysis.