Issues in Phonological Typology @ UiT

Book of abstracts

Obstruent inventories: gaps, universals and simulations

Joachim Kokkelmans
Free University of Bozen/Bolzano

After separating phonology from phonetics (Bérces & Honeybone 2020), both European and American structuralism have brought the attention of phonological research on the phoneme inventory as a system and on its contrasts (Salmons & Honeybone 2014: 35). Concepts like symmetry and gaps in the segment inventory (see e.g. Martinet 1955) started to receive much attention, an attention that has since then somewhat receded in subsequent frameworks (in favour of e.g. syntagmatic processes, representation or derivation in generative frameworks), although only partially so (cfr. more recent work like e.g. Boersma 1989 et seq.; Clements 2003; Flemming 1995 et seq.; Hall 1997, on the structure of segment inventories).
In this talk, I address aspects of segment inventory structure that still bear implications for contemporary theoretical phonology and typology: the sometimes thin border between accidental and systemic gaps, the place of universal principles like e.g. auditory dispersion in typological models, the interplay between perception and articulation, or the relevance of phonetic facts for phonological typology. This is illustrated mainly from the perspective of Optimality Theory (Prince & Smolensky 1993/2004) and that of Bidirectional Phonology and Phonetics (Boersma 2011) as formal theoretical models; the focus is placed mainly on obstruents and particularly on sibilants.

References

Bérces, Katalin Balogné & Patrick Honeybone (2020). "Representation-based models in the current landscape of phonological theory". *Acta Linguistica Academica* 67(1), 3–27. https://doi.org/10.1556/2062.2020.00002

Boersma, Paul (1989). "Modelling the distribution of consonant inventories by taking a functionalist approach to sound change". *Proceedings of the Institute of Phonetic Sciences of the University of Amsterdam* 13: 107–123.

Boersma, Paul (2011). "A programme for bidirectional phonology and phonetics and their acquisition and evolution". In: Anton Benz and Jason Mattausch (eds.): *Bidirectional Optimality Theory*, 33–72. Vol. 180 of Linguistik Aktuell/Linguistics Today. Amsterdam: John Benjamins Publishing Company.

Clements, George N. (2003). "Feature economy in sound systems". *Phonology* 20(3): 287–333. https://dx.doi.org/10.1017/s095267570400003x

Flemming, Edward S. (1995). *Auditory Representations in Phonology* [Ph.D. thesis]. University of California, Los Angeles. Published 2002, London and New York: Routledge.

Hall, Tracy A. (1997). *The Phonology of Coronals*. Amsterdam: John Benjamins. https://dx.doi.org/10.1075/cilt.149

Martinet, André (1955). *Économie des changements phonétiques*. Berne: A. Francke.

Prince, Alan & Paul Smolensky (1993/2004). *Optimality Theory: Constraint Interaction in Generative Grammar*. Oxford: Blackwell Publishing Ltd.

Salmons, Joseph & Patrick Honeybone (2014). "Structuralist Historical Phonology: Systems in Segmental Change". In: Patrick Honeybone & Joseph Salmons (eds.): *The Oxford Handbook of Historical Phonology*, 32–46. https://doi.org/10.1093/oxfordhb/9780199232819.013.029

Teasing apart learning and processing biases in phonological typology

Sara Finley

The relationship between learning and typology has been readily explored using the artificial language learning paradigm (Culbertson, 2012). In this paradigm, participants are exposed to miniature versions of natural languages, varying minimally in terms of linguistic structure to test whether a typologically frequent pattern is easier to learn than a typologically rare or unattested pattern. While many studies have shown a clear learning advantage to typologically common patterns (Zhang and Do, 2025), there is a still a question about the origin of this learning bias, particularly as it relates to phonetic naturalness. Most studies exploring phonetically natural patterns (e.g., vowel harmony, word final devoicing) to phonetically unnatural patterns (e.g., vowel disharmony, word final voicing) have shown mixed or contradictory results (Moreton and Pater, 2012). Part of the issue may be that the traditional train-test model of artificial language learning studies is not sensitive enough to capture differences between natural and unnatural patterns. In addition, most artificial language learning studies are unable to directly test for perceptibility and processing of the stimuli, making it difficult to understand the origin of a learning bias, if any. In this talk, I present data from four experiments that make use of a modified phoneme monitoring paradigm that provides a clear mechanism to tease apart perceptual, processing, and learning biases. In this task, participants listen for the final consonant or vowel in the word and press a corresponding button for the sound (e.g., press button 1 if the last consonant is [p]; press button 2 if the last consonant is [b]). Unbeknownst to the participant, the words they are responding to follow a phonological pattern (e.g., word final devoicing). Using response times, we can test for learnability; as participants learn the pattern, response times decrease. Because participants directly respond to each item in the training set, we can also measure processing and perceptibility. The results of these experiments provide evidence for a bias for categorical vowel harmony over vowel disharmony, as well as a short-lived preference for intervocalic voicing over intervocalic devoicing. This paradigm offers a promising method for testing questions about the connection between learnability and typology in phonological patterns.

Thursday 27 November

Talks

An exploration of grammatical adjacency

Birgit Alber (Free University of Bozen-Bolzano), Nick Kalivoda (Independent)

In work in OT-based Property Theory (Alber & Prince 2021) it is claimed that minimal distance between grammars expressed as a minimal change in property values plays an important role in language change (Alber 2015; Alber & Meneguzzo 2016; DelBusso 2018; Alber & Kokkelmans 2022; Apostolopoulou 2022; Alber, Arndt-Lappe & Kokkelmans 2025).

We compare different approaches to grammatical adjacency and the predictions they make for language change, taking as an example the variation in foot-type encountered in the Panoan language family. We conclude that a definition of grammatical adjacency in terms of property values is preferable to one in terms of minimal differences in surface structures or in ranking, answering Chris Golston's question 'why do we need properties to define minimal adjacency between grammars, if we already have minimal re-ranking'.

Most Panoan languages are analyzed as iambic (1a), but some are trochaic (1b) (González 2016).[1]

(1) a. Saynáwa: dense**.ia.**L.o

i.ˌkə.ne.ˈβĩʔ ɾa.ˌbə.bə.ja.ˈteʔ

u X . u Y u X. o .u Y

b. Kashibo-Kakataibo: dense.**tr**.L.o

ˈbá.ka.ˌka.ma ˈchi.ki.ˈshá.kë.xa

X u . X u X u . X u . o

Some Panoan languages display variation of foot-type within the same language (e.g. Brazilian Matsés); others change foot-type in a subpart of the lexicon (Peruvian Matsés, Huriapano; Fleck 2013). Inter- and intradialectal variation can be interpreted as language change targeting foot-type.

Changes in foot-type cannot be interpreted as surface-minimal, since the prominence relations of a string parsed into iambic feet (uX.uX.o) change for almost every syllable if the same string is trochaic (Xu.Xu.o).

In formal typologies such as nGX (Alber & Prince 2017), languages of type (1a) and (1b) differ in exactly one property value, the value of foot-type:

(2) Property values of languages of type (1a) and (1b) in nGX

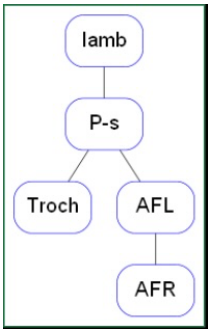
	Density	*Foot-type*	*Foot-positioning*	*Unary elements*
dense.**ia**.L.o	dense	**iambic**	left	o
dense.**tr**.L.o		**trochaic**		

The grammars of the two language types, however, show that the difference between them is not minimal in terms of ranking of single constraints (more specifically, in terms of border point pairs/typohedron, in the sense of Merchant & Prince 2023; Merchant 2019).

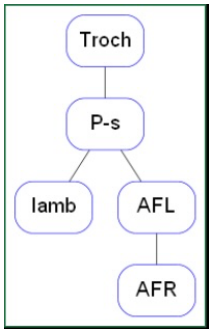
[1] X = stressed syllable; Y = primarily stressed syllable (if distinct); u = unstressed footed syllable; o = unfooted syllable.

(3) Grammars of (1a) and (1b)

dense.**ia**.L.o



dense.**tr**.L.o



In the change from (1a) to (1b), both the rankings between the foot-type constraints and between these and Parse are changed. We conclude that variation in terms of foot-type as encountered in Panoan is minimal property-wise (on the propohedron) though not ranking-wise (not on the typohedron).

The grammatical architecture in (3), where constraints involved in an elementary property are separated by a third constraint, is typical for contexts where minimality in terms of properties differs from minimality in terms of ranking. We conclude by examining the typologies of truncation (Alber & Arndt-Lappe 2023; Alber & Kokkelmans 2022; Alber, Arndt-Lappe & Kokkelmans 2025) and stringency (Alber 2015) for further constellations where minimal differences in property values do not correspond to minimal differences in ranking.

References

Alber, Birgit. 2015. Minimality and Property Analysis. Presented at the Talk at RORG, Rutgers University.

Alber, Birgit & Sabine Arndt-Lappe. 2023. Anchoring in truncation: A typological analysis. *Natural Language & Linguistic Theory* 41(1). 1–50. https://doi.org/10.1007/s11049-021-09534-x.

Alber, Birgit, Sabine Arndt-Lappe & Joachim Kokkelmans. 2025. The Predictability of Name Truncation: Factoring in Language Change. *Catalan Journal of Linguistics* 24(1). 7–39. https://doi.org/10.5565/rev/catjl.467.

Alber, Birgit & Joachim Kokkelmans. 2022. Typology and language change: The case of truncation. *Isogloss. Open Journal of Romance Linguistics* 8(2). 1–17. https://doi.org/10.5565/rev/isogloss.124.

Alber, Birgit & Marta Meneguzzo. 2016. Germanic and Romance onset clusters – how to account for microvariation. In Ermenegildo Bidese, Federica Cognola & Manuela Caterina Moroni (eds.), *Linguistik Aktuell/Linguistics Today*, vol. 234, 25–52. Amsterdam: John Benjamins Publishing Company. https://doi.org/10.1075/la.234.02alb.

Alber, Birgit & Alan Prince. 2017. The Book of nGX. Memoirs of the Society of Typological Analysis 1.1. University of Verona / Rutgers University, ms. ROA 1663. https://roa.rutgers.edu/article/view/1663.

Alber, Birgit & Alan Prince. 2021. The Structure of OT-Typologies. Ch. 1 and Ch. 2.1. Free University of Bozen-Bolzano/Rutgers University, ms. ROA 1381 and 1393.

Apostolopoulou, Eirini. 2022. *Typological variation in language contact. A phonological analysis of Italiot Greek*. Verona, Tromsø: Universities of Verona and Tromsø PhD thesis.

DelBusso, Natalie. 2018. *Typological Structure and Properties of Property Theory*. New Brunswick: Rutgers University PhD thesis.

Fleck, David William. 2013. *A Grammar of Matses*. Houston, Texas: Rice University PhD thesis.

González, Carolina. 2016. Tipología de los sistemas métricos de veinticinco lenguas Pano. *Amerindia* 39(1). 129–172.

Merchant, Nazarré. 2019. Distance from the Edge: Using Border Points to Construct Topologies. Talk presented at the 16th Old World Conference on Phonology, University of Verona.

Merchant, Nazarré & Alan Prince. 2023. *The mother of all tableaux: order, equivalence, and geometry in the large-scale structure of optimality theory* (Advances in Optimality Theory). Sheffield, South Yorkshire Bristol, CT: Equinox Publishing.

Coda inventories and typological variation in Italiot Greek

Eirini Apostolopoulou

UiT – The Arctic University of Norway

One of the innovations that distinguishes contemporary versions of Italiot Greek (IG) from older stages is the elimination of certain manner features in the coda (henceforth the explicit reference to the coda position is omitted). The common ancestor of all IG varieties (here *Pre-IG*) permitted a wide range of segments in terms of manner of articulation: plosives ([–continuant], henceforth ***T***), non-sibilant fricatives ([–strident, +continuant], henceforth ***Θ***), sibilants ([+strident, +continuant]), and sonorants ([+sonorant]; henceforth, sibilants and sonorants are collectively referred to as ***S***) (1). The dawn of IG (here *EarlyIG*) was arguably marked by the conversion of all ***T*** to ***Θ*** (2a). This is retained to date in some varieties, e.g. Martano and Roghudi (2b–c). However, varieties such as Bova and Zollino avoid all [–str] or [–son] (henceforth ***nonS***) by shifting ***nonS*** to ***S*** (3a–b). Etymological ***S*** remained intact in all diachronic stages and geographical varieties of IG, e.g. *ás.pro* 'white', *kar.pó(s)* 'fruit' (data from Rohlfs 1950 and own fieldwork; other changes are to be ignored).

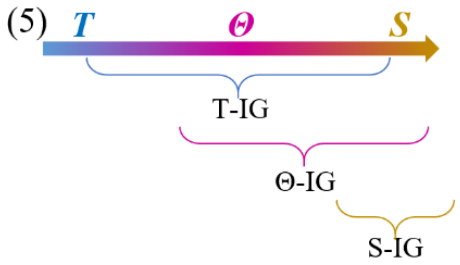
(1)	a.	o**k**.tó 'eight'	e**x**.θés 'yesterday'		*Pre-IG*
(2)	a.	o**x**.tó	e**x**.té		*EarlyIG*
	b.	o**f**.tó	e**f**.té		*Martano*
	c.	o**θ**.tó	e**θ**.té		*Roghudi*
(3)	a.	o**s**.tó	e**s**.té		*Bova*
	b.	o**r**.tó	e**r**.té		*Zollino*

Table (4) summarizes the admissible manner features in the above historical and geographical varieties of IG, dubbed *T-IG*, *Θ-IG*, and *S-IG*:

(4) **IG varieties**	***T***	***Θ***	***S***	**Changes**
T-IG: Pre-IG	✓	✓	✓	*no change*
Θ-IG: EarlyIG, Martano, Roghudi		✓	✓	*T* → *Θ*
S-IG: Bova, Zollino			✓	*nonS* → *S*

I argue that historical change led to grammars permitting progressively less marked codas via the prohibition of manner features reflecting low sonority values (5). I propose a typological analysis within Property Theory (Alber & Prince 2015, in prep.) employing two m(arkedness).constraints and two f(aithfulness).constraints. Simply put, m.T penalizes [T] and m.nonS penalizes both [T] and [Θ]. Moreover, f.T militates against the mapping of /T/ onto [Θ] or [S] and the mapping of /nonS/ onto [T], and, finally, f.nonS is violated when /nonS/ becomes [S] and vice versa. I identify three *properties* defining the system at hand, i.e. the ranking conditions which generate the factorial typology (6; M.dom is the dominant between the m.constraints):

(5)



(6)

	PROPERTY_1	f.nonS < > m.nonS	**all/not all** *nonS* are realized as *nonS*
	PROPERTY_2	f.T < > m.T	faithfulness **does/does not** protect *T*
	PROPERTY_3	f.T < > M.dom	changes **ignore/affect** *T*

Table (7) illustrates the property values defining each grammar of the factorial typology. Mootness arises when neither value of a property is true of the grammar at hand.

(7)	PROPERTY_1	PROPERTY_2	PROPERTY_3
/T/ → [T] /Θ/ → [Θ]	**f.nonS >> m.nonS**	**f.T >> m.T**	*moot*
/T/ → [Θ] /Θ/ → [Θ]	**f.nonS >> m.nonS**	**m.T >> f.T**	**M.dom >> f.T**
/T/ → [T] **/Θ/ → [S]**	**m.nonS >> f.nonS**	**f.T >> m.T**	**f.T >> M.dom**
/T/ → [S] **/Θ/ → [S]**	**m.nonS >> f.nonS**	*moot*	**M.dom >> f.T**

(created with the aid of OTWorkplace, Prince et al. 2017)

References

Alber, Birgit & Alan Prince (2015), Outline of Property Theory, Ms., UniVR / Rutgers University.

Alber, Birgit & Alan Prince (in prep), Property Theory, Ms., UniVR / Rutgers University.

Prince, Alan, Naz Merchant & Bruce Tesar (2017), OTWorkplace

Rohlfs, Gerhard (1950), *Historisches Grammatik der Unteritalienischen Gräzität*, Munich: H. Beck.

A probabilistic model of stop inventory typology

Jahnavi Narkar, UCLA

A central question in phonological typology is why languages have the sounds they do. This talk presents a probabilistic OT model of stop inventories, showing that a Maximum Entropy Harmonic Grammar, or Max-Ent (Hayes and Wilson, 2008), accurately predicts attested inventories. Although an early focus of Optimality-Theoretic research concerned factorial typology, the application of subsequent versions of OT to model typology has been largely unexplored. Additionally, most research on the typology of inventory structure has focused on vowels (Liljencrants and Lindblom, 1972, Schwartz et al., 1997; i.a.) and not on consonants. I demonstrate how Max-Ent models capture stop inventory typology. Moreover, structural properties such as *Featural Economy* (Clements, 2003) are emergent under this approach, despite constraints modeling only functional pressures.

To model stop inventory content, a Max-Ent model was built to predict probability distributions over candidate inventories, given a set of phonetically-motivated constraints. Possible stops were assumed to be those shown in Figure 1, following Narkar (2025). Candidates to the Max-Ent tableau were inventories generated by all possible combinations of the 18 stops under consideration in Figure 1, yielding 2^{18} inventories in total. Attested inventories were assigned frequencies from PHOIBLE (Moran and McCloy, 2019) while unattested inventories were assigned a frequency of zero. Constraints which represent functional pressures were specified – (1) MinDist (Flemming, 2013): minimize the confusability of contrasts (2) MaximizeContrasts (Flemming, 2013): maximize the number of contrasts, and (3) various markedness constraints that penalize articulatory effort. An example is shown in Table 1. Note that there are no inputs to this tableau (c.f. Flemming, 2013).

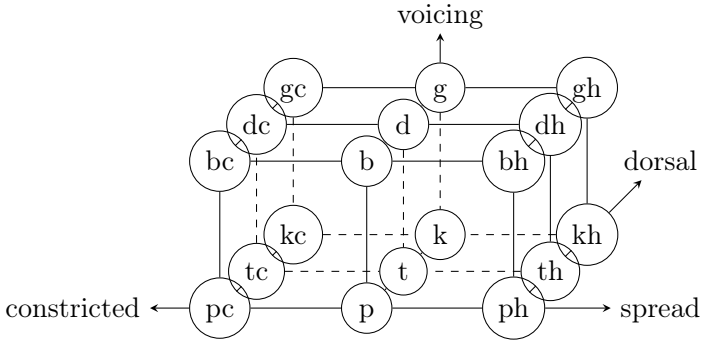


Figure 1: Place and laryngeal settings of stops used in the model.

	MinDist	MaxContrasts	Markedness	freq
a. p-t-k-b-d-g	5	12	6	801
b. p-t-k-b-d-g-p^h-t^h-k^h	2	9	7	138
c. p-t-k-b-d	7	13	5	92
d. p-k-k^h-g-b^h-b_c-g_c	3	11	8	0

Table 1: Example part-tableau. Markedness constraints are combined for illustration.

The results in Table 2 show that the inventories predicted by the model are the most commonly attested inventories for a given size – p-t-k-b at size 4, p-t-k-b-d at size 5 etc. Additionally, *Economy* is emergent – the best inventories at sizes 3, 6, 9 etc. employ their features maximally. Taken together these results suggest that the interaction of functional phonological constraints in a probabilistic grammar can explain much of the structure found in the world's stop inventories. The explanation for cases in which model predictions differ from the attested typology must be found in a diachronic typological approach to phonology (c.f. Easterday and Bybee, 2023). Finally, investigation of the contents of inventories predicted by the model can inform theories of sound change under the view that static inventories are the product of diachronic change.

Size	Best observed	Optimal predicted
3	p-t-k	p-t-k
4	p-t-k-b	p-t-k-b
5	p-t-k-b-d	p-t-k-b-d
6	p-t-k-b-d-g	p-t-k-b-d-g
9	p-t-k-b-d-g-p^h-t^h-k^h	p-t-k-b-d-g-p^h-t^h-k^h
12	p-t-k-b-d-g-p^h-t^h-k^h-b^h-d^h-g^h	p-t-k-b-d-g-p^h-t^h-k^h-b^h-d^h-g^h

Table 2: Most common observed inventory and most optimal inventory predicted by the model for some commonly attested stop inventory sizes.

References

Clements, G. N. (2003). Feature economy in sound systems. Phonology, 20(3):287–333.

Easterday, S. and Bybee, J. (2023). Diachronic phonological typology: understanding inventory structure through sound change dynamics. Linguistic Typology, 27(2):405–427.

Flemming, E. S. (2013). Auditory representations in phonology. Routledge.

Hayes, B. and Wilson, C. (2008). A maximum entropy model of phonotactics and phonotactic learning. Linguistic Inquiry, 39(3):379–440.

Liljencrants, J. and Lindblom, B. (1972). Numerical simulation of vowel quality systems: The role of perceptual contrast. Language, pages 839–862.

Moran, S. and McCloy, D. (2019). PHOIBLE 2.0. Max Planck Institute for the Science of Human History, Jena.

Narkar, J. (2025). Reconceptualizing VOT: Further contributions to marking 50 years of research on voice onset time. Journal of Phonetics, 108:101387.

Schwartz, J.-L., Boë, L.-J., Vallée, N., and Abry, C. (1997). The dispersion-focalization theory of vowel systems. Journal of Phonetics, 25(3):255–286.

A clustering analysis of nasal vs. oral vowel inventories

Michael Dow
Université de Montréal

Introduction Nasal vowels are strikingly absent from empirical and theoretical discussions of vowel inventory typology, whether by omission or conflation with oral vowels. Indeed, Ruhlen's (1975) 100-language study comparing nasal and oral inventories constitutes the largest of its kind. This project aims to fill this gap using more exhaustive data from PHOIBLE (Moran and McCloy 2019) and to examine gaps *within* oral and nasal inventories, in addition to between them.

Methods All oral and nasal vowel phonemes were extracted from the inventories of the 502 unique languages in PHOIBLE containing at least one nasal vowel phoneme. Diphthongs and extremely rare vowels were excluded, and all non-nasality diacritics were removed. Conditional probabilities were then calculated between each unique pair of nasal vowels and separately between oral vowel pairs. For sounds (x, y), the sum of languages containing both was divided by the sum of that number and the languages containing only x, and this was performed again for y. For instance, for /ã/ and /ĩ/ and oral counterparts (where $P(x \mid y)$ = "probability of y given x"):

$$P(\tilde{\text{a}} \mid \tilde{\text{i}}) = \frac{P(\tilde{\text{a}} \cap \tilde{\text{i}})}{P(\tilde{\text{i}})} = \frac{124}{124+8} = 0.94 \qquad P(\text{a} \mid \text{i}) = 0.98$$

$$P(\tilde{\text{i}} \mid \tilde{\text{a}}) = \frac{P(\tilde{\text{i}} \cap \tilde{\text{a}})}{P(\tilde{\text{a}})} = \frac{124}{124+419} = 0.23 \qquad P(\text{i} \mid \text{a}) = 0.27$$

Previous results show a linear relationship between the systems but a significant difference (Author). This study follows up by performing clustering analysis to eke out where these differences lie using Hierarchical Density-Based Spatial Clustering of Applications with Noise (Campello, Moulavi, and Sander 2013), done in R using the `dbscan` package (Hahsler, Piekenbrock, and Doran 2019) at a minimum of 4 points/cluster.

Results Figure 1 plots the overall results, while Figure 2 zooms in on a region of interest containing, among others, clusters involving pairs of mid vowels (i.e., green and purple). For instance, /ɔ/ implies /o/ at a much higher rate in oral systems ($\approx$ 90%) than in nasal systems ($\approx$ 50%). Similar disparities hold in "ɛ|e" and "œ|ø", but were considered outliers under current clustering parameters. (Optimization is ongoing.) Generally, of *predicted* sounds (sound 2 of each pair), /o, e, ɔ, ɛ/ are most common, in descending order. Meanwhile, among *predictors* (sound 1) in Figure 2 clusters, /a, i, u/ are most frequent and imply other cardinal vowels (e.g., /e/ and /o/) more strongly in oral systems than in nasal.

Discussion These results further support the notion of structural differences between nasal and oral vowel systems, and by consequence the potential forces shaping and governing them. Possible explanations are naturally multifaceted and require further investigation. The conflation of tenseness in mid vowels, driven in part by centralization arising from nasal coupling (e.g., Beddor, Krakow, and Goldstein, 1986), replicates Ruhlen's (1975) finding (nasal lax $\Longrightarrow$ tense). We may also consider diachronic changes (e.g., Hajek, 1997) and height-based parameters of "ease" of nasal coupling (cf. Dow, 2020). In the end, much work remains to be done on nasal vowel typology, but this project takes another step in that direction.

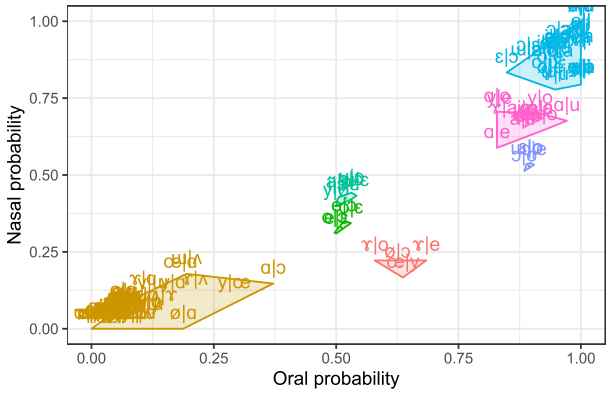


Figure 1: All clusters

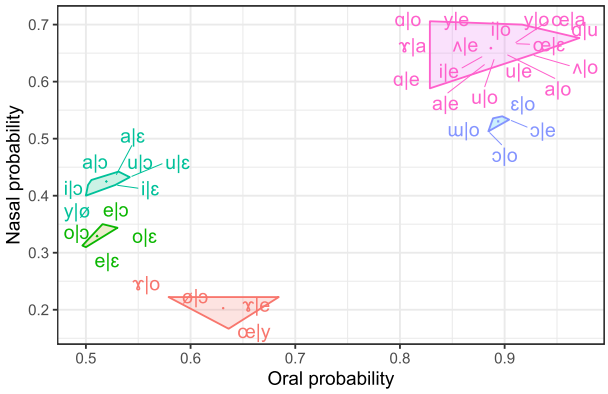


Figure 2: Intermediate clusters

Bibliography

Beddor, Patrice Speeter, Rena Arens Krakow, and Louis M Goldstein. 1986. "Perceptual Constraints and Phonological Change: A Study of Nasal Vowel Height". *Phonology* 3: 197–217

Campello, Ricardo J. G. B., Davoud Moulavi, and Joerg Sander. 2013. "Density-Based Clustering Based on Hierarchical Density Estimates". In *Advances in Knowledge Discovery and Data Mining*, edited by Jian Pei, Vincent S. Tseng, Longbing Cao, Hiroshi Motoda, and Guandong Xu, 160–72. Berlin, Heidelberg: Springer Berlin Heidelberg

Dow, Michael. 2020. "A Phonetic-Phonological Study of Vowel Height and Nasal Coarticulation in French". *Journal of French Language Studies* 30 (3): 239–74

Hahsler, Michael, Matthew Piekenbrock, and Derek Doran. 2019. "dbscan: Fast Density-Based Clustering with R". *Journal of Statistical Software* 91 (1): 1–30. https://doi.org/10.18637/jss.v091.i01

Hajek, John. 1997. *Universals of Sound Change in Nasalization*. Vol. 31. Blackwell Oxford

Moran, Steven, and Daniel McCloy, eds. 2019. *PHOIBLE 2.0*. Jena: Max Planck Institute for the Science of Human History. https://phoible.org/

Ruhlen, M. 1975. "Patterning of Nasal Vowels". Edited by C. Ferguson, L. Hyman, and J. J. Ohala. *Nasálfest: Papers from a Symposium on Nasals and Nasalization*. Stanford University, Department of Linguistics

Roland Noske, University of Lille / UMR 8163 ‘STL’
rgnoske@gmail.com https://rnoske.home.xs4all.nl

Typological evolutionary paths

Traditional phonological typologies mostly use a single perspective like phoneme inventories and syllable complexity (as found in, e.g., the works by Maddieson), relevance and role of certain features (e.g. Laryngeal Realism) and rhythm (e.g. the syllable-timed versus stress-timed typology). By contrast, the little-known model of Syllable and Word Languages (Auer 1993, 1944, 2001, Caro Reina & Szcepaniak 2014) is based on a multilayered, hierarchically structured phonology. It establishes a link between the prosodic categories of the syllable and the prosodic word (Selkirk 1981, Nespor and Vogel 1986) on the one hand, and phoneme inventory, syllable complexity, quantity, stress, and phonological processes on the other. Languages find themselves on a scale between the syllable and the prosodic word as the dominant categories.

Parameters ensuing from this typology are expressed in the following diagram (adapted from Szczepaniak 2007, Caro Reina 2019 and Nübling & Schrambke 2004):

	prototypical syllable language	**prototypical word language**
Syllable structure	simple, clear-cut syllable boundaries, high sonority difference between onset and rhyme	complex, syllable boundaries can be blurred
Quantity distinction (if it exists)	uniform (in all syllables)	stress-sensitive or word-related (distinctive only in stressed syllables)
Vocalism	little or no discrepancy between stressed and unstressed vowels	strong discrepancy between stressed and unstressed vowels
Word stress	a) lack of word stress, musical word stress, phrase stress b) phonetically weak	a) dynamic word stress b) phonetically strong
Phonetic and phonological processes	syllable-related and syllable-optimizing	word-related and word-optimizing
Geminates	possible	generally do not exist, only possible when created by morphology (compounds)

According to these parameters, New High German (NHG) is word language while Old High German (OHG) can be classified as a syllable language. Szczepaniak (2007) shows how the evolution (from approximately 750 AD to 1750 AD) between OHG and NHG took place. It involved the following historical processes:

(i) syncope and apocope (making syllable structure more complex),
(ii) vowel reduction (creating a discrepancy between stressed and unstressed vowels),
(iii) stressed open syllable lengthening (requiring stressed syllable to contain two mora’s, thus enhancing the recognizability of the prosodic word)
(iv) intervocalic consonant lenition (voicing, spirantization, both weakening syllable boundaries),

(v) total deletion > contraction (bringing about a simplification of the prosodic word, often making it single-footed),
(vi) degemination (geminates becoming ambisyllabic singletons, blurring syllable boundaries, enhancing the prosodic word),
(vii) advent of final devoicing (increasing the recognizability of the prosodic word),
(viii) consonant epenthesis at the right word edge (idem).

In this contribution I will show that the transition from Late Latin (LL, a relative syllable language) to Old French (OF, a clear word language) went nearly exactly through the same processes. It took place in the period from, roughly, 100 AD to 1100 AD. After that period, the direction of the evolution was reversed, with Modern French being very much a syllable language.

It can thus be established that while the direction of the typological evolution, towards a word language or towards a syllable language, cannot be predicted, the evolution itself seems to follow a fixed path.

References

Auer, Peter. 1993. *Is a rhythm-based typology possible? = KontRI Arbeitspapier Nr. 21*, University of Konstanz. Downloadable from: http://paul.igl.uni-freiburg.de/auer/userfiles/downloads/Phonotypo_Kontri1.pdf (last accessed 17 August 2025).

Auer, Peter. 1994. Einige Argumente gegen die Silbe als universale prosodische Hauptkategorie. In Karl Heinz Ramers, Heinz Vater, Henning Wode (eds.): *Universale phonologische Strukturen und Prozesse*. 55–78. Tübingen: Niemeyer.

Auer, Peter. 2001. Silben- und akzentzählende Sprachen. In Haspelmath, Martin, Ekkehard König, Wulf Oesterreicher & Wolfgang Raible (eds.). *Language Typology and Language Universals. An International Handbook*. 1391–1399. Berlin: De Gruyter.

Caro Reina, Javier. 2019. *Central Catalan and Swabian: A study in the framework of the typology of syllable and word languages*. Berlin: De Gruyter.

Caro Reina, Javier & Renata Szczepaniak. 2014. Introduction: syllable and word languages. In Caro Reina, Javier & Renata Szczepaniak (eds*.), Syllable and Word Languages*. Berlin: De Gruyter, 8–40.

Nespor, Marina & Irene Vogel. 1986. *Prosodic Phonology*. Dordrecht: Foris.

Nübling, Damaris & Renate Schrambke. 2004. Silben- versus akzentsprachliche Züge in germanischen Sprachen und im Alemannischen, in: Glaser, Elvira, et al. (eds.), *Alemannisch im Sprachvergleich.* Stuttgart, Steiner, 281–320.

Selkirk, Elisabeth O. 1981. On prosodic structure and its relation to syntactic structure. In Fretheim, Thorstein (ed.), *Nordic Prosody II*. Trondheim: Tapir, 111-140.

Szczepaniak, Renata. 2007. *Der phonologisch-typologische Wandel des Deutschen von einer Silben- zu einer Wortsprache*. Berlin: De Gruyter.

The evolution of vertical vowel systems

Håvard Weiberg-Johansen (University of Zürich) & Alan Avdagic (Julius-Maximilians-Universität Würzburg)

Vertical vowel systems (VVS) are typological outliers: they lack a phonemic front–back contrast and distinguish vowels only by height. VVSs appear in unrelated families worldwide (e.g. West Caucasian, Arandic, Central-Chadic, Marshallese, Ndu). Although the histories of these languages have been studied individually, a diachronic typology of verticalization has not appeared to date. Our paper fills this gap and includes some new reconstruction.

VVSs arise when front–back oppositions collapse (e.g. **i*, **u* > /ɨ/). Vowel features are often redistributed elsewhere in the phonology, generally yielding some way to produce a more typical vowel system at the allophonic level.

We identify four diachronic pathways:

1. Vowel centralization: In Marshallese and in West-Caucasian, front/back vowels merge and centralize, phonologizing consonantal palatalization and labialization (cf Bender 1968, Chirikba 1996).

2. Stress-driven mergers: in Arandic, short unstressed vowels were reduced to /ə/, with other vowels merging into /a/. Earlier **u* and **i* leave labialization and palatalization on consonants (Koch 2004).

3. Suprasegmental reorganization: In Central Chadic (Gravina 2014), vocalic contrasts were restructured into suprasegmental "prosodies" wherein all vowels harmonize in rounding or frontness at the word-level. Prosodies are independent of segmental morphology, and morpheme-internally, vowels contrast only in height.

4. Limited consonantal colouring: Ndu languages display very limited consonantal influence on vowel allophony, implying that their phonological evolution did not involve substantial redistribution of phonological information (Fowley 2005).

The individual sound changes that lead to VSSs are not uncommon. High-vowel and mid-vowel mergers occur widely (e.g. Berber, Ethio-Semitic, Moroccan Arabic, or Tocharian A, cf. Pinault 2008) without yielding VVSs. Stress-related vowel reduction, as in Arandic, is also very common, with short unstressed vowels merging into schwa, e.g. in the histories of German, English, Danish, or Irish (Paul 2007). Multi-feature vowel harmony, as found in Kyrgyz or Tundra Nenets (Salminen 1997), are both synchronically and diachronically similar to the prosodies of Central Chadic.

We emphasize that VVSs across languages are not homogenous neither in behaviour nor origin, and that their rarity is explained not by the rarity of some single sound change, but rather by the fact that multiple sound changes must conspire in specific ways to produce a VVS.

VVSs appear more stable than commonly assumed (pace Vaux & Samuels 2015). In our survey we found no secure case of a VVS reorganising into a canonical front–back vowel system. What we find are tendencies of contact-induced deverticalization by phonologizing allophones through loanwords, and cases of VVSs creating new phonemic vowels while remaining vertical, as in parts of West Caucasian and Arandic. We have not found a single clear-cut case of deverticalization, but are going to cover the potential cases.

In conclusion, VVS recur independently by fairly common sound changes applying narrow preconditions and in specific sequences and are resistant to wholesale reversal. VVS across languages are not particularly similar; they share having only height-based phonemic distinctions and some mechanism to create a more typical vowel inventory on the phonetic level, but otherwise little else.

References:

Bender, Byron W. 1968. “Marshallese phonology.” Oceanic Linguistics 7(1): 16–35.

Chirikba, Viacheslav A. 1996. Common West Caucasian: The Reconstruction of Its Phonological System and Parts of Its Lexicon and Morphology. PhD diss., Leiden University.

Foley, William A. Linguistic Ecology of Papua New Guinea. In Papua New Guinea Ecosystems, edited by Andrew Pawley, Robert Attenborough, Jack Golson, and Robin Hide, 305–326. Canberra: Pacific Linguistics, 2005.

Gravina, Richard. The Phonology of Proto-Central Chadic. Utrecht: LOT Publications, 2014.

Koch, Harold. 2004. “The Arandic Subgroup of Australian Languages.” In Australian Languages: Classification and the Comparative Method, edited by Claire Bowern and Harold Koch, vol. 1, 127–150. Amsterdam: John Benjamins.

Paul, Hermann. Mittelhochdeutsche Grammatik. 25th ed. Revised by Thomas Klein, Hans-Joachim Solms, and Klaus-Peter Wegera. Tubingen: Max Niemeyer, 2007.

Pinault, Georges-Jean. Chrestomathie tokharienne: Textes et grammaire. 2 vols. Leuven and Paris: Peeters, 2008

Salminen, Tapani. 1997. Tundra Nenets Inflection. Memoires de la Societe Finno-Ougrienne 227. Helsinki: Suomalais-Ugrilainen Seura.

Vaux, Bert, and Bridget Samuels. “Explaining Vowel Systems: Dispersion Theory vs. Natural Selection.” The Linguistic Review 32, no. 3 (2015): 573–599.

Friday 28 November

Talks

A typology of syllabic consonants: how variable is their vocalic nature?

Martin Krämer, UiT The Arctic University of Norway
Draga Zec, Cornell University

The goal of this paper is to investigate the typology of syllabic consonants, which is subsumed under the larger typology of syllable nuclei. As is well known, vowels universally occupy the nucleus, while consonants do so on a language specific basis (Bell 1978; Faytak 2012; Gordon 2016). In our database of 300 languages, we found 90 languages with syllabic consonants. We counted a consonant as syllabic if it was described as such in reliable primary sources, with phonetic evidence if available.

It has been broadly assumed that the set of syllabic consonants in a given language, which constitutes a proper subset of the consonant inventory in practically all cases other than Tashlhiyt Berber, is governed by sonority (e.g., Blevins 1995). Our findings only partially confirm this assumption. In our database, classes of syllabic consonants include only nasals, only liquids, or only sibilants; nasals+sibilants, liquids+sibilants, or all sonorants; and sonorants and fricatives (including sibilants). In addition to sonorant consonants, an important role is obviously played by sibilants; and among sonorants, by nasals. Stops are conspicuously absent (except in Tashlhiyt Berber, Dell & Elmedlaoui 1986; Prince & Smolensky 1993/2004). While some of the documented classes of syllabic consonants do not conform to sonority, they do reflect complex markedness patterns based on the feature [±*continuant*], which in nasals (cf. Krämer & Zec 2020), as well as in laterals (Mielke 2005), may have a value, or be unspecified, while sibilants can be positively or under-specified. This last option makes nasals, laterals and sibilants vowel-like, making them fit for the nuclear position, with the other two options reserved for syllable margins.

Which consonants may occupy the syllable nucleus is only one aspect of the typology of consonantal nuclei. Other important aspects include stress, tone and length, that may be exhibited by consonantal nuclei; as well as their distribution across syllable types and within words. Consonantal nuclei are typically more restricted than vocalic nuclei in all these respects. Thus, in Chipaya, syllables headed by a sibilant, the only syllabic consonant, have no onset, and only a stop coda (Olson 1967). In Baining (Parker & Parker 1974), consonantal nuclei have to be preceded by a simple onset, with *s, n, r, l* admitted in open, and only *r, l* in closed syllables. And, in Navaho (McDonough 2003; Sapir & Hoijer 1967), different proper subsets of syllabic consonants figure in word initial, final or medial position. Next, consonantal nuclei can be stressed, including Nabak (Fabian & Fabian 1998) syllabic nasals and Czech syllabic liquids (Zec 2013); or can be long, as Ryukyuan (Shimoji 2011) syllabic liquids and sibilants, and Lendu (Lojenga 1989) syllabic sibilants and rhotics (which can also bear tone); or can be both stressed and long, as in Serbian, Slovak (Zec 2013), Yurok (Blevins 2003) and Apache (Hoijer 1946) (where they are also tone-bearing).

We document the degrees to which consonantal nuclei are absorbed into the vocalic system and establish implicational relations that hold among vocalic properties of consonantal nuclei, both contrastive, prosodic and distributional.

References

Bell, A. 1978. Syllabic consonants, in Joseph Greenberg, Charles Ferguson,and Edith A. Moravcsik (eds), Universals of Human Language, Volume 2: Phonology. Stanford, CA: Stanford University Press, 153–201.

Blevins, J. 1995. The Syllable in Phonological Theory, *Handbook of phonological theory*, ed. by John Goldsmith, Basil Blackwell, London, 206-44.

Blevins, J. 2003a. Yurok Syllable Weight. International Journal of American Linguistics 69.1: 4-24.

Fabian, Edmund, and Grace Fabian. 1998. Nabak Organised Phonology Data. Manuscript, Summer Institute of Linguistics.
Available at http://www.sil.org/pacific/png/abstract.asp?id=928474542521

Faytak, M. 2012. Compiling sonority scales with obstruent vowels. BLS 38: 151–161.

Gordon, M. 2016. *Phonological Typology*. Oxford: Oxford University Press.

Hoijer, H. 1946. Chiricahua Apache. In Osgood, Cornelius (ed.), *Linguistic Structures of Native America*, 55-84. New York: Viking Fund Inc. (Johnson Reprint Corp. New York).

Krämer, M. & D. Zec 2020. Nasal consonants, sonority, and syllable phonotactics: the dual nasal hypothesis. *Phonology* 37.1: 27-63.

Lojenga, C. K. 1989. The Secret behind Vowelless Syllables in Lendu. *Journal of African Languages and Linguistics* 11: 115-126.

McDonough, J. 2003. *The Navajo Sound System*. Dordrecht: Kluwer.

Mielke, J. 2005. Ambivalence and ambiguity in laterals and nasals. *Phonology* 22.

169–203.

Olson, R. D 1967. The Syllable in Chipaya. *International Journal of American Linguistics*, Vol. 33, No. 4, pp. 300-304. http://www.jstor.org/stable/1263658

Parker, J. & D. Parker. 1974. A tentative phonology of Baining (Kakat dialect). *Workpapers in Papua New Guinea Languages* 4:5-43.

Sapir, E., & H. Hoijer. 1967. *The Phonology and Morphology of the Navaho Language*. Berkeley, CA: University of California Press.

Shimoji, M. 2011. “Irabu Ryukyuan.” In *Grammatical Sketches from the Field*, edited by Yasuhiro Yamakoshi, Research Institute for Languages and Cultures of Asia and Africa, , pp. 77–131.

Zec, Draga (2013). Liquid syllable nuclei in Slavic: consonantal or vocalic? In Steven Franks, Markus Dickinson, George Fowler, Melissa Witcombe & Ksenia Zanon (eds.) Formal approaches to Slavic linguistics: the 3rd Indiana meeting 2012. Ann Arbor: Michigan Slavic Publications. 436–450.

Invoking typology to account for phonological asymmetries in Yuhup and Hup

Ryan Chon, University of Washington

Two closely related Nadahup languages, Yuhup and Hup, have both been subject to conflicting phonological analyses. When considered together with language-internal facts, typology helps account for phonological asymmetries that arise in Yuhup and Hup phenomena relating to nasality and glottalization.

Yuhup and Hup both exhibit one set of voiced occlusive phonemes that surface with variable nasality. When adjacent to nasal vowel nuclei, the bilabial and alveolar voiced occlusives surface as nasals [m, n]. When preceded by oral vowel nuclei, they surface as complex oral-nasal consonants [bm, dn]; when followed by them, they surface as oral stops with optional pre-nasalization [(m)b, (n)d]. Some authors **[2, 3, 7]** analyze this set as voiced stops, while others **[5, 6, 10]** analyze them as nasals. I adopt the latter analysis, partially motivated by the phonotactic asymmetry between /m, n/ and /ɲ, ŋ/. In Yuhup, though the latter pair displays the aforementioned pattern of allophony in coda position ([ɲ~ɟɲ, ŋ~gŋ]), they never appear as onsets (see **Table**). Thus, since [(ɲ)ɟ, (ŋ)g] are not allophones of /ɲ, ŋ/, they always surface with some nasality, casting their analysis as stops /ɟ, g/ into doubt. It is also cross-linguistically common for "basic" nasal phonemes /m, n/ to occur more freely than other nasal phonemes. In many languages (e.g., English), a velar nasal phoneme /ŋ/ is barred from word-initial position **[1]**. In Spanish, the palatal nasal /ɲ/ occurs word-initially only marginally **[8]**.

The level of phonological representation of glottalization in Yuhup and Hup is also contentious. While some authors posit phonemic glottalized consonants **[7, 10]**, others treat glottalization as a morpheme-level feature that affects segments' realization morpheme-internally **[5, 6, 9]**. The former group agrees that /c, k/, among other plain occlusive phonemes, have glottalized counterparts /c', k'/. The other voiceless stops /p, t/, notably, do not: /p', t'/ are absent or marginal in both languages. Accordingly, in Lopes' **[5]** Yuhup wordlist, morpheme-level glottalization (/$^{[glt]}$/) never occurs on morphemes with an onset /p, t/, while it can occur on morphemes with an onset /c, k/ (e.g., /$^{[glt]}$cak/ [c'a̱:k̄] 'buriti'). But morpheme-level features should be able to apply without being sensitive to the identity of morpheme-internal phonemes. When /c', k'/ (but not /p', t'/) are instead posited as phonemes in addition to /p, t, c, k/, Yuhup and Hup conform to the cross-linguistic tendency for dorsal ejective phonemes to be more typical than non-dorsal ones **[4]**. Thus, [p', t'] are lacking or rare simply because /p', t'/ lack phonemic status.

In certain phonological analyses, languages display seemingly arbitrary, unmotivated asymmetries. Here, I show that analyses of Yuhup and Hup that have no underlying nasal or glottalized consonant phonemes should be abandoned in favor of analyses that allow language-internal facts to be motivated with regard to well-attested cross-linguistic patterns.

Table: Allophones of Yuhup nasals

position	phoneme	nucleus	
		V	Ṽ
$_	/m/	[(m)ba]	[mã]
	/n/	[(n)da]	[nã]
	/ɲ/	—	—
	/ŋ/	—	—
_$	/m/	[abm]	[ãm]
	/n/	[adn]	[ãn]
	/ɲ/	[aɟɲ]	[ãɲ]
	/ŋ/	[agŋ]	[ãŋ]

[1] Anderson, G. D. S. (2013). *The Velar Nasal.* In Dryer, M. S. & Haspelmath, M. (Eds.), WALS Online (v2020.4). **[2] Epps, P.** (2008). *A Grammar of Hup.* De Gruyter Mouton. **[3] Gutiérrez, L. R.** (2000). Los Macúes, lengua juhupde: Aspectos de la fonología. In de Pérez, G., Stella, M., de Montes, R., & Luisa, M. (Eds.), *Lenguas indígenas de Colombia: Una visión descriptiva*, 537-546. Instituto Caro y Cuervo. **[4] Ladefoged, P.** (2005). *Vowels and Consonants*. Blackwell. **[5] Lopes, A. B.** (1995). *Fonologia da língua yuhup: Uma abordagem não-linear* [Master's thesis, Universidade Federal de Santa Catarina]. **[6] Lopes, A. B., & S. Parker.** (1999). Aspects of Yuhup Phonology. *International Journal of American Linguistics 65*(3), 324-342. **[7] Martins, V.** (2005). *Reconstrução fonológica do protomaku oriental* [Doctoral dissertation, Vrije Universiteit]. **[8] Morales-Front, A.** (2018). The Syllable. In Geeslin, K. L. (Ed.), *The Cambridge Handbook of Spanish Linguistics*, 190-210. Cambridge University Press. **[9] Ospina Bozzi, A. M.** (2002). *Les structures élémentaires du yuhup makú, langue de l'Amazonie colombienne: Morphologie et syntaxe* [Doctoral dissertation, Université de Paris VII]. **[10] Silva, C., & Silva, E.** (2012). *A Língua dos Yuhupdeh: Introdução Etnolinguística, Dicionário Yuhup-Português e Glossário Semântico-Gramatical.* Pró-Amazônia.

Phonological vs. phonetic typologies of laryngeal systems

Péter Őri
Eötvös Loránd University (ELTE), Budapest

It is common practice in representational phonological analyses to use two distinctive features, [(±)voice] and [(±)spread glottis], or the melodic elements |L| and |H| in Element Theory to encode the laryngeal contrast in VOT-based binary systems, differentiating between voicing and aspirating languages already in the phonological representation. It is (i) the phonetic realization and (ii) the behavior of the obstruent series that are taken to reveal whether a language should be categorized as an L- or an H-system.

However, a great deal of variation can be observed in the physical implementation of the two laryngeal elements or their absence: e.g., the phonologically unmarked obstruents (the ones not triggering assimilation) are actively voiced in Swedish but voiceless by default in Yorkshire English; or the fortis/voiceless obstruents causing assimilation appear to be unaspirated in Meccan Arabic but are aspirated in Yorkshire English. Besides, both laryngeal elements exhibit the same range of phonological behaviors cross-linguistically: (i) they can be licensed in any environment or only in presonorant position (→ final neutralization); (ii) they can spread or not (→ assimilation), and (iii) if they spread, it can happen in both directions. Therefore, I argue elsewhere that one laryngeal element, namely the fortisness/voicelessness-marking |H|, is enough for the representation of the laryngeal contrast in both aspirating and voicing languages. This |H|-only analysis provides a laryngeal typology established solely along the phonological processes operating on |H|. Also, it does not require more stipulation regarding possible phonetic realizations and phonological processes than have been necessary all along, and generalizations do not seem to get lost.

Elsewhere, I also argue that there are laryngeal phenomena whose amalgamation into the proposed phonological typology would be misguided: e.g., the presonorant sandhi voicing of laryngeally neutralized final obstruents, e.g., in *jak oni* 'how they,' pronounced [jag#ɔɲi] in Cracow Polish vs. [jak#ɔɲi] in Warsaw Polish. Although Cyran (2014) accounts for the different phonetic forms elegantly by phonologically reanalyzing the former accent as an H-language and assuming passive voicing in it, the situation is much more complex. Consider, e.g., Central Catalan, where in the sandhi context, all obstruents undergo voicing before sonorant consonants, but prevocalically, only sibilants and plosive+sibilant clusters (and variably the labiodental fricative) do; see Strycharczuk (2012), who points out that "there are no factors that could motivate a representational asymmetry between sonorants and vowels independently of the aim to capture the pattern formally," and that a "successful representational solution to this problem is not readily available." As these are neutralized phonological objects whose voicedness or voicelessness does not carry any grammatical function and cannot be synchronically justified, I propose that we regard this property as the result of the arbitrary mapping of a phonetic feature to obstruents or obstruent categories, which a child simply has to learn in the course of acquisition. Languages only differing, e.g., in the exact realization of their neutralized obstruents or of the presence of |H| in a segment should be considered phonologically identical laryngeal systems, differing only phonetically.

References

Cyran, Eugeniusz. 2014. Between phonology and phonetics: Polish voicing (Studies in Generative Grammar [SGG] 118). Boston, MA/Berlin: De Gruyter Mouton.

Strycharczuk, Patrycja. 2012. Phonetics-phonology interactions in pre-sonorant voicing. PhD dissertation. University of Manchester, Manchester.

Gradient Integration of Anglicisms in Bilingual Speech: A Phonetic-Typological Approach[1]

Rubén Roberto Peralta-Rivera
Universidad Autónoma de Baja California
ruben.peralta55@uabc.edu.mx

Loanword Phonology has traditionally posited that phonological adaptations follow either L1-based substitution or L2-preserving realization (Bäumler, 2024; Calabrese and Wetzels, 2009 *inter alia*). These conditions are shaped by perception-driven or production-driven mechanisms (Best and Tyler, 2007; Flege, 1995). However, spontaneous bilingual speech in contact settings often resists binary classification. This study challenges categorical models through acoustic evidence from the Tijuana–San Diego region, a context where Spanish and English have multidimensionally coexisted. The study analyzes 131 vowel tokens from monophthongal monosyllabic Anglicisms (e.g., *bun* /bʌn/, *clean* /kli:n/, *mall* /mɔl/, etc.) in spontaneous conversations with Spanish–English bilinguals, using the sociolinguistic approach *Friend-of-a-friend* (Milroy and Gordon, 2003). The analyses extracted F1 and F2 values using *Praat* (Boersma and Weenink, 2023). Formant values were then compared with Spanish (/a/, /e/, /i/, /o/, /u/) and English (/ɑ/, /æ/, /ɛ/, /ʌ/, /ɔ/, /i/, /u/) target vowels via Euclidean distance in the F1–F2 acoustic space (Fig. 1).[2]

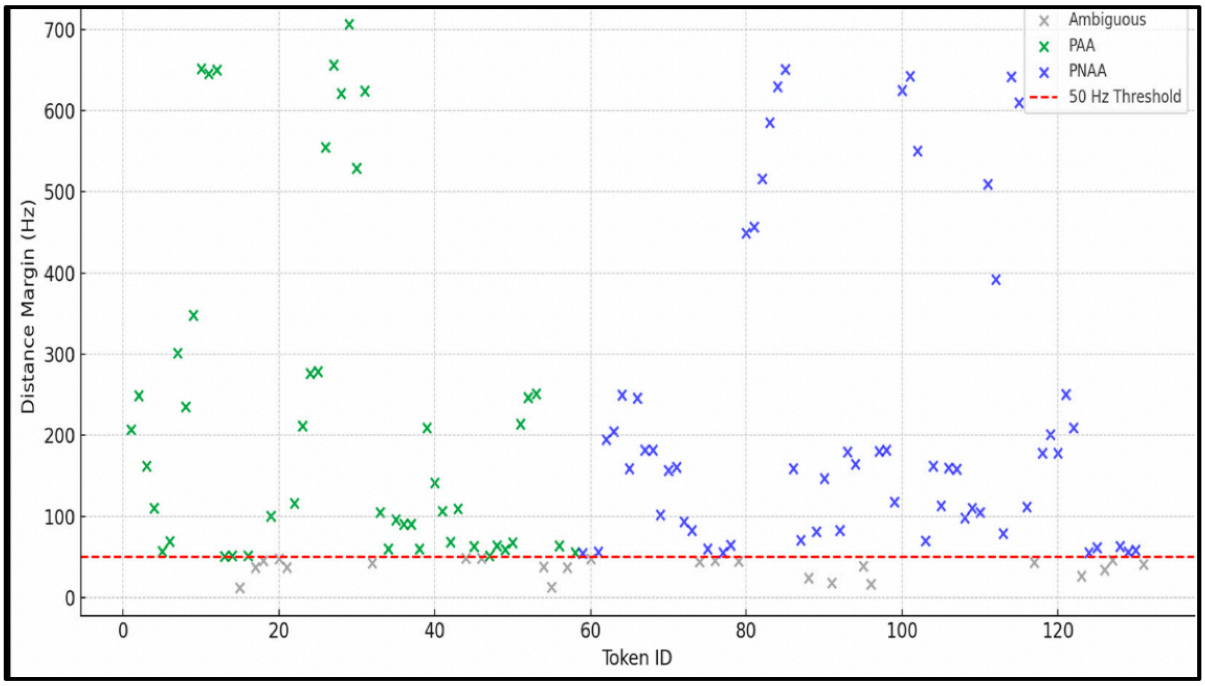


Figure 1. Distance margins show the proximity of each token (vowel) to Spanish vowels (positive = PAA), English vowels (negative = PNAA) targets and intermediate vowels (Ambiguous). Dashed lines at ± 50 Hz mark the perceptual threshold for classification.

(Peralta-Rivera et al., 2025, p. 7)

[1] This is a research extension from Peralta-Rivera, Gil-Burgoin and Valenzuela-Miranda (2025).
[2] See appendix for representative data and classification criteria.

The results reveal three phonetic trajectories: some vowels align with Spanish-like features (Phonetically-Adapted Anglicisms, PAA), others retain English-like features (Phonetically Non-Adapted Anglicisms, PNAA) and some exhibit intermediate features (Ambiguous), defined as realizations lying between language-specific targets within defined acoustic thresholds. The attested gradient realizations problematize the traditional perception–production dichotomy (e.g., Bäumler, 2024; Calabrese & Wetzels, 2009) by suggesting a usage-based continuum of phonological integration. Particularly, the Ambiguous category realizations suggest speaker-dependent mappings shaped by lexical frequency, age of acquisition and quantity-quality aspects of L2 input as theorized in both *Speech Learning Model* (Flege, 1995) and *Perceptual Assimilation Model for L2 Learners* (Best, 1995; Best and Tyler, 2007). Therefore, the findings imply a reassessment of foundational phonological assumptions by revealing typologically attested vowel patterns in bilingual speech that have thus far remained theoretically unaccounted. More broadly, the data challenge strict modularity of phonological foundations by revealing gradient mappings that blur the boundaries between phonological and phonetic representation. Rather than conforming to rule-governed alternations, vowel realizations emerge from a dynamic interplay of cognitive, articulatory and sociolinguistic factors; thereby, undermining assumptions of derivational uniformity. These patterns align with non-modular, interactive accounts of the phonetics–phonology interface, as advanced by emergentist and exemplar-based models (e.g., Beckman and Edwards, 2018; Bybee, 2013). The study bridges formalist abstraction and usage-based realism by grounding F1 and F2 acoustic measurements in theoretical constructs of phonological representations. Thereby, it offers an empirically grounded account of contact-induced variation. Although the proposed typology (PAA, PNAA and Ambiguous) derives from a single bilingual speech group, its methodological foundation permits replicability and invites typological extension across other bilingual settings. Finally, the research contributes a data-driven and theoretically grounded framework for modeling representational variability in loanword adaptation within language contact settings.

References

Beckman, J., & Edwards, J. (2018). *Phonological acquisition as a gradual, emergent process.* In J. Lidz,W. Snyder & J. Pater (Eds.), *The Oxford Handbook of Developmental Linguistics*. Oxford University Press.

Best, C. T. (1995). A direct realistic view of cross-language speech perception. In W. Strange (Ed.), *Speech perception and linguistic experience: Issues in cross-language research* (pp. 171–204). York Press.

Best, C. T., & Tyler, M. D. (2007). Nonnative and second-language speech perception: Commonalities and complementarities. In O.-S. Bohn, & M. J. Munro (Eds.), *Language experience in second language speech learning: I honor of James Emil Flege* (pp. 13–34). John Benjamins.

Boersma, P., y Weenink, D. (2023). *Praat: doing phonetics by computer* [Computational software]. Version 6.1.40. Accessed on February 10th 2023. https://www.fon.hum.uva.nl/praat/.

Bybee, J. (2013). *Usage-based theory and exemplar representations of constructions.* In T. Hoffmann & G. Trousdale (Eds.), *The Oxford Handbook of Construction Grammar* (pp. 49–69). Oxford University Press.

Bäumler, L. (2024). Loanword Phonology of Spanish Anglicisms: New Insights from Corpus Data. *Languages*, 9(9), 294, 1-18. https://doi.org/10.3390/languages9090294.

Calabrese, A., & Wetzels, L. (2009). Loan Phonology: Issues and controversies. In A. Calabrese & L. Wetzels (Eds.), *Loanword Phonology* (pp. 1-10). John Benjamins Publishing Company.

Flege, J. E. (1995). Second-language speech learning: Theory, findings, and problems. In W. Strange (Ed.), *Speech perception and linguistic experience: Issues in cross-language research* (pp. 233–277). York Press.

Milroy, L., & Gordon, M. (2003). Style-shifting and code-switching. *Sociolinguistics: method and interpretation*, 188-222. https://doi.org/ 10.1002/9780470758359.ch8.

Peralta-Rivera, R. R., Gil-Burgoin, C. I., & Valenzuela-Miranda, N. E. (2025). Phonetically Based Corpora for Anglicisms: A Tijuana-San Diego Contact Outcome. *Languages*, 10(6), 143. https://doi.org/10.3390/languages10060143.

Challenges and Advantages in Using Artificial Grammar Learning to Expand Natural Typologies

Jenna Conklin & Martin Krämer

In constructing a typology, attested languages allow linguists to sketch a broad framework of possible grammars, but natural typology often exhibits gaps whose exact nature is unknown. To construct a strong phonological theory, it is necessary to know whether such gaps are inherent to human phonology or if they are accidental. Consider the lack of prefix-controlled consonant harmony: is such a grammar possible, or should it be ruled out by our theoretical model? This is a question which cannot be presently answered by descriptive linguistics due to the lack of languages featuring such a system. In this talk, we examine the challenges and advantages of using experimental methods, such as Artificial Grammar Learning (AGL), to expand natural typologies, and outline a research program using AGL to improve our understanding of the typology of vowel and consonant harmony.

The chief benefit of AGL studies for typology is their ability to add learnable grammars to the set of attested ones. A number of AGL studies of harmony have confirmed that certain unnatural grammars are also unlearnable, such as the majority rules pattern (Finley & Badecker, 2008), cross-featural harmonies (Wilson, 2003), and several nuances of locality and transparency (Finley, 2011, 2015). The talk opens with a review of key works in this area before discussing two key questions: what are the challenges and limitations in using AGL results to expand natural typologies, and what type of typological conclusions, if any, can reliably be drawn from this body of work?

Assuming that learnable grammars are equivalent to possible grammars is a dangerous leap of logic; the set of possible grammars sought by typology will, of course, be a subset of the set of learnable grammars, but it will also be influenced by factors impossible to replicate in an AGL paradigm, such as historical and social pressure, channel bias, and analytic bias (Moreton, 2008; Moreton & Pater, 2012a, 2012b; Trudgill, 2004). Furthermore, AGL results are subject to the linguistic biases and domain-general cognitive abilities of adults, while language acquisition and historical development are influenced by the linguistic acquisitional abilities of children (Chabot, 2021). We discuss how AGL studies can navigate this challenge to draw specifically phonological conclusions based on the results of adult participants, rather than domain-general conclusions.

To conclude, we examine whether AGL work can be used to expand natural typologies, what kinds of typological conclusions can and cannot be drawn from AGL results, and to what degree AGL results should be allowed to influence formal models of phonological typology, outlining the precautions and caveats needed when merging these two approaches. In the process, we discuss the relationship between formal complexity, phonetic naturalness, typological frequency, and phonology. Finally, we outline a program of future work addressing gaps in natural typologies of vowel and consonant harmony through Artificial Grammar Learning and contextualize the scope of the future findings of this program.

References

Chabot, A. M. (2021). *Possible and impossible languages: Naturalness, third factors, and substance-free phonology in the light of crazy rules* [Université Côte d'Azur]. https://policycommons.net/artifacts/15830706/possible-and-impossible-languages/16721565/

Finley, S. (2011). The privileged status of locality in consonant harmony. *Journal of Memory and Language*, *65*(1), 74–83. https://doi.org/10.1016/j.jml.2011.02.006

Finley, S. (2015). Learning nonadjacent dependencies in phonology: Transparent vowels in vowel harmony. *Language*, *91*(1), 48–72. https://doi.org/10.1353/lan.2015.0010

Finley, S., & Badecker, W. (2008). Analytic biases for vowel harmony languages. *WCCFL*, *27*, 168–176.

Moreton, E. (2008). Analytic Bias and Phonological Typology. *Phonology*, *25*(1), 83–127.

Moreton, E., & Pater, J. (2012a). Structure and Substance in Artificial-phonology Learning, Part I: Structure. *Language and Linguistics Compass*, *6*(11), 686–701. https://doi.org/10.1002/lnc3.363

Moreton, E., & Pater, J. (2012b). Structure and Substance in Artificial-Phonology Learning, Part II: Substance. *Language and Linguistics Compass*, *6*(11), 702–718. https://doi.org/10.1002/lnc3.366

Trudgill, P. (2004). Linguistic and social typology. In J. K. Chambers, P. Trudgill, & N. Schilling-Estes (Eds.), *The handbook of language variation and change* (pp. 707–728). Blackwell.

Wilson, C. (2003). Experimental investigation of phonological naturalness. *In G. Garding & M. Tsujimura (Eds.), Proceedings of the 22nd West Coast Conference on Formal Linguistics*, 533–546.

Friday 28 November
Poster session

Exploring the Prosody-Morphology Interface: A Typological Assessment of Muṯallaṯ Arabic Pausal Forms

Letizia Cerqueglini, Tel Aviv University

Interest in pausal forms is particularly prominent within the Semitic language family. In various classical written Semitic languages, such as Arabic, the Aramaic languages, and Hebrew (Beyer 2009; Birkeland 1940; Goerwitz 1993; Suchard 2019; van Putten 2022), pausal forms are codified as part of the grammar, represented in writing as morphological alternations. Pausal (and initial) forms also occur in other language families, but have received less attention, since —apart from Sanskrit (Selkirk 1980)—they are realized as spoken allophony rather than morphological forms (Xu 1997; Myers and Hansen 2007; Palakurthy 2016). A comprehensive typology specifying the syntactic and prosodic contexts of pausal forms and the strategies by which they are realized is still lacking, even within Semitic languages and among Arabic varieties.

Many Arabic dialects continue to exhibit pausal forms (Arnold 2010; Blanc 1953; Fischer and Jastrow 1980; Fleisch 1968; Klimiuk 2022; Lipnicka 2022; Shachmon 2011; Zuʿbi 2017, 2021). This study focuses on Muṯallaṯ Arabic, a Palestinian Arabic variety, where pausal forms have recently been identified in narrative style (Cerqueglini 2023), in order to offer a unifying analysis. Across Arabic dialects, pausal forms are signaled through diverse phonological strategies, including stress shift, alternations in vowel quality or quantity, modifications in consonant articulation or gemination, diphthongization, vowel epenthesis, deletion of short vowels or consonants, as well as the reemergence of archaic forms and creation of innovative ones.

In Muṯallaṯ Arabic traditional narrative, some pausal forms differ from everyday speech. For instance, daily interrogative pausal forms exhibit rising intonation and vowel lengthening, whereas narrative interrogatives—similar to rhetorical or argumentative questions—show falling intonation and lowered final vowels. Muṯallaṯ Arabic also exhibits several categories of pausal forms: internal (minor), final (major), and forms influenced by sentence-level intonation when utterances are prosodically marked for emphasis, invocation, lamentation, or exclamation. For many morphological word classes, minor pausal forms coincide with archaic forms, which also appear when the word is the first element of a construct state (e.g., noun+noun, noun+pronoun, verb+pronoun). Major pausal forms often coincide with isolated word forms, revealing a cycle of morphological conventionalization. Prosodically marked pausal forms trigger vowel lengthening and stress shifts to the final syllable, which are generally incompatible with the dialect's morphophonological structure.

Major pausal forms are realized through centralization of the final short vowel, centralization and lengthening of the final non-final short vowel, centralization of the final non-final long vowel, and epenthesis of a short vowel in clusters of two final consonants (Ito 1989). Markedness constraints on pausal forms are deeply entangled with morphology. As argued by McCarthy for Classical Arabic, Wolf's Optimal Interleaving theory (2008) provides a suitable account for Muṯallaṯ Arabic, explaining the interaction between phonology and morphology in pausal forms. The theory connects seemingly disparate phenomena—such as infixation and allomorphy—and accommodates purely phonological consequences of pause. These findings indicate that, despite substantial morphological differences between Classical Arabic and Muṯallaṯ Arabic, the two share significant typological affinities in phonology-morphology interaction.

References

Arnold, W. 2010. Pausalformen in den arabischen Dialekten Antiochiens. Bobzin, H., Talay, S. (eds.) *Arabische Welt*, pp. 227–235. Wiesbaden: Reichert.

Beyer, K. 2009. Die klassisch arabische Pausa. Arnold, W., Jursa, M., Müller, W., Procházka, S. (eds.), *Philologisches und Historisches zwischen Anatolien und Sokotra*, pp. 9-16. Wiesbaden: Harrassowitz.

Birkeland, H. 1940. *Altarabische Pausalformen*. Oslo: Jacob Dybwad.

Blanc, H. 1953. *Studies in North Palestinian Arabic*. Jerusalem: Israel Oriental Society.

Cerqueglini, L. 2023. *Ya ṛaḅḅíːt! Tanṭīni binéːt!*: Ǧbēne in the Traditional Muṯallaṯ Arabic of Bāḳa l-Ġarbiyye. *Folia Orientalia* 60: 227-275.

Fischer, W., Jastrow, O. 1980. *Handbuch der Arabischen Dialekte*. Wiesbaden: Harrassowitz.

Fleisch, H. 1968. *L'Arabe Classique*. Beirut: Dar Al Machreq.

Goerwitz, R. 1993. *Tiberian Hebrew Pausal Forms*. Doctoral dissertation, University of Chicago, Chicago. Available at http://www.goerwitz.com/papers/dissertation/.

Hoberman, R. 1995. Subtractive morphology and morpheme identity in Arabic pausal forms. *Yearbook of Morphology* 1995: 161-74.

Ito, J. 1989. A prosodic theory of epenthesis. *Natural Language & Linguistic Theory* 7: 217-59.

Klimiuk, M. 2022. Vowel Length in the Maltese Dialects of Gozo. Klimiuk, M. (ed.) *Semitic Dialects and Dialectology*, pp. 213-227. Heidelberg: Heidelberg University Publishing.

Lipnicka, M. 2022. Pausal Diphthongisation in Gozitan Dialects Compared to Zaḥlé, Lebanon. Klimiuk, M. (ed.) *Semitic Dialects and Dialectology*, pp. 229-241. Heidelberg: Heidelberg University Publishing.

McCarthy, J. 2012. Pausal Phonology and Morpheme Realization. Borowsky, T., Kawahara, S., Shinya, T., Sugahara, M (eds.) *Prosody Matters,* https://hdl.handle.net/20.500.14394/32511. London: Equinox.

Myers, S, Hansen, B. 2007. The origin of vowel length neutralization in final position: Evidence from Finnish speakers. *Natural Language & Linguistic Theory* 25: 157-93.

Palakurthy, K. 2016. Acoustic evidence for prosodic units in Navajo. *Journal of the Acoustics Society of America* 140: 3113.

Selkirk, E. 1980. Prosodic domains in phonology: Sanskrit revisited. Aronoff, M., Kean, M. (eds.), *Juncture*, pp. 107-129. Saratoga, CA: Anma Libri.

Shachmon, O. 2011. Pausal final imala in central Palestinian dialects. *Jerusalem Studies in Arabic and Islam* 38: 145-161.

Suchard, B. 2019. *The Development of the Biblical Hebrew Vowels.* Leiden: Brill.

Van Putten, M. 2022. *Quranic Arabic: From Its Hijazi Origins to Its Classical Reading Traditions*. Leiden: Brill.

Wolf, M. 2008. Optimal Interleaving: Serial Phonology-Morphology Interaction in a Constraint-Based Model. Doctoral dissertation, University of Massachusetts Amherst, Amherst, MA.

Xu, Y. 1997. Contextual tonal variations in Mandarin. *Journal of Phonetics* 25: 61-83.

Zuʿbi, A. 2017. Pausal forms in the Arabic of Nazareth. *Mediterranean Language Review* 24: 159-174.

Zuʿbi, A. 2021. Interesting Pausal Forms in the Speech of Muslims and Christians in Kufᵘr-Kanna. *Journal of Arabic and Islamic Studies* 21: 121-136.

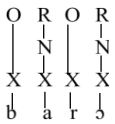
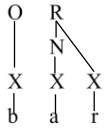
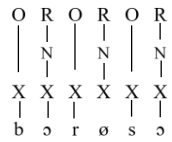
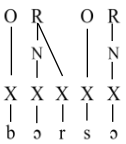
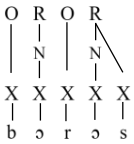
Experimental Method in understanding Empty Nuclei and Rhymal Coda

Pratikshya Guru, IIT Delhi

This paper investigates a case of empty nuclei (EN) and rhymal coda (RC) in two varieties of Odia (an East Indo-Aryan language) : Katki (Kt) and Sambalpuri (Sb). Kt and Sb (Dutta Baruha, 2007) share the same vowel repertoire of /i, e, a, ɔ, o, u/, with /ɔ/ as the epenthetic vowel. /ɔ/ can be inserted in EN positions. The preference for EN insertion differs in Kt and Sb. Kt only allows open syllables, of template: (C)V. Sb, on the other hand, allows both open and closed syllables: (C)V(C). This paper considers all the segments where the underlying representation contains an EN and the epenthetic (/ɔ/) is inserted. For example /br.sa/ →[bɔr.sa] 'rain'. Looking at cognates in Kt and Sb using Government Phonology (Kaye et al., 1990) I find that ENs manifest in 2 different ways.

(1)	Kt	Template	Sb	Template	Gloss
1a.	*ʈa.lɔ*	CV.CV	*ʈal*	CVC	'palm tree'
	ba.rɔ	CV.CV	*bar*	CVC	'day'
1b.	*bɔr.sɔ*	CVC.CV	*bɔr.sɔ ~ bɔ.rɔs*	CVC.CV ~ CV.CVC	'year'
	rɔk.ʈɔ	CVC.CV	*rɔk.ʈɔ ~ rɔ.kɔʈ*	CVC.CV ~ CV.CVC	'blood'

(A) Words like those in (1a) follows an open syllable structure in Kt (2a) in contrast to Sb where the final consonant can be a part of RC (2b). **(B)** Examples in (1b) suggest that Kt and Sb both can have medial consonant clusters. However, I propose that the two have different syllable structures. Kt (2c) forms trisyllables, with a nuclear segment that is not filled with epenthetic vowel (underlying trisyllable surfaces as disyllable).

(2)		**Kt** (*RC)		**Sb** (RC)	
(A)	a.	CV.CV		b. CVC	
(B)	c.	CV.Cø.CV → CVC.CV		d. CVC.CV	
				e. CV.CVC	

Contrary to Kt, the same string in Sb (2d & 2e) is disyllabic, where either one of the two syllables can contain a RC, and there is no EN. To understand the disparity in the preference for epenthesis and rhymal coda we conducted a nonce-word pilot study. A syllabification game was conducted, that involve the insertion of a specific syllable segment to the provided data. The words provided are in disyllabic CVCCV and CVCVC forms. **Predictions.** In case of C-final word, Kt will prefer insertion of /ɔ/, but in case of medial-C Kt will prefer medial coda whereas Sb will prefer coda in both cases. Fig (1) and Fig (2) shows results for 5 participants. This paper also questions if this is a result of diachronic or synchronic change.

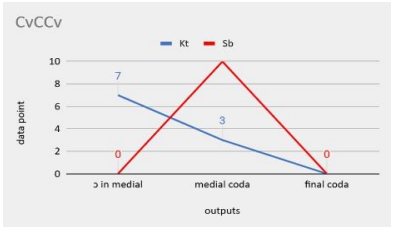


Figure 1: Results for CVCCV

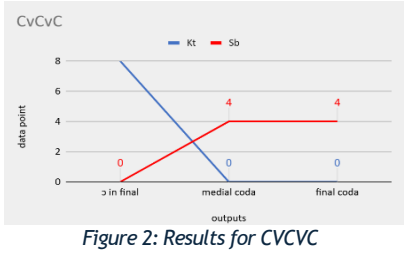


Figure 2: Results for CVCVC

References:

Dutta Baruha, P. N. (2007). A contrastive analysis of the Morphological Aspect of Assamese and Oriya, *Issue 535 of Central Institute of Indian Languages publication*

Kaye, J., Lowenstamm J., Vergnaud, J. (1990). Constituent stucture and government in phonology, *Phonology Yearbook 7*, 193-231.

Kaye, J (1990). 'Coda' licensing. *Phonology Yearbook 7*, 301-330

Frazier, M., & Kirchner, J. S. (2011), *Correspondence and Reduplication in Language Play: Evidence from Tigrinya and Ludling Typology*, current manuscript

Sahu G. (2001), *Generative Phonology of Sambalpuri,* PhD Thesis, Sambalpur University

A typological tool for marginal consonant clusters

Alireza Jaferian – SFL (*Structures formelles du langage*) CNRS, Paris, France

In this poster, I present a sketch of a typological tool developed within CVCV (Lowenstamm 1996, Scheer 2004), useful for classifying languages in terms of consonant clusters they allow at word margins (see Gordon 2016: §4.2).

In CVCV, in the less marked word-internal position, two empty nuclei in a row violate the Empty Category Principle and are thus banned.

Word-finally, two parameters are at play. Final Empty Nuclei (FEN), even though ungoverned, are parametrically licensed to remain empty. With this parameter on, a language can have word-final simple codas. FEN can further be enabled to govern another preceding empty nucleus, authorizing it to be empty. This means that the language can have word-final CCs.

Word-initially, in some languages, the beginning of the word is marked by an initial empty CV unit (Lowenstamm 1999). The nucleus of this unit needs to be governed, hence the necessity of the first nucleus of the word to be full. Languages in which this parameter is on pose restrictions on word-initial consonants. Branching onsets are bound by an interconsonantal lateral force, called Infrasegmental Government (IG), whereby liquids govern obstruents (Scheer 1996). This creates a closed domain, meaning that the nucleus in between cannot be targeted. It follows that a language with both Initial CV and IG on allows branching onsets word-initially.

The interplay of these four parameters yields the 12 language types below.

FEN licensed	+	+	+	+	+	+	+	+	−	−	−	−
FEN can govern	+	+	+	+	−	−	−	−	−	−	−	−
IG	+	+	−	−	+	+	−	−	+	+	−	−
Initial CV	+	−	+	−	+	−	+	−	+	−	+	−
Language type	1	2	3	4	5	6	7	8	9	10	11	12

Odd classes have an Initial CV, thereby restricting clusters word-initially. Even types do not have an Initial CV and allow all types of word-initial clusters (cf. “everything goes”, Scheer 2012).

Class	#CC	C#	CC#	Examples
1	IG + (TR only)	Yes	Yes	English, French, Dutch, Middle Persian?
3	IG - (no #CC)	Yes	Yes	Persian, Classical Arabic
5	IG + (TR only)	Yes	No	Middle Persian?, Flemish, Hebrew
7	IG - (no #CC)	Yes	No	Finnish
9	IG + (TR only)	No	No	Standard Italian?
11	IG - (no #CC)	No	No	Lumasaaba, Hua

Class	#CC	C#	CC#	Examples
2	IG + (everything goes)	Yes	Yes	Kurdish, Balochi, Pashto
4	IG - (everything goes)	Yes	Yes	?
6	IG + (everything goes)	Yes	No	Czech
8	IG - (everything goes)	Yes	No	Levantine Arabic
10	IG + (everything goes)	No	No	?
12	IG - (everything goes)	No	No	?

Using this tool, diachronic evolution and dialectal variation can be analyzed as a change of class: contemporary French seems to be shifting toward class 2; Modern Persian is characterized by its loss of IG, diachronically active, etc.

Data and concrete language cases will be discussed.

References

Gordon, Matthew K. 2016. *Phonological typology.* Oxford: OUP.

Lowenstamm, Jean. 1996. CV as the only syllabe type. *Current trends in phonology. Models and methods.* Jacques Durand & Bernard Laks (eds) : 419-441. Salford, Manchester: ESRI.

Lowenstamm, Jean. 1999. The beginning of the word. *Phonologica 1996: Syllables!?* John Rennison & Klaus Kühnhammer (eds) : 153-166. The Hague: Thesus.

Scheer, Tobias. 1996. *Une théorie de l'interaction directe entre consonnes.* PhD dissertation. Université Paris VII.

Scheer, Tobias. 2004. *A lateral theory of phonology. Volume 1: What is CVCV and why should it be?* Berlin: Mouton de Gruyter.

Scheer, Tobias. 2012. *Direct interface and one-channel translation: a non-diacritic theory of the morphosyntax-phonology interaction.* Berlin: Mouton de Gruyter.

Lexical stress with gradient Theme prominence: A typological perspective

Giorgos Markopoulos[1] & Anthi Revithiadou[2]
[1]*University of the Aegean,* [2]*Aristotle University of Thessaloniki*

Lexical stress assignment involves morphemes that are pre-specified for prominence, creating conflicts when multiple stressed elements occur within a word. Such conflicts have been proposed to be resolved phonologically, by assigning stress to the leftmost stressed morpheme (Kiparsky & Halle 1977; Melvold 1989; Idsardi 1992; Halle & Idsardi 1995; Bogomolets 2021), or morphologically, by prioritizing specific elements (morphological elements: Alderete 1999, 2001; Revithiadou 1999; weighted constituents: Vaxman 2016; Zimmerman 2017; Kushnir 2022). However, a less explored dimension of these systems concerns the role of *Theme Elements* (ThEs) in accentuation, a gap this paper seeks to address.

ThEs can be roughly described as morphological constituents that combine with roots and form nominal and verbal stems (e.g., Latin: *am-a-* 'love-ThE'). What makes them particularly interesting is their variable accentual behavior coupled with ambiguous morphosyntactic status. ThEs in the nominal domain are typically treated as declension class markers, that is, "ornamental" pieces of morphology, often analyzed within *Distributed Morphology* (Halle & Marantz 1993) as the spell-out of Theme nodes/features inserted post-syntactically due to well-formedness requirements (e.g., Latin: Embick & Noyer 2007; Lampitelli 2014; Spanish: Oltra-Massuet & Arregi 2005; Kramer 2015; Greek: Markopoulos 2025). By contrast, in verbal structures, ThEs are treated not only as conjugation class markers with no morphosyntactic content (e.g., Latin: Aronoff 1994; Embick & Halle 2005; Catalan: Oltra-Massuet 1999; Spanish: Arregi 2000; Roca 2010), but also as verbalizers, light verbs or aspect/voice exponents (e.g., Slavic: Svenonius 2004; Jabłońska 2007; Božič 2015; Taraldsen-Medová & Wiland 2019; Milosavljević & Arsenijević 2022; Quaglia et al. 2022; Simonović & Mišmaš 2023; Kovačević et al. 2024; Greek: Warburton 1973; Galani 2003; English: Kayne 2016; Spanish: Fábregas 2017).

This asymmetry mirrors the generalization that nouns tend to have more inflection classes than verbs (Kouneli 2022), but we also show that it has a phonological reflex in stress assignment, a connection not explicitly formulated in previous typological work. Verbal ThEs display systematic and predictable stress patterns, with stress often being assigned on the ThE itself (1a) (e.g., Oltra-Massuet 1999; Roca 2010; Simonović & Mišmaš 2023). This pattern reflects their 'heavier' functional load: verbal ThEs carry semantic content (aspect, voice, verbalization), making them more likely to attract stress under the assumption that stress enhances the perceptibility of semantically significant information (Molineaux 2014). Conversely, nominal ThEs, being 'empty' elements, exhibit gradient and variable stress, with individual ThEs appearing with multiple stress patterns (1b–c) (e.g., Oltra-Massuet 1999; Oltra-Massuet & Arregi 2005; Markopoulos 2025; see also Smith 2011 for typological generalizations).

The categorical vs. gradient stress distinction calls for a flexible phonological model capable of generating both single stress outputs and multiple grammatical candidates with different

probabilities. We explore various analyses to accommodate this requirement, including ThEs with gradient strength and Harmonic Grammars scaled by morphosyntactic factors.

(1) *Spanish* (Arregi 2000; Oltra-Massuet & Arregi 2005; Roca 2005, 2010)

a.	√	v	Th	TAM	Agr	
	cant	Ø	**á**	ba	mos	‘we sang’
b.	√	n	Th			
	pom**á**d	Ø	a			‘ointment’
c.	√	n	Th			
	c**ó**ler	Ø	a			‘cholera’

Selected references

Embick, David & Morris Halle. 2005. On the status of stems in morphological theory. In Twan Geerts, Ivo van Ginneken & Haike Jacobs (eds.), *Romance Languages and Linguistic Theory 2003: Selected Papers from “Going Romance” 2003*, Nijmegen, 20–22 November [Current Issues in Linguistic Theory 270]. 37–62. Amsterdam & Philadelphia: John Benjamins. DOI: https://doi.org/10.1075/cilt.270.03emb

Halle, Morris & William Idsardi. 1995. General properties of stress and metrical structure. In John Goldsmith (ed.), *The Handbook of Phonological Theory*. 403–443. Cambridge, MA & Oxford: Blackwell.

Kouneli, Maria. 2022. Inflectional classes in Kipsigis. *Glossa: A Journal of General Linguistics* 7(1): 1–33. DOI: https://doi.org/10.16995/glossa.8549

Molineaux, Benjamin. 2014. *Synchronic and Diachronic Morphoprosody: Evidence from Mapudungun and Early English*. Doctoral dissertation, University of Oxford.

Oltra-Massuet, Isabel. 1999. *On the Notion of Theme Vowel: A New Approach to Catalan Verbal Morphology*. MSc dissertation, MIT.

Oltra-Massuet, Isabel & Karlos Arregi. 2005. Stress-by-structure in Spanish. *Linguistic Inquiry* 36(1): 43–84. DOI: https://doi.org/10.1162/0024389052993637

Revithiadou, Anthi. 1999. *Headmost Accent Wins: Head Dominance and Ideal Prosodic Form in Lexical Accent Systems*. LOT Dissertation Series 15 (HIL/Leiden Universiteit). The Hague: Holland Academic Graphics.

Simonović, Marko & Petra Mišmaš. 2023. Theme-vowel class indeterminacy and root allomorphy in Slovenian. *Glossa: A Journal of General Linguistics* 8(1): 1–38. DOI: https://doi.org/10.16995/glossa.8550

Smith, Jennifer L. 2011. Category-specific effects. In Marc van Oostendorp, Colin J. Ewen, Elizabeth V. Hume & Keren Rice (eds.), *The Blackwell Companion to Phonology*. 2439–2463. Malden, MA: Wiley-Blackwell. DOI: https://doi.org/10.1002/9781444335262.wbctp0102

Vaxman, Alexandre. 2016. *How to Beat without Feet: Weight Scales and Parameter Dependencies in the Computation of Word Accent*. Doctoral dissertation, University of Connecticut.

Elena Perekhvalskaya, INALCO, Paris

Valentin Vydrin, INALCO – LLACAN (CNRS), Paris

Tonal density index as a yardstick to the functional load of tone

In the frames of our project Theory of Tone, we measure, among other parameters, the *tonal density*. The tonal density is quantified by the means of the Tonal Density Index (TDI), the ratio of the number of tonemes to the number of segmental units. In our vision, the tonal density is a direct indicator of the functional load of tones in a language.

The term "functional load" goes back to the Prague School (Mathesius 1929), and was further promoted by Martinet (1955). As mentioned by Larry Hyman, functional load of tone can be formulated, in an informal way, "how likely we are to find (near-)minimal pairs". The question is, how to measure the potential number of tonal minimal pairs.

A seemingly simple answer could be to count tonal pairs in a dictionary. However, if used in a cross-linguistic study where a considerable number of languages is involved, it will certainly encounter serious obstacles, such as: different size of available dictionaries and their degree of elaboration; exclusion of tonal grammatical morphemes; difficult access to the inflectional paradigms.

Another method involves experiments with native speakers to evaluate the importance of tonal notation in writing, whereby respondents are confronted with a text in their mother tongue where tones are indicated, and another text without tonal notation: a series of such experiments was carried out in Western Africa (Roberts et al. 2020; Roberts & Walter 2021). However, such experiments are difficult to organize and costly; besides, their results are often influenced by negative concomitant factors, such as insufficient reading skills of the participants of the experiment.

Yet another method, "change in entropy" (Surendran & Niyogi 2003), is tantalizing, but it is difficult to apply to a large number of languages, especially those which are scantily documented.

We propose to use the notion of tonal density (Gussenhoven 2004: 34) and methods for its evaluation, which allows for a quantitative comparison of various tonal systems. The key notion needed in evaluating tonal density is Toneme, a basic unit of tonology which can distinguish lexical and/or grammatical meanings. Detection of the inventory of tonemes in a language often requires a thorough analysis of the entire tonal system, which is often painstaking, but unavoidable.

We suggest to calculate the TDI as the number of tonemes per 100 segmental units (there can be "moraic TDI", "syllabic TDI", "wordy TDI", etc., depending on what segmental unit is taken as the basis). Our hypothesis is that the numerical value of TDI reflects the functional load of tone in a language.

The tonal density is an important indicator which can be put in correlation with other parameters of tonal systems taken into account in the ThoT Database. When correlation between a parameter and the value of the TDI is positive, the parameter tone-increasing, and if the correlation is negative, it is tone-decreasing.

References

Gussenhoven, Carlos. 2004. *The phonology of tone and intonation*. Cambridge University Press.

Martinet, André. 1955. *Économie des changements phonétiques*. Bern: Francke.

Mathesius, Vilém. 1929. La structure phonologique du lexique du tschèque moderne. *Travaux du Cercle Linguistique de Prague* 1. 67–84.

Roberts, David, Ginger Boyd, Johannes Merz & Valentin Vydrine. 2020. Quantifying written ambiguities in tone languages: a comparative study of Elip, Mbelime and Eastern Dan. *Language Documentation and Conservation* 14. 108–138.

Roberts, David & Stephen L. Walter (eds.). 2021. *Tone orthography and literacy: The voice of evidence in ten Niger-Congo languages* (Studies in Written Language and Literacy 18). Amsterdam - Philadelphia: John Benjamins Publishing Company.

Surendran, Dinoj & Partha Niyogi. 2003. Measuring the functional load of phonological contrasts. https://arxiv.org/abs/cs/0311036. (30 August, 2025).

Kirill Maslinsky, INALCO, Paris
Valentin Vydrin, INALCO – LLACAN (CNRS), Paris

Towards a typology of tone

About 43% of the world languages are tonal (Maslinsky, Vydrin & Gerasimov 2025), and tonal systems are extremely diverse in what concerns both tonal exponents and their functional load. Meanwhile, the major typological databases (WALS, LAPSyD), when dealing with tones, recur to the simplistic categories that hardly reflect the diversity of tonal systems. The only quantitative parameter concerned is the "number of tones". Taking into account abundant tonal processes and all kinds of contextual tonal modifications, this parameter is far from being evident in many languages.

There is a set of well-established hypotheses on the universal trends in tonal processes in the works by Hyman and Schuh (1974) and Hyman (2007). But, paradoxically, we are not aware of the application of their results in typological surveys for characterization of tonal systems in quatitative terms. Notably, the editors of the special issue on the phonological typology point to the lack of current work on the phonological typology of tone (Moran, Easterday & Grossman 2023).

Phonological theory apparently has the necessary analytical categories to describe tones of individual languages in a comparable way. However, the emergence of general typological works seems to be impeded by the focus on the theoretical explanation of the complicated corner cases, to the detriment of typological generalizations.

In our view, in order to move forward, we need a system of comparative categories that would allow to capture the phonologically relevant aspects of tonal systems both on the underlying and on the surface level (phonological inventories of tones, tonal processes, and functional load of tone).

On a practical side, we propose to develop a descriptive template for a tonal system of a language. In this talk, we would like to present a descriptive model and a set of typological features devised for the project Theory of Tone. The key notions of this model are: a toneme, as a basic unit of the tonal inventory (a toneme can be level or contour); a tonal span, i.e. the part of the segmental chain on which a toneme is realized on the surface level; the tonal process. Special attention is paid to tonal grammatical morphemes (aka grammatical tones), tonalization of the underlyingly toneless segmental units, tonal melodies (regular toneme combinations within the limits of a word).

We use this template in description of tonal systems of the languages sampled for the Thot Database (Maslinsky, Vydrin & Gerasimov 2025). Apart from filling a questionnaire, a sample text in each language is annotated using our tonal notions. The annotation permits to quantify the functioning of the tone in text, in particular, the tonal density (i.e., the ratio of the number of tonemes to the number of segmental units); the relative frequency of tonemes; the correlation between the boundaries of tonal spans and the boundaries of morphosyntactic and prosodic units of various levels, etc. A combination of a typological questionnaire with an annotated text allows to characterize both underlying phonological tonal contrasts, and their surface realization.

References

Hyman, Larry M. 2007. Universals of tone rules: 30 years later. In Tomas Riad & Carlos Gussenhoven (eds.), *Tones and tunes* (Typological Studies in Word and Sentence Prosody), vol. 1, 1–34. Mouton de Gruyter. Berlin - New York.

Hyman, Larry M. & Russel G. Schuh. 1974. Universals of tone rules: Evidence from West Africa. *Linguistic Inquiry* 5(1). 81–115.

Maslinsky, Kirill, Valentin Vydrin & Dmitry Gerasimov. 2025. ThoT database. Database. https://thot.huma-num.fr/db/.

Moran, Steven, Shelece Easterday & Eitan Grossman. 2023. Current research in phonological typology. *Linguistic Typology* 27(2). 223–243. https://doi.org/10.1515/lingty-2022-0069.

Chain Shifts and Transphonologizations are Driven by Homophony Avoidance

Andrew Wedel, University of Arizona, USA
Stefon Flego, University of New Mexico, USA

Languages balance pressures for efficiency and accurate information transmission. This tension has been argued to play out in the structure of phoneme inventories and how they change (e.g. Liljencrantz & Lindblom 1972). Previous work has shown that merger of a phoneme contrast is more likely when that merger creates few new, within-syntactic category homophones (Wedel et al., 2013). For example, few English words are distinguished by the vowels /ɑ/ and /ɔ/, and this vowel contrast has merged in many dialects. Here, we show that homophony avoidance appears to drive two other, superficially distinct sound changes. **Chain shifts** occur when a set of phonemes move in concert within phonetic space. For example, the front vowels in New Zealand English have undergone a chain shift upwards, such that the vowel /æ/ in 'pat' has raised to /ɛ/, and the original /ɛ/ in 'pet' has raised to /e/ (Bauer et al., 2007). **Transphonologizations** occur when the primary cue distinguishing a phoneme contrast merges, while a minor cue expands. For example, aspirated and lenis stops in Korean are historically distinguished by a voice-onset-time difference, with a minor distinction in vowel f0. In Seoul Korean, the voice-onset-time difference is collapsing, while the f0 difference has expanded (Silva, 2006). These two types of sound change have in common that lexical contrast is maintained throughout the change. Here we show that while phoneme mergers are characterized by particularly few minimal pairs, chain shifts and transphonologizations are characterized by particularly many. Our dataset comprises twelve languages which have undergone historically recent inventory changes. We identified the number of minimal pairs distinguished by phoneme contrasts participating in a change, as well the number of minimal pairs associated with a set of contrasts that have not changed. Relative to the distribution of minimal pairs of non-changing phoneme contrasts, we find that mergers, as shown previously, are drawn significantly from the lower end of this distribution. Conversely, we find that contrasts that have undergone chain-shifts and transphonologizations are drawn significantly from the higher end of this distribution (Figure 1). We confirm that it is within-syntactic category minimal pairs, not between-syntactic category pairs, that account for this pattern. Phonological processes often involve parallel changes over feature classes. Here we show that treating parallel phoneme changes as one feature-based change gives a significantly better fit to the data, providing evidence from a novel process that phonological category change occurs over feature-classes. Traditional theory assumes phonological systems are independent of actual words. This work shows instead that phoneme inventory change is strongly influenced by the particularities of the lexicon. These findings support models in

which the structure of phoneme inventories is shaped by usage-driven pressures to preserve successful communication of meaning.

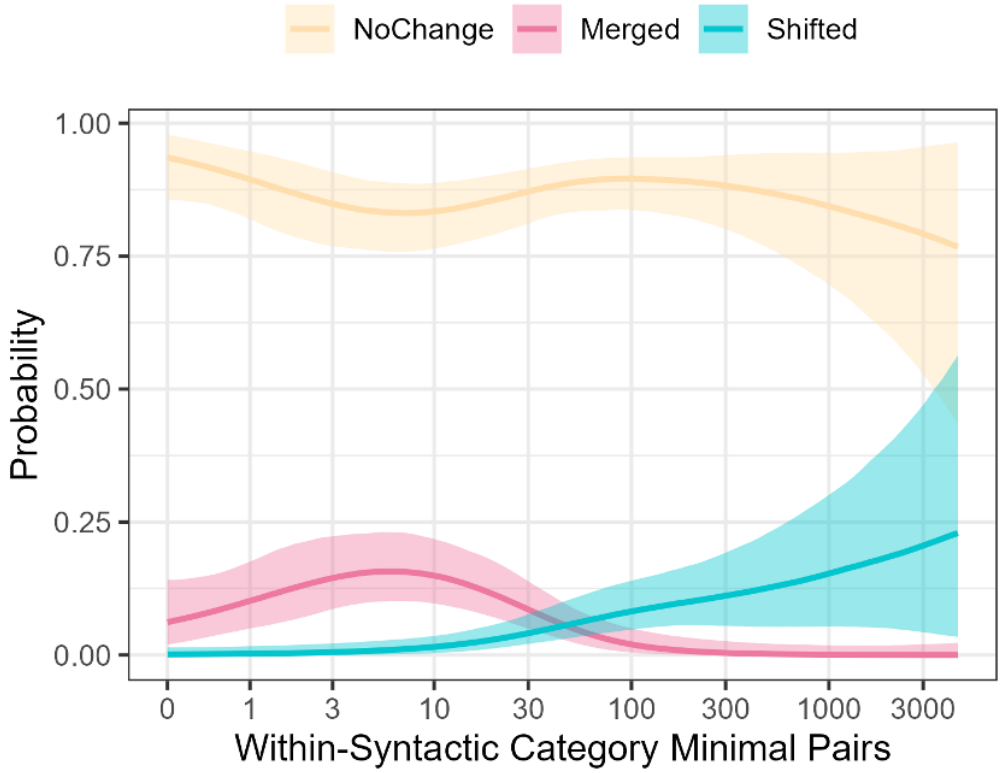


Figure 1. Probability of merger vs chain-shift/transphonologization by minimal pair count. Y-axis: model probability of change type. The yellow line represents the probability of no change within the dataset. The red line represents the probability of merger; the blue line represents chain-shifts and transphonologizations.

References

Bauer, L., Warren, P., Bardsley, D., Kennedy, M., & Major, G. (2007). New Zealand English. *Journal of the International Phonetic Association*, 37(1), 97-102.

Liljencrants, J. & Lindblom, B. (1972). Numerical simulation of vowel quality systems: the role of perceptual contrast. *Language* 48, 839-862.

Silva, D. J. (2006). Acoustic evidence for the emergence of tonal contrast in contemporary Korean. *Phonology*, 23(2), 287-308.

Wedel, Andrew, Scott Jackson & Abby Kaplan. 2013a. Functional load and the lexicon: Evidence that syntactic category and frequency relationships in minimal lemma pairs

predict the loss of phoneme contrasts in language change. *Language and Speech* 56.395-417.